Outline Construction Methodology

Gortnalug 110 kV Substation, Loop In and Out Grid Connection

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1.0 Introduction

The purpose of this document is to outline and explain the construction techniques and methodologies that will be implemented during the construction of a new 110kV substation and its connection to the existing Agannygal–Shannonbridge 110kV overhead line. The grid connection will consist of underground cabling (UGC), which will transition to the overhead line network via two cable sealing end (CSE) tower masts (1493-LCIM). The 110kV connection is intended to link the solar farm to the national grid through a 110kV "Loop-In" substation, to be constructed at the Ballydonagh Solar Farm site in accordance with ESB Networks requirements. The UGC and end masts will be installed on private land. The proposed substation will be named Gortnalug 110kV substation.

The 110kV grid connection will involve the construction of two masts and a new standard EirGrid loop-in substation. The proposed Gortnalug Substation will be connected via two underground 110kV cable (UGC) circuits, approximately 459m and 537m in length, to the two mast structures that will interface with the existing Agannygal–Shannonbridge 110kV overhead line (OHL). The OHL works will include the installation of two new masts and the termination of the existing phase conductors onto these structures, see Figure 1 for details.

This outline document provides an overview of the construction methodologies for the proposed development and should be read alongside all specialist reports submitted with the Strategic Infrastructure Development planning application. It will be revised and updated before construction begins, with detailed Method Statements prepared for each aspect of the works.

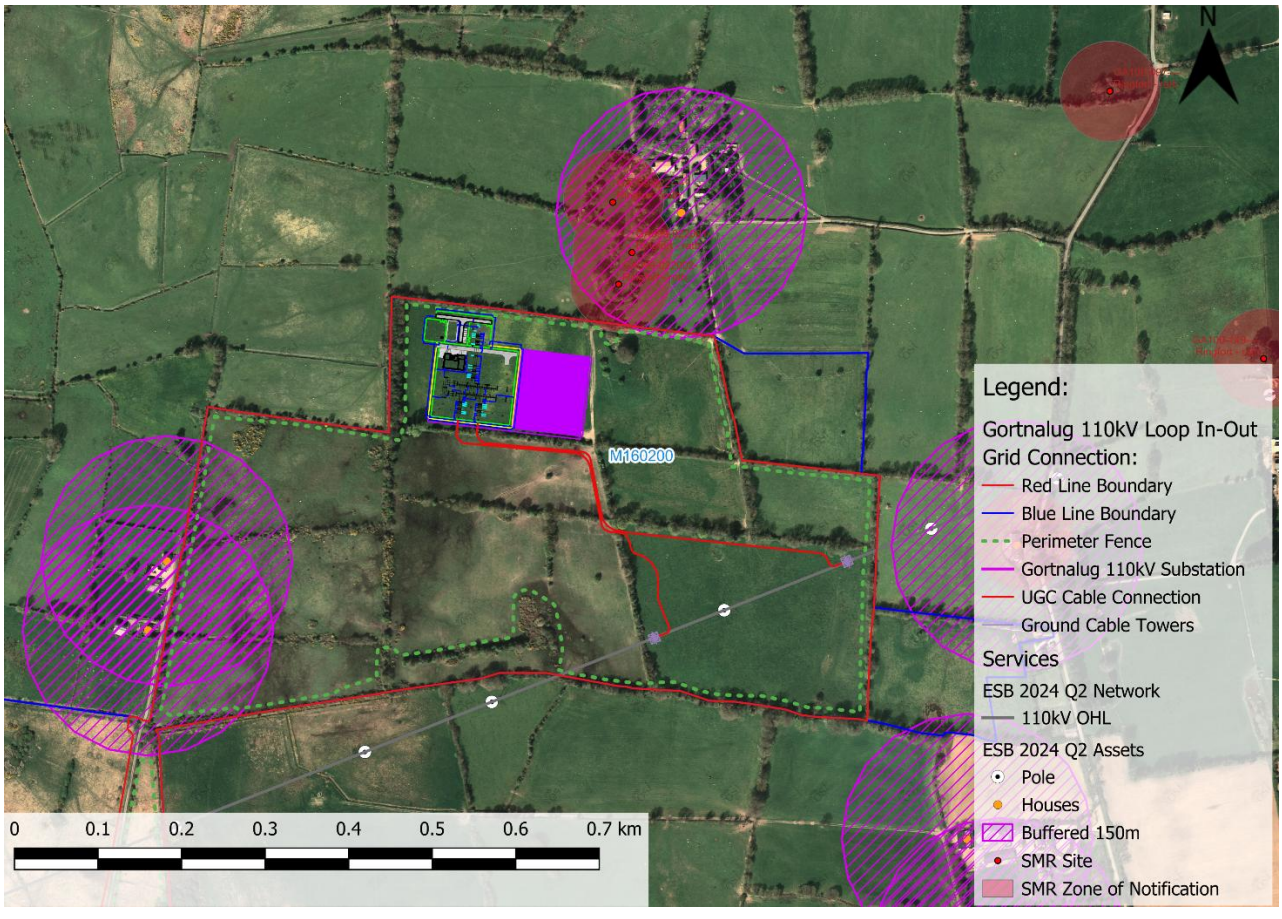

Figure 1: Location of New Overhead Line and 110kV Gortnalug Substation

Table 1: Summary of OHL works

Table 1 - Summary of Preliminary Grid Connection 110kV Design Route	
Section	**Description (all lengths are approximate and to be confirmed at detailed design stage)**
Section 1 **Underground Loop-in Connection to Existing OHL Line**	2 Steel Masts (15m) – 1493 LCIM Gortnalug - Agannygal 110kV line UGC Circuit Length: 459m Gortnalug - Shannonbridge 110kV line UGC Circuit Length: 537m
Proposed Gornalug Substation Coordinates	X = 583924.8658 Y = 720751.4329
Existing Pole Set 162 Coordinates	X = 584214.9780 Y = 720475.7375
Loop-in Tower 162A Coordinates	X = 584139.6604 Y = 720445.8011
Loop-in Tower 162B Coordinates	X = 584370.3445 Y = 720537.4895
Refer to Figure 1 and to the planning drawings submitted for location details. Note: The precise location of the proposed route within the planning application boundary is subject to change as result of existing services/utility locations, ground conditions and any environmental constraints.	

2.0 Preliminary Site Investigations

The proposed substation will be designed and constructed in full compliance with EirGrid standards. The site will be levelled and built up to the required elevation using stone fill material, finished with a compacted layer of high-quality stone to provide a stable base for construction activities.

As part of the geotechnical investigations, trial pits and boreholes will be carried out at the locations of the substation and overhead line structures. A minimum of 4 No. boreholes will be drilled at specific points within the substation area to assess ground conditions and determine the thermal and electrical resistivity of the soil, which is critical for substation design and earthing.

Equipment:

- 4x4 vehicle
- Wheeled dumper
- Soil compactor
- 360° tracked excavator (wheeled excavator where required)
- Borehole Drill Equipment

3.0 Loop-In Masts

3.1 Existing 110kV OHL

The proposed Gortnalug 110kV loop-in substation will connect to the existing Agannygal–Shannonbridge 110kV overhead transmission line. As part of this connection, the existing overhead line will be broken at pole set No. 162, and two new tower masts will be installed at positions 162A and 162B.

3.2 Loop-In Overhead Line

The proposed design for the 110 kV loop-in from the existing overhead line (OHL) will require the installation of two new tower mast structures at positions 162A and 162B. These structures will be constructed under the existing Agannygal–Shannonbridge 110 kV OHL. The existing OHL conductors will be terminated on the new towers and connected to the substation via underground cable. This modification will create two new line sections: the Gortnalug–Agannygal and Gortnalug–Shannonbridge 110 kV circuits. Refer to Figure 2 and Figure 3.The overall construction period for the overhead line works is expected to be approximately 12 weeks. Pole Set 162 will be removed to facilitate the new design. Construction of each mast foundation will take approximately 7 days to allow for concrete curing, and the erection of each mast will take approximately 5 days. The construction period will also be weather-dependent. Stringing of the conductor is expected to take approximately 2 weeks. Final connection to the existing grid will be carried out by ESBN and once completed, the substation commissioning can commence.

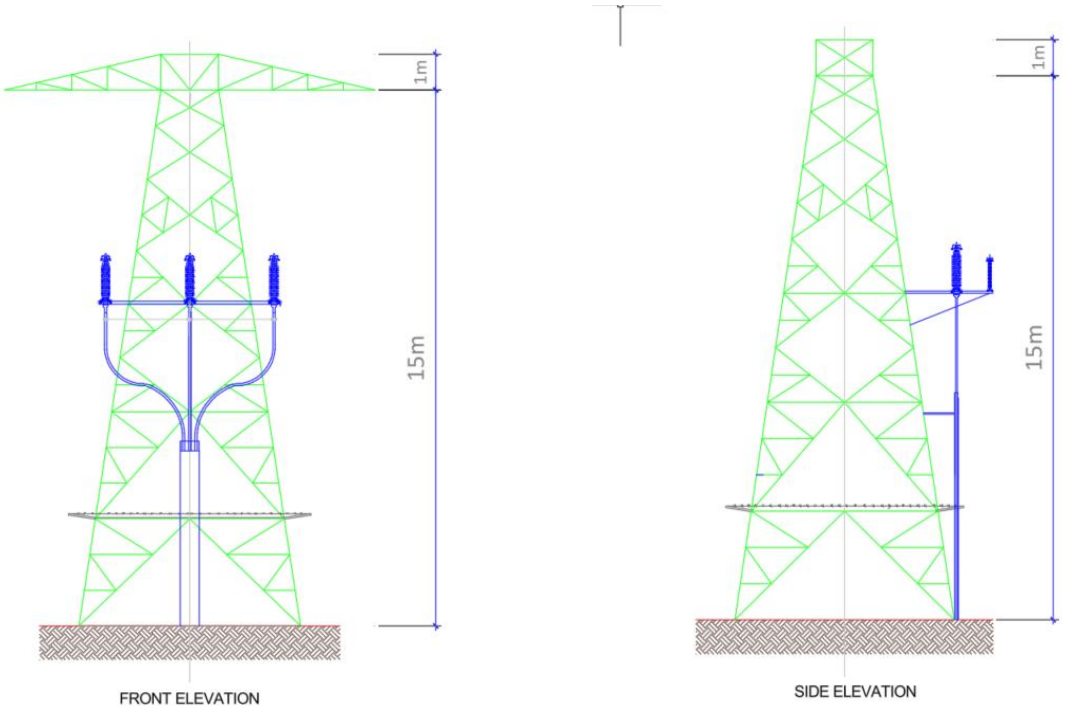

Figure 2: Tower Mast Details

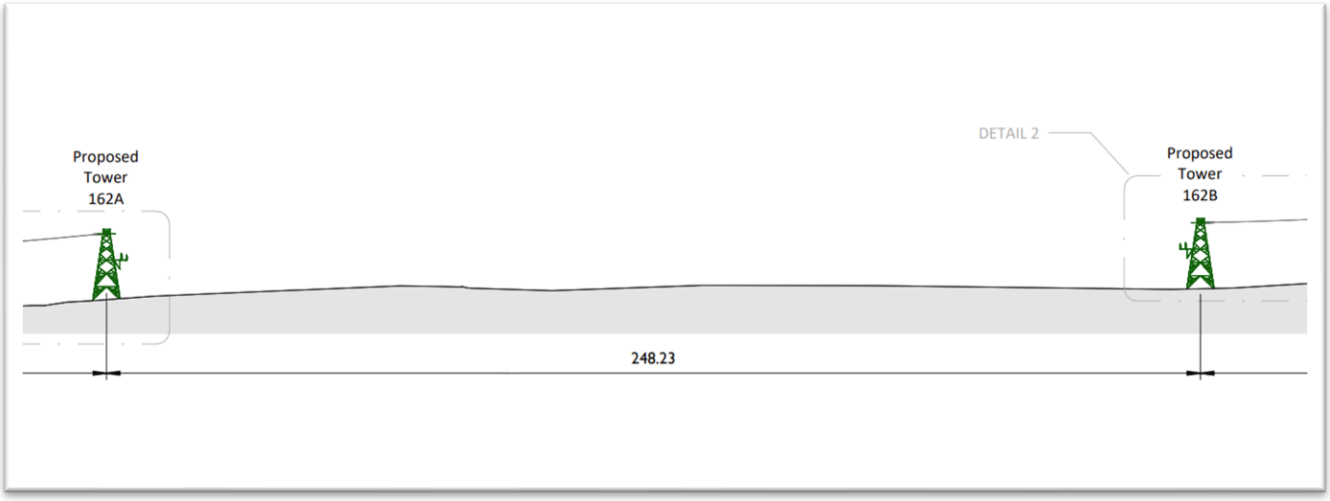

Figure 3: 110kV Loop-In Details

3.3 Steel Mast Structures

The proposed mast structure locations have been selected based on ground surveys, ground profiles, sight lines, and ruling span checks to ensure optimal placement and safe operation.

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	• Lattice steel mast • Insulators • Electrical connections • Concrete (foundation) • Aggregate

The following section outlines the methodology to be followed during construction works of the new Mast structures which will be constructed within the solar farmlands.

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. 4m x 4m 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 reused on site, placed in the designated disposal area, or transported off-site and disposed of at a fully authorised facility.

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, as shown in Figure 4 and Figure 5 and below.

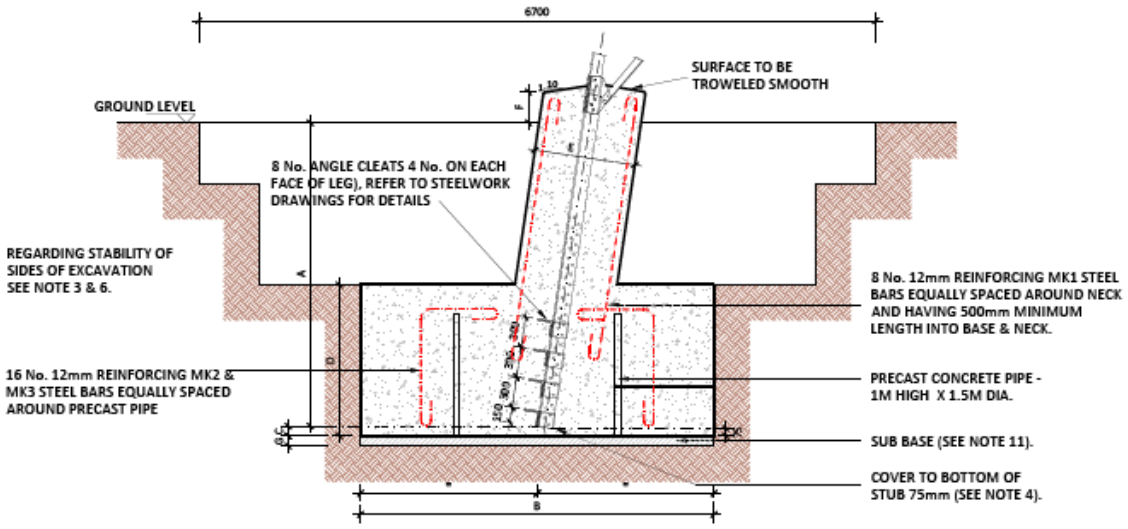

Figure 4: New Mast Foundation

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 will be re-used on site, placed in the deposition area, or transported off site and disposed of at a fully authorised facility, as shown in Figure 6 below.

Figure 6: Base of Mast Structure Backfilled

8. For the masts located under the existing line, the line will be de-energised by ESB so work can commence on the construction of the masts. Where it is offline the masts will be built without an 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, see Figure 7 and Figure 8 for reference.

Figure 7: Mast

Figure 8: Cable End Mast

4.0 EirGrid 110kV AIS 4 Bay (Loop In Substation)

The Gortnalug 110kV substation will be constructed to loop-in the existing Agannygal–Shannonbridge 110kV overhead line. The Gortnalug 110kV substation will consist of IPP and Eirgrid control buildings, transformer compound and busbar compound. 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. The busbar compound structural steelwork will be erected. 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.

5.0 Substation Construction

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

1. This new substation will be in a compound of circa 100m x 130m plan area secured by a 2.6m high palisade fence.
2. The substation compound and drainage will be marked out by a qualified engineer.
3. A drainage system will be excavated and installed around the compound area.
4. Topsoil and subsoil will be removed from the footprint of the compound using an excavator. The excavated material will be temporarily stored in adjacent berms for later use during reinstatement works.
5. A layer of geotextile material will be laid over the footprint of the compound.
6. 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.
7. Each layer will be compacted using a vibrating roller.
8. Earthing cable will be laid underground around the substation for connection to the various electrical components during the electrical fit out phase.
9. The construction of a 110kV substation within a 12,183.3m² compound, comprising approximately 250m² of an IPP control building and associated outdoor electrical equipment, including one 110kV transformer, an internal access track, a 2.6m high station palisade fence, and a 1.2m high concrete post-and-rail property boundary fence.
10. Adequate lighting will be installed around the compound on the lighting masts.
11. Lightning protection masts of approximate height 18m will be installed to protect the station from direct lightning strikes, see Figure 9 and Figure 10 for Substation Infrastructure and Transformer connection.
12. The electrical installation is expected to take 20 weeks and includes the following:
    - Delivery and installation of 110kV transformer. These are unusually large, and 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 9: Typical 110kV Electrical Infrastructure

Figure 10: Typical 110kV Transformer Connection

6.0 UGC Construction Methodology – Private Land

The proposed UGC will consist of 2 No. trenches with a minimum of 2000mm separation distance between each circuit. Each trench will contain 3 No. 160mm diameter HDPE power cable ducts, 2 No. 125mm diameter HDPE communications ducts and 1 No. 125mm diameter HDPE earth continuity duct to be installed in an excavated trench, typically 825mm wide by 1315mm deep, with variations on this design to adapt to bridge crossings, service crossings and watercourse crossings, etc. The power cable ducts will accommodate 3 No. power cables. The communications ducts will accommodate a fibre cable to allow communications between the Gortnalug substation and the adjoining Agannygal–Shannonbridge 110kV substations. The earth continuity duct will carry a single Earth Continuity Conductor (ECC) for electrical safety purposes and in accordance with ESB specifications. The ducts will be installed, the trench reinstated in accordance with landowner requirements and EirGrid specifications, and then the electrical cabling/fibre cable is pulled through the installed ducts. Construction methodologies to be implemented and materials to be used will ensure that the UGC is installed in accordance with the requirements and specifications of EirGrid and ESB.

6.1 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 application and accompanying reports, including the Construction Environmental Management Plan and as required by planning conditions where relevant.
- All existing underground services shall be identified on site prior to the commencement of construction works.
- At watercourse crossings, the contractor will be required to adhere to the environmental control measures outlined within the planning application and accompanying reports, the detailed Construction Environmental Management Plan (CEMP) to be prepared prior to the commencement of construction, 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 ESB specifications.
- If culverts require removal for ducting installation, it is proposed that a suitable method of damming the water source and pumping the water around the work area would 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 in advance of works.
- Traffic management measures will be implemented in accordance with those included in the Traffic Management Report, and a detailed Traffic Management Plan will be prepared and agreed with Galway County Council.
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 20m 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 will be re-used on site, placed in the deposition area, or transported off site and disposed of at a fully authorised facility.

- 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.
- 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.

Figure 11: Typical 110kV Underground Duct Installation on Private Land

6.2 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 1315mm depth and 825mm width have been obtained, see Figure 12 for reference.
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 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 unsurfaced/grass sections, backfill with suitable excavated material to ground level leaving at least 150 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.
11. 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.

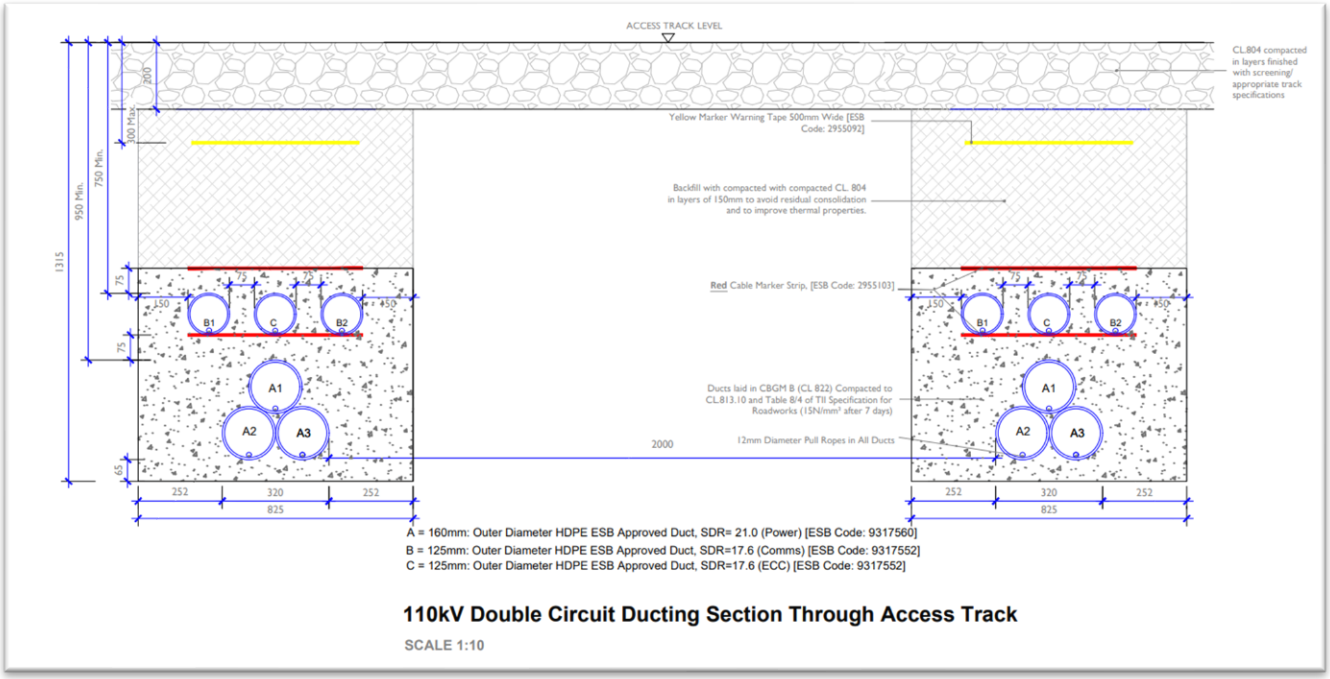

Figure 12: Typical Trench Details

Equipment:

- 1 no. tracked excavator (only rubber tracked machines will be allowed on public roads);
- 1 no. 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
- 160mm diameter HDPE ducting;
- 125mm diameter HDPE ducting;
- 125mm diameter HDPE ducting;
- Temporary Surface Reinstatement Materials

6.3 Cable Installation

The installation of the cable on private land will depend on several factors, including the width of the track, bends along the route, and any crossings. Where track widening is required, stone will be imported to raise the area to the same level as the existing track. The excavated material will be re-used on site, placed in the deposition area, or transported off site and disposed of at a fully authorised facility. The typical bending radius of the UGC loop from the tower to the proposed substation is 7m horizontal length, followed by a 6m bending radius. Elsewhere, a 12m bending radius is maintained until looping into the cable sealing end. The two cable circuits must maintain a separation distance of 2.32m, with a 2.5m easement on both sides, in accordance with Eirgrid specifications.

6.4 Cable Markers

Surface cable markers will be installed where cable burial depth is shallow due to site constraints, to indicate the precise location of the UGC. This marker will be metallic plates compliant with ESB 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 700mm base, and with centred lightning symbol, on engineering grade fluorescent yellow background shall be installed in adequately sized concrete foundations. Marker posts shall also be placed if burial depth is not to standard. Siting of marker posts to be dictated by ESBN as part of the detailed design process, see Figure 13 for ESB Markers.

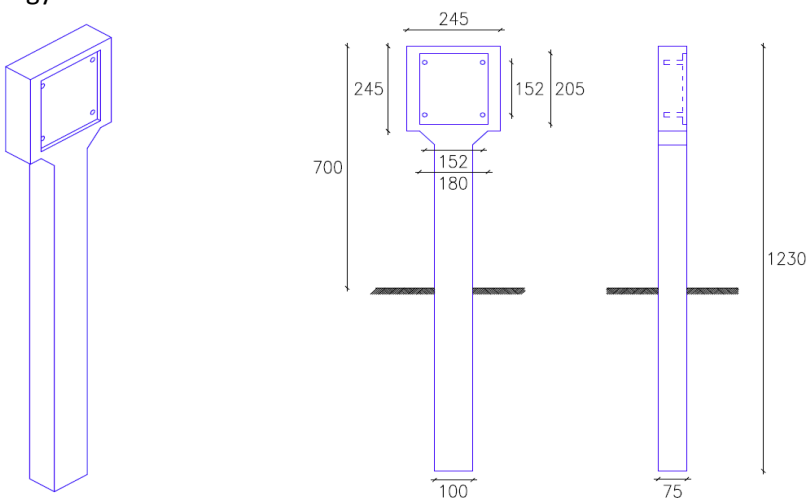

Figure 13: Typical ESB Marker Posts Example

6.4 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 2m in height. Where excess material will be re-used on site, placed in the deposition area, or transported off site and disposed of at a fully authorised facility.

6.5 Storage of Plant and Machinery

All plant, machinery and equipment will be stored on site within the works area or within the temporary construction compound to be located within the Ballydonagh Solar Farm. Oils and fuels will not be stored on site and will be stored in an appropriately bunded area within the temporary storage compound.

1. The cable is supplied in pre-ordered lengths on large cable drums (Figure 14). 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, see Figure 14 for cable pulling procedure.

Figure 14 - HV Cable Pulling Procedure (Typical drum set-up)

Equipment:

- 1 Excavator Operator
- 360˚ tracked excavator (13 ton normally, 22 ton for rock breaker)
- 1 no. tracked dumper or tractor and trailer

Materials:

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

7.0 Access Routes to Work Area

Temporary access tracks on the consented land (if required due to ground conditions and/or landowner requirements) will consist of timber or aluminium bog mats or crushed rock on a geotextile fabric (Figure 15, Figure 16 and Figure 17) to spread the weight of machinery over a greater area to prevent damage to the ground. If necessary, a low ground pressure excavator may also be utilised. This machine is designed to spread its weight across a wider area thereby reducing the pressure exerted on the ground. No invasive works will be undertaken when placing the matting. Upon completion of the works, all mats will be removed immediately. 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 the requirement for bog mats. Any such requirements will be incorporated into the relevant method statement, see Figure 15, Figure 16, Figure 17 for Access Route Details.

Figure 15: Temporary Aluminium Panel Tracks

Figure 16: Timber Roadway (Bog Matt)

Figure 17: Crushed Rock Roadway

Figure 18: Crushed Rock Roadway Build-up with Geotextile

Figure 19: Crane pad and laydown areas.

8.0 Best Practice Design and Construction & Environmental Management Methodology

Prior to commencement of construction works the contractor will prepare detailed Method Statements informed by the Construction Methodology, with an Outline Construction Environmental Management Plan (CEMP) to be provided as part of the planning application. These will also include environmental protection measures, guidance documents and best practice measures listed below. This 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 pocketbook*. (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 that will be provided prior to construction. This Construction Methodology's measures listed below are non-exhaustive.

- All materials shall be stored at the temporary compound, see CEMP temporary construction compound details and within the substation site and transported to the works zone immediately prior to construction.
- Weather conditions will be taken into consideration when planning construction activities to minimise risk of run off from site.
- Provision of 20m 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 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 not be permitted on site.
- 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 always located beyond the 20m hydrological buffer.

9.0 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 Galway County Council. The contractor will prepare detailed traffic management plans for inclusion as part of CEMP.

All traffic management measures will comply with those outlined in the accompanying Outline Construction Traffic Management Plan submitted as part of this planning application and will be incorporated into a detailed Traffic Management Plan to be prepared, in consultation with Galway County Council, before the commencement of development.

The 110 kV transformer has an approximate transport weight of up to 100,000 kg, depending on final design, and requires a special transport solution that needs to be assessed as part of the detailed design phase. A preliminary design is provided in the accompanying Traffic Management Plan that accompanies this planning application.

10.0 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 vegetate naturally or reinstated with excavated grass turves and will be restored to their original condition.

11.0 Implementation of Environmental Protection Measures

All environmental protection measures will be incorporated into a detailed CEMP and construction method statements prior to the commencement of development and will be implemented in full during the construction phase. The Project Manager and Site Manager will be responsible for the implementation of measures following consultation with the Environmental Manager and ECoW where necessary.

12.0 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.

13.0 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 (WMP) will be prepared by the contractor prior to the commencement of construction. An Outline Waste Management Plan has been prepared to form the basis of the WMP.

14.0 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, therefore the overall start-to-finish duration is estimated to be fourteen months.

Table 3: Estimated Construction Duration (Activities Run Concurrently)

Development Element	Estimated Construction Duration
Construct 110kV Substation	14 months
Overhead Line Structures	3 months
Connection to Existing OHL and Commissioning	6 weeks
Total	14 Months