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CAPPAKEEL 110KV SUBSTATION SID APPLICATION

CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN

Prepared for:

Perigus Energy Ireland Midco Limited

Perigus Energy

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CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

REVISION CONTROL TABLE, CLIENT, KEYWORDS AND ABSTRACT

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Abstract: Fehily Timoney is pleased to submit this Construction and Environmental Management Plan (CEMP) for the development of a 110kV Substation within the townland of Morett Co. Laois, providing a grid connection to the national grid for the permitted Cappakeel Solar Farm via a loop in/loop out connection (hereafter referred to as the 'Proposed Development'). Consent for the solar farm was granted by Laois County Council on 18th September 2025, (Pl. Ref. 2560148), section 34 of the PDA, with consent for the solar farm granted by An Coimisiún Pleanála (ACP) on 17th February 2026 (Ref No.: PL-500061-LS).

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1. INTRODUCTION

1.1 General Introduction and Purpose

This document is the Construction and Environmental Management Plan (hereafter referred to as CEMP) for the proposed Cappakeel 110kV Substation SID. It has been prepared by Fehily Timoney and Company (FT) on behalf of Perigus Energy Ireland Midco Limited. This document should be read in conjunction with the Planning and Environmental Report enclosed as part of this planning application.

This application for consent will be made to An Coimisiún Pleanála (ACP), pursuant to Section 182 of the Planning & Development Act 2000 (as amended).

It is important to note, that the 110kV electrical Air Insulated Switchgear (AIS) substation, and all ancillary infrastructure (the Proposed Development), is an integral part of the consented Cappakeel Solar Farm and therefore falls under the provisions of S.I No.402 of 2025 which transposes certain provisions of the RED III Directive.

A planning application for the now permitted primary solar farm component was lodged to Laois County Council on the 24th of March 2025. Consent for the solar farm was given by Laois County Council under section 34 of the PDA on the 18th of September 2025 (Pl. Ref. 2560148) and by ACP on the 17th of February 2026 (Ref No. PL-500061-LS).

The CEMP will be updated prior to construction to take account of any relevant conditions attached to the planning permission, with all grid connection cabling works carried out by a statutory undertaker, as outlined within Appendix 7 - Statutory Undertaker Letter, contained within this application Cover Letter. The CEMP should be considered a live document and will be subject to ongoing review through regular environmental auditing and site inspections and updated as required. For the avoidance of doubt, all measures stipulated in this CEMP will be implemented in full.

This CEMP sets out the key construction and environmental management issues associated with the construction, operation and decommissioning of the proposed project, to ensure that during these phases of the development, the environment is protected and impacts on the environment are minimised. This CEMP will form the basis for the appointed contractor's CEMP, to be further developed on their appointment.

The document is divided into five sections:

Section 1: *Introduction* provides an overview of the existing site and the proposed project.

Section 2: *Overview of Construction Works,* this section provides an overview of the construction works proposed, including drainage and sediment controls to be installed.

Section 3: *Environmental Management Plan (EMP*), this section outlines the main requirements of the EMP and outlines operational controls for the protection of the environment including soil management, habitat and species, site drainage control, archaeology, construction traffic, site reinstatement and decommissioning, waste management.

Section 4: *Safety & Health Management Plan*, this section defines the work practices, procedures and management responsibilities relating to the management of safety and health during the design, construction and operation of the Proposed Development.

Section 5: *Emergency Response Plan* contains predetermined guidelines and procedures to ensure the safety, health and welfare of everybody involved in the project and to protect the environment during the construction phase of the Proposed Development.

1.2 The Applicant

Perigus Energy Ireland Midco Limited (formerly known as Ørsted Onshore Ireland Midco Limited), hereafter referred to as "Perigus Energy Ireland Midco Limited" is a company owned by Perigus Energy. Perigus Energy is an independent renewable energy developer with a registered address at Lapp's Quay, Cork. The company's management has extensive experience throughout Ireland in responsible development of solar energy projects. Perigus Energy has an ambitious program for the development of solar PV in Ireland. Perigus Energy considers solar energy to be a viable renewable energy source that is complementary to other renewable energy sources and will contribute to achieving the national energy targets.

1.3 Site Location and Context

The Cappakeel Solar Farm comprises 2 separate components. The component for which planning consent is now being sought is the 110kV Air Insulated Switchgear (AIS) substation and LI/LO connection, located in the West parcel (A) within the townland of Morett Co. Laois. The Site Location is shown in Figure 1-1.

The 110kV on-site substation will be connected to the national grid for the permitted Cappakeel Solar Farm via a Loop-In Loop-Out (LILO) connection to the Cushaling-Portlaoise 110kV Overhead line within the townland of Morett, and an underground tail fed connection, primarily laid within the public road, to the Coolnabacky 110kV Substation within the townland of Coolnabacky, Co. Laois.

The connection to the Coolnabacky 110kV substation will be primarily within the public road, and will connect via an underground tail fed connection traversing the townlands of Derrytrasna, Park Or Dunamase, Aghnahily, Dysart, Coolnacarrick, Heathlodge, Ballygormill North, Ballinlough, Killenny, Raheen, Money Upper, Lamberton Demesne, Greatheath, Cremorgan, Ballygormill South, Carrigeen, Greatheath, Hophall, Ballycarroll, Morett and Powelstown, Co. Laois.

The proposed arrangement will provide a circuit between the Cushaling-Portlaoise 110kV line and the Coolnabacky 110kV Substation, so as to facilitate additional capacity in the electrical infrastructure in the region. The Proposed Development (110kV on-site substation and grid connection) is to facilitate the connection to the national grid of the permitted Cappakeel Solar Farm.

The permitted Cappakeel Solar Farm consists of 5 no. parcels, totalling c. 249 ha. These land parcels are referred to as the West (A), Centre West (B), Centre (C), Centre East (D) and East Parcels (E). Consent for the solar farm was granted by Laois County Council on 18th September 2025, under Pl. Ref. 2560148, section 34 of the PDA.

Each of the parcels noted include:

- West Parcel (A) is located in the townland of Morett. This parcel is also the location of the Proposed Development.
- Centre West Parcel (B) is located in the townlands of Morett and Cappakeel.
- Centre Parcel (C) is located in the townlands of Morett and Cappakeel.
- Centre East Parcel (D) is located in the townland of Cappakeel.
- East Parcel (E) is located in the townland of Rossmore and Raheennahown North.

There is 1 no. 110kV transmission lines traversing the West Parcel (A) in a north-south orientation. The Proposed Development has been situated in the West Parcel (A) as the traveling overhead line provides an opportunity to connect the substation to the national grid in the future, in addition to the proposed LILO connection.

The site for the Proposed Development is located between the towns of Portlaoise to the south-west and the town of Monasterevin to the north, with the 'West' and 'Centre West' Parcel's being located within a kilometre of the M7 motorway (linking Limerick and Dublin) and R445 regional road (linking Portlaoise to Monasterevin).

There is an existing access within each land Parcel providing direct entry to all the parcels of the permitted Cappakeel Solar Farm. The N80 national primary route connecting Portlaoise and Carlow is located c. 5.6km south of the 'West Parcel' (A) where the Proposed Development is to be located. Access to the 'West Parcel' (A) is available via a new site access connecting to the L78151. Additional new access points are to be made connecting the Centre West (B), Centre (C), and Centre East Parcels (D) to the L3930 local road and the East Parcel (E) to the L39301 local road. Topographical surveys have been carried out to ensure all site access points and visibility splays are to remain unobstructed.

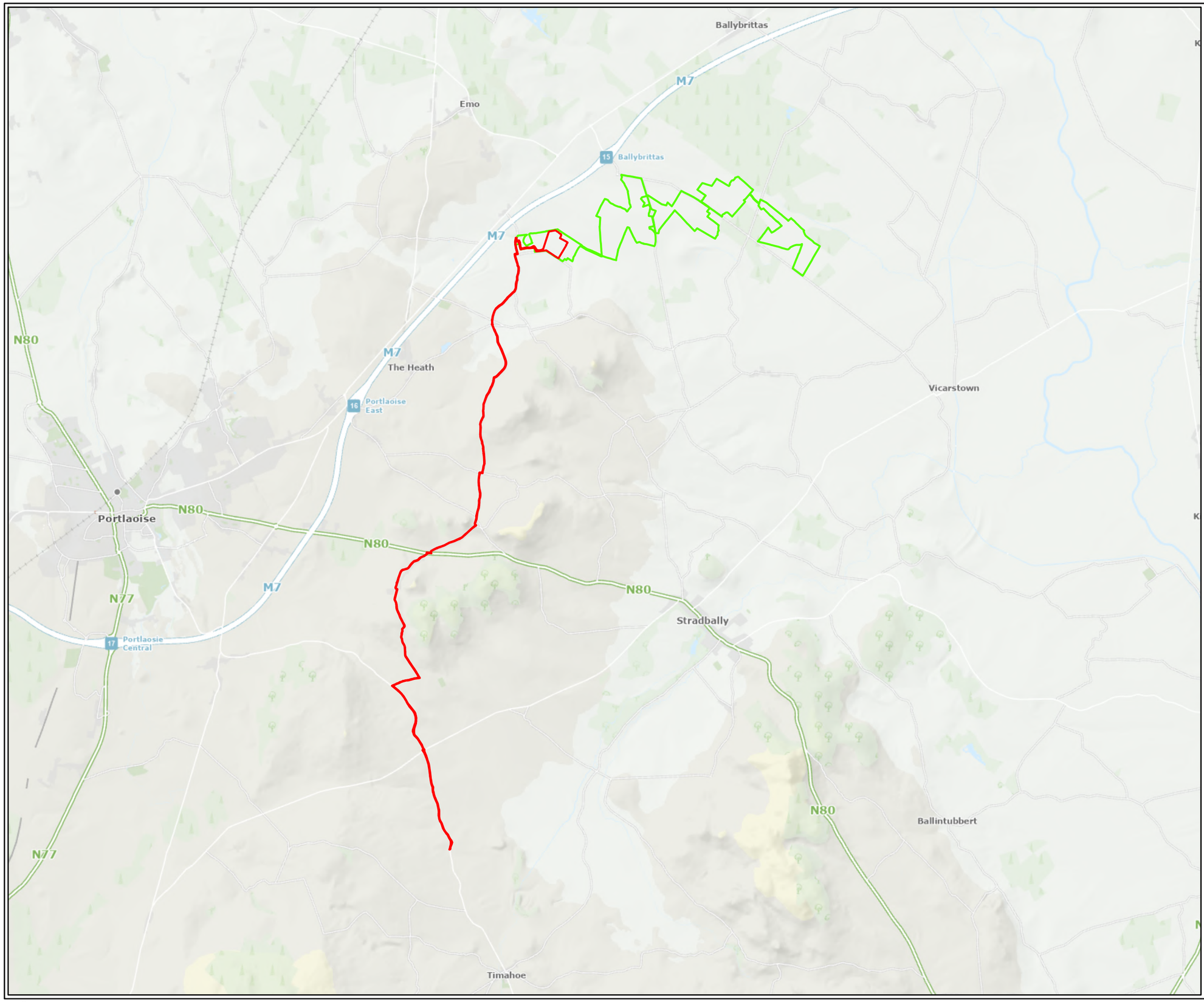
The area of County Laois is rural in character, comprising isolated one-off dwellings with farmsteads and concentrations of single dwellings dispersed along the local road network. The site of the permitted Solar Farm and proposed 110kV Substation comprises agricultural lands, with grazing and pasture activity dominating land use. Adjacent land uses are also predominantly agricultural. Internal boundaries comprise hedgerows and tree lines typical to the area. These are generally quite mature and provide some screening to the adjacent road network. This provides for some relatively open areas particularly to the south of the site.

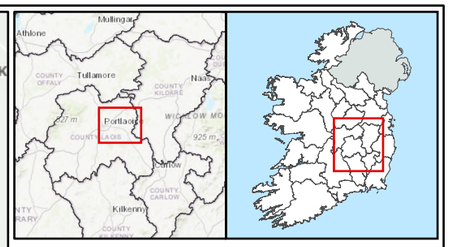
The lands are generally gently sloping with elevations ranging from 78m to 85m. Small areas of coniferous forestry and wet grassland/scrub are also a feature of the surrounding landscape.

The Dunrally stream flows along the northern boundaries of the West Parcel (A) and the southern boundaries of the Central West Parcel (B). The Dunrally stream traverses the Central East Parcel (D). Appropriate 10m riparian buffers are to be incorporated into the design of the development from the existing stream. This buffer has been extended to 20m from either side in the Central Parcel (C) to ensure the enhancement of biodiversity within this area.

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Legend

- SID Boundary
- Permitted Solar Farm

TITLE: Site Location			
PROJECT: Cappakeel Solar Farm			
FIGURE NO:	1.1		
CLIENT:	Perigus Energy Ireland Midco Limited		
SCALE:	1:65,000	**REVISION:**	0
DATE:	08/07/2026	**PAGE SIZE:**	A3

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2. OVERVIEW OF THE CONSTRUCTION WORKS

2.1 Project Components

The Proposed Development comprises of:

i) A 110 kV Air Insulated Switchgear (AIS) electrical substation and associated works.
ii) A 110 kV loop-in grid connection and associated works.
iii) A 110 kV underground cable (UGC) grid connection and associated works.

The 110kV AIS substation and grid connection components have been determined by ACP pursuant to consultations undertaken in accordance with Section 182A of the PDA to fall under remit of ACP as Strategic Infrastructure Development, with further information on this process provided within this report.

This report sets out the key characteristics of the proposed solar farm and 110kV AIS substation, outlining the construction and operational stages of the proposed solar farm before describing the potential impact of the development and mitigation measures where necessary. This copy of the Planning and Environmental report is submitted with the application for Strategic Infrastructure Development approval being made to ACP.

This measures set out in this report are similar to the CEMP submitted with the planning application to Laois County Council for the solar farm component on the 24th of March 2025 (Pl. Ref 2560148). Changes in this document relate principally to alterations of the mapping figures provided to show the redline boundary around the subject application.

2.1.1 110kV Air Insulated Switchgear (AIS) Substation Details

2.1.1.1 Site Entrance

The Proposed Development is proposed to be accessed from a new access located on the L7815 local road. This access was consented as part of the permitted solar farm application. The layout of this new access is shown in drawing P23-226-0101-0001, submitted as part of this application. Hedgerow maintenance will be required periodically to ensure the desired sightlines are maintained.

2.1.1.2 Main Substation and Compound

The exact substation dimensions are subject to detailed design and EirGrid/ESB Networks approval, with connection agreements to the Irish National Grid requiring the developer to permanently hand over the substation to the Transmission Service Operator (TSO), which will be EirGrid. EirGrid 110kV Substation Site Design Standards drawings are included in Appendix 1.

Part of the substation will be retained by the operator which acts as the collection point for the energy generated from the solar panels (West (A), Central (C)and East Parcels (E)) and energy brought to the substation via the internal network cable. A further requirement of EirGrid when taking charge of the TSO area of 110kV substations is to keep lands adjacent to the substation free from development so to accommodate future expansion.

The proposed 110kV AIS substation will occupy 1.80 hectares comprising:

- Transmission System Operator (TSO) compound with electrical equipment, transformer sub-compound, bus bars sub-compound, cable chairs and substation building of 437.5m² (25m x 18m), which will be enclosed by palisade fencing 2.6 m high containing an area of 1.22 hectares;
- One 110kV transformer within the Independent Power Producer (IPP) compound, and the provision of an area for a second transformer if future connection is required;
- TSO expansion area enclosed by palisade fencing 2.6m high at 0.90 hectares;
- Operators compound (with switch room building, electrical equipment and rainwater collection system) enclosed by palisade fencing at 0.43 hectares. The proposed operators control building will have a gross floor area of 403.5m2;
- Perimeter protection area of post and rail fencing at approximately 1.40 hectares;
- 13no. lightning mast to a height of 18m;
- 1 No. telecom pole to a height of 23m.

- New entrance to the L-7815 local road from West Parcel (A) shared with the proposed solar farm.
- A minimum width of 4.5m and a maximum width of 10.9m access road corridor (1.183m long).
- Underground cable corridor of c. 348m in length and provision of 2 no. 21m high mast structures linking the proposed substation to the adjacent existing Cushaling-Portlaoise 110kV Overhead line.
- Associated construction works and drainage infrastructure.

The proposed site boundary (red line) for the proposed 110kV substation and compound and underground tail fed connection, as indicated in the accompanying drawings, measures c. 22.70 hectares, and includes the elements shown above.

2.1.1.3 Security Fence

Palisade fencing will be erected around the TSO and Operators compound for security/protection reasons. It will be c. 2.6m high standard metal palisade fence. The position of the security fence allows for an electrical insulation area around the substation equipment for safety. Separate security gate access is provided for access to the main TSO Compound and Operators Compound. A low post and rail fence is proposed outside the palisade fence to define the substation property and encloses the perimeter protection area. An area of landscaping is proposed outside the fenced areas.

2.1.2 On Site Access Tracks and Hardstandings

Access tracks for the Proposed Development will be shared with the consented Cappakeel Solar Farm.

Access Tracks of standard traditional aggregate road construction. Interceptor drains are proposed along the access tracks and around the transformer stations which will be discharged by diffusers and spreaders as shown on the enclosed planning drawings. The drains will be approximately 0.5 m in depth with a bottom width of 0.5 m and side slope of 2 in 1. Piped culverts are proposed at crossing points along the site access tracks. During construction of the access tracks, temporary road drainage can be implemented at localised points where necessary (e.g. close to hedgerows, existing ditches). The site layout has been designed to limit the extent of hard surfacing and impermeable paving.

The general method of construction will be as follows:

- Establish alignment of the new site tracks from the construction drawings and mark out centrelines.
- Topsoil/subsoil will be stripped back to required levels. All material will be bunded and stored separately.
- The soil will be excavated down to a suitable formation layer of either firm subsoil or rock.
- Well-graded granular fill will be spread and compacted in layers to provide a homogeneous running surface.
- The access tracks will be of single-track design with an overall width of approximately 3.5m. All bends will be designed to suit the requirements of the delivery vehicles.

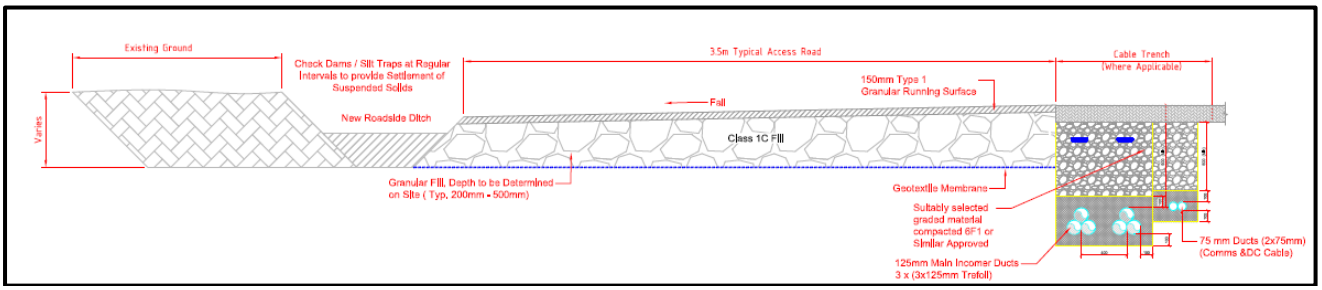


Plate 2-1: Typical Access Track Section

Hardstanding areas will be covered with gravel which will allow surface water to infiltrate underground or drain over the edge of the hardstanding area into adjoining interceptor drains. Piped culverts are proposed where access tracks to the hardstand's cross interceptor drains.

Floating road construction will be adopted where the site investigation has revealed the depth of unsuitable sub-formation (e.g., wet ground) is such that it is not suitable to be excavated for traditional track construction.

In this instance, geogrid will be placed directly on the existing ground surface, and aggregate will be placed and compacted in lifts on top with additional layers of geogrid placed at specified depths where necessary. A running layer will be laid as per traditional track construction.

Temporary aluminium access trackway will be used to provide short term access to areas of the site not served by the proposed aggregate tracks during the construction and commissioning phase. This solution is commonly used to provide temporary road access to outdoor events and is designed to be installed quickly in modular sections with minimal impact to existing ground. It is primarily used for ground protection and to prevent the creation of excess mud from site vehicles.



Plate 2-2: Temporary Aluminium Access Trackway

During construction, a temporary site compound will be constructed near the site entrance. This is located within the site, shown as hatched red area on the drawing P23-226-0101-0002. The temporary site compound will provide enough parking for all site staff and any visitors who will be on site during the installation phase.

Wheel wash facilities will be located near the site entrance to reduce construction traffic fouling public roads. Each wheel wash will come with an additional water tank which will be filled regularly. These units will be self-contained and will filter the waste for ease of disposal. Silt will be removed from each unit and from site by a licensed contractor.

Regular inspections of the wash down areas and associated settlement lagoon shall be carried out and adequate records kept.

Upon completion of the construction phase, the concrete wash-out, wheel wash areas and settlement lagoons will be decommissioned by removing the impermeable membrane and backfilling the area with the material arising during excavation. The removed material will be recovered or disposed of off-site at an appropriate local licensed waste facility.

2.1.3 Drainage

Drainage for the proposed development shall be carried out in accordance with the Surface Water Management Plan (SWMP) contained in Section 3 of this CEMP. The SWMP contains methodologies for drainage, water quality management and silt control. The proposed drainage scheme has been designed to treat surface water run-off, enhance biodiversity, protect and enhance visual amenity.

2.1.4 Watercourse crossings

The following sections outline construction methodologies to be used for the various drain crossing scenarios in the context of crossings associated with the proposed project. There are 3 no. watercourse crossings associated with the Proposed Development, these watercourse crossings are associated with the UGC component of the Proposed Development. The crossings are summarised in Table 2-1 below.

Table 2-1: Watercourse Crossing Summary

Crossing Location (ITM Coordinates)	Crossing Method
653458.0289, 701493.2993	Bridge Overcrossing (Open Trenching)
653505.7679, 701923.8520	Culvert Undercrossing (Open Trenching)
653671.0769, 702079.9106	Culvert Undercrossing (Open Trenching)

Proposed methodologies for each crossing are included in TLI Group's Outline Construction Methodology included in Appendix 2 of this report.

The proposed methodology and design for the bridge overcrossing at 653458.0289, 701493.2993 was agreed in principle with Laois County Council Roads Department in a pre-application meeting on 24th April 2026. The Applicant agreed to structural surveys being carried out prior to construction and that remedial works to the bridge would be carried out as part of the works where necessary.

2.1.5 110 kV Loop-In Grid Connection

The proposed 110 kV AIS substation will provide a LILO grid connection for Cappakeel Solar Farm to the national grid via the existing Cushaling – Portlaoise OH transmission line, which runs in a north/south axis c. 415m east of the proposed 110kV substation.

2.1.5.1 Mast Structures and Cable Corridor

End masts will be located on the existing Cushaling - PortLaoise 110kV OH transmission line in order to loop the proposed substation into the electricity transmission system.

2.1.6 110 kV UGC

The UGC component of the proposed development runs between the proposed Cappakeel Solar Farm 110kV Substation and the Coolnabacky 110kV Substation. The route runs predominately within the public road, for a distance of c. 13.7 km along the L-7815, L-3813, L-7830, L-7832, R-426 public roads. Approximately 12.56km of the route is within the public road, with c. 2.4km on private land.

Table 2-2: Grid Connection Location Summary

Description	Route Length
National Roads	0.06km
Regional Roads	3.1km
Local Primary Roads	4.3km
Local Secondary Roads	5.1km
Total Road Network	12.56km
Private Lands (Access Track)	1.2km
Total Off-Road Network	1.2km
Total Route Length	13.7km

This UGC will require delivery of plant and construction materials, followed by excavation, laying of cables and subsequent reinstatement of trenches and road surfaces. Excavated material will be stored adjacent to the trench and incorporated into the backfilling where possible. Should there be any excess material it will be removed offsite to a licensed facility.

The UGC grid connection will be primarily contained within the public road, and will consist of a single 110kV UGC circuit, which will be installed predominantly within the public road network. The UGC works will consist of the installation of 6 no. ducts in an excavated trench to accommodate 3 no. power cables, 2 no. fibre communications cables and 1 no. earth continuity conductor (ECC). The fibre communication cable will allow communications between the Proposed 110kV Substation and Coolnabacky 110kV Substation.

2.1.6.1 Cable Trenching

The specification for cable trenches will vary slightly depending on cable voltage, location and existing land use. The maximum depth of cable trenches will be typically 1.2m.

In advance of construction, detailed desk studies and site investigations will be carried out to find the optimal location to place cables. Records of services such as water mains, sewers, gas mains, communications cables and other power cables will be obtained from the relevant service providers. Cable detection tools, ground penetrating radar and silt trenches will be used by the contractor, as appropriate, to find the exact locations of existing services.

The typical method of construction involves the following:

- The contractor initially excavates the trench to the specified depth using a mechanical excavator.
- A bedding of sand or approved CBM (cement bound material) is placed in the bottom of the trench.
- The cable is laid in the trench from a ground or vehicle mounted cable drum reel.
- If specified, the contractor will lay ducting in the trench. If so, a rope will be inserted into the ducts to facilitate cable-pulling later.
- Communication cables and respective ducts will also be laid where required.
- Cable marker strips will be placed at a specified distance above the cables/ducts.
- The trench is back-filled using as-dug material and topsoil reinstated with vegetated side up where possible.

2.1.6.2 Trenching Methodology

The following section outlines the methodology to be followed during trenching works:

- The Contractor, and their appointed Site Manager, will prepare a targeted method statement concisely outlining the construction methodology;
- 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 environmental control measures which will be outlined in the detailed Construction Environmental Management Plan (CEMP) which will be prepared prior to commencement of construction, and best practice construction methodologies.

- Where the cable route intersects with culverts, the culvert will remain in place, and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with the ducting design and Uisce Éireann specifications;
- Traffic management measures will be implemented in accordance with a detailed Traffic Management Plan which will be prepared and agreed with Laois County Council in advance of the works;
- The base of the excavated trench will be lined with sand bedding to be imported to site from a local licensed supplier. The 160mm diameter HDPE cable ducts, the 125mm communications ducts and the 63mm earth continuity ducts will be placed into the prepared trench, inspected, and backfilled;
- 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 in suitably safe locations, and 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 of 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;
- Public road trenching will be reinstated in line with Laois County Council requirements and as per the Guidelines for Managing Openings in Public Roads (Purple Book – April 2017).
- Where required, grass will be reinstated by either seeding or by replacing with grass turves;
- Where hedgerows and ditch lines are to be crossed, these will be crossed between mature trees where possible to mitigate disturbing the existing tree line. Where it is required to remove a section of hedgerow or ditch line to facilitate the installation of the cable trench, this will be reinstated as per landowner requirements and local environment;
- 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 the majority of reinstatement has been completed on the first;
- The excavation, installation and reinstatement process will take approximately 1 no. day to complete a 100m section.

2.1.6.3 Ducting Installation

For the trenching and ducting works the following step by step methodology will apply, with Typical 110kV Cable Ducting, below:

- Grade, smooth and trim trench floor when the required 1315 mm depth and 825 mm width have been obtained.
- Place bedding layer of Cement Bound Granular Mixture B (CBGM B) material in accordance with the specification and compact it so that the compacted thickness is as per the drawings.
- Lay the bottom row of ducts in trefoil formation as detailed on the design drawings. Use timber templates and cable ties to maintain the trefoil shape and required spacings. Fit a secure cap / bung to the end of each duct run to prevent the ingress of dirt or water.
- Carefully surround and cover ducts with CBGM B in accordance with the design drawings and specifications and thoroughly compact without damaging ducts.
- Place cable protection strips on compacted CBGM B directly over the ducts.

- Lay the top row of ducts onto the freshly compacted CBGM B including the cable protection strips above the bottom row of ducts. Place a secure cap at the end of each duct to prevent the ingress of dirt or water.
- Carefully surround and cover ducts with CBGM B material in accordance with the drawings and thoroughly compact without damaging ducts.
- Place red cable protection strip on top of compacted CBGM B over each set of ducts as shown on the drawings.
- Place and thoroughly compact CBGM B material or Clause 804 backfill, or soil backfill as specified and place warning tape at the depth shown on the drawings.
- For unsurfaced/grass sections, backfill with suitable excavated material to ground level leaving at least 100 mm topsoil or match existing level at the top to allow for seeding or replace turves as per the specification of the local authority or landowner.
- Clean and test the ducts in accordance with the specification by pulling through a brush, sponge and mandrel. Install 12 mm polypropylene draw rope in each duct and seal all ducts using robust duct end seals fitted with rope attachment eyes in preparation for cable installation at a later date.
- All excavated material will be temporarily stored adjacent to the trench before re-use in the trench reinstatement (where applicable). Stockpiles will be restricted to less than 2m in height.
- All plant, machinery, and equipment will be stored on-site within the works area or within the consented temporary construction compounds located adjacent to the substation. Oils and fuels will be stored in an appropriately bunded area within the consented temporary construction compounds.

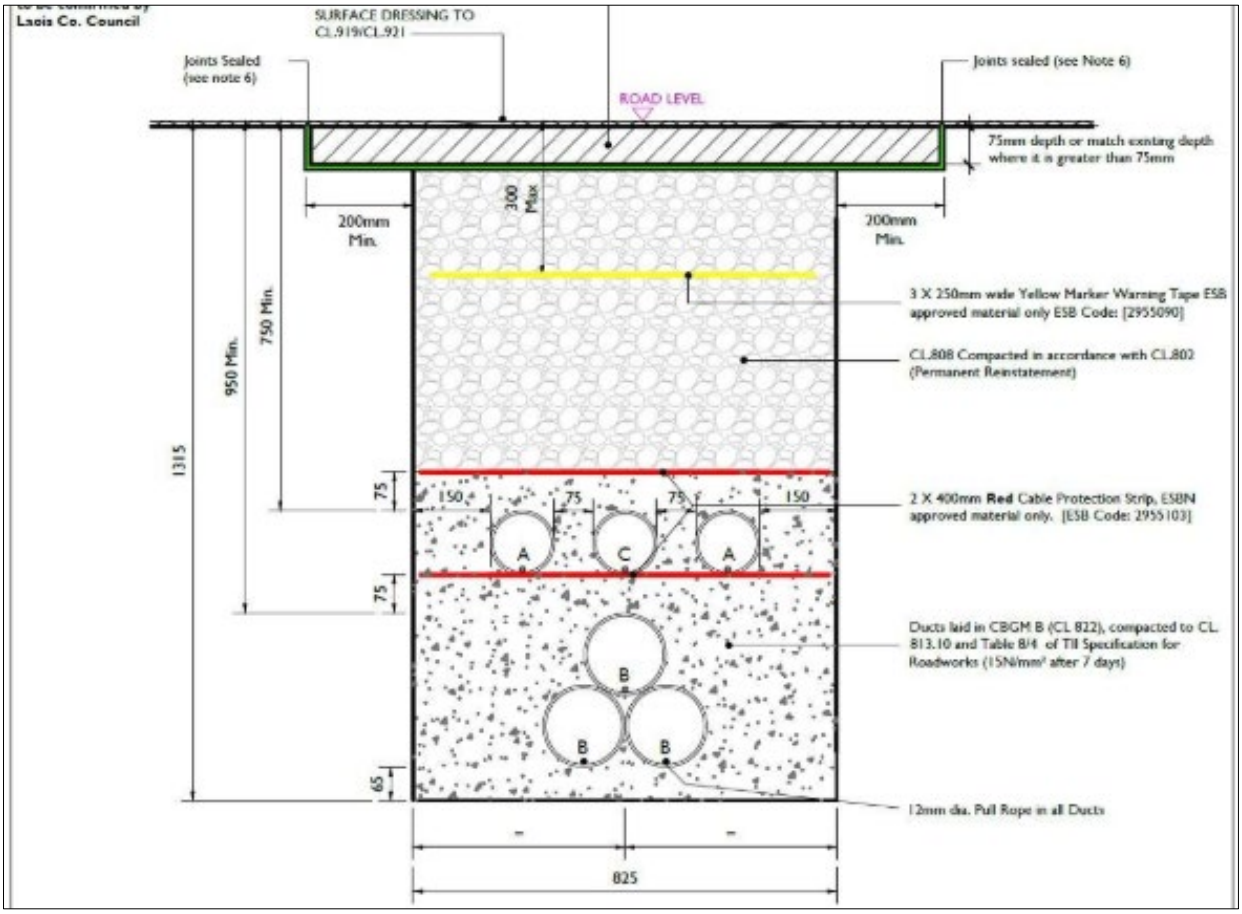


Plate 2-3: Typical 110kV Cable Duct – Section View

2.1.6.4 Installation of Joint Bays and Link Box Chambers

- Setting out and location of services will be carried out in the same manner as for trench excavations.
- A tracked excavator will be used for the excavation of the joint bay pits in accordance with detailed design drawings.
- A tractor/dump trailer and/or tipper truck shall be used to remove excavated spoil from the work area. Spoil shall be removed to a licensed waste facility.
- A watchman will be used to assist machine operators while reversing or when their visibility is restricted.
- Safe ladder access/egress to excavation shall be in place. The ladder will be footed at the base and tied at the top.
- Base materials will be placed by the excavator from a truck and placed in the base of the excavation.
- Precast chamber sections will arrive on site via articulated lorries accompanied by a crane truck. The crane truck will load each unit separately from the articulated truck.
- The precast units will be transported to site and a flatbed trailer and a truck mounted crane will lift the section into position.
- A lift plan /DJSP will be required for all Joint Bay installations.
- When the joint bays are in place, the sections will be back filled using approved fill material. The road surface will be reinstated using cold tar/surface dressing for the full width of the road section.

2.1.6.5 Watercourse Crossings

The design of the UGC watercourse crossings for the Proposed Development was undertaken by TLI Group. For a detailed description of each watercourse crossing please refer to the Outline Construction Methodology report prepared by TLI Group and submitted as part of this application. For a summary of the proposed crossings, please see Table 2.

Table 2-3: Watercourse Crossing Summary

Crossing Name	ITM Coordinates (Easting, Northing)	Crossing method
Culvert 1	653,505.7679, 70192.8520	Undercrossing (Open trench installation)
Culvert 2	653671.0769, 702079.9106	Undercrossing (Open trench installation)
Bridge 1	653458.0289, 701493.2993	Overcrossing (Open trench installation)

It is proposed for the UGC to cross under the culverts listed above, maintaining minimum separations as per Eirgrid guidance. It is proposed to leave the existing culverts in place where possible.

It is proposed to cross “Bridge 1” by laying the UGC within the deck of the bridge. In order to achieve minimum cover levels over the cable, the level of the road over the bridge will have to be raised by up to 110mm. It is proposed to transition from this raised section of road back to the existing road level at a gradient of 4%, for detailed construction methodology please see the Outline Construction Methodology report prepared by TLI Group and submitted as part of this application.

The proposed crossing approach for “Bridge 1” was discussed with Laois County Council Roads Department at a Pre-Application Consultation Meeting on 24th April 2026. Laois County Council agreed in principle to the proposed approach. The Applicant agreed to carry out a condition survey of the bridge prior to commencement of any works and to carry out remedial works to the bridge as necessary as part of the works.

2.2 Preliminary Construction Programme

The construction period for the Proposed Development has been estimated to be 18 months, with works on the grid-connection estimated to take c. 9 months. The phasing of the construction activities is illustrated in Table 2-3.

The construction works can be divided into 6 stages. Construction is to be phased based on the main activities underway during a given period and to minimise the level of impact of the construction on the local road network.

Stage 1 – Mobilisation and site set up

Stage 2 – Onsite Substation and Compound

Stage 3 - Grid connection works

Stage 4 - Testing and commissioning

Stage 5 - Landscaping and reinstatement

Stage 6 – Demobilisation

The construction of the Proposed Development will involve inter-related, inter-dependent and overlapping elements with the consented Cappakeel Solar Farm. A summary of the works involved in the solar farm is included below. Full information on the solar farm's estimated construction programme is available within its application (Pl. Ref. 2560148).

Solar Farm Construction Activities:

- For each Parcel, site establishment works will commence first, i.e., construction of the site entrance, access road, two number watercourse crossings, drainage system, hardstandings and temporary site compound.
- At the same time site establishment works for the Substation on the West Parcel will also commence as this is accessed through a different entrance, "West Parcel – Site Entrance".
- Site security fencing will be erected as necessary around the proposed site, on all Parcels.
- Substation construction and installation of the solar panels on ground mounted steel frames (driven into the ground).
- Subsequently, Solar Panel installation for the East Parcel and Centre East Parcel will take place.
- Thereafter, Solar Panel installation for the Centre Parcel and West Parcel are undertaken.
- Laying of underground low voltage cables connecting the solar panels and the inverter stations.
- Construction of on-site substation, inverter/transformer stations and battery storage units.
- Laying of underground medium voltage cables connecting the inverter stations.
- Grid connection works.
- Installation of underground array interconnector cables.
- Installation of CCTV system.
- Landscaping and biodiversity work.

Table 2-4: Estimated Construction Program

Construction Programme																		
Construction Activity: Substation & Grid Connection	**Month**																	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Mobilisation																		
Onsite Substation and Compound																		
Grid Connection Works																		
Testing and Commissioning																		
Landscaping and Reinstatement																		
Demobilisation																		

2.3 Construction Working Hours

The hours of construction activity will avoid unsociable hours and will be agreed with the planning authority in advance of site start. It is anticipated that this will restrict working hours at the site during the installation phase to be limited to 07:00 to 19:00 Monday to Saturday inclusive.

Work on Sundays or public holidays will only be conducted in exceptional circumstances and subject to prior notification insofar as possible with the local community.

3. ENVIRONMENTAL MANAGEMENT PLAN

3.1 Environmental Management Responsibility

The Contractor's Project Manager will be responsible for the delivery of all elements of the Environmental Management Plan.

The Contractor's Project Manager will retain all responsibility for issuing, changing and monitoring the Environmental Management Plan throughout.

3.2 Policy & Legislation

The Contractor is responsible for preparing and maintaining an Environmental Policy for the site. The policy should be appropriate to the project, commit to continuous improvement and compliance with legal requirements and provide a framework for objectives and targets. This will be communicated to all site personnel and will be available on-site notice boards.

The Contractor is responsible for preparing and maintaining a register of key environmental legislation pertaining to the site. This register will reference all current environmental legislation and will be inspected, reviewed and updated regularly to ensure compliance.

3.3 Objectives and Targets

Objectives and targets should be set to ensure that the project can be constructed and operated in full accordance with the planning conditions and legislative requirements, with minimal impact on the environment.

Environmental objectives are the broad goals that the Contractor must set in order to improve environmental performance. Environmental targets are set performance measurements (key performance indicators or KPI's) that must be met in order to realise a given objective.

The Contractor will set objectives based on each significant environmental impact. Key objectives are likely to include the following:

- To ensure that the rivers and streams are not negatively impacted by construction works.
- To ensure that humans are not negatively impacted by dust generated by construction works.
- To ensure that humans are not negatively impacted by noise or vibration generated by construction works.
- To ensure that impacts to habitats and wildlife are minimised during works.
- To ensure that a waste management plan for this site will be fully implemented.
- To ensure that the visual impact during the construction work is minimised.
- To ensure the development is constructed in compliance with planning conditions.

3.4 Concrete Management Plan

Precast concrete will be used wherever possible for the structural elements such as foundations for loop in grid connection masts, substation foundations and joint bays during the construction phase. On-site batching will not be permitted. Concrete will instead be transported to the Site by concrete truck.

All concrete will be delivered to site via ready-mix trucks from a local supplier. Concrete washout will be carried out in dedicated areas at the temporary construction compound hard standing area. Concrete mats will be used during concrete pours to prevent spillage. No surplus concrete will be stored or deposited anywhere on site. Such material will be returned to the source location or disposed of off-site appropriately.

The acquisition, transport and use of concrete will be planned fully in advance of commencing works such that volumes are minimised, the route to and through the Site is predetermined so as to aim to avoid drains and watercourses and wash down areas are appropriately located. Additionally, all concrete works will be supervised at all times by the Developer's appointed EcOW.

Concrete works will be scheduled during dry weather conditions to reduce the elevated risk of runoff and will avoid foreseen sustained rainfall (any event longer than 4-hour duration) and/or any foreseen intense rainfall event (>3mm/hour), and do not proceed during any yellow (or worse) rainfall warning issued by Met Éireann.

All pouring operations will be continuously supervised to prevent accidental spillages outside the excavation. Only concrete chutes will be washed out on site at a designed impermeable (lined) washout area at the site compound; there will be no concrete wash out of trucks. The residual liquids and solids from concrete wash-out will be disposed of off-site at an appropriate licensed waste facility.

The concrete wash-out area will be constructed as follows:

- The topsoil and subsoil, if necessary, will be stripped out and placed adjacent to the temporary compound area;
- An impermeable membrane will be installed directly onto the subsoil, and/or subsoil, to form the impermeable concrete wash-out settlement lagoon;
- A designated truck wash-down concrete apron shall be constructed next to this settlement lagoon; Impermeable lined drains will direct the wash-out flow to the wash-out settlement lagoon;
- The residual liquids and solids will be disposed of off-site at an appropriate licenced waste facility.

The ECoW will continually monitor the pH of any watercourse during concrete works in or adjacent to a watercourse or drain. Should any change in pH +/-0.5 be detected, concrete works will immediately be ceased. Steps will then be taken to identify the entry point to the drain or watercourse and appropriate measures will be implemented to prevent further escape to the environment. The ECoW should consult CIRIA C532 to consider the most appropriate measure.

Spill kits will be readily available at the location of concrete works and will be appropriate for the containment and control of concrete spills and/or runoff.

The Community Water Officer for the Western Region, National Parks and Wildlife Services and Inland Fisheries Ireland will be notified immediately of any concrete spills / runoff into a watercourse.

3.5 Surface Water Management Plan

This Surface Water Management Plan outlines the drainage strategy for the Proposed Development and the mitigation measures that will be put in place during the construction, operational and decommissioning phases of the Proposed Development.

Sections 3.5.1, 3.5.2 and 3.5.3 focus on the permanent drainage network for the Proposed 110 kV AIS Substation component of the Proposed Development. This drainage network is separate to the drainage network for the access track serving the proposed substation. This access track also forms part of the associated Cappakeel Solar Farm. The design of the access tracks and associated drainage was consented as part of the Cappakeel Solar Farm Development.

3.5.1 Proposed Surface Water Drainage Network

The proposed 110 kV Substation will have a surface water and foul water network. The proposed drainage scheme is as shown on drawing P23-226-0600-0001, submitted as part of this application.

Attenuation for the Proposed 110 kV Substation is provided by settlement ponds. Settlement ponds have been sized for the Proposed Development in line with CIRIA C532 guidance. Details of the settlement pond design methodology are included in section 3.5.2 below.

Interceptor drains are proposed to collect the overland flow paths from the upslope side of the substation and redirect them around the substation. These interceptor drains will discharge to diffuse stone outfalls, mitigating the potential for erosion and minimising the impact of the Proposed Development on the natural overland flow paths at the Application Site.

Within the substation compound channel drains are proposed to collect surface water runoff from carparking spaces. These channel drains will be collected by a piped surface water drainage network, which will pass through a petrol interceptor before discharging to the proposed settlement ponds.

Rainwater downpipes are proposed for the substation buildings. Channel drains are proposed at each doorway of the buildings. Additionally, the walkways and ground around the buildings will fall away from the building, redirecting any surface water away from the building and towards other surface water drainage features.

Swales are proposed along the downslope edge of the proposed substation. These swales will collect any excess surface water runoff from the substation compound and discharge it to the proposed settlement ponds.

It is proposed to include a rainwater harvesting system as part of the surface water drainage network. The system will comprise a filter, an underground tank and a pump. The proposed system collects rainwater from the roofs of substation buildings, filters it and stores it in underground tanks which are fitted with a pump. This stored water can then be reused by the Proposed Development.

3.5.2 Settlement Pond Sizing

Settlement ponds have been sized for the Proposed Development in line with CIRIA C532 guidance.

The settlement pond design is based on primary settling out of suspended solids from aqueous suspension. The theory behind the design of the settlement ponds is the application of Stoke's Law. The settlement ponds will be designed to provide sufficient retention time and a low velocity environment to allow suspended solids of a very small particle size to fall out of suspension prior to allowing the water to outfall to the receiving environment.

Treated water will percolate to groundwater or travel over ground and be assimilated into the existing drainage network. There will be no direct discharges from the Proposed Development to any existing natural watercourse. Discharge from the settlement ponds will be by diffuse stone outfall. Flow rates for storm events will be maintained at or below greenfield run-off rates.

3.5.2.1 Coefficient of Runoff

The substation compound being treated by the settlement ponds are primarily unbound surfaces. The substation compound is split between a customer compound and an Eirgrid compound, with a combined area of 17,750 m^2. The substation layout is as shown on drawing 300100925-DR-100. Substation details including buildups for the different surface types are included in drawing 300100925-DR-106.

Within the overall compound the areas that could be considered as impermeable are the two buildings with associated concrete walkways and the Eir Grid compound's concrete access track. These areas sum to 1,845 m^2 or c. 10% of the overall compound area. There are some limited concrete areas within the remaining 90% of the substation area, but this area is primarily unbound stone. This surface type will facilitate surface water infiltrating to ground across c. 90% the compound.

As a conservative approach the settlement ponds were sized as if the entire catchment (the substation compound) were impermeable, with no rainfall permeating to ground prior to entering the ponds.

3.5.2.2 Climatic Data

Climatic Data for the Application Site was obtained from Met Éireann's Rainfall Return Period Calculator. The full rainfall return period for the application site is included within the pond sizing calculations in Appendix 3. A 30% factor was applied to all rainfall values to account for potential future increases in rainfall due to climate change.

3.5.2.3 Calculations

For the preliminary design Stokes' law is used in combination with the Rational Method. The inflow to stilling pond is calculated using Modified Rational Method:

Q = 2.78 x c x I x A (l/s)

C = coefficient runoff, for hardstanding area the value of 1is used.

I = intensity (mm/h) for 1 in 75 years storm event, duration 10 mins

A = contributing area (ha)

According to the CIRIA 648 a pond volume is defined by inflow and retention time:

$$V = Q \times t$$

Full calculations for the sizing of settlement ponds are provided in Appendix 3.

3.5.2.4 Settlement Pond Construction

Settlement ponds will be installed concurrently with the formation of the access tracks. Settlement ponds will be monitored closely over the construction timeframe to ensure that they are operating effectively. Settlement pond maintenance and/or cleaning will not take place during periods of extended heavy rain; this will be carried out under low or zero flow conditions so as not to contaminate the clean effluent from the pond. The water level would first be lowered to a minimum level by pumping through a settlement tank without disturbing the settled sediment. Then excavator can remove sediment;

All settlement ponds have been set back a minimum of 50m from water framework directive waterbodies. Of the two proposed ponds, Pond SSP (2) is set back c. 70m from the Dunrally Stream_010 and Pond SSP (1) is set back c. 115m from same.

In the event of an emergency, the settlement ponds will provide a temporary holding area for any accidental spills on site as it will be possible to block off the outflow from these ponds for a limited period. Erosion control and retention facilities, including settlement ponds will be regularly maintained during the construction phase.

The following shall apply to construction of settlement ponds at the Site:

- Pond depths generally to be excavated to 0.5m;
- Side slopes to be shallow, nominally at a 1 in 2 side slope (maximum); and
- Material excavated from the settlement pond should be compacted around the edge of the pond.

3.5.3 Proposed Foul Drainage Network

The proposed 110 kV Substation will have a surface water and foul water network. The proposed drainage scheme is as shown on drawing P23-226-0600-0001, submitted as part of this application.

Permanent sanitary facilities will be provided at the substation. A foul system is proposed within the station to cater for the wastewater generated in the welfare facilities of the control building. The foul system will consist of an underground pipe network, foul manholes and a full retention foul effluent storage tank. The tank will have an associated high-level alarm which will be connected to the control building. A foul holding tank to be maintained and emptied bi-annually is the proposed means of treating and disposing of foul waste from the site.

The licensed contractor charged to empty and dispose of the waste will be the holder of a valid waste collection permit.

3.5.4 Construction Stage Impact and Mitigation Measures

The potential impacts of the proposed development during the construction phase are detailed in Section 6.4 of the enclosed Planning and Environmental Report.

Potential measures to reduce potential impacts during the construction stage are outlined below for consideration by the contractor:

- The increase in the rate of runoff along the route of the site access roads will be mitigated by the proposed drainage system which includes provision of stilling ponds to reduce concentration of suspended solids in the runoff from these areas.
- Stilling ponds with a diffuse outflow detail will be put in place in advance as construction progresses across the site. Erosion control and retention facilities, including stilling ponds will be regularly maintained during the construction phase.
- The three-stage treatment train (swale – stilling pond – diffuse outflow) proposed to retain and treat the discharges from hard surface areas as a result of the development will reduce any risk of flooding downstream.
- Where haul roads pass close to watercourses, silt fencing will be used to protect the streams.
- Silt traps will be provided at outfalls from roadside swales to stilling ponds.
- A suitably qualified person will be appointed by the developer to ensure the effective operation and maintenance of drainage and other mitigation measures during the construction process. The operations management of the subject development will include regular monitoring of the drainage system and maintenance as required.
- The developer will ensure that erosion control, namely silt-traps, silt fencing, swales, stilling ponds and diffuse outflow areas are regularly maintained during the construction phase.
- Interceptor cut-off drains will be provided, where required, on the upslope side of the access roads to prevent the mixing of overland flows with the drainage for the proposed development. These interceptor drains will discharge diffusely over land to avoid concentration of runoff. The roadside drains will therefore only carry the site access road runoff and so avoid carrying large volumes of water and concentrating flows.
- Cross drains of 450 mm will be provided to prevent a risk of clogging for drainage crossings and conveying flow from agricultural drains and forestry drains under access track roads.
- Where new cross-drains are proposed on this site to convey surface water from roadside swales to stilling ponds, these will be sized at a minimum of 225 mm diameter to avoid blockages.
- All open water bodies adjacent to proposed construction areas will be protected by fencing.
- Site access tracks have been laid out to reduce longitudinal slope of roadside drains where possible. Where roadside drains are laid at slopes greater than 2%, check damns will be provided. This will reduce effective slope and runoff velocities and any consequent potential for erosion.
- Any diesel, fuel or hydraulic oils stored on site will be stored in bunded storage tanks – the bund area will have a volume of at least 110 % of the volume of such materials stored.
- Refuelling of plant during construction will only be carried out at the site compound.
- Cables will be installed in trenches adjacent to the site access roads, or laid within the access road line, where required. Trenches will be excavated during dry periods where possible in short sections and left open for minimal periods, to avoid acting as a conduit for surface water flows.
- The temporary storage of excavated material on site will be stockpiled at least 50 metres from watercourses.
- Emergency drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site.

- During construction portaloo's and/or containerised toilets and welfare units will be used to provide toilet facilities for site personnel. Sanitary waste will be removed from site via a licenced waste disposal contractor.
- A vehicle wheel wash facility will be used to remove any deposited muck, dirt debris or other material from vehicles to prevent soiling of the public road during construction.
- Only concrete chutes will be washed out on site at a designed impermeable (lined) washout area at the site compound; there will be no concrete wash out of trucks.The increase in the rate of runoff along the route of the site access roads from the entrance to the 110kV Substation will be mitigated by the proposed drainage system which includes provision of stilling ponds to reduce concentration of suspended solids in the runoff from these areas.

3.5.5 Operational Phase Impacts and Mitigation

The impact on hydrology and water quality of the proposed development for the Operation and Maintenance stage is 'Not significant'.

There will be no releases of the sediments as there will be no further disturbance of soils post-construction.

No specific mitigation measures are required.

3.5.6 Decommissioning Phase Impacts and Mitigation

The substation and grid route will remain in situ beyond the operational lifetime of the associated consented solar farm, as an operational component of the national electricity grid network. As such, decommissioning of the grid route and substation will not be required and therefore result in no source of impact on surface water.

3.5.7 Proposed Mitigation Measures for Flooding

Weather warnings will be monitored, and no construction will take place during extreme events to mitigate against potential flooding.

As outlined in the Planning and Environmental Report, the proposed substation compound location is in Zone C. The new access tracks are within Zone C. No mitigation measures are envisaged for construction stages.

With the drainage system being installed which will reduce the peak runoff from the site, increase in the flood risk downstream of the site is not expected.

3.6 Noise, Vibration, Dust and Air Quality

3.6.1 Construction Stage Mitigation

Noise from the construction phase will arise from deliveries and/or removal of material to and from site, top-soil excavation, preparation of access roads and drainage, pouring of concrete where necessary.

The following categories are considered when undertaking the noise assessment for the construction stage:

- Site traffic.
- Site preparatory works.
- Preparation of access roads and drainage.
- Preparation of substation foundations.
- Installation of electrical skids (containing inverters, transformers and switchgear).

To mitigate against the impacts of noise on the local community during construction, the following measures are proposed:

- A pre-construction commitment to managing nuisance noise will be agreed through notification and consultation with affected parties, if deemed necessary;
- Working hours at the site during the installation phase will be limited to 07:00 to 19:00 Monday to Saturday inclusive. Work on Sundays or public holidays will only be conducted in exceptional circumstances and subject to prior notification as far as possible with the local community;
- Construction contractors will be required to comply with the requirements of the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1988 as amended in 1990 and 1996 (S.I. No. 320 of 1988, S.I. No. 297 of 1990 and S.I. No. 359 of 1996), and the Safety, Health and Welfare at Work (Control of Noise at Work) Regulations, 2006 (S.I. No. 371 of 2006).

The main control measures will be control of noise at source using the following methods in line with Clause 8 'Control of noise' of BS 5228-1:2009+A1:2014:

- Operators of all mobile equipment will be instructed to avoid unnecessary revving of machinery (Clause 8.2.1 General);
- Use of appropriate plant and equipment where possible with low noise level generation where possible (Clause 8.2.2 Specification and substitution);
- All construction plant to be used on site should have effective well-maintained silencers (Clause 8.2.3 Modification of existing plant and equipment);
- Noise generating equipment will be located as far as possible away from local noise sensitive areas identified (Clause 8.2.5 Use and siting of equipment); and
- Regular and effective maintenance of site machinery including a full maintenance schedule to ensure that all pieces of equipment are in good working order. With efficient use of well-maintained mobile equipment, considerably lower noise levels than those predicted can be attained (clause 8.2.6 Maintenance).

In addition, the following best practice measures are proposed:

- Training of site staff in the proper use and maintenance of tools and equipment;
- Avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment;

- Machines that could be in intermittent use will be shut down between work periods or will be throttled down to a minimum;
- Plant start-up will be sequential rather than all together;
- Internal access tracks to be well maintained;
- Plant known to emit noise strongly in one direction will, when possible, be orientated so that the noise is directed away from noise-sensitive locations; and
- Drop heights for materials such as gravels will be minimised whenever practicable.

3.6.2 Operational Stage Impact and Mitigation

The predicted noise levels at the nearest noise sensitive locations are below the applicable site noise limits from EPA NG4 Guidance during all periods and no operational mitigation measures are required.

Tones are audible close to the inverter stations; however, it is expected that the tonal noise will not be audible at noise sensitive locations and no penalty for noise character will be applicable. If tonal noise is audible at noise sensitive locations, mitigation measures can be implemented in the form of a vibration damper to suppress tonal noise from inverter stations.

3.6.3 Decommissioning Stage Impact and Mitigation

The substation and grid route will remain in situ beyond the operational lifetime of the associated consented solar farm, as an operational component of the national electricity grid network. As such, decommissioning of the grid route and substation will not be required and therefore result in no source of impact on receptors.

3.7 Soil Management Plan

It is intended to maintain an earthworks balance on site, with all excavated material re-used within the site therefore minimising the need for removal of any materials for off-site disposal.

Excavated material will largely be used for backfilling within the biodiversity areas across the site. Surplus excavated materials will be levelled out across the site, this will mostly comprise of top-soil material. Care will be taken to ensure that all watercourses are avoided when depositing any excess soil, no deposition of excavated material will be placed within at least 50m from watercourses.

Surplus excavated materials will be levelled out across the site, this will mostly comprise of top-soil material. Care will be taken to ensure that all watercourses are avoided when depositing any excess soil, no deposition of excavated material will be placed within 50m of watercourses.

Trenching for underground cabling will be undertaken using controlled methods, with excavation and backfilling taking place over short lengths. There will be no permanent spoil heaps at the site of the proposed development.

Cable trenches could provide preferential pathways for groundwater and contaminant movement. To avoid the cable trenches becoming preferential pathways, clay plugs (or other low permeability material) will be installed at intervals along the trench to stop/inhibit water movement.

Temporary spoil heaps will be used in the backfilling of trenches and where necessary.

Excavation works will be monitored by suitably qualified and experienced geotechnical personnel. All materials shall be stored at the main contractor compound and transported to the works zone immediately prior to construction.

The programming of the works will be such that earthworks are not scheduled to be carried out during severe weather conditions. Where such weather is forecast, suitable measures will be taken to secure the works.

Due to the possibility of soil-borne diseases, all topsoil/peat recovered from the site will remain on that property. Topsoil will be used for landscaping berms alongside existing and new access tracks where suitable and will also be used for reinstatement and landscaping purposes.

No off-site disposal of soil will be required from the site and no spoil stockpiles will be left on site after construction is completed.

3.8 Ecological Management Plan

Fehily Timoney and Company was commissioned on behalf of Perigus Energy Ireland Limited, to undertake an Ecological Impact Assessment (EcIA), Appropriate Assessment (AA) Screening and subsequent Natura Impact Assessment (NIS) which accompany the application for the Proposed Development. The EcIA considered the terrestrial and aquatic ecology of the Application Site and the impacts of the Proposed Development

The ecology appraisal involved a field assessment and a desktop review of relevant data available for the study site and locality.

3.8.1 Potential Impacts During the Construction Phase

As outlined in the accompanying EcIA Report the following are potential impacts during of the Proposed Development's construction stage:

- Release of sediment and pollutants to the Dunrally watercourse, with potential to adversely affect water quality and aquatic habitat. This would result in a **temporary, significant reversible effect**.
- Small-scale loss of improved agricultural grassland, resulting in reduction in foraging habitat for some passerine and raptor species. This was assessed to be **a permanent non-significant effect.**
- Temporary noise disturbance to local nesting avian species including 'confirmed breeding' yellowhammer is considered a **temporary slight, negative effect on avifauna in a local context.**

3.8.2 Potential Impacts During the Operational Phase

There is potential for increased collision risk between local avifauna including foraging raptors and the two newly installed 21m steel loop-in masts within the substation field. This could result in direct mortality or displacement of birds flying over this field. Considering the proposed 21m masts are to replace existing 16m, the risk of increased collision is deemed imperceptible and as such resulting in a **long-term imperceptible effect on local avifauna.**

3.8.3 Potential Impacts During the Decommissioning Phase

The substation and grid route will remain in situ beyond the operational lifetime of the associated consented solar farm, as an operational component of the national electricity grid network. As such, decommissioning of the grid route and substation will not be required and therefore result in no source of impact on ecological key receptors.

3.8.4 Mitigation Measures

3.8.4.1 Mitigation by Avoidance and Design

Mitigation is prescribed in accordance with the Environmental Protection Agency EPA guidance on EIAR (EPA, 2022) which requires mitigation by avoidance as a first approach. Where this is not feasible, measures to prevent impacts from giving rise to significant effects should be adopted (e.g. design of bunded storage). Where impacts cannot be avoided e.g. generation of noise, mitigation by reduction of impact is required to limit the exposure of the receptor to an acceptable level (often achieved by interrupting the pathway between the source and receptor).

A process of 'mitigation by avoidance', as informed by constraints assessment, was undertaken during the design of the Proposed Development with the objective of avoiding/ minimising the potential for adverse effects on European sites. The Proposed Development has been designed to avoid potential impacts on sensitive habitats, including the rich fen and flush habitat within the Great Heath of Portlaoise (000881) pNHA. Recognising the groundwater dependency of these habitats, a minimum setback distance of 250 m has been incorporated into the design, with no groundworks proposed within this zone. This measure ensures that local groundwater flow regimes and volumes will not be altered, thereby avoiding adverse effects on the integrity and functioning of these groundwater-dependent terrestrial ecosystems (GWDTEs).

3.8.4.2 Site Supervision

Project Ecologist/Ecological Clerk of Works (ECoW) will be employed for the duration of the construction phase to ensure that all the mitigation measures set out in the EcIA, NIS and any conditions of consent pertaining to biodiversity are employed. The Project Ecologist/ECoW will advise on environmental effects and communicate with the project owner and contractor to ensure the required actions to implement the mitigation prescribed in this EIAR are carried out. The Project Ecologist/ECoW will be awarded a level of authority and will be allowed to stop construction activity if there is potential for significant environmental effects other than those predicted and mitigated in the EIAR.

3.8.4.3 Mitigation for the sediment runoff

Along with the water quality mitigation set out in the CEMP, the following mitigation measures are proposed during cabling works construction:

- Weather warnings will be monitored, and no construction will take place during extreme events to mitigate against potential flooding.
- Mitigation measures will be provided where surface water flows may be temporarily prevented from reaching gullies during trench excavation. Mitigation measures will include the provision of temporary over ground surface water channels using sand bagging for example to divert flows to downstream gullies.

- Trenches will be excavated during dry periods where possible in short sections and left open for minimal periods, to avoid acting as a conduit for surface water flows.
- Any excavated material will be used in the reinstatement of the cable trenches subject to approval. Surplus material will be removed from the site to an appropriate licenced facility. There will be no stockpiling of excavated material.
- All excavated soil material will be managed on site.
- Silt fencing will be provided around any exposed areas to prevent the ingress of suspended solids into adjacent watercourses. These mitigation measures will prevent surface water contamination and will prevent subsequent flows of contaminated water into watercourses. Silt fences will be established downslope along the perimeter of source areas of contaminated runoff. Silt fences will be installed close to source (as opposed to close to receptor). Silt fences will be constructed using a permeable filter fabric (e.g. Hy Tex Terrastop Premium silt fence or similar) and not a mesh or terram. The base of the silt fence will be bedded at least 15- 30 cm into the ground. Once installed the silt fence will be inspected regularly, daily during the proposed works, weekly on completion of the works for at least one month, but particularly after heavy rains and periodically thereafter. The integrity of the silt fencing will be checked daily by the ECoW and after poor weather conditions (rain or wind) and any failures rectified immediately. Any build-up of sediment along the fence will be removed as deemed necessary by the ECoW and in accordance with manufacturers requirements. The silt fencing will be left in place until the works are completed (which includes removal of any temporary ground treatment). Silt fences will not be removed during heavy rainfall. The silt fence will not be pulled from the ground but cutaway at ground level and posts removed. A record of when it was installed, inspected and removed will be maintained by the ECoW.
- A temporary berm (i.e., polypropylene bag, filled with clean pea gravel grade or rectangular straw bales) will be placed along the edge of the track to prevent loose material being dislodged or washed into the waterbody. Double silt fencing will be placed upslope of the buffer zone on each side of the water body. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replacement overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location.
- Daily visual inspections of drains and streams will be performed during the construction period to ensure suspended solids are not entering the streams and rivers alongside the work area, to identify any obstructions to channels, and to allow for appropriate maintenance of the existing roadside drainage regime. Water quality in the nearby downstream drains and watercourses will be monitored in real time for turbidity. Where turbidity equals or exceeds 28 Nephelometric Turbidity Units (NTU) the works will be stopped and an investigation into cause carried out and measures taken as appropriate.
- There will be no storage of material/equipment, excavated material or overnight parking of machinery inside the 20m buffer zone.
- Bog mats will be used underneath the excavator inside the 20-meter vegetative buffer zone to prevent soil erosion and potential water quality impacts from localised surface water runoff.
- Temporary storage of excavated overburden from the diversion channel will be undertaken outside of the 20m buffer on flat ground or within a local hollow.
- A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the water body.
- The silt fencing on either side of the stream buffer will be left in place and maintained until the disturbed ground has re-vegetated.

- There will be no batching or storage of cement allowed at the stream crossing. There will be no refueling allowed within 100m of the stream crossing. All plant will be checked for purpose of use prior to mobilisation at the stream crossing.
- The waterproofing spray system will only be carried out during calm, dry weather periods (little to no breeze) to prevent drift of airborne substances or runoff towards the river.
- Consultation with the NPWS will be carried out as species protected under the Wildlife Act, EU Habitats Directive and the EU Freshwater Fish Directive occur within the river water bodies which the site drains into.
- Oils/hydrocarbons will be stored in a designated secure bunded area in watertight containers, preventing washout or disturbance of containers.
- Any generators stored in the compound will be bunded to 110% capacity.
- No fuel or oils will be stored within 50m of any watercourses or other surface water feature.
- Any temporary spoil heaps will be more than 10m away from trenches, drains and watercourses. The heaps will be surrounded by silt fences and preferably placed in a well vegetated area. Compact the surface of any stored soil or spoil heaps and keep their height to less than 2m.
- Surplus soil that is spread within the site will be deposited at least 50m away from watercourses, rolled and re-seeded with a certified native grassland seed mix. In heavy rainfall spoil heaps must be covered with geotextile to prevent erosion when not in use.
- Any surplus material will be transported off site and disposed of at a fully authorised soil recovery facility.
- Stockpiles will be restricted to less than 2m in height. Store all materials separately in bunded, safe areas greater than 50m from a watercourse and 10m from a drain which will be subject to approval by the site manager and ecological clerk of works (ECoW). Any surplus material will be transported off site and disposed of at a fully authorised soil recovery facility.

During trenching/ ducting works if culvert removal is required to facilitate duct installation, a method statement will be prepared detailing measures such as temporary damming and over-pumping of water around the work area. This will be agreed with relevant stakeholders in advance. Upon completion, culverts will be reinstated to their original levels and dimensions. The Contractor will liaise with Inland Fisheries Ireland (IFI) prior to undertaking such work.

Joint bay locations are located at a minimum distance of 147m from Dunrally stream. Nonetheless, during the installation of joint bays where ground levels slope towards a watercourse, or where there is a risk of sediment runoff, silt fencing in combination with straw bales will be installed between the works area and nearby watercourses or drainage features to prevent sediment migration. Check dams, constructed from stone or geocomposite-wrapped sandbags, will be installed both upstream and downstream of these culverts to intercept and retain any suspended solids generated during the works.

3.8.4.4 Mitigation for Accidental Spills and Leaks

Construction vehicles will be refuelled off-site, wherever possible. This will primarily be the case for road vehicles such as vans and trucks. Refuelling of mobile plant during construction will be carried out by mobile fuel tanks equipped with pressure relief valves, built-in vents, handles for easy transportation, pumps, hoses and meters to facilitate fuel transfer operations. Any additional fuel containers and for smaller equipment (such as generators, lights etc.) used on site will be positioned on appropriately sized plant nappy/bund and stored within additional secondary containment e.g. bund for static tanks or drip trays for smaller mobile containers. Taps/nozzles for fuels and storage containers for oils will be fitted with locks to ensure their use is controlled. Only designated trained and competent operatives will be authorised to refuel plant on site.

All tank and drum storage areas will, as a minimum, be bunded, either locally or remotely, to a volume not less than the greater of the following:

- 110% of the capacity of the largest tank or drum within the bunded area; or
- 25% of the aggregate volume of all other substance which could be stored within the bunded area.
- The purpose of this requirement is to ensure that any potential leaks, spills, or other releases from tanks or drums are effectively contained within the bunded area, preventing any environmental contamination or harm. The bunded area acts as a secondary containment system, providing an additional layer of protection against accidental releases and facilitating proper clean-up and mitigation measures.
- All plant and equipment will be in good working order, checked regularly and maintained when necessary and a maintenance log maintained.
- Fuels, lubricants and hydraulic fluids will be carefully handled to avoid spillage, properly secured and provided with appropriate type of spill containment kits in case of incident.
- All spill-kits will be inspected on a weekly basis by the EnCoW to ensure they are maintained as fit for purpose.
- Welfare / hygiene facilities will be located within the construction compounds only.
- All water from vehicle wheel washes will be removed from site and disposed of in line with Waste Legislation.

3.8.4.5 Mitigation for Concrete works

Mitigation for concrete works will be provided in line with section 3.4 above.

3.8.4.6 Mitigation for works at Existing Water crossings - Bridge 1

No instream works will be required. Considering the road raising works and ducting at Bridge 1 are associated with local stream, the works will adhere the guidelines set out in the best practice documents as listed below for the control of water pollution:

- CIRIA (2001). Control of water pollution from construction sites - Guidance for consultants and contractors (C532). Construction Industry Research and Information Association, London.
- CIRIA (2006). Control of Pollution from Linear Construction Project; Technical Guidance (C648). Construction Industry Research and Information Association, London.
- CIRIA (2015). Manual on scour at bridges and other hydraulic structures, second edition (C742). Construction Industry Research and Information Association, London.

- CIRIA (2015). Environmental Good Practice on Site (4th edition) (C741). Construction Industry Research and Information Association, London.
- CIRIA (2019). Culvert, screen and outfall manual (C786). Construction Industry Research and Information Association, London.
- Enterprise Ireland (unknown). Best Practice Guide (BPGCS005) Oil storage guidelines.
- IFI (2016). Guidelines on Protection of Fisheries during Construction Works in and adjacent to waters. Inland Fisheries Ireland, Dublin.
- Kilfeather, P.K. (2007). Maintenance and protection of the Inland Fisheries resource during road construction and improvement works. Requirements of the Southern Regional Fisheries Board. Southern Regional Fisheries Board, Clonmel, Co. Tipperary
- Murphy, D.F. (2004). Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin.
- NRA (2008). Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. National Roads Authority.
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note);

3.8.4.7 Mammals

A pre-construction mammal survey will be undertaken within the footprint of the development in order to reconfirm the findings from the ecology survey, and in the event that any badger sett/otter holts or couches should be encountered at any point, the NPWS will be informed and NRA Guidelines for the Treatment of Badgers Prior To the Construction of National Road Schemes/NRA Guidelines for Treatment of Otters Prior to the Construction of National Road Schemes will be followed. As an Annex IV species has not been recorded within the site during surveys, there is no requirement for a licence currently and this is not considered likely to change in the future given the habitats present within the footprint of the development. However, in the unlikely event that a strictly protected species is identified during re-confirmatory preconstruction surveys the appropriate licensing shall be sought.

3.8.4.8 Avifauna

Any vegetation removal that may be required within the footprint of works, will be carried out outside of the bird breeding season (March 1st – August 31st). It is particularly important that no section of hedgerow is cut more than once every three years.

In the event that vegetation clearance during the bird breeding season is unavoidable, an ECoW will be appointed to examine the area of construction/clearance for nests no more than 48 hours in advance of works. They will have the authority to include a buffer zone if needed until birds have fledged or breeding has been confirmed as failed.

3.9 Waste Management Plan

During the construction phase various activities will result in the generation of waste material and the management of this waste will impact on both the work area and outside the work area at disposal locations. It is expected that the majority of waste will arise from the construction of the new 110kV substation and the installation of ducting. These work activities along with vegetation clearance (if required), and activities at the temporary compounds will lead to the generation of waste by-products such as soils, subsoils, stones and bedrock (if encountered), cardboard, plastic packaging, timber, mixed municipal waste and hazardous waste such as batteries, waste oils etc.

Fuels and oils that will be used during the construction phase are classed as hazardous. Any fuel stored at the contractors' compound will be bunded. If the fuel is correctly contained and bunded, it is not expected that there will be any fuel wastage.

Cut and fill volumes have been calculated for the substation works and a summary is provided below:

Table 3-1: Estimated Volumes of Cut/Fill and Import*

Element	Estimated VolumeofCut(m3)	Estimated Volume of Fill (m3)	Volume to be Imported to site (m3)
Substation Compound	14,739	14,826	87

Element	Estimated Volume of Cl 804/808 fill to be imported (m3)	Estimated Volume of Sub-base to be imported (m3)	Volume of Concrete to be imported (m3)
Substation Compound	2,460	4,920	520

**The volumes provided above are estimates only.*

All waste arising from the Proposed Development will be handled by an approved waste contractor holding a current waste collection permit. All waste requiring disposal off-site will be disposed of at a facility holding the appropriate licence or permit.

Mixed municipal waste generated will be manged by a waste contractor. Dedicated waste receptacles will be provided for the segregation of waste into mixed dry recyclables and non-recyclable residual waste.

The appointed waste contractor will collect and transfer the wastes as receptacles are filled. Non-recyclable waste will be transferred to a landfill or incinerator.

Dedicated bunded storage containers will be provided for hazardous wastes such as batteries, paint, waste paint material and oils, fuels etc.

Waste storage areas will be provided in the temporary compound which will have skips to facilitate segregation of the waste streams. Waste generated at work sites will be brought to the waste storage area at the end of each working day. All staff using the facilities at the compounds will be made aware of the requirements for the segregation and appropriate disposal of mixed waste. Littering within and in the vicinity of the compounds will not be permitted. The waste management contractor assigned for the collection and disposal of waste from the compounds will hold a valid waste collection permit and will use facilities with a valid waste facility permit or licence.

As works are taking place in a greenfield site it is not anticipated to encounter contaminated ground and made ground material in the soil. However, if contaminated ground is encountered, works will cease, and relevant authorities contacted. The Environmental Clerk of Works will assess potential pollution events.

All movement of waste and the use of waste contractors will be undertaken in accordance with the Waste Management Acts 1996-2008, Waste Management (Facility Permit & Registration) Regulations 2007, and the Waste Management (Collection Permit) Regulations 2007. This includes the requirement for all waste contractors to have a waste collection permit. The contractor will maintain a copy of all waste collection permits.

3.10 Outline Traffic Management Plan

The contractor will prepare a site-specific Traffic Management Plan (TMP) prior to the construction works commencing. The Construction Traffic Management Plan shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works contract.

Some items in this plan can only be finalised with appropriate input from the contractor who will be appointed to carry out and schedule the works. Furthermore, it is appropriate that the Project Supervisor Construction Stage (PSCS), when appointed, should have an active role in the preparation/review of the Traffic Management Plan.

The contractor is required to prepare the necessary Site-Specific TMPs prior to the construction works commencing in accordance with Chapter 8 of the Traffic Signs Manual 2019 and subject to load permits.

The contractor will be responsible for the implementation of all agreements between the developer, Laois County Council and the local residents with the objective that the transportation needs for the proposed project will have a minimal impact on the road network and local communities.

As with any construction development project, the transport of materials onto the site will give rise to increased traffic and associated impacts. However, due to the very nature of construction these impacts will be temporary.

Construction traffic will require regular access to the site at varying times throughout the construction phase. The aim of this TMP is to put in place procedures to manage traffic effectively on site and in the immediate vicinity of the proposed project, to ensure the continued movement of traffic on the public roads and to minimise disturbance during transportation of materials particularly large loads. The correct implementation of this TMP will ensure that appropriate procedures are in place to minimise any effects on the safety and movement of the general public.

Prior to the commencement of construction, the TMP will be reviewed by the main contractor (and any sub-contractors) and will be updated as necessary.

The contractor will be responsible for the implementation of all agreements between the Applicant and Laois County Council, with the objective that the transportation needs for the proposed development will have a minimal impact on the road network and local communities.

The Haul Route for the Proposed Development is shown in Figure 3-1 and Figure 3-2. All vehicles hauling materials to and from the site shall only use agreed transport routes.The installation phase for the Proposed Development will result in additional traffic on the roads in the vicinity of the development, the road network in the vicinity of both entrances is marked up on the haul route maps.

3.10.1 *General Traffic Management Measures*

General measures that shall be addressed in the TMP shall include:

- **Traffic Management Co-Ordinator** – A dedicated Traffic Management Coordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management on the project.
- **Roads and Routes:** The TMP clearly identifies roads that will be used to access the project site and roads that are not to be used. HGVs shall use the L-3002, R401, L-7007, L-7008, L-7011, R445, M7, L-3930, and the L-7815 as the primary haul route.
- **Road Condition Survey:** a pre-condition survey will be carried out on all public roads that will be used in connection with the development to record the condition of the public roads in advance of construction commencing. A post-construction survey will also be carried out after the works are completed. This is to be undertaken on the road in each direction of the proposed site entrance for a distance of 100m and submitted to the planning authority. The timing of the surveys will be agreed with the road's authority. Joint surveys shall be completed if the roads authority requests.
- **Road Reinstatement:** All roads will be reinstated expeditiously on completion of the construction works. Roads will be reinstated to their pre-works condition or better and to the satisfaction of the road's authority. This connection method is advantageous when compared to trenching and reduces the impact on the public road by:
    - Reducing the amount and duration of public road and lane closures.
    - Reduces traffic management requirements.
    - Reduces dust, debris and soiling of public road infrastructure.
    - Maintains public road surface integrity.
    - Reduces public road reinstatement requirements.
- **Site Inductions:** All workers will receive a comprehensive site induction which will include a section on traffic management and clear guidance on the routes to be used/not used to access the site.
- **24-Hour Emergency Contact:** a 24-hour emergency phone number will be maintained for the duration of the construction works and the number will be noted on temporary signage at each works area (for grid connection) and the site entrance for the site.
- **Traffic Management Guidance:** All necessary temporary traffic management will be planned and executed in accordance with best practice, including Chapter 8 of the Traffic Signs Manual published by the Department of Transport in 2019.

- **Community Liaison:** A community liaison will be appointed by the contractor in advance of the commencement of the construction phase who will have responsibility for consulting with members of the public and act as a first point of contact for the project management team. Letter drops will be carried out to notify members of the public living near the proposed site and cable route to advise them of any particular upcoming traffic related matters e.g. temporary lane/road closure or delivery of large components.
- **Signage:** Clear signage relating to the development, both temporary and permanent, will be provided for accessing the site.
- **Road Sweeping:** Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. When, if necessary, a road sweeper will be used to maintain the public roads in a clean condition during the construction activities of the project.
- **Site Entrances:** The entrance to the site will be secured when the site is not in use. When necessary, a flagman will be used to assist traffic movements at the site entrance or in other areas as required.

Mitigation measures proposed for grid connection cable works along the internal access tracks and public road include:

- **Route Proofing:** In advance of the main grid connection works an assessment will be carried out to define the precise alignment of the cable route within the corridor which has been assessed. This will include silt trenching with the aim of minimising the construction impacts and avoiding existing services in the road.
- **Maintaining Local Access:** Reasonable access to local houses, farms and businesses will be maintained at all times during any road closures associated with the grid connection works. The details of this will be agreed with the road's authority in advance of the grid connection works commencing.
- **Road Cleanliness:** Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. Road sweeping vehicles will be used when necessary, to ensure that the public road network remains clean.

3.10.2 *Construction Plant and Vehicles*

The typical construction plant and vehicles used as part of the construction of the Proposed Development are as follows (non-exhaustive):

- Heavy Goods Vehicles (HGVs) transporting materials to and from the site, including road making materials, concrete (ready mix), building materials, drainage/ducting materials, cabling, electrical components, and excavated material;
- HGVs transporting conventional earthworks machinery such as excavators, dumper trucks, rollers etc.;
- HGVs transporting solar panels and steel mounting frame structure components;
- Fuel trucks transporting fuel (for plant) to each site compound during the works;
- Light goods vehicles (LGVs) such as cars, 4x4s and vans used by the workers and supervisory staff involved in the construction works.

It should be noted however that final selection of construction plant and vehicles may vary depending on suitability, availability, contractor's choice, etc.

Plant operators will be responsible for the upkeep and maintenance of construction plant and vehicles, ensuring good working order prior to use. Should emergency maintenance need to be carried out on site, this will be carried out at a designated area away from sensitive receptors and will ensure that a spill kit is nearby.

3.10.3 *Construction Compound*

All visitors to the site shall report to the site office located in the main temporary construction compound. The location of the construction compound is shown on the site layout. Please see drawing reference numbers P23-226-0100-0007, P23-226-0100-0008, P23-226-0100-0010, P23-226-0100-0011.

The layout of each temporary construction compound is shown in drawing reference number P23-226-0400-0009.

3.10.4 *Consultation and Notification*

3.10.4.1 Laois County Council

The contractor will liaise directly with the County Council in relation to the plan. Any concerns/requirements they have will be incorporated into the plan.

The necessary permits (including standard permits) will be applied for and obtained from the relevant local authorities.

Construction commencement dates are yet to be confirmed at this stage; these will be made known to the relevant Planning Authorities by way of formal Commencement Notice.

3.10.4.2 Local Residents

The following measures will be used to communicate the necessary information to the households along the grid-route from the Cappakeel site to the entrance of the Cappakeel Solar Farm adjacent to the site:

- Information signs will be erected in advance of the construction/transportation works.
- A flyer drop will be carried out to advise households along the local road leading to the site in relation to the programme of construction works and especially in relation to oversized load movements.
- Residents will be consulted with regarding the development of plans for the project.
- Contact details for the project Community Liaison Officer will be provided so that any concerns can raised, logged and be easily channelled to the Developer to be dealt with.

Complaints will be entered into the site complaints log and the relevant site environmental officer will arrange to meet with those affected. The situation will be acted upon immediately and reviewed by the Project Manager.

3.10.5 Temporary Road Closures and Diversions

It is expected that full road closures will be put in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems. This will enable the works to be completed as quickly and as safely as possible, with minimal disruption time for residents of the area.

The cabling works will require delivery of plant and construction materials to the sections along the route, followed by excavation, laying of cables and subsequent reinstatement of trenches and road surfaces. Road closures will be applied for by the appointed contractor and will outline local diversions whilst always maintaining local access for residents, farms and businesses.

Where a road has provision for two traffic lanes with adequate width, a rolling Stop/Go traffic light system will be implemented in approximately 50m-100m works sections, allowing traffic to bypass the construction works. This measure would involve the road remaining open, but with reduced traffic flows due to the closure of one lane of traffic at the works area.

Narrow single-lane local roads will be closed to allow construction of the grid route to proceed. Diversion routes will be indicated for all traffic. Local access for residents / businesses will be maintained and accommodated during the works. Where required, stoned passing bays will be prepared by the contractor in road verges to create space for local residents to bypass tracked machinery and other construction plant. Where open trenches obstruct residents' access, steel road plates may be installed over the trench temporarily to provide safe access.

It is expected for both options that approximately between 75-100m of trenching, ducting and backfilling (temporary surface) could be completed on average per day.

The appointed contractor will at all times implement suitable traffic management in the form of a stop-go system. Enforcement of traffic management procedures will include temporary traffic lights/ flag men in place during proposed ducting works. Should the need for weekend or night works be required this will be adhered to by the build contractor and agreed with in writing prior to such works taking place.

Local access to residence and property will be maintained throughout the works, although traffic flow may be temporarily reduced during active construction. Where road closures and diversions are put in place, local access to residences and property will be maintained. Where construction works are progressing outside property entrances, access can be maintained by keeping an access point clear of spoil/fill and by the provision crossing points over the works, e.g. steel plate crossings.

Emergency services access to residence and property will be maintained throughout the works. Where road closures and diversions are put in place, local access to residences and property will be maintained. In the event of an emergency, steel plates (kept on site) can be placed over open trenches to temporarily restore traffic flow.

All traffic management measures, including road closures, will be subject to the applicable statutory licensing processes as implemented by the roads authority. Road closures will be facilitated by the existing network of roads in the area. The contractors proposed Traffic Management Plan to be fully agreed with Laois County Council prior to commencement of any works.

Road Cleaning

Public roads shall be kept free of mud, dust, spillages and debris from the construction site, construction plant or haulage vehicles. Any necessary measures shall be put in place at the site entry/exit points.

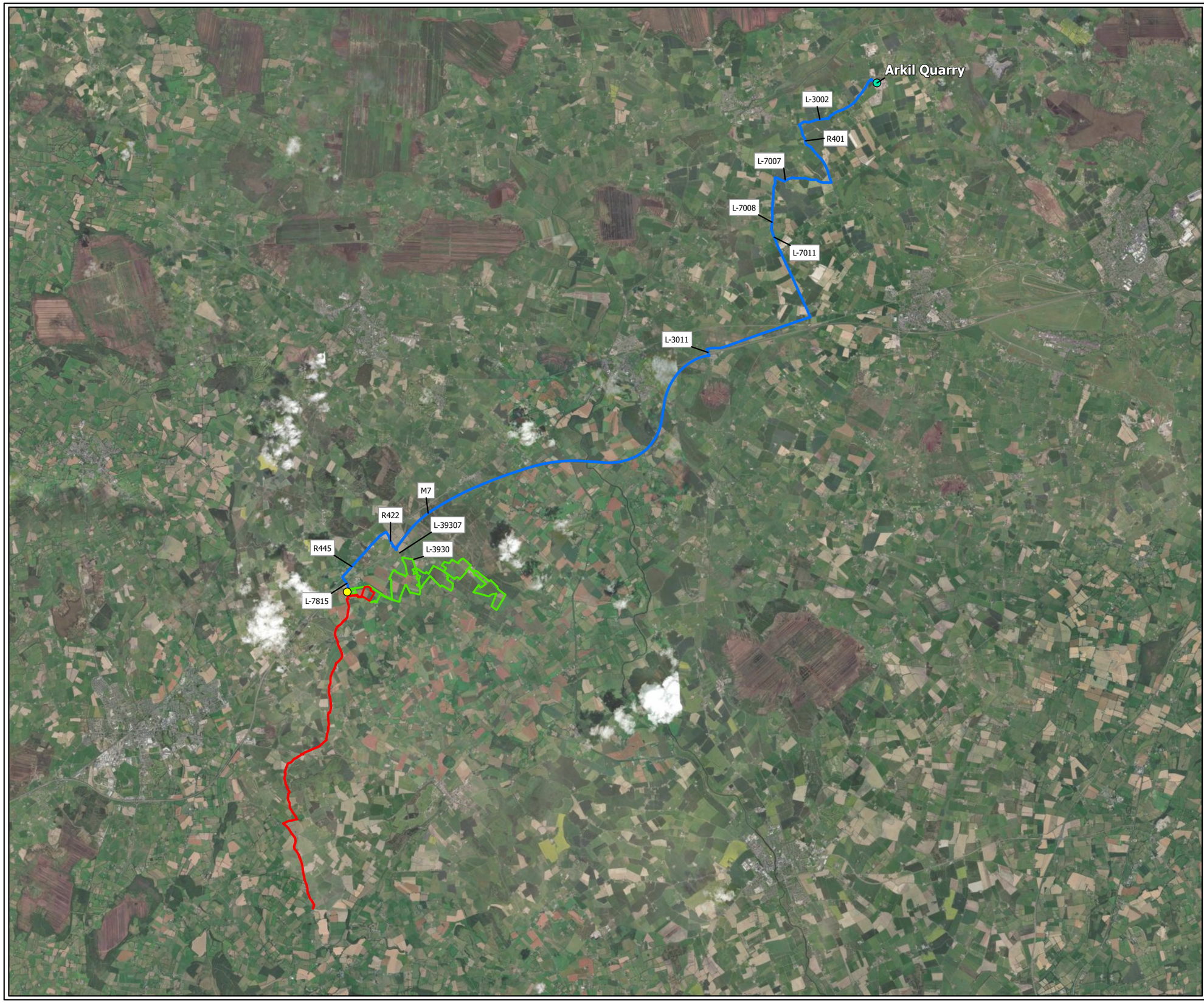
Carriageway/ Road Reinstatement

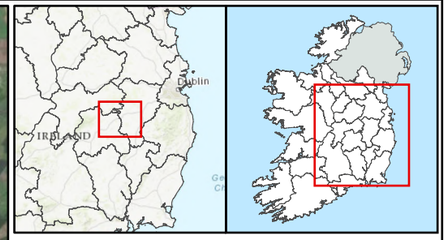
A pre-condition survey of haul routes, consisting of a video survey and photographs shall be carried out and a copy submitted to Laois County Council.

Any damage caused to the road shall be repaired to its pre-works condition or better, to the satisfaction of Laois County Council. Any defects that appear during the construction period shall be rectified by the developer.

World Imagery: Earthstar Geographics
World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS
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Legend

- SID Boundary
- Permitted Solar Farm
- Haul Route
- Quarry Location
- Site Entrance

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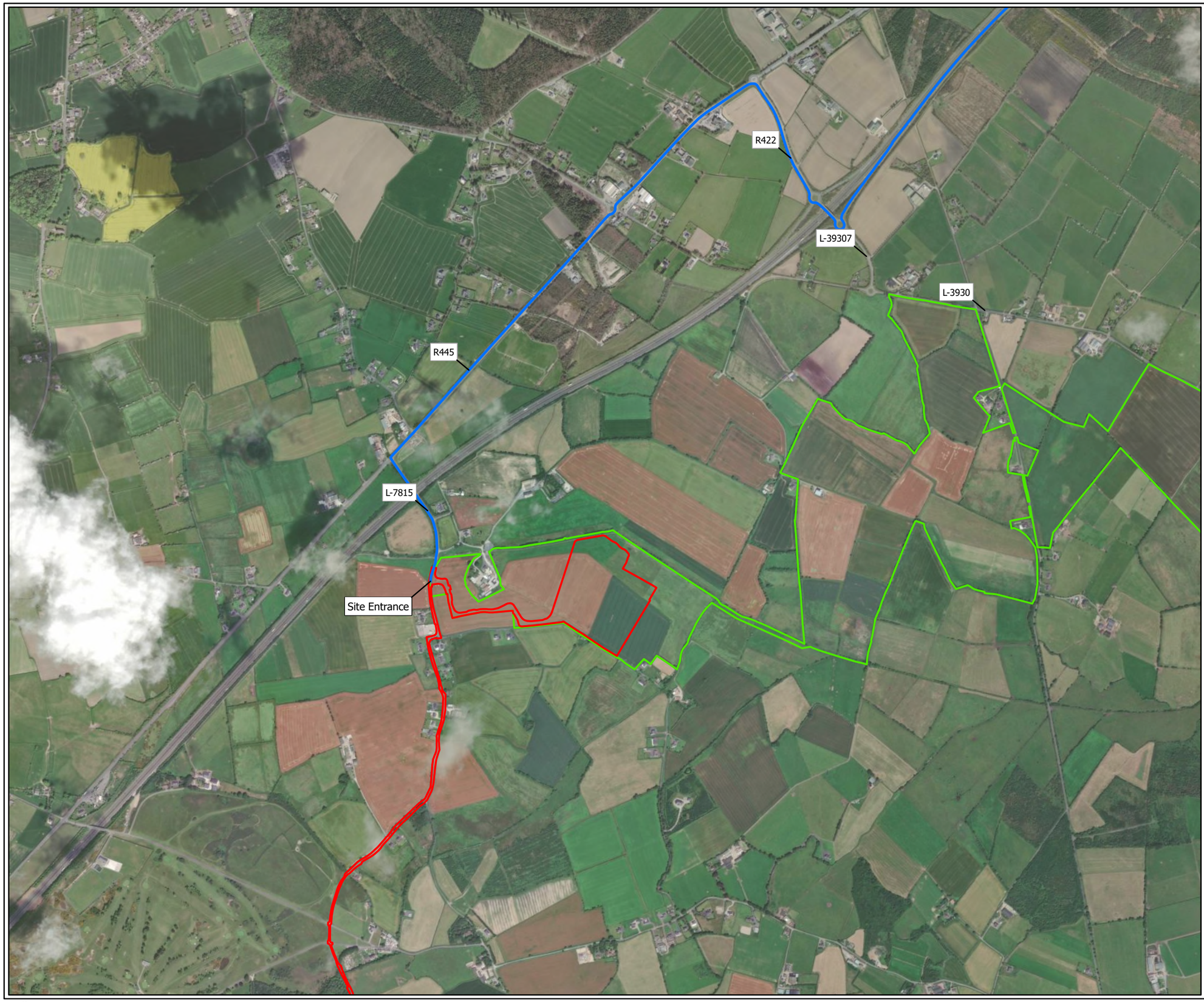
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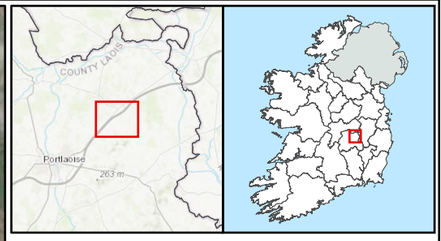
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PROJECT:	Cappakeel Solar Farm		
FIGURE NO:	3.1		
CLIENT:	Perigus Energy Ireland Midco Limited		
SCALE:	1:125,000	**REVISION:**	0
DATE:	08/07/2026	**PAGE SIZE:**	A3

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Legend

- SID Boundary
- Permitted Solar Farm
- Haul Route

N W E S

0 0.25 0.5 1 1.5 2 Kilometers

TITLE:	Proposed Haul Route - Local		
PROJECT:	Cappakeel Solar Farm		
FIGURE NO:	3.2		
CLIENT:	Perigus Energy Ireland Midco Limited		
SCALE:	1:15,000	**REVISION:**	0
DATE:	08/07/2026	**PAGE SIZE:**	A3

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3.11 Reinstatement and Decommissioning

The Proposed Development comprises: the 110kV site substation, Loop-In Loop-Out (LILO) connection to the Cushaling-Portlaoise 110kV Overhead line within the townland of Morett, and underground tail fed connection to Coolnabacky 110kV Substation.

This infrastructure will remain in situ beyond the operational lifetime of the associated consented solar farm, as an operational component of the national electricity grid network. As such, decommissioning of the grid route and substation will not be required.

4. SAFETY AND HEALTH MANAGEMENT PLAN

4.1 Project Obligations

The construction of the Proposed Development will impose numerous safety management obligations on the developer, designer and contractor. Responsibilities and obligations are comprehensively set out in health and safety at work legislation listed below. As well as statutory obligations, there may be specific obligations set out in the planning conditions for the Proposed Development, with grid connection cabling works carried out by a statutory undertaker, as described within Appendix 7 - Statutory Undertaker Letter, as contained within the application Cover Letter, should it be granted consent.

The contractor for the main construction works and all of its sub-contractors are to ensure that they are fully aware of and in compliance with these safety obligations.

4.1.1 Planning Permission Obligations

Should the proposed development be granted consent, the planning conditions will be complied with and should be read in conjunction with the project CEMP and other related reports prepared by and on behalf of the developer.

4.1.2 Felling License

There is no felling license required for this project.

4.1.3 Other Obligations

The Safety, Health and Welfare at Work Act 2005 and the Safety, Health and Welfare at Work (Construction) Regulations 2013 place a responsibility on the Developer as the “Client”, the Designer, the Project Supervisors and the Contractor.

The Client must:

- Appoint a competent and adequately resourced Project Supervisor for the Design Phase (PSDP)
- Appoint a competent and adequately resourced Supervisor for the Construction Stage (PSCS)
- Be satisfied that each designer and contractor appointed has adequate training, knowledge, experience and resources for the work to be performed.
- Co-operate with the project supervisor and supply necessary information
- Keep and make available the safety file for the completed structure
- Provide a copy of the safety and health plan prepared by the PSDP to every person tendering for the project
- Notify the Authority of the appointment of the PSDP.

Designers must:

- Identify any hazards that their design may present during construction and subsequent maintenance
- Eliminate the hazards or reduce the risk
- Communicate necessary control measures, design assumptions or remaining risks to the PSDP so they can be dealt with in the safety and health plan
- Co-operate with other designers and the PSDP or PSCP
- Take account of any existing safety and health plan or safety file
- Comply with directions issued by the PSDP or PSCS.

The PSDP must:

- Identify hazards arising from the design or from the technical, organisational, planning or time related aspects of the project
- Where possible, eliminate the hazards or reduce the risks
- Communicate necessary control measure, design assumptions or remaining risks to the PSCS so they can be dealt with in the safety and health plan
- Ensure that the work of designers is coordinated to ensure safety
- Organise co-operation between designers
- Prepare a written safety and health plan for any project and deliver it to the client prior to tender
- Prepare a safety file for the completed structure and give it to the client.

The PSCS must:

- Co-ordinate the identification of hazards, the elimination of the hazards or the reduction of risks during construction
- Develop the Safety and Health Plan initially prepared by the PSDP before construction commences
- Co-ordinate the implementation of the construction regulations by contractors
- Organise cooperation between contractors and the provision of information
- Co-ordinate the reporting of accidents to the Authority
- Notify the Authority before construction commences
- Provide information to the site safety representative
- Co-ordinate the checking of safe working procedures
- Co-ordinate measures to restrict entry on to the site
- Co-ordinate the provision and maintenance of welfare facilities
- Co-ordinate arrangements to ensure that craft, general construction workers and security workers have a Safety Awareness card, e.g., Safe Pass and a Construction Skills card where required
- Co-ordinate the appointment of a site safety representative where there are more than 20 persons on site
- Appoint a safety adviser where there are more than 100 on site

- Provide all necessary safety file information to the PSDP
- Monitor the compliance of contractors and others and take corrective action where necessary;
- Notify the Authority and the client of non-compliance with any written directions issued.

The Contractor must:

- Co-operate with the PSCS
- Promptly provide the PSCS with information required for the safety file
- Comply with directions of the project supervisors
- Report accidents to the Authority and to the PSCS where an employee cannot perform their normal work for more than 3 days
- Comply with site rules and the safety and health plan and ensure that your employees comply
- Identify hazards, eliminate the hazards or reduce risks during construction
- Facilitate the site safety representative
- Ensure that relevant workers have a safety awareness card and a construction skills card where required
- Provide workers with site specific induction
- Appoint a safety officer where there are more than 20 on site or 30 employed
- Consult workers with site specific induction
- Monitor compliance and take corrective action.

Consequently, at all stages of the project there are statutory requirements for the management of safety, health and welfare of all involved in or affected by the development.

4.2 Training Awareness and Competence

All site personnel will receive environmental awareness information as part of their initial site briefing. The detail of the information should be tailored to the scope of their work on site.

The contractor for the main construction works will conduct the environmental awareness training at the same time as Health and Safety Training (often referred to as Site Inductions).

This will ensure that personnel are familiar with the environmental aspects and impacts associated with their activities, the procedures in place to control these impacts and the consequences of departure from these procedures.

The CEMP will be available in the main site compound during the project. The environmental performance at the site is on the agenda of the monthly project management meetings for the project.

Elements of the CEMP will be discussed at these meetings including objectives and targets, the effectiveness of environmental procedures etc. Two-way communication will be encouraged by inviting all personnel to offer their comments on environmental performance at the site.

4.3 Health and Safety

The contractor for the main construction works will implement a site safety management system (SMS) on this project to meet the specified contractual, regulatory and statutory requirements, environmental impact statement mitigation measures and planning conditions.

It is the contractor's responsibility to implement an effective safety management system to ensure that the developer's safety requirements for the construction of this project are met. Any SMS will incorporate and develop upon any preliminary plans prepared for the project by the Project Supervisor for the Design Process.

The selection criteria for the contractor for the works will be based on the ability to construct the works in a manner that will not endanger the safety, health and welfare of any parties and competence to fulfil the role of PSCS.

All site personnel will be required to be familiar with the requirements of the Safety and Health Management Plan for the construction phase of the project as related to their role on site. The plan will describe the project organisation and sets out the health and safety procedures that will be adopted on site.

The Safety and Health Plan is a controlled document and will be reviewed and revised as necessary. A copy of the Safety and Health Plan will be located on/near the site H&S notice board. All employees, suppliers and contractors whose work activities cause/could cause impacts on the environment will be made aware of the SHMP and its contents.

Solas Safe Pass registration cards are required for all construction, delivery and security staff. Construction operatives will hold a valid Construction Skills Certificate Scheme card where required.

Public safety will be addressed by restricting site access during construction. Appropriate warning signs will be posted, directing all visitors to the site office.

All personnel on site will wear adequate personal protective equipment (PPE), appropriate for their activity while on site.

In relation to working near overhead electric lines, the contractor will comply with ESB Networks Code of Practice for Avoiding Danger from Overhead Electricity Lines, 2019. Prior to site start, hazard exclusion zones will be established by the main contractor and overhead goalposts will be set up at designated crossing points where plant must pass directly under overhead electricity lines in accordance with ESBN requirements. A minimum 3m exclusion zone for 10kV, 20kV and 38kV overhead lines will be maintained at all times.

4.4 Training, Awareness and Competence

All site personnel will receive health and safety information as part of their initial site briefing. The detail of the information should be tailored to the scope of their work on site. The contractor for the main construction works may decide to conduct the environmental awareness training at the same time as Health and Safety Training (often referred to as Site Inductions).

This will ensure that personnel are familiar with the environmental aspects and impacts associated with their activities, the procedures in place to control these impacts and the consequences of departure from these procedures.

Relevant information relating to environmental management of the site will be posted on the main site notice board during the project. Two-way communication will be encouraged by inviting all personnel to offer their comments on environmental performance at the site.

4.5 Control of Documents

The Contractor will establish, implement and maintain a procedure to control project documents and records so they are clearly identifiable, organised, current, easily located and revised when necessary.

5. EMERGENCY RESPONSE

An Emergency Response Plan shall be produced following the appointment of the contractor for the main construction works and following detailed design development.

An emergency is any disruptive or harmful event that endangers people, environment, property or assets. Emergencies can be small, as in a fire contained by employees using firefighting equipment or large, as in a disaster resulting from a storm.

Examples of Emergency Response Plan emergency events are:

- Medical emergency
- Explosion
- Overheated equipment
- Chemical and fuel spill
- Fire
- Loss of power
- Vehicle incidents

Example sources of emergency or disaster events are:

- Unstable/inappropriate stockpiles on site
- Faulty or incorrect use of equipment
- Falls from height
- Smoking
- Storm/adverse weather
- Power failure
- Fuel spill
- Road failure
- Serious vehicle collisions or overturning

An emergency response plan deals with the immediate physical effects of a disaster and outlines the initial response.

The Emergency Response Plan should contain predetermined guidelines and procedures to ensure the safety, health and welfare of everybody involved in the project and to protect the environment during the construction phase. It should clearly outline the immediate response to an emergency or disaster situation by the main construction works contractor and PSCS as part of their construction stage Safety and Health Plan.

5.1 Emergency Response Plan

An emergency response plan deals with the immediate physical effects of a disaster and outlines the initial response.

The plan should include provisions for the following:

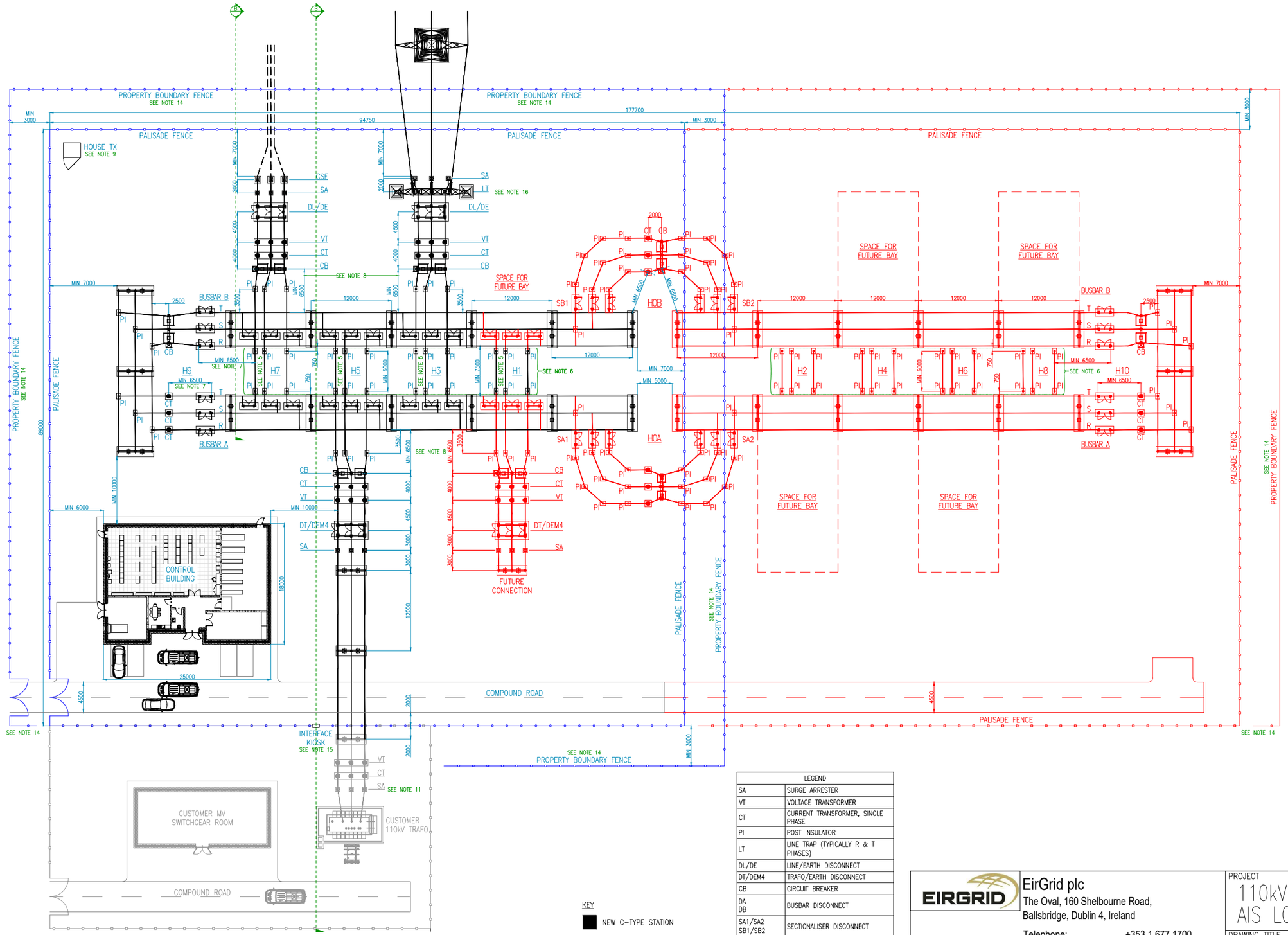
- Emergency response liaison and reporting;
- Procedure for reporting emergencies and raising the alarm;
- Designated responder;
- Location and contact information for the nearest emergency services, ambulance and Accident & Emergency (A&E) facilities including:
  - Accident & Emergency (A&E);
  - Ambulance Service;
  - Fire Services;
  - Local Garda Station, district and divisional headquarters.
- Medical protocol;
- Escape and evacuation procedure;
- Prevention of illness/injury of site staff due to weather / elements;
- Environmental emergency procedure;
- Emergency response plan for the haul route.

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APPENDIX 1

EirGrid 110 kV Station Design
Standard AIS Loop Station



KEY

- NEW C-TYPE STATION
- FUTURE RING STATION (SPACE ONLY)

LEGEND	
SA	SURGE ARRESTER
VT	VOLTAGE TRANSFORMER
CT	CURRENT TRANSFORMER, SINGLE PHASE
PI	POST INSULATOR
LT	LINE TRAP (TYPICALLY R & T PHASES)
DL/DE	LINE/EARTH DISCONNECT
DT/DEM4	TRAFO/EARTH DISCONNECT
CB	CIRCUIT BREAKER
DA DB	BUSBAR DISCONNECT
SA1/SA2 SB1/SB2	SECTIONALISER DISCONNECT
CSE	CABLE SEALING END

NOTE 1:
THIS IS A CONCEPTUAL DESIGN FOR GUIDANCE ONLY. ALL DIMENSIONS AND REFERENCES GIVEN ARE INDICATIVE ONLY.
LAYOUT TO BE FURTHER OPTIMISED DURING DETAILED DESIGN PENDING SPECIFIC EQUIPMENT SUPPLIER AND SITE DETAILS.

NOTE 2:
RELOCATION OR ADDITIONAL POST INSULATORS MAY BE REQUIRED, SUBJECT TO DETAIL DESIGN. NOT SHOWN FOR CLARITY.

NOTE 3:
VEHICULAR ACCESS TO ALL HV PLANT SHALL BE PERMITTED WITHOUT THE NEED FOR UNNECESSARY PROXIMITY OUTAGES. CONSIDERATION OF LV CABLE TRENCH LAYOUTS AND TRAFFIC-BEARING TRENCH COVERS SHALL BE CONSIDERED DURING DETAILED DESIGN.

NOTE 4:
LIGHTNING MAST, LV TRENCH DUCT ROUTES, MARSHALLING/INTERFACE CABINETS AND LIGHTING FIXTURES SHALL BE CONSIDERED DURING DETAIL DESIGN.

NOTE 5 (AS ILLUSTRATED ON DRAWING):
TWO PHASES OF THE LOW LEVEL BAY CONDUCTORS ARE ARRANGED CLOSER TOGETHER TO AVOID UNNECESSARY PROXIMITY OUTAGES ON ADJACENT BAYS. TO BE REPEATED FOR ALL BAYS.

NOTE 6 (AS ILLUSTRATED ON DRAWING):
INDEPENDENT SUPPORTED SPAN ON LOW LEVEL BAY CONDUCTORS BETWEEN DA AND DB. CONNECTOR ON PI SHALL BE A "T" TYPE CONNECTOR RATHER THAN A PASS THROUGH CONNECTOR SUCH THAT IT SHALL BE CAPABLE OF CONNECTING TWO SECTIONS OF CONDUCTOR TOGETHER. PI AND SPAN TO BE INSTALLED ON ALL FUTURE BAYS IN THE C-TYPE (PHASE 1) STATION.

NOTE 7 (AS ILLUSTRATED ON DRAWING):
DISTANCE BETWEEN CT AND CB ON WING COUPLER TO BE A MINIMUM OF 6500mm FROM THE BUSBAR SIDE OF THE OPEN DISCONNECTOR. DISTANCE BETWEEN DISCONNECTOR AND ADJACENT LOW LEVEL BAY CONDUCTOR TO BE A MINIMUM OF 6500mm.

NOTE 8 (AS ILLUSTRATED ON DRAWING):
6500mm DISTANCE REQUIRED BETWEEN BUSBAR AND CB ON EACH BAY.

NOTE 9:
REFER TO THE AUXILIARY SUPPLY FUNCTIONAL SPECIFICATION XDS-GFS-008-001 FOR LV POWER SUPPLY REQUIREMENTS. THE SECONDARY MAINS LV SUPPLY IS TO BE PROVIDED FROM THE LOCAL MV DISTRIBUTION NETWORK. THIS CAN BE VIA A POLE MOUNTED TRANSFORMER LOCATED OUTSIDE THE PALISADE FENCE OR VIA A GROUND MOUNTED TRANSFORMER IN A KIOSK LOCATED INSIDE THE PALISADE FENCE. THE PRECISE LOCATION OF THE POLE MOUNTED TRANSFORMER AND THE GROUND MOUNTED TRANSFORMER, AS THE CASE MAY BE, ARE SITE SPECIFIC AND WILL BE BY AGREEMENT WITH EIRGRID.

NOTE 10:
THIS LAYOUT RELATES PRIMARILY TO NEW SUBSTATIONS AND SIGNIFICANT EXTENSIONS PROJECTS. OTHER DEVELOPMENT OF EXISTING SUBSTATIONS (BROWN-FIELD) SHALL MAKE ALL REASONABLE EFFORTS TO BRING THE ARRANGEMENT IN LINE WITH THIS STANDARD (INCREASED CLEARANCES, NEW WRAP-AROUND COUPLER, AND SECTIONALISER CONFIGURATION). THE DEVELOPMENT SHALL NOT WORSEN ANY EXISTING O&M CLEARANCES WHICH MAY NOT BE IN ACCORDANCE WITH THIS STANDARD LAYOUT.

NOTE 11:
REQUIREMENT & POSITION OF SA/CT/VT IN THE CUSTOMER COMPOUND IS TO BE DETERMINED BY THE CUSTOMER. IT IS THE RESPONSIBILITY OF THE CUSTOMER TO ENSURE THAT THEIR TRANSFORMER IS SUITABLY PROTECTED FROM OVER VOLTAGES.

NOTE 12:
MINIMUM ELECTRICAL CLEARANCES SHALL COMPLY AS OUTLINED IN EIRGRID GENERAL REQUIREMENTS SPECIFICATION XDS-GFS-00-001.

NOTE 13:
PHASE ROTATION ON INCOMING CIRCUITS IS INDICATIVE AND SHALL BE VERIFIED BASED ON PARTICULAR PROJECT REQUIREMENTS.

NOTE 14:
A DETAILED ARRANGEMENT SHALL CONSIDER PROXIMITY OF THE PROPERTY BOUNDARY FENCE TO THE PALISADE FENCE, ENSURING THAT IT CANNOT BE USED AS A CLIMBING AID TO SCALE THE PALISADE FENCE. ARRANGEMENT SHALL BE SITE SPECIFIC AND SHALL BE AGREED WITH EIRGRID DURING THE DETAILED DESIGN PHASE.

NOTE 15 (AS ILLUSTRATED ON DRAWING):
INTERFACE KIOSK LOCATION IS INDICATIVE. FINAL POSITION TO BE AGREED.

NOTE 16 (AS ILLUSTRATED ON DRAWING):
FOR OHL BAYS WHERE A LINE TRAP IS NOT REQUIRED, THE SA SHOULD BE LOCATED UNDER THE OHL GANTRY.

NOTE 17:
THE CUSTOMER SHOULD ALLOW SPACE FOR A FUTURE TRANSFORMER CONNECTION IN THE AREA ADJACENT TO THE CUSTOMER COMPOUND AND TRANSMISSION STATION.

REV	DESC	DRAWN	CHECKED	APPROVED	DATE
08	CONTROL BUILDING RELOCATED CLOSE TO STATION ENTRANCE TO OPTIMISE SUB-STATION FOOTPRINT. WING COUPLER BAYS AMENDED TO INCLUDE SUPPLEMENTARY PIs NEXT TO THE CTs AND CBs. PIs ON FEEDER AND TRAFO BAYS REPOSITIONED CLOSER TO THE CB. SECTIONALISING BAY SA1 & SB1 NO LONGER REQUIRED IN PHASE 1 BUILD.	DA	AB	AG	04/02/2021
07	REQUIREMENT FOR INDEPENDENT SPAN (NOTE 6) UPDATED; INDICATIVE CABLE BAY ADDED; CUSTOMER BAY MODIFIED; ROAD ARRANGEMENT MODIFIED; BOUNDARY FENCE MODIFIED; CONTROL BUILDING UPDATED; SHEET 02 ADDED;	JD	KMcG	CF	22/08/2019

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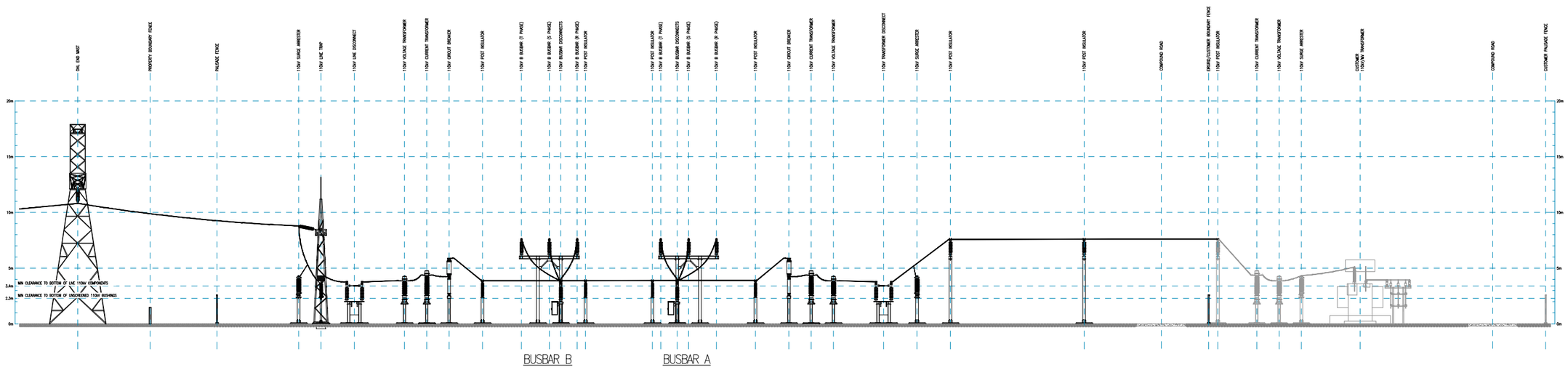
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PROJECT
110kV STATION DESIGN STANDARD
AIS LOOP STATION

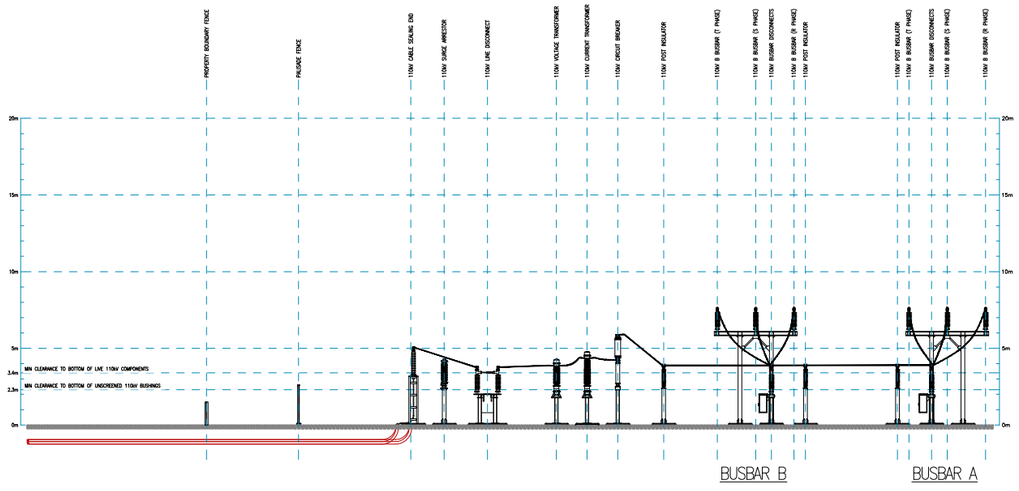
DRAWING TITLE
INITIAL C-TYPE 110kV STATION
AND FUTURE ENHANCED RING STATION
PLAN VIEW

No of Shts	SIZE	SCALE
2	A3	NTS

DRAWING NUMBER	SHEET	REV
XDN-LAY-ELV-STND-H-001	001	08



SECTION A



SECTION B

REV	DESC	DRAWN	CHECKED	APPROVED	DATE
08	CONTROL BUILDING RELOCATED CLOSE TO STATION ENTRANCE TO OPTIMISE SUB-STATION FOOTPRINT. WING COUPLER BAYS AMENDED TO INCLUDE SUPPLEMENTARY PIs NEXT TO THE CTs AND CBs. PIs ON FEEDER AND TRAFO BAYS REPOSITIONED CLOSER TO THE CB. SECTIONALISING BAY SA1 & SB1 NO LONGER REQUIRED IN PHASE 1 BUILD.	DA	AB	AG	04/02/2021
07	REQUIREMENT FOR INDEPENDENT SPAN (NOTE 6) UPDATED; INDICATIVE CABLE BAY ADDED; CUSTOMER BAY MODIFIED; ROAD ARRANGEMENT MODIFIED; BOUNDARY FENCE MODIFIED; CONTROL BUILDING UPDATED; SHEET 02 ADDED;	JD	KMcG	CF	22/08/2019

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PROJECT
110kV STATION DESIGN STANDARD
AIS LOOP STATION

DRAWING TITLE
INITIAL C-TYPE 110kV STATION
AND FUTURE ENHANCED RING STATION
ELEVATION VIEW A

No of Shts	SIZE	SCALE
2	A3	NTS

DRAWING NUMBER	SHEET	REV
XDN-LAY-ELV-STND-H-001	002	08

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APPENDIX 2

Outline Construction Methodology – TLI Group

OUTLINE CONSTRUCTION METHODOLOGY

Cappakeel Solar Farm 110 kV

Grid Connection and Substation

Perigus Energy

Revision:	Author:	Checked:	Approved:	Date:	Notes:
00	BG & TOC	KC	ER	01.12.2025	Issued for Information
01	BG & TOC	KC	ER	19.12.2025	Issued for Information
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04	BG & TOC	KC	ER	20.03.2026	Issued for Planning
05	BG & TOC	KC	ER	16.06.2026	Issued for Planning

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Abbreviation	Definition
BGL	Below Ground Level
ECC	Earth Continuity Conductor
EIA	Environmental Impact Assessment
ESBN	Electricity Supply Board Networks
GNI	Gas Networks Ireland
HDD	Horizontal Directional Drilling
HV	High Voltage
JB	Joint Bay
UGC	Underground Cable
IPP	Independent Power Producer
OHL	Overhead Line

1 Introduction

1.1 Background

TLI Group ("the Consultant") were engaged by Perigus Energy ("the Client") to identify and analyse potential 110kV loop in options available for the Cappakeel Solar Farm Project, which is currently being developed by Perigus Energy ("the Developer") and will connect the Tail-fed Substation into the existing Cushaling – Port Laoise 110kV Overhead line (OHL).

The Consultant was engaged by the Client to identify and analyse potential 110kV grid connection options available for the proposed Cappakeel Solar Farm Substation to the Coolnabacky 110 kV Substation.

Coolnabacky 110 kV is a new substation located to the south-east of Portlaoise at Coolnabacky, designed to accommodate both voltage levels. For the Cappakeel project, this substation will be referred to as Coolnabacky 110 kV Substation.

This project will have an estimated Maximum Export Capacity (MEC) of 170 MW.

1.2 Purpose of this document

The purpose of this document is to outline and explain the construction techniques and methodologies which will be implemented during construction of the 110kV EirGrid standard substation and the loop-in grid connection from the existing Cushaling – Port Laoise 110kV line to the substation, it will also explain the implementation of the Cappakeel Solar Farm grid connection to the Coolnabacky 110 kV Substation.

The 110kV loop-in grid connection will consist of constructing two masts and a new standard EirGrid loop in substation. The Cappakeel Substation will be connected via 2 no. 110kV UGC circuits to the 2 no. mast structures that will intersect with the existing Cushaling – Port Laoise 110kV line. The OHL works will consist of the installation of 2 no. masts and terminating the existing phase conductors on those masts.

The Underground Cable (UGC) grid connection will consist of a single 110kV UGC circuit, which will be installed predominantly within the public road network. The UGC works will consist of the installation of 6 no. ducts in an excavated trench to accommodate 3 no. power cables, 2 no. fibre communications cables and 1 no. earth continuity conductor (ECC). The fibre communications cable will allow communications between the proposed Cappakeel Solar Farm 110kV Substation and the Coolnabacky 110 kV Substation access road.

This document is intended to be used as an aid to understand the methodologies to be employed during construction and should be read in conjunction with all other specialist reports and drawings which accompany the planning application. In addition, this document is in outline form only and will be revised and updated prior to the commencement of any construction activities. Detailed method statements will be prepared in respect of each aspect of the development.

For the purposes of the planning application, this document should be read in conjunction with the Planning and Environmental Report (Chapters Dev. Description / Policy etc, Environmental Impact Assessment (EIA), Traffic and Transport, Noise and Hydrology), Construction and Environmental Management Plan (CEMP), Natura Impact Statement (NIS), Archaeology Report, Landscape and Visual Impact Assessment (LVIA), Glint and Glare and Flood Riak Assessment Report (FRA).

2 Proposed Grid Connection Route Summary

2.1 Loop-in grid connection route summary

The loop-in grid connection route is approximately 348 m in length, as described in Table 1 and showing in Figure 1 below:

Ref	Section Description	Route Length (approx.)
Section 1 Tower 156A – Substation	Installation of one 110 kV Steel Line Cable Interface Mast Type 1493ET with shield wire to be connected as UGC to the Cappakeel Substation.	195 m
Section 2 Tower 157A – Substation	Installation of one 110 kV Steel Line Cable Interface Mast Type 1493ET with shield wire to be connected as UGC to the Cappakeel Substation.	153 m
Total		**348 m**

Table 1: Loop-in Grid Connection Route Section Summary

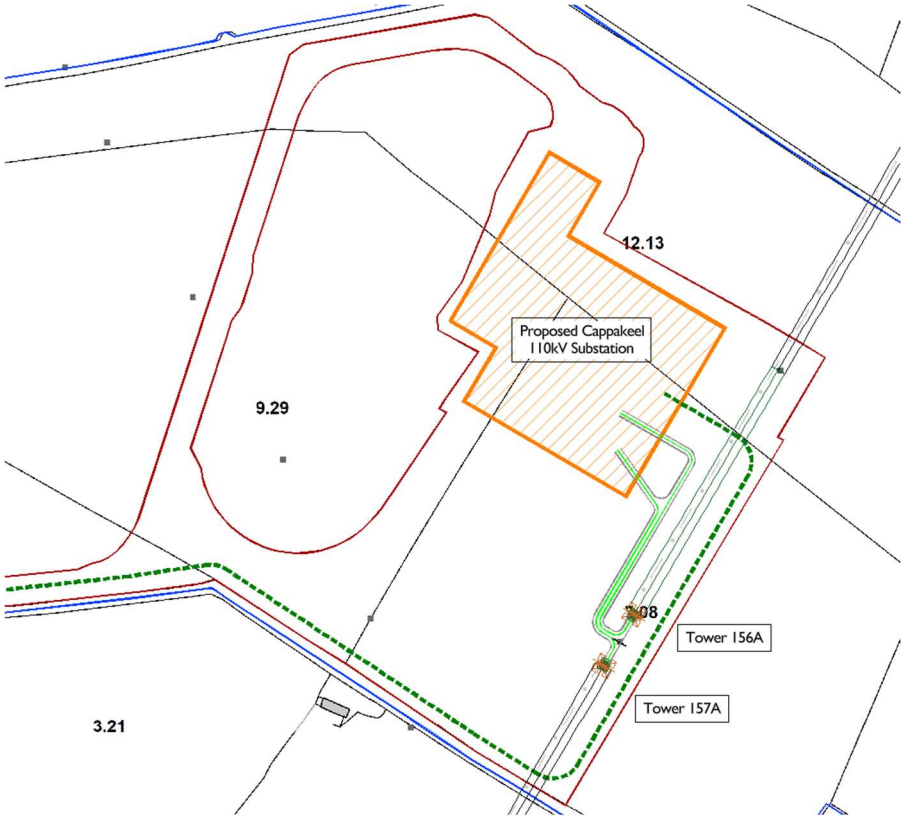


Figure 1: Loop-in Grid Connection Route

2.2 Overall UGC Grid Connection Route

The Grid connection route is approximately 13.7km in length and will travel in a southerly direction from the proposed Cappakeel Solar Farm 110 kV Substation to the Coolnabacky 110 kV Substation access road with most of the Grid connection route situated in the public road network.

The Grid connection route begins by exiting the Cappakeel Solar Farm 110 kV Substation, which is located in Morett, County Laois. The UGC exits through the western boundary of the Cappakeel Solar Farm, travelling northwest for a short distance of 1.2 km through private access track before reaching the L-7815 public road.

The Grid connection route turns south along the L-7815 for approximately 930 m before merging onto the L-3813 local road heading towards the Rock of Dunamase. The cable will traverse approximately 4.3 km onto L-3813 to reach at the at the T-junction with the local road L-7830. Along this section, the UGC route will cross one bridge, two culverts (C1 & C2), two cattle grids, and navigate narrow road sections while running parallel with Uisce Éireann assets. It should be noted that at this point of the route, the UGC passes through a proposed Natural Heritage Area (pNHA).

Continuing along the L-7830 local road for approximately 60 m, it diverts towards the access road located between the Rock of Dunamase and Trinity Holy Church to connect with the L-6831 local road. The UGC will continue along the L-6831 for approximately 1 km until it reaches the junction with the National Road N-80. Here the UGC route under crosses a medium-pressure gas pipeline and Uisce Éireann.

The UGC route then crosses the N-80 national road junction before merging onto the L-6772 then progresses southwest for approximately 2.59 km, until it joins the L-7832 local road and traverses southwest for 480m before joining the R-426 regional road traveling southeast. Along this section the UGC will run parallel with Uisce Éireann follows with narrow road widths, and sharp bends.

The route then continues onto the R-426 for an additional 3.1 km, traversing the R-427 regional road and Uisce Éireann at the junction until it reaches at the start of access road turning towards the Coolnabacky 110 kV substation.

The overall location of the grid connection route, the Cappakeel Solar Farm boundary and Coolnabacky 110 kV Substation location is shown in Figure 2 below.



Figure 2: Map Indicating overall location of Cappakeel Solar Farm and Grid Connection Route

2.3 Grid connection route summary

Table 2 below gives a summary of the grid connection routes location regarding public road network road types and private land ownership.

Description	Route Length
National Roads	0.06 km
Regional Roads	3.1 km
Local Primary Roads	4.3 km
Local Secondary Roads	5.1 km
Total Road Network	**12.56 km**
Private Lands[1] (Access Track)	1.2 km
Total Off Road Network	**1.2 km**
Total Route Length	**13.7 km**

Table 2: Grid Connection Route Summary

2.4 Section-by-section summary

As an aid to understanding, the grid connection route has been broken into four shorter sections as shown in Table 3 below. Each of these route sections is described in further detail in Sections 2.4.1-2.4.4 below. Across all sections of the UGC route, there is 20 no. of 110 kV joint bays required to accommodate the 13.7 km circuit.

Ref	Section Description	Route Length
Section 1	The T-junction of R-426 near Coolnabacky 110 kV Substation access road to the junction of R-426 merging to L-7832.	3.1 km
Section 2	The junction of R-426 with L-7832 to the junction of L-7830 with L-3813.	4.2 km
Section 3	The junction of L-7830 with L-3813 near Rock of Dunamase to the junction of L-3813 with L-7815	4.3 km
Section 4	The junction of L-3813 with L-7815 towards the proposed Cappakeel SF 110 kV Substation	2.1 km
Total		**13.7 km**

Table 3: Grid Connection Route Section Summary

2.4.1 Route Section 1 Summary (Approximate length 3.1 km)

The grid connection route begins following the regional road R-426 for approximately 3.1 km, crossing the R-427 regional road at the junction until it merges onto the L-7832 heading northeast. This section of the route is relatively flat with relatively slow long bends.

Features:

- Joint Bay 1 (JB-01) will be located approximately 25 m from the Coolnabacky 110 kV substation access road. It is proposed that this Joint Bay will be installed within the R-426 regional road.
- Joint Bay 2 (JB-02) will be located approximately 750 m from Joint Bay 1. It is proposed that this Joint Bay will be installed within the R-426 regional road.
- Joint Bay 3 (JB-03) will be located approximately 770 m from Joint Bay 2. It is proposed that this Joint Bay will be installed within the R-426 regional road.
- Joint Bay 4 (JB-04) will be located approximately 760 m from Joint Bay 3. It is proposed that this Joint Bay will be installed within the R-426 regional road.
- Joint Bay 5 (JB-05) will be located approximately 750 m from Joint Bay 4. It is proposed that this Joint Bay will be installed within the R-426 regional road.

[1] Access track within the Cappakeel Solar Farm boundary.

2.4.2 Route Section 2 Summary (Approximate length 4.2 km)

Section 2 for the grid connection route continues along the L-7832 local road and traverses northeast for 480m before joining L-6772 local road. Along this section the UGC will run parallel with Uisce Éireann follows with narrow road widths, and couple of sharp bends until it reaches at the junction with R-426 regional road.

The UGC route then progresses northwest for approximately 2.59 km, until the route crosses the N-80 national road joining the L-6831 local road. Here the UGC route under crosses a medium-pressure gas pipeline and Uisce Éireann services.

The UGC will continue along the L-6831 heading northeast for approximately 1 km until it reaches the Trinity Holy Church, it should be noted that this section of road is narrow. The route then continues north through an access road located between the Rock of Dunamase and Trinity Holy Church for approximately 115 m. The UGC then joins the L-7830 heading northeast for approximately 60m, where it merges onto the L-3813 local road.

Features:

There is 2 no. medium pressure GNI crossings and Uisce Éireann services crossings perpendicularly to the UGC at the N-80 National Road junction. These two-medium pressure GNI pipelines and Uisce Éireann services will be undercrossed within the N-80 National Road. The Uisce Éireann services running parallel for this whole section alongside the grid connection route and the grid route will also under cross Uisce Éireann services at multiple locations on this section. There is one LV UGC on this section of the grid connection route approximately 60 m southeast of the joint bay 6 which will be undercrossed. The grid connection route will cross under this cable as per EirGrid/ESB safety requirements.

- Joint Bay 6 (JB-06) will be located approximately 746 m from joint bay 5. It is proposed that this Joint Bay will be installed within the L-6772 local road.
- Joint Bay 7 (JB-07) will be located approximately 725 m from joint bay 6. It is proposed that this Joint Bay will be installed within the L-6772 local road.
- Joint Bay 8 (JB-08) will be located approximately 717 m from joint bay 7. It is proposed that this Joint Bay will be installed within the L-6772 local road.
- Joint Bay 9 (JB-09) will be located approximately 727 m from joint bay 8. It is proposed that this Joint Bay will be installed within the L-6772 local road.
- Joint Bay 10 (JB-10) will be located approximately 699 m from joint bay 9. It is proposed that this Joint Bay will be installed within the L-6831 local road.
- Joint Bay 11 (JB-11) will be located approximately 688 m from joint bay 10. It is proposed that this Joint Bay will be installed within the L-7830 local road.

2.4.3 Route Section 3 Summary (Approximate length 4.3 km)

This section of the grid connection route follows L-3813 local road. The grid route will be installed within the public road in parallel with other services in the road. The grid connection route will cross 2 Cattle Grids and 2 culverts, and 1 bridge continuing for approximately 4.3 km on the L-3813 until it reaches the T-junction merging onto the L-7815.

Features:

There are 2 culverts (C1, & C2) and 1 bridge encountered on this section of the grid connection route on the L-3813 local road. The crossing method for these culverts is proposed to be an undercrossing in flat formation, and the crossing method for the bridge is proposed to be an open trench. The grid connection route will under cross Uisce Éireann services at multiple locations on this section. The grid connection route will pass through the approximately 150 m stretch of pNHA.

- Joint Bay 12 (JB-12) will be located approximately 705 m from joint bay 11. It is proposed that this Joint Bay will be installed within the L-3813 local road.

- Joint Bay 13 (JB-13) will be located approximately 705 m from joint bay 12. It is proposed that this Joint Bay will be installed within the L-3813 local road.
- Joint Bay 14 (JB-14) will be located approximately 222 m from joint bay 13. It is proposed that this Joint Bay will be installed within the L-3813 local road.
- Joint Bay 15 (JB-15) will be located approximately 720 m from joint bay 14. It is proposed that this Joint Bay will be installed within the L-3813 local road.
- Joint Bay 16 (JB-16) will be located approximately 741 m from joint bay 15. It is proposed that this Joint Bay will be installed within the L-3813 local road.
- Joint Bay 17 (JB-17) will be located approximately 740 m from joint bay 16. It is proposed that this Joint Bay will be installed within the L-3813 local road.

2.4.4 Route Section 4 Summary (Approximate length 2.1 km)

The grid connection route continues along the L-7815 local road heading northeast for approximately 930m where the route will merge onto the access track within the proposed Cappakeel Solar Farm and travels for approximately 1.2 km where it will connect into the proposed Cappakeel 110 kV Substation.

Features:

- Joint Bay 18 (JB-18) will be located approximately 698 m from joint bay 17. It is proposed that this Joint Bay will be installed within the L-7815 local road.
- Joint Bay 19 (JB-19) will be located approximately 680 m from joint bay 18. It is proposed that this Joint Bay will be installed within the L-7815 local road.
- Joint Bay 20 (JB-20) will be located approximately 680 m south of joint bay 19. It is proposed that this Joint Bay will be installed within the Cappakeel 110 kV Substation access road.

3 Preliminary Site Investigation

A Site Investigation (SI) was carried out at the location of the proposed 110 kV substation and loop-in towers. The SI works consisted of trial pits and percolation testing. These investigations were undertaken to establish the ground and groundwater conditions to a depth of approximately 3.0 m BGL, assess the suitability of the site for the disposal of stormwater runoff via soakaways as part of the substation drainage strategy, and provide information for the design of the foundations for the loop-in towers.

A total of 13 No. trial pits and 4 No. percolation tests were completed within the footprint of the proposed substation. The intrusive SI works were conducted on 15 and 16 December 2025.

The Cappakeel Site Investigation Factual Report (300100925-CS-R-10-00) should be read in conjunction with this OCM to support a full understanding of the SI findings.

4 Access Routes to Work Area

Access tracks, combined towers laydown and crane hardstand area (80x30m), and combined pole laydown and crane hardstand area (28x20m) will be utilised for the structure installation and erection on the consented land (if required due to ground conditions and/or landowner requirements) will consist of crushed rock on a geotextile. Upon completion of the works, all access tracks will remain in place for future access to the substation and solar farm grounds. Access routes will be carefully selected to avoid any damage to land. Local consultation will be carried out with the relevant landowners to ensure that any potential disturbance will be minimised. Prior to the commencement of construction, the contractor will assess all access routes and determine specific requirements for each area. Any such requirements will be incorporated into the relevant method statement.



Figure 3: Crushed Rock Roadway build-up with Geotextile



Figure 4: Crane Pad and Laydown Areas

Most of the underground cable route will be installed within the public road network. Where the cable route is located on private lands, contractor(s) will be required to utilise the private access roads, where appropriate as agreed.

A Traffic Management Plan (TMP) will be prepared and agreed with the various stakeholders who have a wayleave agreement along the affected construction area, prior to the commencement of construction. Some work areas will require a road closure where it is not possible to safely implement a Stop/Go system. Where road closures are necessary, a suitable diversion will be implemented using appropriate signage, following consultation with Laois County Council.

Careful and considered local consultation will be carried out, to minimise the amount of disturbance caused during works. Prior to the commencement of construction, the contractor will assess all access routes and determine any

additional access requirements which will be incorporated as part of the method statement. All plant and equipment employed during the works (e.g., diggers, tracked machines, footwear etc.) will be inspected prior to arrival on site and on leaving site and cleaned where necessary to prevent the spread of invasive aquatic / riparian species.

5 Traffic Management

Traffic management and road signage will be in accordance with the Department of Transport: Traffic Signs Manual - Chapter 8: Temporary Traffic Measures and Signs for Road Works and in agreement with Laois County Council. All work on public roads will be subject to the approval of a road opening license application by Laois County Council. The contractor will prepare a detailed traffic management plan for inclusion as part of the road opening applications. Where road widths allow, the UGC installation works will allow for one side of the road to be open to traffic at all times by means of a 'Stop/Go' type traffic management system, where a minimum 2.5m roadway will be maintained at all times.

Where it is not possible to implement a 'Stop/Go' system a full road closure will be required. 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. Typically, the UGC will be installed in 150 metres sections, and no more than 100 metres will be excavated without most of the previous section being reinstated. Where the construction requires the crossing of a road, works on one carriageway will be completed before the second carriageway is opened, to maintain traffic flows.

All construction vehicles will be parked within the works area so as not to cause additional obstruction or inconvenience to road users or residents. Any traffic signals required will be in place prior to the works commencing and will remain in place until after the works are completed. The public road will be checked regularly and maintained free of mud and debris. Road sweeping will be carried out as appropriate to ensure construction traffic does not adversely affect the local road condition.

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.

All traffic management measures will comply with those outlined within the accompanying planning and environmental report will be incorporated into a detailed Traffic Management Plan to be prepared, in consultation with Laois County Council prior to the commencement of UGC construction.

6 Road Opening Licence

The UG grid connection works will require a road opening licence under Section 254 of the Planning and Development Act 2000-15 from Laois County Council. A Traffic Management Plan (TMP) will be agreed with Laois County Council prior to the commencement of the development. 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 Laois County Council in advance of the preparation of the TMP.

7 Construction Hours

Standard working hours for construction will be 8:00 - 19:00 Monday to Friday, and 8:00 - 18:00 on Saturday (if required), with no works on Sundays or Bank Holidays except in exceptional circumstances or in the event of an emergency. If required, all local residents will be notified.

8 Loop-in Masts Construction Methodology

8.1 Existing 110 kV OHL

The proposed Cappakeel Solar Farm 110kV loop-in station will connect into the existing Cushaling – Port Laoise 110kV line. The 2 no. new end masts will be placed either side of existing pole set No.157. Pole set 157 is to be removed

after the installation of the 2 no. new cable interface masts (proposed masts No. 156A and 157A). Pole set No. 156 is to be replaced with larger poles. Presently pole set 156 consists of 2 no. 16m poles. These will need to be replaced with 2 no. 21m poles.

The proposed design for the 110kV Loop-In from the existing OHL will require two new 15m 1493ET mast structures, which will be constructed under the existing Cushaling – Port Laoise 110kV line. The existing OHL conductor will be terminated at these towers connecting to the substation via UGC.

The duration of works for the overhead line construction is expected to be approximately 12 weeks. Construction of foundations for masts circa. 7 days each with time allowing for curing of the concrete, erection of the masts circa 5 days each, weather dependant. Stringing of conductor will be a 2-week process and final connection to the existing grid will be carried out by ESBN and at that point in time commissioning of the substation can start.

8.2 Steel Mast Structures

The proposed mast structure locations have been selected based on ground surveys, ground profiles, sight lines and ruling span checks.

The proposed construction scope will require the relevant personnel, machinery and materials which is as follows:

Equipment	**Materials**
• 5 operatives • 4x4 vehicle • Winch • Tractor and trailer • Crane • Teleporter • Chains / small tools • Tracked Excavator • Tracked Dumper • Sheet Piling Rig	• 2 Cable Interface Masts • Insulators • Electrical connections • Concrete (foundation) • Aggregate

Table 4: Steel Mast Equipment and Materials

The following section outlines the methodology to be followed during construction works of the new mast structures.

1. Mast sites are scanned for underground services such as cables, water pipes etc. Consultation with the landowners will help to identify hazards and ensure there are no unidentified services in the area.
2. For each leg of the 2 No. masts (8 legs in total) a foundation circa. 4.3m x 4.3m x 3m deep is required. To allow for safe construction, the excavation will be stepped back which requires additional area to be excavated, or shutter piles used if ground material is not suitable for benching. The formation levels (depths) will be checked by the onsite engineer. The excavated material will be temporarily stored close to the excavation and excess material will be used as berms along the site access tracks.
3. To aid construction, a concrete pipe is placed into each excavation to allow operatives level the mast at the bottom of the excavation. The frame of the reinforcing bars will be prepared and strapped to a concrete pipe with spacers as required. The reinforcing bars will be lifted into each excavated foundation using the excavator and chains/slings. The base and body section of each mast will then be assembled next to the excavation.
4. Concrete trucks will pour concrete directly into each excavation in distinct stages.
5. A final pour for the mast is the encasing of the mast leg which will be finished 300mm over finished ground level. The leg of the mast is required to be shuttered with metal panels to form the required shape.

6. Once the concrete is set after five days the shuttering is removed and if used sheet piles removed.



Figure 5: Typical 110kV mast foundation excavation

7. The Mast foundations will be backfilled one leg at a time with the material already excavated at the location. The backfill will be placed and compacted in layers. All dimensions will be checked following the backfilling process. All surplus excavated material will be removed from the mast locations and stored in berms for reuse across the construction site.



Figure 6: Base of mast structure backfilled

8. Once the base is in place the line will be de-energised by ESB so the remainder of the tower cab be built during the approved outage.
9. An earth mat consisting of copper or aluminium wire will be laid circa 400mm below ground around the mast. This earth mat is a requirement for the electrical connection of the equipment on the mast structure.
10. Once the base section of each mast is completed and the concrete sufficiently cured, it is ready to receive the mast body.
11. A hardstand area for the crane will be created by laying geogrid material on the ground surface and overlaying this geogrid with a suitable grade of aggregate.
12. A physical barrier (Heras Fence Site Boundary) will be put in place to restrict plant from coming too close to the OHL.
13. The mast will be constructed lying flat on the ground beside the recently installed mast base.
14. The conductor will be moved off centre using a stay wire and weights to anchor the stay wire to ground.
15. The mast section will be lifted into place using the crane and guide ropes.
16. The body sections will be bolted into position.
17. The conductor will be centred over the masts and held in place. Once the conductor is secured at both ends it is then cut and attached onto each mast. The section of conductor in between the two masts will be removed and utilised as connector wire for the new masts.
18. Down dropper conductors (for electrical connections, insulators, surge arrestors), shackles and all associated accessories required for transition from line to cable will be installed on the interface masts.
19. The circuit will be tested in both directions before the line is re-energised.





Figure 7: Cable End Mast

9 Proposed Substation Build Construction Methodology

The Cappakeel Solar Farm 110kV Substation will be constructed to loop-in the existing Cushaling – Port Laoise 110kV line. The substation will be made up of a control building, transformer compound, electrical equipment and a shunt filter. The control building works will consist of foundation works, block work, roofing, low voltage electrical fit out, cladding and building finishing works. The transformer, cable chair and structural steelwork will be installed in the transformer compound. Substation electrical equipment will be installed once the control building and compound is complete. Palisade fencing will be erected around the compound for security/protection and a concrete post and rail fence to mark the substation boundary.

9.1 110 kV Loop-in and Tail-Fed Substation

The proposed construction scope will require the relevant personnel, machinery and materials which is as follows:

Equipment	**Materials**
• Up to 10 Electrical/Civil Crews • Tracked Excavators • 360˚tracked excavators (13 ton normally, 22 ton for rock breaker) • Tracked dumpers / tractors and trailers • Crane • Hoist • Power Tools • Generator • Scaffolding	• Stone • Geotextile • Lighting • Paving. • Fencing • Steel Uprights • Concrete • Timber • Cladding • Doors

The following section outlines the methodology to be followed during construction works of the new 110 kV substation.

1. This new substation will consist of a costumer compound (IPP side) of circa 4,270m^2 and an EirGrid compound of circa 13,480 m^2 surrounded by a 2.6m high palisade fence.
2. A level compound area will be created using cut and fill methods.
3. The substation compound and drainage will be marked out by a qualified engineer.
4. A drainage system will be excavated and installed around the compound area.
5. Topsoil and subsoil will be removed from the footprint of the compound using an excavator. The excavated material will be stored separately and temporarily on adjacent berms for later use during reinstatement works.
6. A layer of geotextile material will be laid over the footprint of the compound.
7. Using an excavator, a base layer of Clause 804 material will be laid followed by a 6F2 capping layer which will provide the finished surface.
8. Each layer will be compacted using a vibrating roller.
9. Earthing cable will be laid underground around the substation for connection to the various electrical components during the electrical fit out phase.
10. The construction of a substation compound circa 17,750m², comprising of approx. 437.5m² single storey 110kV substation control building, a 403.5m² IPP building and associated outdoor electrical equipment, including 1 no. 110kV transformer, associated internal access track, 2.6m high station perimeter fencing and concrete post and rail property boundary fence will be built.

11. Adequate lighting will be installed around the compound on the lighting masts.
12. Lightning protection masts of approximate height 18m will be installed to protect the station from direct lightning strikes.
13. The electrical installation is expected to take 16 weeks and includes the following:
    - Delivery and installation of 33/110kV transformer. The deliveries will be managed in accordance with regulations governing the movement of large loads.
    - Delivery and installation of all other HV equipment.
    - Wiring and cabling of HV/LV equipment, protection, and control cabinets.
    - Commissioning of all newly installed equipment.



Figure 8: Typical 110kV Electrical Infrastructure



Figure 9: Typical 110kV Transformer Connection

10 UGC Construction Methodology

The UGC for the loop-in connection will consist of 2 No. trenches with a minimum of 2.3m separation distance between each circuit. Each circuit will consist of 3 no. 160 mm diameter HDPE power cable ducts, 2 no. 125 mm diameter HDPE communications duct and 1 no. 125 mm Earth Continuity Conductor duct to be installed in an excavated trench between the proposed solar farm substation and existing Cushaling – Port Laoise 110kV line.

The UGC grid to Coolnabacky 110 kV Substation will consist of 3 no. 160 mm diameter HDPE power cable ducts, 2 no. 125 mm diameter HDPE communications duct and a 125 mm Earth Continuity Conductor duct to be installed in

an excavated trench between the proposed solar farm substation and the Coolnabacky 110 kV Substation access road.

The standard trench is 825 mm wide, 1315 mm deep, with variations in this design to adapt to service crossings and watercourse crossings, etc., where applicable. The power cable ducts will accommodate one power cable per duct. The communications duct will accommodate a fibre cable to allow communications between the substations. The ducts will be installed, the trench reinstated in accordance with the private third-party landowners and Laois County Council specifications. Once all are satisfied, then the electrical cabling/fibre cable is pulled through the installed ducts in up to approximately 220 to 780 m sections. Construction method statements and templates will be implemented to ensure that the UGC is installed in accordance with the correct requirements, materials, and specifications of EirGrid.

10.1 Trenching Methodology

The following section outlines the methodology to be followed during trenching works:

- 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 and environmental report and as required by planning conditions where relevant.
- All existing underground services along the Grid connection route shall be confirmed 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 and environmental report, the detailed Construction Environmental Management Plan (CEMP) and best practice construction methodologies.
- 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 EirGrid and Uisce Éireann specifications.
- If culverts require removal for ducting installation, a suitable method of damming the water source and pumping the water around the work area will be set out in a method statement and agreed with the relevant stakeholders. Once the ducts are installed the culvert will be reinstated to match existing levels and dimensions. If works of this nature are required, the contractor will liaise with Inland Fisheries Ireland (IFI) in advance of works.
- Traffic management measures will be implemented in accordance with those included in the planning and environmental report, and a detailed Traffic Management Plan will be prepared and agreed with the local authority.
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2 m in height. Stockpiles will be located a minimum of 50 m from surface water features and 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 to the on-site borrow pit.
- 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-metre section will only be excavated once most of the reinstatement has been completed on the first section.

- The excavation, installation and reinstatement process will take on average of two days to complete a 100-metre 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.
- Following the installation of ducting, pulling the cable will take approximately one day between each joint bay. The jointing of cables will take approximately 1 week per joint bay location.



Figure 10: Typical 110 kV Underground Duct Installation

10.2 Ducting Installation Methodology

For the trenching and ducting works the following step-by-step methodology will apply:

1. Grade, smooth and trim trench floor when the required 1315 mm depth and 825 mm width have been obtained.
2. Place bedding layer of Cement Bound Granular Mixture B (CBGM B) material in accordance with the specification and compact it so that the compacted thickness is as per the drawings.
3. Lay the bottom row of ducts in trefoil formation as detailed on the design drawings. Use spacers/templates as appropriate to establish horizontal duct spacing. Fit a secure cap / bung to the end of each duct run to prevent the ingress of dirt or water.
4. Carefully surround and cover ducts with CBGM B in accordance with the design drawings and specifications and thoroughly compact without damaging ducts.
5. Place cable protection strips on compacted CBGM B directly over the ducts.
6. Lay the top row of ducts onto the freshly compacted CBGM B including the cable protection strips above the bottom row of ducts. Place a secure cap at the end of each duct to prevent the ingress of dirt or water.
7. Carefully surround and cover ducts with CBGM B material in accordance with the drawings and thoroughly compact without damaging ducts.
8. Place red cable protection strip on top of compacted CBGM B over each set of ducts as shown on the drawings.
9. Place and thoroughly compact CBGM B material or Clause 804 backfill, or soil backfill as specified and place warning tape at the depth shown on the drawings.
10. For concrete and asphalt/bitmac road sections, carry out immediate permanent reinstatement in accordance with the specification and to the approval of the local authority and/or private landowners, unless otherwise agreed with local authorities (Figure 11).

11. For unsurfaced/grass sections, backfill with suitable excavated material to ground level leaving at least 100 mm topsoil or match existing level at the top to allow for seeding or replace turves as per the specification of the local authority or landowner (Figure 12).
12. Clean and test the ducts in accordance with the specification by pulling through a brush and mandrel. Install 12 mm polypropylene draw rope in each duct and seal all ducts using robust duct end seals fitted with rope attachment eyes in preparation for cable installation later. All the works should be witnessed by ESBN Clerk of Works (CoW) as required.

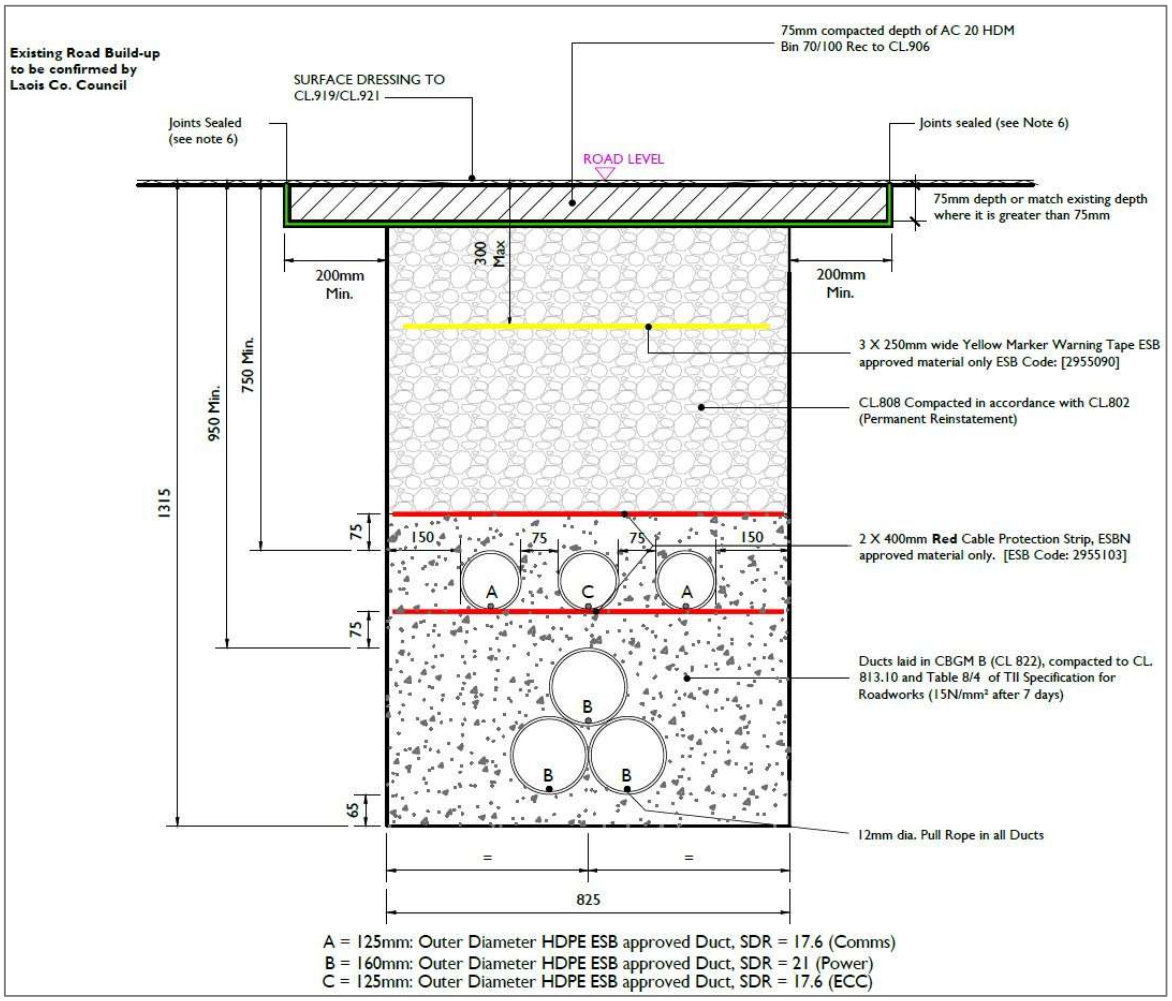


Figure 11: Typical Trench in Roadway

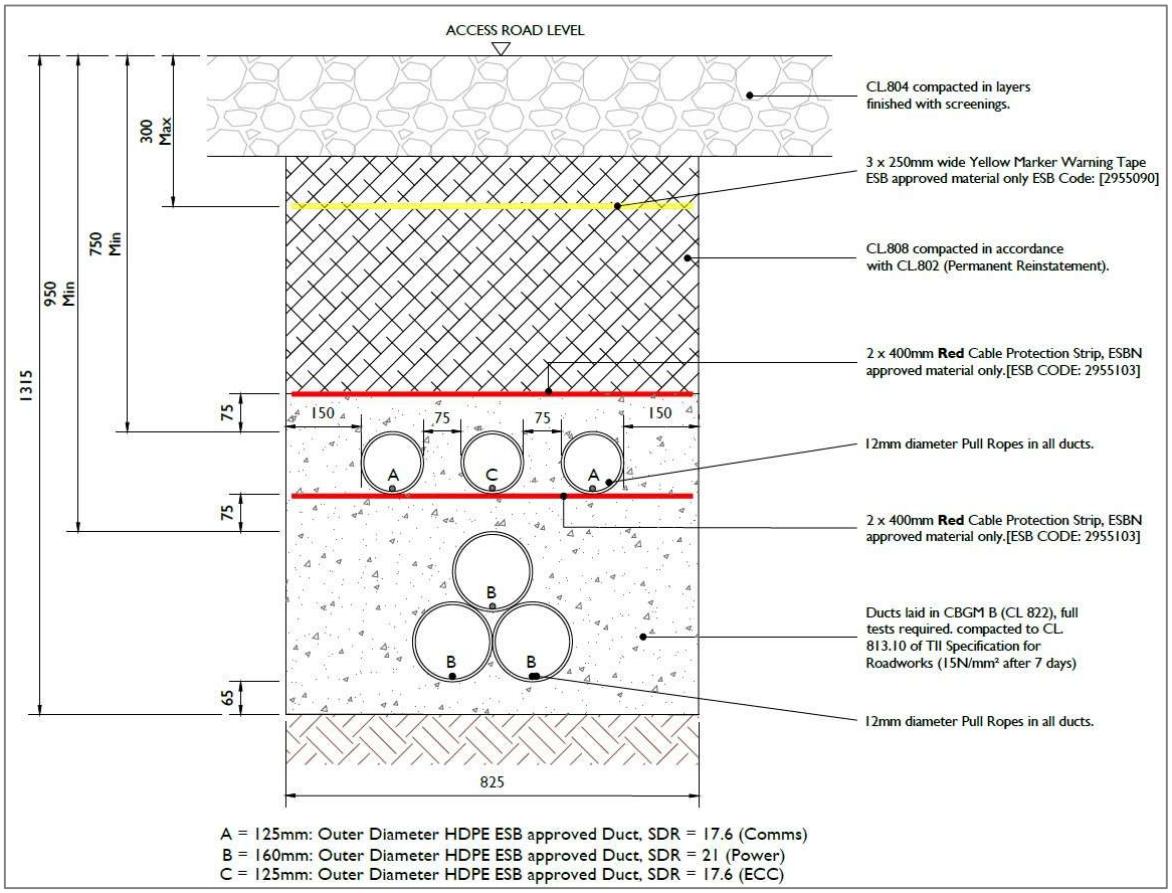


Figure 12: Typical Trench in Off -Road Section

10.3 UGC Installation on Private Land

Where the cable is to be laid in previously green-field areas, the exact location of the cable trench will depend on several factors such as width of track, bends along the track and crossings. Where the existing tracks need to be widened, stone will be brought in to build up the area to the same level of the existing track. The excess material from the track will be used elsewhere on reinstatement works or removed from site and disposed of at a licenced facility.

On existing private roads or access tracks, the cable trench will be installed in the non-trafficked strip between the wheel marks. The cable will be micro-sited based on the presence of exiting utilities and the nature of the road and the adjoining terrain.

10.4 Cable Pulling

Once the ducting is installed the electrical cables (situated on a drum) are pulled through the ducting by a specialised mechanical winch. The winch will also monitor the tension on the cables being pulled so as not to damage the cables. A guide rope is installed with the ducting to assist in the cable pulling process. The guide rope also is used for proving the ducts by attaching a mandrel, a sponge or brush, for cleaning the duct installed. Cable lubricant is applied to the outside of the cables being pulled through the duct. The lubricant assists in the pulling process by removing friction between the cable and the rollers. This not only speeds up the process but also prevents snagging and therefore damage to the cable.

10.5 Marker Posts

Surface cable markers will be placed along the route where cable depth is unavoidably shallow, due to constraints such as existing services, to indicate the precise location of the UGC. These markers will be metallic plates in accordance with ESBN and EirGrid standards.

Marker posts will be used on non-roadway routes to delineate the cable route and joint bay positions. Corrosion proof aluminium triangular danger sign, with 700 mm base, and with centred lightning symbol, on engineering grade fluorescent yellow background shall be installed in adequately sized concrete foundations. Marker post shall also be placed in the event that burial depth is not to standard. Siting of marker posts to be dictated by ESBN as part of the detailed design process (Figure 13).

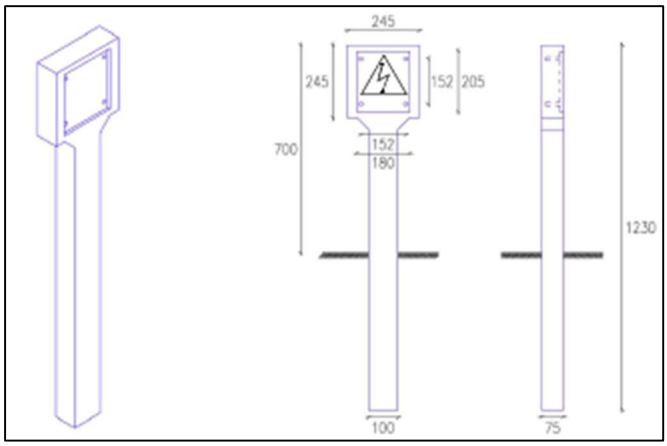


Figure 13: Typical ESB Marker Post Example

10.6 Managing Excess Material from Trench

All excavated material will be temporarily stored adjacent to the trench prior to re-use in the trench reinstatement (where applicable). Stockpiles will be restricted to less than 2 m in height. Where excess material exists, it may be used in the reinstatement of the borrow pit as part of the proposed 110 kV substation. Excavated tar from the public road network will be transported off site by an appropriately authorised waste collector and disposed of at an appropriately licenced waste facility.

10.7 Storage of Plant and Machinery

All plant, machinery and equipment will be stored on site within the UGC works area or within the temporary construction compound to be located nearby to the proposed Solar Farm substation. Oils and fuels will be stored in an appropriately bunded area within the temporary construction compounds.

Joints bays are to be installed with various separation distances approximately between every 220 m – 780 m along the grid connection route to facilitate the jointing of two lengths of underground cables. Joint bays are typically 2.6 m x 6 m x 1.75 m pre-cast concrete structures installed below finished ground level (Figure 14). Where possible joint bays will be in the non-wheel bearing strip of roadways, however given the narrow profile of local roads this will 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 110 kV solar farm substation and the existing 110 kV node at Coolnabacky 110 kV Substation. Earth sheath link chambers are also required at every joint bay along the cable route. Earth sheath links are used for earthing and bonding cable sheaths of underground power cables, so that the circulating currents and induced voltages are eliminated or reduced. Earth sheath link chambers and communication chambers are located in proximity to joint bays. Earth sheath link chambers and communication chambers will typically be pre-cast concrete structures with an access cover at finished surface level.

The precise siting of all joint bays, earth sheath link chambers, and communication chambers is subject to approval by EirGrid. Marker posts will be used on non-roadway routes to delineate the duct route and joint bay positions. The marker posts will consist of a corrosion-proof aluminium triangular danger sign, with a 750 mm base, and with a centred lightning symbol, on engineering grade fluorescent yellow background. They will be installed inadequately sized concrete foundations and will also be placed where the cable has not been buried to the standard depth, due to existing road conditions. Drawings of the joint bays and communication chambers are included within this planning package.

Equipment:

- 360° tracked excavator (wheeled excavator where required)
- 1 no. tracked dumper or tractor and trailer

Materials:

- Sand for pipe bedding
- Ready-mix Concrete where necessary (delivered to site)
- Trench backfilling material (excavated material and aggregates) to relevant specifications
- Precast Chamber Units / Construction materials for chambers
- Cable ducting

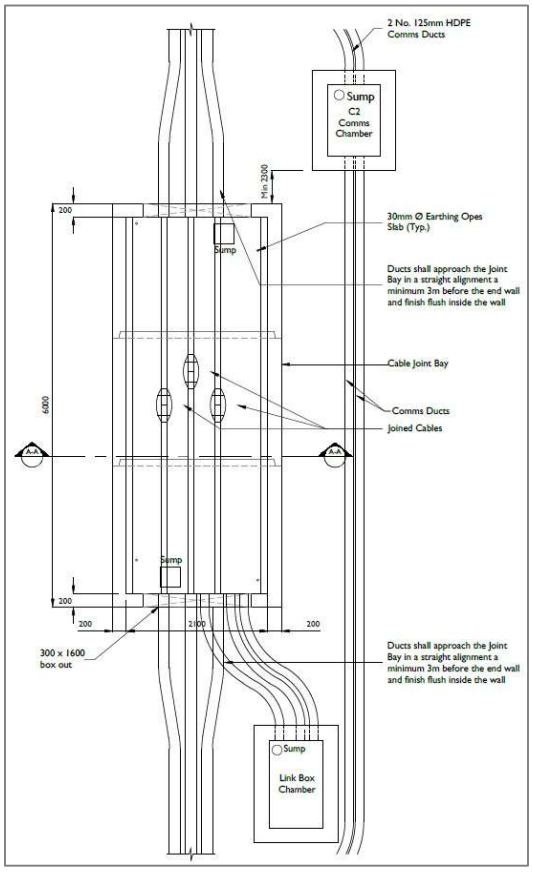


Figure 14: Typical Joint Bay and Link Box Plan Layout

10.9 Joint Bay Construction and Cable Installation

Before starting construction, the area around the edge of the joint bay which will be used by heavy vehicles will be surfaced with a geo-composite cover (Terram® or similar) if required and stone aggregate to minimise ground damage. Any roadside drains within the temporary works area will be culverted and check dams made from stone or geo-composite covered sandbags will be inserted upstream and downstream of these culverts to intercept any solids generated during the insertion or which wash out during the works. If the ground slopes from the working area toward a watercourse or if there is evidence of solids washing off the works area toward nearby watercourses or drains, a silt fence with straw bales, will be interposed between the works area and the watercourse.

All excavated material will be stored near the excavations and reused for reinstatement works. Any soil required for reinstatement that will be temporarily stockpiled on site will be placed at least 15 m back from the nearest watercourse on level ground and will be ringed at the base by silt fencing and be regularly monitored by a designated competent person for signs of solids escape. In which case an additional line of silt fencing with straw bales will be added in line with the relevant environmental control measures.

If the joint bay needs to be dewatered, this will be pumped to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the dewatering process to comply with the environmental control measures.

The risk of concrete reaching surface waters is considered very low given that all concrete will be poured into the pit excavated for the joint bay so that spills will be contained. The basic requirement therefore is that all pouring operations be constantly supervised to prevent accidental spillages occurring outside the pit.

Temporary storage of cement bound sand (if required) will be on hardstand areas only where there is no direct drainage to surface waters and where the area has been bunded e.g. using sandbags and geotextile sheeting or silt fencing to contain any solids in run-off.

The following steps outline the methodology for joint bay construction and reinstatement:

1. The contractor will excavate a pit for joint bay construction, including for a sump in one corner.
2. Grade and smooth floor; then lay a 75 mm depth of blinding concrete (for in situ construction) or 50 mm thick sand (for pre-cast concrete construction) on 200 mm thick Clause 804 granular material.
3. In situ construction. Construct 200 mm thick reinforced concrete floor slab with sump and starter bars placed for walls as detailed on the drawings.
4. In situ construction. Construct 200 mm thick reinforced concrete sidewalls as detailed on the drawings. (Figure 15)



Figure 15: Typical Joint Bay under Construction (In Situ)

5. In situ construction. Remove formwork and backfill with suitable backfill material in grassed areas or Clause 804 material once ducting has been placed in the bay. Backfill externally with granular material to local authority/Transport Infrastructure Ireland (TII) Specification for Roadworks. (Figure 16)



Figure 16: Completed Joint Bay prior to Cable Installation (In-Situ)

6. Pre-cast concrete construction. Place pre-cast concrete sections on sand bedding. (Figure 17)



Figure 17: Typical Joint Bay under Construction (Pre-Cast)

7. Where joint bays are located under the road surface the joint bay will be backfilled with compacted layers of Clause 804 and the road surface temporarily reinstated as specified by the local authority.
8. Precast concrete covers may be used as temporary reinstatement of joint bays at off road locations. These covers are placed over the constructed joint bay and are then removed at the cable installation stage of the project.
9. Later, to facilitate cable installation and jointing, reinstate traffic management signage, secure individual sites, re-excavate three consecutive joint bays and store excavated material for reuse.
10. The cable is supplied in pre-ordered lengths on large cable drums (Figure 18). Installing “one section” of cable normally involves pulling three individual conductors into three separate ducts. The cable pulling winch must be set at a predetermined cut off pulling tension as specified by the designer. The cable will be connected to the winch rope using approved suitably sized and rated cable pulling stocking and swivel or the pulling head fitted by the cable manufacturer. A sponge may also be secured to the winch rope to disperse lubricant through the duct. Lubrication is also applied to the cable in the joint bay before it enters the duct.



Figure 18: HV Cable Pulling Procedure (Typical Drum Setup)

11. Once the two sections of cable (total of 6 conductors) are pulled into the joint bay, a jointing container is positioned over the joint bay and the cable jointing procedure is carried out in this controlled environment. (Figure 19)



Figure 19: HV Cable Jointing Container

12. Following the completion of jointing and duct sealing works in the joint bay, place and thoroughly compact cement-bound sand in approximately 200 mm layers to the level of the cable joint base to provide vertical support. Install additional layers of cement-bound sand and compact each layer until the cement-bound sand is level with the top of the joint. Install an additional 100 mm cement-bound sand layer. Install cable protection strip. Backfill with cement-bound sand to a depth of 250 mm below surface and carry out permanent reinstatement including placement of warning tape at 400 mm depth below finished surface.

Equipment:

- 2-3 General Operatives
- 1 Excavator Operator
- 360° tracked excavator (13-ton normal operations, 22-ton for rock breaking applications)
- 1 no. tracked dumper or tractor and trailer

Materials:

- Sand for pipe bedding
- Blinding Concrete where necessary
- Clause 804 Material
- 160 mm diameter HDPE ducting
- 125 mm diameter HDPE ducting
- Precast Chamber Units / Relevant construction materials for chambers
- Earth Sheath Link Box

10.10 Major Watercourse Crossing

Where the cable route intersects with existing watercourses, a detailed construction method statement will be prepared by the contractor prior to the commencement of construction and is to be approved by the Local Authority and relevant environmental agencies. Crossing existing culverts will be implemented using either an undercrossing or an overcrossing, depending on the depth of the watercourse. The culvert crossing methods are detailed in Figure 20 and Figure 21 below.

Inland Fisheries Ireland have published guidelines relating to construction works along water bodies entitled ‘Requirements for the Protection of Fisheries Habitats during Construction and Development Works at River Sites’, and these guidelines will be adhered to during the construction of the development.

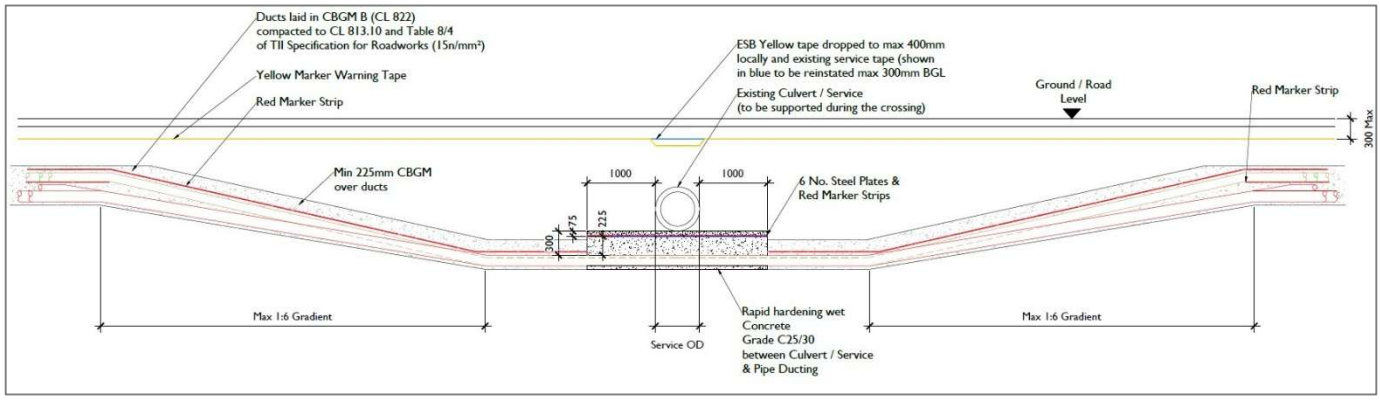


Figure 20: 110 kV UGC Culvert/Service Undercrossing

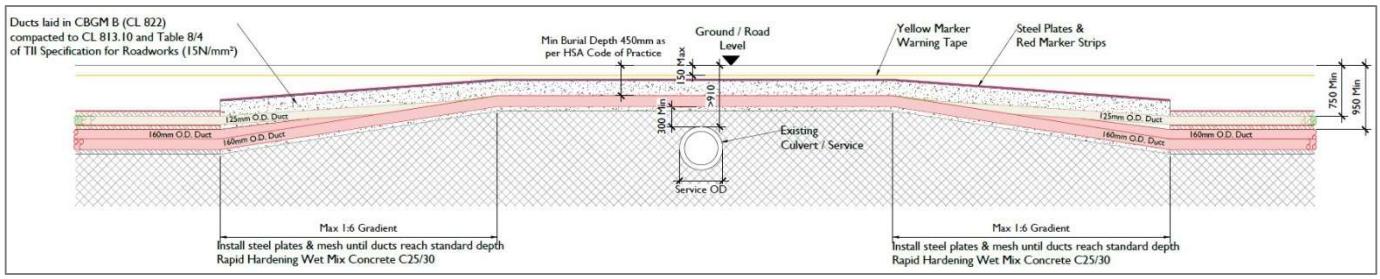


Figure 21: 110 kV UGC Culvert/Service Overcrossing

10.10.1 Bridge 1 Overcrossing – Open Trench Installation

ITM Coordinates: Eastings – 653458.0289, Northings – 701493.2993

This bridge is located between JB-16 & JB-17, along the L-3813 local road approx. 50m southeast of Cattle Grid 1.

In order to accommodate the installation of the UGC trench, the road will need to be raised by approx. 0.11m. It should be noted that due to the raised roadway in this section, the bridge walls will also need to be raised proportional to the road level through the installation of handrails. All works will need to comply with local county council & TII specifications.

In raising the road by approx. 0.11m, this will enable the ducting to be installed at a minimum of 0.45m below the road surface in line with EirGrid specification XDC-CBL-STND-H-006 Sheet 002 Rev 00. This raised road detail is indicatively shown in drawing 300100925-DR-515 which will needed to be viewed in conjunction with this OCM.



Figure 22: Bridge 1 - East Elevation View

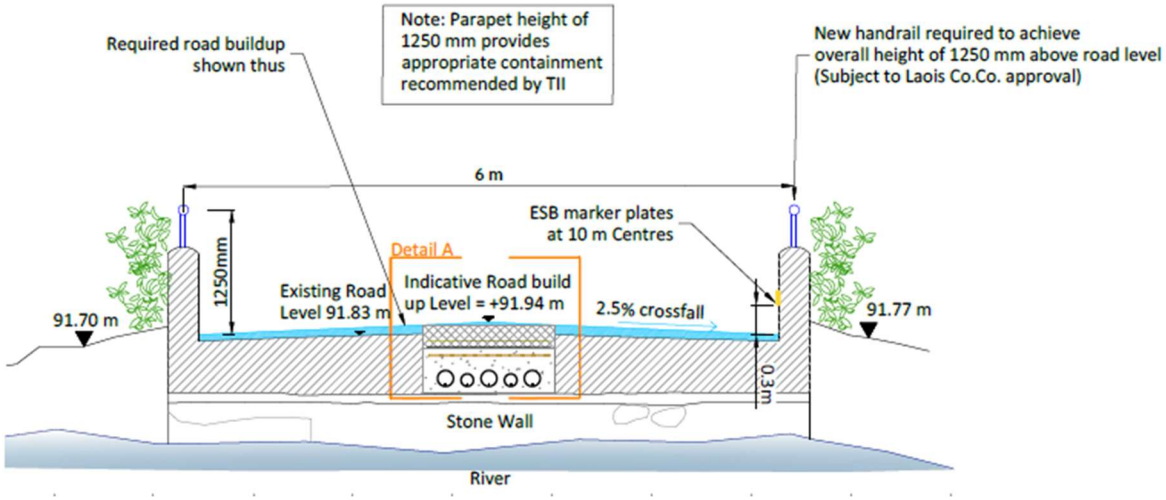


Figure 23: Bridge 1 – Indicative Raised Road Open Trenching detail

10.10.2 Culvert 1 Undercrossing – Open Trenching

ITM Coordinates: Eastings – 653505.7679, Northings – 701923.8520

The undercrossing of this concrete pipe is located between JB-17 & JB-18, along the L-3813 local road approx. 40m northeast of Cattle Grid 2. The culvert will remain in place (where possible) and the ducting will be installed below the culvert to provide minimum separation distances in accordance with EirGrid specifications as mentioned in section 10.1. Refer to Figure 20 for the required culvert undercrossing specification.



Figure 24: Culvert 1 - Concrete Pipe under the L-3813



Figure 25: Culvert 1 - Pipe running across the Road

10.10.3 Culvert 2 Undercrossing – Open Trenching

ITM Coordinates: Eastings – 653671.0769, Northings – 702079.9106

The undercrossing of this precast culvert is located between JB-17 & JB-18, along the L-3813 local road approx. 245m northeast of Culvert 2. The culvert will remain in place (where possible) and the ducting will be installed below the culvert to provide minimum separation distances in accordance with EirGrid specifications as mentioned in section 10.1. Refer to Figure 20 for the required culvert undercrossing specification.



Figure 26: Culvert 2 – Precast culvert under the L-3813



Figure 27: Culvert 2 – Overgrown under the road View

10.11 Watercourse Damming and Reinstatement Methodology

If sections of trenching and ducting would involve instream works at culvert crossing locations in order to install cabling. To facilitate the works, these watercourses will be dammed, and the water diverted over or around the works using either a flume pipe or a diversion channel. Following the completion of works at the watercourse, the dam will be removed, and the watercourse reinstated. These works would require pre-planning engagement with Inland Fisheries Ireland to agree environmental controls required.

Duration: 1-2 Days per location

Personnel, Machinery & Equipment:

- 2-3 operatives
- Wheeled dumper or track dumper (6 to 8 tons)
- 360° tracked excavator
- Materials:
- Pipe culvert
- Box culvert
- Cable ducting and trenching backfill
- Sandbags
- Water pump
- Geotextile membrane
- Straw bales

10.11.1 Standard Methods – Dam & Flume Work

1. The flume pipe(s) will be set out on the bed of the existing stream.
2. A dam will be constructed using sandbags and suitable clay material around the flume pipe(s) and across the stream so that all the flows are diverted through the pipe(s).
3. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream trenching location prior to construction, to minimise silt loss.
4. The ducting installation works will be carried out in the dry stream bed and under/around the flume pipe(s). If required, a temporary sump will be established and used to collect any additional water. This water will be removed by pumping to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the de-watering.

10.11.2 Standard Methods – Dam & Divert Work

1. A suitable channel for the stream will be excavated adjacent to the original channel. Bedding stone will be placed on the bed of the new channel.
2. A dam will be constructed using sandbags and suitable clay material across the stream so that the flow is diverted down the new channel.
3. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-river trenching location prior to construction, to minimise silt loss.
4. The trench will be excavated in the dry stream bed. If required, a temporary sump will be established and used to collect any additional water. This water will be removed by pumping to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the de-watering.

10.11.3 Standard Methods – Reinstatement of the Watercourse at Dam and Flume Locations

1. Following the completion of works, the stream bed will be reinstated with original or similar material and the spawning gravels replaced under the supervision of an aquatic ecologist.
2. Once the stream bed is appropriately re-instating the dam and the flume pipe(s) will be removed thus restoring the stream to its original condition.

10.11.4 Standard Methods – Reinstatement of the Watercourse at Dam and Divert Locations

1. Following the installation of the cable ducts, the stream bed will be reinstated with original or similar material and the spawning gravels replaced under the supervision of an aquatic ecologist.
2. Once the stream bed is appropriately reinstated, the dam will be removed thus restoring the stream to its original alignment.
3. The temporary channel will then be reinstated with the previously excavated material.

Given the length of both route options presented in this report, there is a high likelihood of encountering a significant number of culverts along the route. Of these culverts found during previous surveys, many appear to be either concrete pipe, HDPE twin wall pipe or stone construction, most of which are on the public road. Where there is insufficient cover over the culvert, it will be necessary to trench under the culvert. It should be again noted that the EirGrid preferred method of crossing third party services/culverts is undercrossing. For stone culverts there is a high probability that the culvert would collapse sending stream water into the trench. To avoid this occurring, stone culverts with insufficient cover will be identified and replaced prior to trenching works. The following approach will be taken:

1. Works will be supervised by the ECoW and / or the project aquatic ecologist who will liaise with IFI and National Parks and Wildlife Service (NPWS) prior to works commencing. The ECoW will also monitor surface water quality downstream of the works in accordance with the surface water monitoring programme and will have the authority to cease any works should the monitoring identify unacceptable water quality conditions.
2. Any works within watercourses that are subject to fish habitat (indicated in the planning and environmental report at least of “Medium” sensitivity), will be avoided between Oct 1st and April 30th as per IFI and Loughs Agency guidelines.
3. All plant and equipment will be serviced and cleaned before entry to site to limit risk of oil spillage and for biosecurity.
4. Where temporary fluming or flow diversion are in situ, in a watercourse frequented by salmon or trout, (at least medium sensitivity) all fish within the designated area will be subject to fish rescue and translocation downstream by a fisheries biologist. Fish rescue will be conducted under Section 14 authorisation (DCCAE/ IFI) or Section 69 authorisation (Loughs Agency) where appropriate.
5. Works will be carried out in dry weather with low flows in the streams with forecast for dry weather for the duration of the works – approximately 2 days.
6. Machinery used will stay on the public road; machinery will not be permitted to enter the stream channel.
7. The road edge adjacent to the watercourse will be lined with sandbags and silt fences (multiple fences recommended) as appropriate to prevent runoff from the trenching works reaching the stream. The design of these multiple features shall also allow for the safe removal of accumulated silt away from the channel, particularly through staged removal of the most contaminated upper fence before the lower ones, and the removal of the final fence only when it is clear of any silt.
8. Clean sandbags will be used to dam flows on the upstream side of the culvert. Sandbags will be placed by hand at a suitable location to take advantage of any natural pool but set back from the works to permit unhindered excavation of the existing culvert.
9. A second sandbag dam will be placed on the downstream side of the culvert to prevent backflow into the works and contain any groundwater seepage that is likely to be turbid.
10. Sandbagging requires careful attention to detail if it is to be effective. All bags must be laid neck uppermost and seams aligned. Bags must not be overfilled, or they will not tamp together or will burst with ease. Additional bags will be filled ready to raise freeboard of dams.
11. Flume placement for temporary flow diversion or permanent replacement of culverts will follow guidelines issued by IFI and CIRIA to ensure that fish passage is not impeded.
12. If topography permits, the water will be piped over the road by gravity flow, otherwise, it will be pumped. Discharge will be via break tank or similar approved storage onto a splash-plate or riprap (gabion basket) to dissipate energy and avoid scour or erosion of the stream bend or banks. The pump will be filled with a screen, so fish aren’t drawn into the pump intake.
13. The use of pump sumps will be considered within the dammed area. These will be lined to prevent scouring. The intention is to intercept clean groundwater ingress and pump it out rather than allowing it to get silted in the works area by segregating off areas.

14. Any spoil generated will be removed to designated safe area clear of the flood plain. Some of this spoil will be saturated and will require bunding and sheeting over.
15. If bank material needs to be removed, it will be stored separately and reinstated according.
16. The ducting will be advanced passed the culvert and the existing culvert will be excavated 'in the dry' and a new culvert, sized for a 100-year rainstorm event, will be installed with appropriate gradient, headworks, and outfall. A precast concrete culvert, concrete pipe or HPDE pipe will be used. Culverts will be embedded to at least 300mm below the existing stream bed to ensure backwatering. Culverts will avoid a significant change in gradient (i.e., >3%). After embedding, replacement culverts will be filled with clean washed gravels and cobbles to replace lost habitat and facilitate fish movement.
17. Dry stone headworks will be placed at the culvert intake and discharge and the stream bed adjacent to the works will be reinstated at the direction of the project aquatic ecologist.
18. The ECoW will determine the quality of any water trapped between the two dams – visual inspection and turbidity meter. If this water is clean, it will be left in situ. If it is not clean, it will be removed from the works area prior to removal of the dams. If required, dewatering of the works area prior to dam removal will be undertaken by pumping from the stream bed to either a) the cable trench for percolation or b) taken back to the wind farm site for treatment at an existing settlement pond or c) treatment using a mobile water treatment system such as Siltbuster® or similar. The most efficient method will depend on the volume of water present and the available percolation.
19. The upstream dam will then be removed to permit flow though the new culvert. This will be done in phases, so a large volume of water isn't released at once. The downstream dam will be removed in a similar manner.

11 Design and Construction & Environmental Management

Prior to commencement of construction works the contractor will draw up detailed Method Statements which will be informed by this Outline Construction Methodology, measures proposed within the CEMP, and the guidance documents and measures listed below. These method statement will be adhered to by the contractors and will be overseen by the Project Manager, Environmental Manager and ECoW where relevant.

The following documents will contribute to the preparation of the method statements in addition to those measures proposed below:

- Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters. Inland Fisheries Ireland, Dublin,
- National Roads Authority (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. National Roads Authority, Dublin;
- E. Murnane, A. Heap and A. Swain. (2006) Control of water pollution from linear construction projects. Technical guidance (C648). CIRIA;
- E. Murnane et al., (2006) Control of water pollution from linear construction projects. Site guide (C649). CIRIA.
- Murphy, D. (2004) Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin;
- H. Masters-Williams et al (2001) Control of water pollution from construction sites. Guidance for consultants and contractors (C532);
- Enterprise Ireland (unknown). Best Practice Guide (BPGCS005) Oil storage guidelines;
- Law, C. and D'Aleo, S. (2016) Environmental good practice on site pocket book. (C762) 4th edition. CIRIA;
- CIRIA Environmental Good Practice on Site (fourth edition) (C741) 2015.
- The proposed works will be carried out by employing accepted good work practices during construction, and environmental management measures such as those discussed below. Please note that the following measures will be supplemented by further specific environmental protection measures that will be included in method statements prepared for specific tasks during the works and will form part of the detailed CEMP.
- All materials shall be stored at the temporary compound within the wind farm sites and transported to the works zone immediately prior to construction;
- Where drains and watercourses are crossed with underground cables, the release of sediment will be prevented through the implementation of best practice construction methodologies.
- Weather conditions will be considered when planning construction activities to minimise risk of run off from site;
- Provision of 50 m exclusion zones and barriers (silt fences) between any excavated material and any surface water features to prevent sediment washing into the receiving water environment;
- If dewatering is required as part of the proposed works e.g. in trenches for underground cabling or in wet areas, water must be treated prior to discharge;
- The contractor shall ensure that silt fences are regularly inspected and maintained during the construction phase;
- If very wet ground must be accessed during the construction process bog mats/aluminium panel tracks will be used to enable access to these areas by machinery. However, works will be scheduled to minimise access requirements during winter months;
- The contractor shall ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall is required, and the Contractor is required to prepare a contingency plan for before and after such events;

- The contractor will carry out visual examinations of local watercourses from the proposed works during the construction phase to ensure that sediment is not above baseline conditions. In the unlikely event of water quality concerns, the Environmental Manager and ECoW will be consulted;
- Excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows.
- Only emergency breakdown maintenance will be carried out on site. Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures.
- 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;
- Concrete or potential concrete contaminated water run-off will not be allowed to enter any watercourses. Any pouring of concrete (delivered to site ready mixed) will only be carried out in dry weather. Washout of concrete trucks shall be strictly confined to a designated and controlled wash-out area within the solar farm sites; remote from watercourses, drainage channels and other surface water features;
- Entry by plant equipment, machinery, vehicles and construction personnel into watercourses or wet drainage ditches shall not be permitted. All routes used for construction traffic shall be protected against migration of soil or wastewater into watercourses;
- Cabins, containers, workshops, plant, materials storage and storage tanks shall not be located near any surface water channels and will be located beyond the 50 m hydrological buffer at all times.

12 Relocation of Existing Services

In order to facilitate the installation of the proposed UGC, it may be necessary to relocate existing underground services such as water mains, telecoms or existing cables. In advance of any construction activity, the contractor will undertake additional surveys of the proposed route to confirm the presence or otherwise of any services. If found to be present, the relevant service provider will be consulted with in order to determine the requirement for specific excavation or relocation methods and to schedule a suitable time to carry out works.

12.1 Underground Cables

If existing underground cables are found be present, a trench will be excavated, and new ducting and cabling will be installed along the new alignment and connected to the network on either end. The trench will be backfilled with suitable material to the required specification. Warning strip and marking tape will be laid at various depths over the cables as required. Marker posts and plates will be installed at surface level to identify the new alignment of the underground cable, with the underground cables will then be re-energised.

12.2 Gas Networks

Consultation with Gas Networks Ireland (GNI) must take place before starting works where gas pipes are present. Gas Networks Ireland will advise on the safety measures required and will arrange for the exact location of the gas pipe to be marked out on site. The works will be carried out in accordance with the safety working practices and utility standards to be outlined by GNI.

12.3 Water Mains

Uisce Eireann will need to be consulted and advised on details of the project and associated technical information with as much available information as possible. Early engagement between Uisce Eireann and the developer will be carried out on the project regarding any infrastructure which may be located near their assets with the intention of identifying as early as possible, to determine if bespoke design measures or diversions are necessary.

13 Reinstatement of Private Land

Once all construction works are complete, the work areas will be reinstated with excavated soil and either seeded out with native species, allowed to re-vegetate naturally or reinstated with excavated grass turves and will be restored to their original condition. This work will be carried out in consultation with the landowner and in line with any relevant measures outlined in the planning application, CEMP and planning conditions.

14 Emergency Response Plan

All site personnel will be inducted in the provisions of the Emergency Response Plan. The following outlines some of the information, on the types of emergencies, which must be communicated to site staff (list not exhaustive):

- Release of hazardous substance - Fuel or oil spill
- Concrete spill or release of concrete
- Flood event – extreme rainfall event
- Environmental buffers and exclusion zones breach
- Housekeeping of materials and waste storage areas breach
- Stop Works order due to environmental issue or concern

The Emergency Response Plan must be completed by the appointed contractor before the project begins.

15 Invasive Species Best Practice Measures

Invasive species can be introduced into a location by contaminated plant, machinery and equipment which were previously used in locations that contained invasive species. Good site organisation and hygiene management shall be maintained always on site, and best practice measures will be implemented, as follows:

- The contractor will prepare an Invasive Species Action Plan to be implemented during construction, and all personnel will be made aware of the requirements contained within;
    - Plant and machinery will be inspected upon arrival and departure from site and cleaned/washed as necessary to prevent the spread of invasive aquatic/ riparian species such as Japanese knotweed Fallopia japonica and Himalayan Balsam Impatiens glandulifera. A sign off sheet will be maintained by the contractor to confirm the implementation of measures:
- Site hygiene signage will be erected in relation to the management of non-native invasive material.

16 Waste Management

All waste products (general waste, plastic, timber, etc.) arising during the construction phase will be managed and disposed of in accordance with the provisions of the Waste Management Act 1996 and associated amendments and regulations, and a Waste Management Plan will be prepared by the contractor prior to the commencement of construction. All waste material will be disposed of at a fully licensed facility.

17 Archaeology

The following are the mitigation measures which will be carried out during construction where required:

- If required a project archaeologist will be appointed to oversee the project.
- Demarcation of protective buffer zones around cultural heritage sites where there is a potential for disturbance during the construction phase and inclusion of the same in site induction.

18 Programme

Estimates for the duration of the construction works are included in the table below. Please note that some of the elements are likely to happen concurrently.

Table 3: Estimated Construction Duration (Activities Run Concurrently)	
Development Element	**Estimated Construction Duration**
Construct 110kV Substation	14 months
Overhead Line Structures	3 months
Underground Cable	6 months
Cable Testing and Commissioning	6 weeks
Connection to Existing OHL and Commissioning	3 months
Total	18 Months

Table 5: Estimated Construction Duration

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APPENDIX 3

Settlement Pond Sizing Calculations

Settlement Ponds

Pond ID	Catchment Area (m2)	Length(m)	Width (m)	Observations	Result
SSP (1)	13096	64	5.5		Settlement
SSP (2)	3358	17	5.5		Settlement

Description	Coefficient of runoff	Climate Change (%)	Particle size considered	Routing Coefficient
Parameters	CV	CC	-	Cr
Units	-	(%)	mm	-
Inputs	1	30%	0.02	1.3

Description	Particle Density	Fluid Density	Gravitational Force	Fluid Viscosity
Parameters	ds	df	g	v
Units	g/cm3	g/cm3	cm/s2	g/cm*s
Inputs	2.7	1	981	0.01

Table 7 of the Brithish Standard BS 5930:2015

SOIL GROUP	Very coarse soils			Coarse soils						Fine soils				
PRINCIPAL SOIL TYPE	BOULDERS		COBBLES	GRAVEL			SAND			SILT			CLAY	
Particle size (mm)	Large boulder	Boulder	Cobble	Coarse	Medium	Fine	Coarse	Medium	Fine	Coarse	Medium	Fine		
	>630	630–200	200–63	63–20	20–6,3	6,3–2,0	2,0–0,63	0,63–0,2	0,2–0,063	0,063–0,02	0,02–0,0063	0,0063–0,002	<0,002	

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Value of C_R

The routing coefficient C_R depends on the shape of the time-area diagram and on the variation of rainfall within the time of concentration. Examination of typical time-area diagrams, rainfall profiles and rainfall-runoff data led to the recommendation of a constant value for C_R of 1.30 for both design and simulation.

Latitude	53.0746	Longitude	-7.19332
Easting	254061	Northing	202963.4

Duration	0.5 yrs	1 yrs	2 yrs	3 yrs	4 yrs	5 yrs	10 yrs	20 yrs	30 yrs	50 yrs	75 yrs	100 yrs	120 yrs
5 mins	3	4.5	5.3	6.5	7.4	8	10.3	12.9	14.7	17.2	19.5	21.3	22.6
10 mins	3.9	5.7	6.6	8.1	9.1	9.9	12.5	15.5	17.5	20.3	22.9	24.9	26.3
15 mins	4.5	6.5	7.6	9.2	10.3	11.1	14	17.2	19.4	22.4	25.2	27.3	28.7
30 mins	5.8	8.2	9.5	11.4	12.7	13.7	17	20.6	23.1	26.5	29.5	31.9	33.5
1 hour	7.5	10.4	11.9	14.2	15.7	16.8	20.6	24.8	27.5	31.3	34.7	37.3	39
2 hours	9.8	13.2	15	17.6	19.4	20.7	25	29.7	32.7	37	40.7	43.5	45.4
3 hours	11.4	15.2	17.2	20	21.9	23.4	28	33	36.3	40.8	44.7	47.7	49.7
4 hours	12.7	16.8	18.9	21.9	23.9	25.5	30.3	35.6	39	43.7	47.7	50.8	52.9
6 hours	14.7	19.3	21.6	24.9	27.1	28.7	34	39.6	43.2	48.2	52.4	55.7	57.8
9 hours	17.1	22.2	24.7	28.3	30.6	32.4	38	44.1	47.9	53.1	57.6	61	63.2
12 hours	19.1	24.5	27.1	31	33.4	35.3	41.2	47.5	51.5	56.9	61.5	65	67.4
18 hours	22.2	28.1	31	35.2	37.8	39.9	46.2	52.8	57	62.7	67.6	71.2	73.7
24 hours	24.7	31	34.1	38.5	41.3	43.4	50	57	61.3	67.2	72.2	76	78.5
2 days	30.2	37.3	40.7	45.6	48.7	51	58.1	65.5	70.2	76.4	81.6	85.5	88.1
3 days	35.1	42.9	46.6	51.9	55.2	57.7	65.4	73.3	78.3	84.8	90.4	94.5	97.3
4 days	39.5	48	52	57.7	61.2	63.9	72.1	80.5	85.8	92.7	98.5	102.9	105.7
6 days	47.7	57.4	61.9	68.2	72.2	75.2	84.3	93.7	99.4	107.1	113.5	118.2	121.3
8 days	55.2	66	71	78	82.4	85.6	95.6	105.8	112	120.2	127.1	132.2	135.6
10 days	62.4	74.1	79.6	87.1	91.9	95.4	106.1	117.1	123.8	132.6	140	145.4	149
12 days	69.3	81.9	87.8	95.9	101	104.8	116.2	127.9	135	144.3	152.2	157.9	161.7
16 days	82.5	96.8	103.5	112.6	118.4	122.6	135.4	148.4	156.3	166.6	175.2	181.6	185.7
20 days	95.2	111.1	118.5	128.6	134.9	139.6	153.6	167.8	176.4	187.7	197.1	204	208.5
25 days	110.6	128.4	136.6	147.8	154.8	160	175.5	191.1	200.5	212.9	223.2	230.7	235.6

Settlement Pond Sizing

Description	Inputs Parameters		
	Catchment Area	Modified Rational Method	Climate Change
		Coefficient of runoff	Climate Change (%)
Parameters	AREA	CV	CC
Units	m2	-	(%)
Info Source	Catchment Drawings		-
Inputs	13096	1	30%

Description					Return Periods (T)					
Return Period	T	T	Years	-	2	5	30	50	75	100
Storm Duration		D	min	-	10	10	10	10	10	10
Modified Rational Method	Rainfall Intensity (T Year)	I	(mm/h)	www.met.ie/climate/services	6.6	9.9	17.5	20.3	22.9	24.9

Description	Design Peak Flow							
	Catchment Area	Catchment Area	Modified Rational Method					
			Design Peak Flow Return Period T= 2	Design Peak Flow Return Period T= 5	Design Peak Flow Return Period T= 30	Design Peak Flow Return Period T= 50	Design Peak Flow Return Period T= 75	Design Peak Flow Return Period T= 100
Parameter	AREA	AREA	Q	Q	Q	Q	Q	Q
Units	m2	Ha	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)
Formula			Q = Cr*2.78*Cv*i*Area*(%CC)	Q = Cr*2.78*Cv*i*Area*(%CC)	Q = Cr*2.78*Cv*i*Area*(%CC)	Q = Cr*2.78*Cv*i*Area*(%CC)	Q = Cr*2.78*Cv*i*Area*(%CC)	Q = Cr*2.78*Cv*i*Area*(%CC)
Info Source	Catchment Drawings	Catchment Drawings	Modified Rational Method	Modified Rational Method	Modified Rational Method	Modified Rational Method	Modified Rational Method	Modified Rational Method
Outputs	13096	1.30960	0.04061	0.06091	0.10767	0.12490108	0.14089827	0.15320379

Description	Peak flow	Particles						Ditch dimension				
	Peak flow in 1:75 yrs return period	Particle size considered	Particle diameter	Particle Density	Fluid Density	Gravitational Force	Fluid Viscosity	Length	Width	Vertical slope (V)	Horizontal Slope (b)	Water depth for 1:75 ys return period
Parameters	Q	-	D	ds	df	g	v	L	B	v	b	Y
Units	m3/s	mm	cm	g/cm3	g/cm3	cm/s2	g/cm*s	m	m	m	m	m
Info Source		-	-	-	-	-	-			?(V):Z(H)	X(V):?(H)	
	Manual imputs							Manual imputs	Manual imputs	Manual imputs	Manual imputs	Manual imputs
Inputs	0.14	0.02	0.002	2.7	1	981	0.01	64.00	5.5	1	1	0.5

Description	Calculation (pg 168 CIRIA 532)						
	X-sectional area	Velocity of the flow	Drag Co-efficient	Settling Velocity		Time to travel through swale	Time taken for particle to settle
Parameters	-	-	C	V	V	-	-
Units	m2	m/s	-	cm/s	m/s	s	s
		-	C = (ds-df)g/18v	$V = CD^2$	$V = CD^2$	-	-
Inputs	3	0.047	9265	0.03706	0.0003706	1362.685	1349.164

Settlement checker
Settlement

Settlement Pond Sizing

Description	Inputs Parameters		
	Catchment Area	Modified Rational Method	Climate Change
		Coefficient of runoff	Climate Change (%)
Parameters	AREA	CV	CC
Units	m2	-	(%)
Info Source	Catchment Drawings		-
Inputs	3358	1	30%

Description					Return Periods (T)					
Return Period	T	T	Years	-	2	5	30	50	75	100
Storm Duration		D	min	-	10	10	10	10	10	10
Modified Rational Method	Rainfall Intensity (T Year)	I	(mm/h)	www.met.ie/climate/services	6.6	9.9	17.5	20.3	22.9	24.9

Description	Design Peak Flow							
	Catchment Area	Catchment Area	Modified Rational Method					
			Design Peak Flow Return Period T= 2	Design Peak Flow Return Period T= 5	Design Peak Flow Return Period T= 30	Design Peak Flow Return Period T= 50	Design Peak Flow Return Period T= 75	Design Peak Flow Return Period T= 100
Parameter	AREA	AREA	Q	Q	Q	Q	Q	Q
Units	m2	Ha	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)
Formula			Q = Cr*2.78*Cv*i*Area*(%CC)	Q = Cr*2.78*Cv*i*Area*(%CC)	Q = Cr*2.78*Cv*i*Area*(%CC)	Q = Cr*2.78*Cv*i*Area*(%CC)	Q = Cr*2.78*Cv*i*Area*(%CC)	Q = Cr*2.78*Cv*i*Area*(%CC)
Info Source	Catchment Drawings	Catchment Drawings	Modified Rational Method	Modified Rational Method	Modified Rational Method	Modified Rational Method	Modified Rational Method	Modified Rational Method
Outputs	3358	0.33580	0.01041	0.01562	0.02761	0.03202641	0.03612831	0.03928362

Description	Peak flow	Particles						Ditch dimension				
	Peak flow in 1:75 yrs return period	Particle size considered	Particle diameter	Particle Density	Fluid Density	Gravitational Force	Fluid Viscosity	Length	Width	Vertical slope (V)	Horizontal Slope (b)	Water depth for 1:75 ys return period
Parameters	Q	-	D	ds	df	g	v	L	B	v	b	Y
Units	m3/s	mm	cm	g/cm3	g/cm3	cm/s2	g/cm*s	m	m	m	m	m
Info Source		-	-	-	-	-	-			?(V):Z(H)	X(V):?(H)	
	Manual imputs							Manual imputs	Manual imputs	Manual imputs	Manual imputs	Manual imputs
Inputs	0.04	0.02	0.002	2.7	1	981	0.01	64.00	5.5	1	1	0.5

Description	Calculation (pg 168 CIRIA 532)						
	X-sectional area	Velocity of the flow	Drag Co-efficient	Settling Velocity		Time to travel through swale	Time taken for particle to settle
Parameters	-	-	C	V	V	-	-
Units	m2	m/s	-	cm/s	m/s	s	s
		-	C = (ds-df)g/18v	$V = CD^2$	$V = CD^2$	-	-
Inputs	3	0.012	9265	0.03706	0.0003706	5314.392	1349.164

Settlement checker
Settlement

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