APPENDIX 4-7

GRID CONNECTION CONSTRUCTION METHODOLOGY REPORT

Outline Construction Methodology

Clonberne Overhead Line Consultancy



Date: June 2024

Report Ref: 05990-R01-P1

Client: MKO

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1 Introduction

MKO ("The Client") have appointed TLI Group ("The Consultant") to provide specialist consultancy in overhead line and substation design in relation to grid infrastructure for the proposed Clonberne Wind Farm in County Galway, South of Clonberne Village. The Project proposes to connect to the existing Cashla - Flagford 220kV overhead line (OHL) and a new loop-in Gas insulated Switchgear (GIS) 220kV switching substation.

This Outline Construction Methodology Plan has been prepared by the Consultant as the framework of appropriate methodologies that shall be utilized during the Overhead Line Construction phase of the project. This report shall be used by the client for the planning application of the grid connection aspect of the project. In addition, this document is in outline form only and shall be revised and updated prior to the commencement of construction activities in which detailed method statements shall be prepared in respect to each aspect proposed in its development.

Table 1: Summary of 220kV Preliminary Grid Connection Design	
Section	**Description**
Section 1: Loop in	Existing 220kV Cashla - Flagford 220kV Overhead Transmission line will be broken between tower 87 and 88 and two loop-in towers shall be built to turn the existing Transmission line into two new gantries within two cable compounds. The OHL will be terminated to Underground Cable (UGC) to connect to the 220kV GIS Building.
Section 2: GIS Switching Substation	New construction of a 220kV Gas Insulated Switchgear Switching substation. The building will consist of an eight-bay, two-storey modular building housed in the substation compound site boundary enclosed within palisade fencing.
Total	• Two towers in total: • Type 269E mast. • Two steel gantries. • Two Cable Compound. • 220kV GIS Switching Substation compound. • Access road. • 36m Telecoms Mast

Table 1: Summary of 220kV Preliminary Grid Connection Design

Figure 1: Indicative Location of Proposed Loop In

2 Preliminary Site Investigation

Based on the available GSI data for the area, the site is underlain by glacial tills (limestone tills) as mapped at the end mast locations. The site of the proposed substation is also underlain by glacial tills (limestone tills). The structures proposed for these locations will be the subject of a detailed engineering design requiring geotechnical information at each structure location, obtained by either trial holes or bore holes.

3 Loop-In Masts

3.1 Existing 220kV Overhead Line

The proposed 220kV GIS Loop-in Switching substation shall connect into the existing Cashla - Flagford 220kV overhead transmission line. The existing line will be broken in proximity of Tower 87 and Tower 88 conductor diverted to the 2 new towers and onto the 2 new gantry structures to facilitate connection to the proposed substation.

3.2 Loop-in Overhead Line

The proposed design for the 220kV Loop-in from the existing Cashla - Flagford 220kV transmission line will require two new mast structures Figure 2, which will be constructed under the existing 220kV Overhead line (OHL). The existing conductor will be deviated at these two towers onto two gantries within cable compounds. A double circuit 220kV UGC will connect the cable compounds to the new Clonberne 220kV GIS substation.

The duration of the works for the project is anticipated to be 18 months. The timeframe for construction of the overhead lines steel tower and cable compounds is estimated to be twenty-two weeks. The duration of works of GIS substation with infrastructure is anticipated to be 18 months.

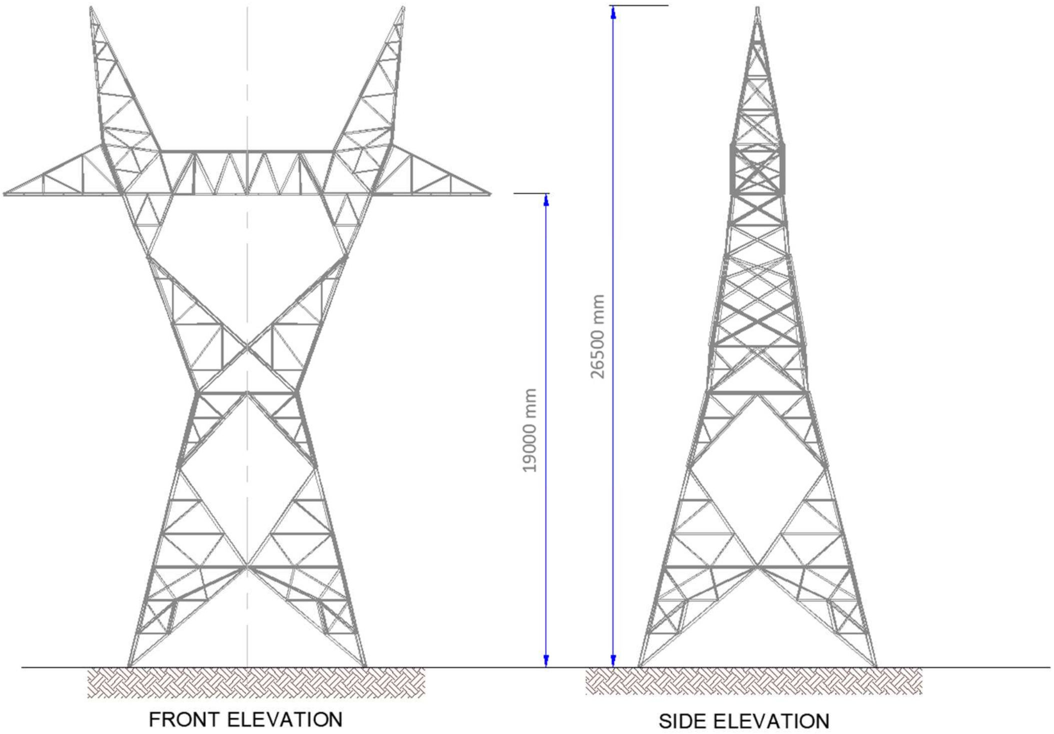

Figure 2: 220kV Type 269E Towers

3.3 Steel Mast Structures

The proposed mast and gantry structure locations have been selected based on ground surveys, ground profiles, permissible angles, and ruling span checks. Type 269E towers are required for the loop-in connection.

Figure 3: Indicative cable compound and 269E mast.

The proposed construction scope shall 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 • Sheet Piling Rig • Tracked Dumper	• Lattice Steel Mast • Insulators • Electrical Connections • Concrete (foundation) • Aggregate • Insulators • Steel guy ropes • Electrical Connections • Crushed rock & timber (foundation) • Crushed rock and concrete (alternative foundation)

Table 2: Equipment and Materials for Steel Mast Construction

The following section outlines the methodology that shall be followed during construction mast structures which shall be constructed within private lands.

1. Mast sites are scanned for underground services such as cables, water pipes etc. Consultations with landowners shall help to identify hazards and ensure that there are no unidentified services within the area.
2. For leg of the 2 masts (8 legs in total) a foundation of circa 4.4m by 4.4m by 3.6m deep are required. To allow for safe construction where ground conditions are good, the excavation shall be stepped back which requires additional area to be excavated as outlined in Figure 4. The formation levels (depths) shall be checked by the onsite engineer. The excavated material shall be temporarily stored close to the excavation and excess material shall be used as berms along the site access roads.

Figure 4: Stepped Back Excavation

3. To aid construction, a concrete pipe shall be placed into each excavation to allow operatives level the mast at the bottom of the excavation. The frame of the reinforcing bars shall be prepared and strapped to a concrete pipe with spacers as required. The reinforcing bars shall be lifted into each excavated foundation using the excavator and chains/slings. The base and body section of each mast shall then be assembled next to the excavation.
4. In areas of insufficient ground and high-water table, it may be necessary to use sheet piles supported by hydraulic frame(s) to prevent collapse of the sides and prevent the excavation becoming too large. In this scenario, the requirement of a concrete pipe (which is typically used in tower foundations) is removed. During any dewatering activities, a standard water filtration system shall be utilised to control the amount of sediment in surface ware runoff.
5. A setting template is used to set and hold the tower stubs in position while the concrete is being poured and cured. And water in the excavation shall be poured out prior to any concrete being poured into the foundation.
6. Concrete trucks shall pour concrete directly into each excavation in distinct stages.
7. A final pour for the mase is the encasing of the mast leg which shall be finished 300mm over finished ground level. The leg of the mast required to be shuttered with metal panels to form its required shape.
8. Once concrete is set after five days, the shuttering is removed along with sheet piles (if required).
9. The mast foundations shall be backfilled one leg at a time with the material already excavated at the location. The backfill shall be placed and compacted in layers. All dimensions shall be checked following the backfilling processes. All surplus excavated material shall be removed from the mast locations and stored in berms for use across the construction site.
10. An earth mat consisting of copper wire will be laid circa 600mm below ground around the mast. This earth mat is a requirement for the electrical connection of the equipment on the mast structure.
11. Once the base section of each mast is completed and its concrete is sufficiently cured, it is ready to receive the mast body.
12. A hardstand area for the crane shall be created by laying geogrid material on the ground surface and overlaying this geogrid with a suitable grade of aggregate.
13. A physical barrier (Heras Fence Site Boundary) shall be put in place to restrict plant from coming too close to the overhead line.
14. A temporary access road shall be constructed to allow access to the tower locations.
15. A temporary hardstand area shall be constructed to allow the assembly and laydown of the towers.
16. The masts shall be constructed lying flat on the ground beside the recently installed mast base on the temporary hardstand.
17. The mast section will be lifted into place using the crane and guide ropes.
18. The body sections will be bolted into position.

3.4 Gantry Structures

The proposed construction of the G and H gantry scope shall 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 • Sheet Piling Rig • Tracked Dumper	• Steel Gantry • Insulators • Electrical Connections • Concrete (foundation) • Aggregate • Insulators • Steel guy ropes • Electrical Connections • Crushed rock & timber (foundation) • Crushed rock and concrete (alternative foundation)

1. Gantry sites are scanned for underground services such as cables, water pipes etc. Consultations with landowners shall help to identify hazards and ensure that there are no unidentified services within the area.
2. For leg of the 2 gantries (4 legs in total) a foundation of circa 5m by 4m by 2.35m deep are required. To allow for safe construction where ground conditions are good, the excavation shall be stepped back which requires additional area to be excavated as seen in Figure 5. The formation levels (depths) shall be checked by the onsite engineer. The excavated material shall be temporarily stored close to the excavation and excess material shall be used as berms along the site access roads.
3. The reinforcing bars shall be lifted into each excavated foundation using the excavator and chains/slings. The base and body section of each gantry shall then be assembled next to the excavation.
4. A setting template is used to set and hold the gantry J-bolts in position while the concrete is being poured and cured. And water in the excavation shall be poured out prior to any concrete being poured into the foundation.
5. Concrete trucks shall pour concrete directly into each excavation in distinct stages.
6. A final pour for the base is the encasing of the gantry leg which shall be finished 300mm over finished ground level. The leg of the mast required to be shuttered with metal panels to form its required shape.
7. The mast foundations shall be backfilled one leg at a time with a 200mm layer deep compacted T.0 graded granular fill material. A finishing 100mm layer of compound stone is layered on top of a geotextile to finish the compound ground level. The backfill shall be placed and compacted in layers. All dimensions shall be checked following the backfilling processes.
8. Once the base section of each gantry is completed and its concrete is sufficiently cured, it is ready to receive the gantry body.
9. A hardstand area for the crane shall be created by laying geogrid material on the ground surface and overlaying this geogrid with a suitable grade of aggregate.
10. A physical barrier (Heras Fence Site Boundary) shall be put in place to restrict plant from coming too close to the overhead line.
11. A temporary access road shall be constructed to allow access to the tower locations.

12. A temporary hardstand area shall be constructed to allow the assembly and laydown of the gantries.
13. The gantries shall be constructed lying flat on the ground beside the recently installed cable compound on the temporary hardstand.
14. The gantry section will be lifted into place using the crane and guide ropes.
15. The body section will be bolted into position.

Figure 5 Stepped Back Excavation for Cable Compound Foundations

3.5 Cable Compounds

1. The 220kV cable compounds shall be in a compound of circa 25.8m by 33.00m, surrounded by a 2.6m high palisade fence with a total area of circa 851.40m^2.
2. Topsoil and subsoil shall be removed from the footprint of the compound using an excavator. The excavated material shall be temporarily stored in adjacent berms for later use during reinstatement works.
3. A Layer of geotextile material shall be laid over the footprint of the compound as outlined in Figure 22.
4. Using an excavator, a base of 6F2 material shall be laid followed by a geotextile layer. Clause 804 material is a specific type of granular material used in road construction and sub-base layers consisting of crushed stone, crushed concrete or a mixture of both. 6F2 material is a granular fill material consisting of crushed concrete crushed brick or reclaimed construction aggregate.
5. Each layer shall be compacted using a vibrating roller.
6. Earthing cable shall be laid underground around the vicinity of the compound for connection to various electrical components during the electrical fit out phase.
7. The construction of the cable compounds consists of a 220kV steel gantry and associated outdoor electrical equipment.
8. The electrical installation is estimated to last 22 weeks and includes the following:
    a. Construction of gantry masts.
    b. Wiring and cabling of High Voltage equipment and protection.
    c. Commissioning of all newly installed equipment.

Figure 6 Cable Compound Complete with Gantry

3.6 Stringing Conductor

Stringing of the phase conductors will use tension stringing methods. A pulling rope will be run out between structures using a quad bike or drone and the rope lifted into position in running blocks on each tower. Tension stringing machines and conductor drums will be set up at tension masts and the pulling rope used to haul the conductors through. The conductor is then made off at the angle/tension masts and connected into the suspension insulators ready for ESB to commission. For shorter spans, conductors can be run out along the ground and then lifted using smaller winches to the crossarm position for sagging and terminating.

Figure 7: Puller - Tensioner Machine

4 Proposed UGC Route

The 220kV double circuit underground cable is approximately 2.8 km long and runs within the substation site.

The proposed UGC will consist of a 2 No. trenches each containing 3 No. 200mm diameter HDPE power cable ducts, 2 No. 125mm diameter HDPE communications duct and 1 No. 125mm diameter Earth Continuity Conductor (ECC) duct to be installed in an excavated trench, typically 1957mm wide by 1250mm deep, with variations on this design to adapt to service crossings and watercourse crossings, etc. (Figure 8) The power cable ducts will accommodate 3 No. power cables. The communications duct will accommodate a fibre cable to allow communications loop in the existing Cashla - Flagford OHL to the Clonberne substation. The ducts will be installed, the trench reinstated in accordance with Galway County Council specification, and then the electrical cabling/fibre cable is pulled through the installed ducts in approximately 550 - 750m sections. The existing road will require widened to a minimum of 5.5 meters to accommodate the Clonberne loop in circuits. Any existing drainage along the roadside will require relocated, connecting into its original source. 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. Contact has been made with both Irish Water, Gas Networks Ireland and Galway County Council Roads Engineer to notify them of the proposed project. Any specific requirements will need to be picked up during detailed design.

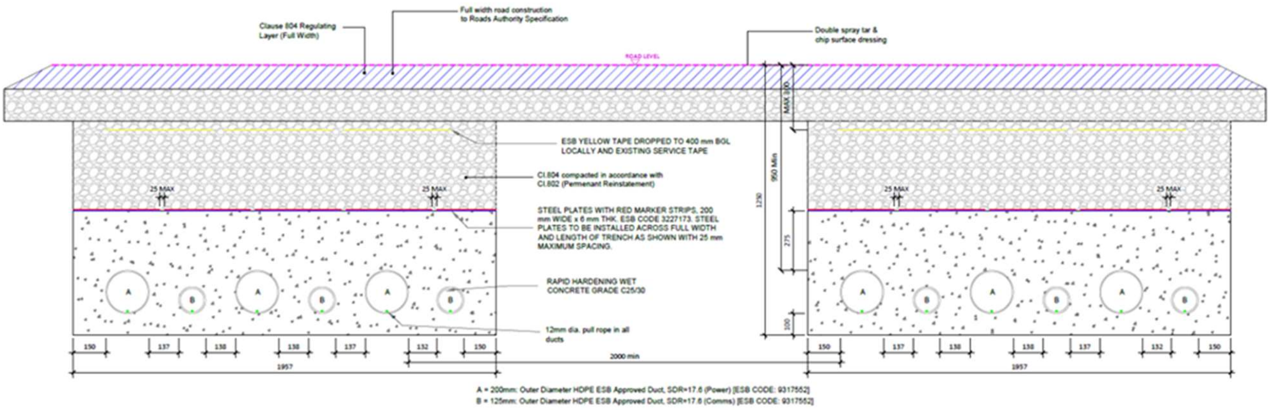

Figure 8: Cross Section view of UGC

4.1 Water Course Crossing

The underground cable will encounter 1 No. Bridge crossing and culverts along the route. 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. The cable will be located within the bridge deck where there is sufficient depth and width available on the bridge, where there is insufficient depth and width available horizontal directional drilling (HDD) may be employed as an alternative.

Existing culverts will be crossed using open trenching with either an undercrossing or an overcrossing, depending on the depth of the culvert. A confirmatory site survey of all culverts has been completed as part of this phase of the project prior to planning to confirm the crossing methods. The proposed standard culvert crossing methods are detailed in Figure 9 and Figure 10.

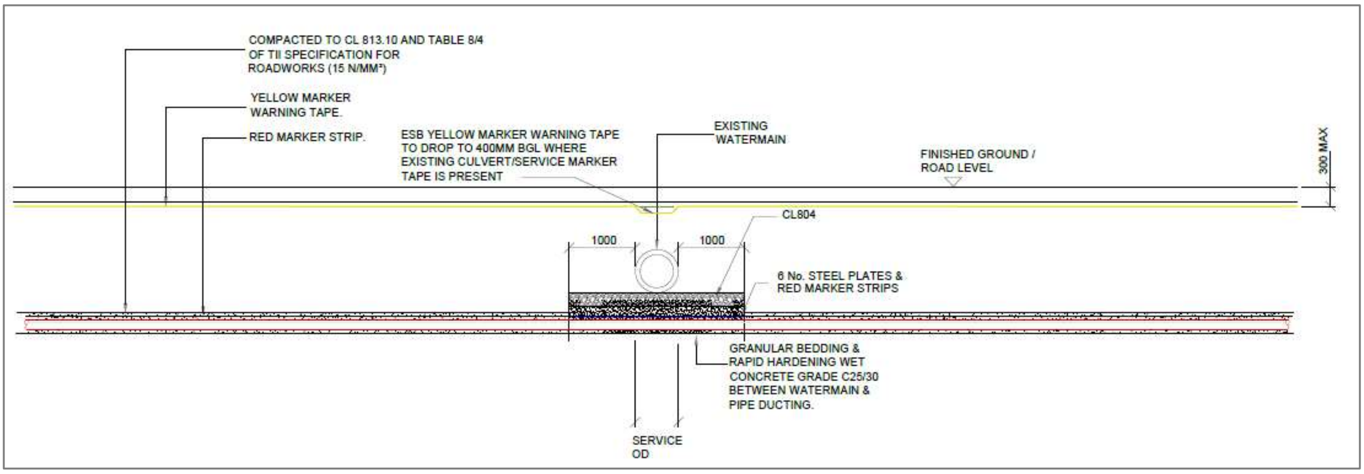

Figure 9 – 220kV UGC Culvert/Service Undercrossing

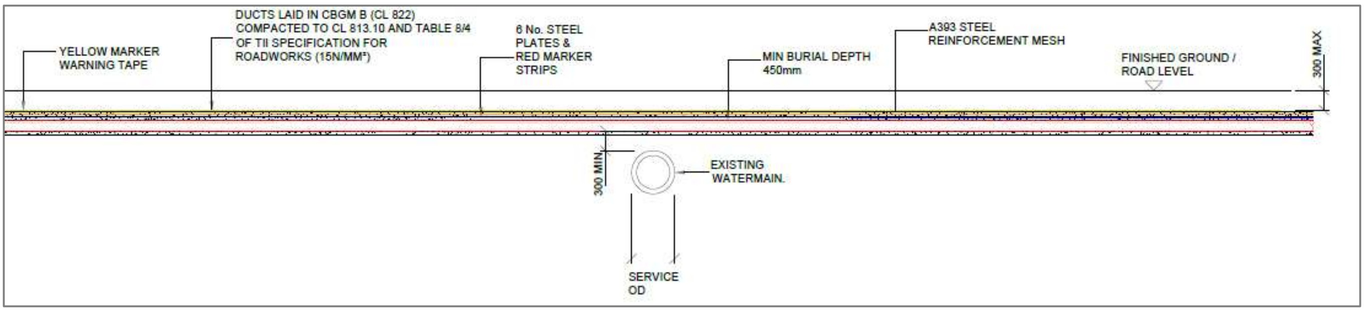

Figure 10 - 220kV UGC Culvert/Service Overcrossing

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.

4.1.1 Bridge 1 – Horizontal Directional Drilling

ITM Coordinates: 555857.29, 755288.13

Bridge 1 is located on a local tertiary road approx. 205m east of JB03 crossing over the Levally Stream. This steam flows in a southeast direction and into the Lough Corrib S.A.C (Special Area of Conservation).

The Bridge has insufficient room to install the cable to ESBN and EirGrid specifications (450mm cover to top of ducts) therefore the suitability of the bridge is inadequate to accommodate the works. Horizontal directional drilling (HDD) will be implemented to bore approximately 1500mm beneath the waterway and bridge foundations. This depth is based on locating a suitable clay/silt formation for HDD and the required depth may increase subject to geotechnical investigations. The HDD launch pad will require an area circa 550mts. The launch pad will require existing land to the north of the road to be raised to the existing local road level to allow for the HDD drill shots. The receive pad will require an area circa 1,000mts. The receive pad will require existing ground level to match the local road levels. Drilling will take place from the road carriageway and launch pad. It is proposed to slope the launch and receive pads to the stream edge to ensure the HDD bores will not break the surface prior to crossing the stream. There are existing drainage channels located where the proposed launch and receive pits are situated, it is proposed to pipe these drains beyond the launch and receive areas. The methodology for HDD is outlined in Section 4.2 below.

See Drawing 05990-DR

-127 for further details.

Figure 11 - Bridge 1

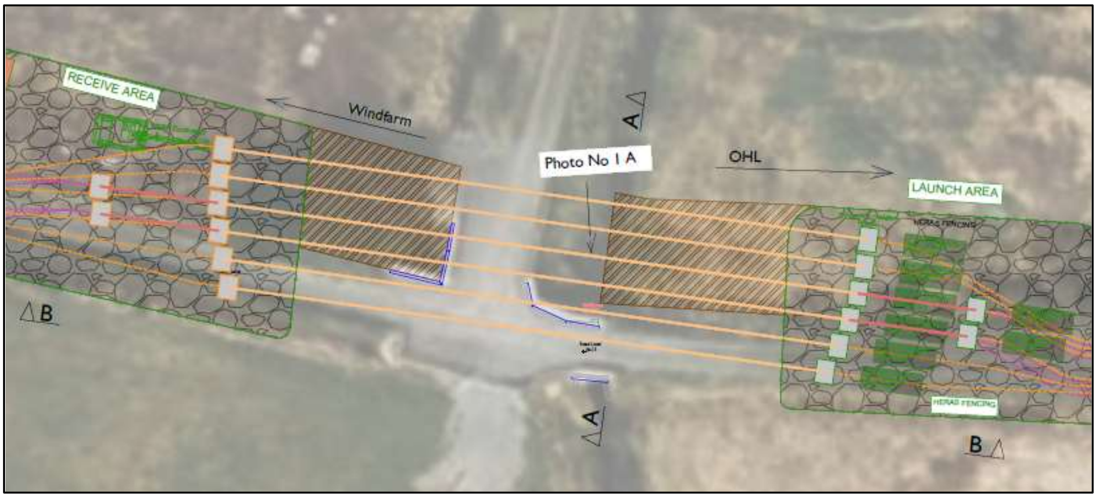

Figure 12 - Bridge 1 Superimposed Within Aerial Imagery.

4.2 Horizontal Directional Drilling

Horizontal Directional Drilling (HDD) is a method of drilling under obstacles such as bridges, railways, water courses, etc. in order to install cable ducts under the obstacle. This method is employed where installing the ducts using standard installation methods is not possible. There is one bridge on this UGC route which will require HDD due to there being insufficient cover and depth in the bridge to cross within the bridge deck. The drilling methodology is as follows: -

1. A works area of circa. 500m^2 on the launch area and circa 1100m^2 on the receive area will be fenced.
2. The drilling rig and fluid handling units will be located on one side of the bridge and will be stored on double bunded 0.5mm PVC bunds which will contain any fluid spills and storm water run-off.
3. Entry and exit pits (1m x 1m x 2m) will be excavated using an excavator, the excavated material will be temporarily stored within the works area and used for reinstatement or disposed of to a licensed facility.
4. A 1m x 1m x 2m steel box will be placed in each pit. This box will contain any drilling fluid returns from the borehole.
5. The drill bit will be set up by a surveyor, and the driller will push the drill string into the ground and will steer the bore path under the watercourse.
6. A surveyor will monitor drilling works to ensure that the modelled stresses and collapse pressures are not exceeded.
7. The drilled cuttings will be flushed back by drilling fluid to the steel box in the entry pit.
8. Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit pit and will pull a drill pipe back through the bore to the entry side.
9. Once all bore holes have been completed, a towing assembly will be set up on the drill and this will pull the ducting into the bore.
10. The steel boxes will be removed, with the drilling fluid disposed of to a licensed facility.
11. The ducts will be cleaned and proven and their installed location surveyed.
12. The entry and exit pits will be reinstated to the specification of ESBN, EirGrid and Galway County Council.
13. A transition coupler will be installed at either side of the bridge/ following the horizontal directional drilling as per ESBN and EirGrid requirements, this will join the HDD ducts to the standard ducts.

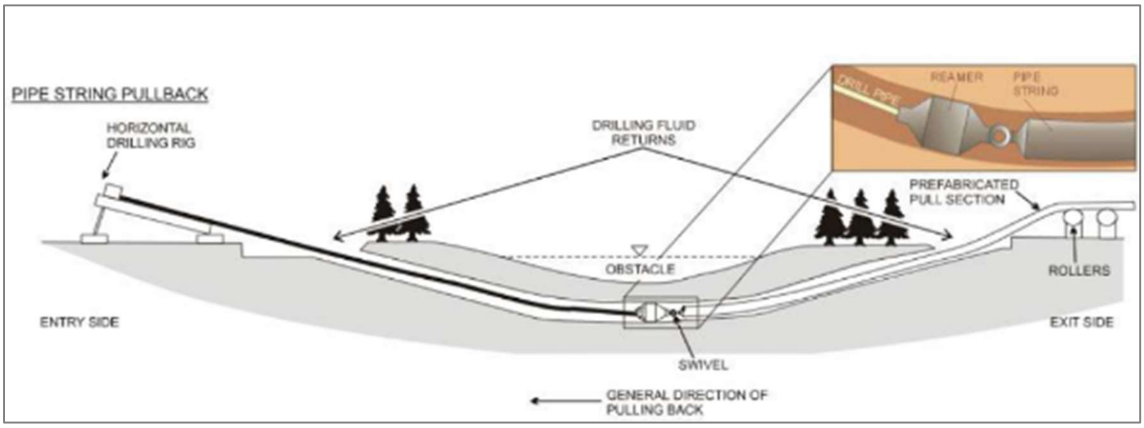

Figure 13 - Typical HDD Installation

4.3 Joint Bays

Joints Bays are to be installed approximately every 550 - 750m along the UGC route to facilitate the jointing of UGC. Joint Bays for 220kV are typically 2.5m x 8m x 1.75m pre-cast concrete structures installed below finished ground level.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between substations. 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 close 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 ESBN. Marker posts will be used on non-roadway routes to delineate the duct route and joint bay positions.

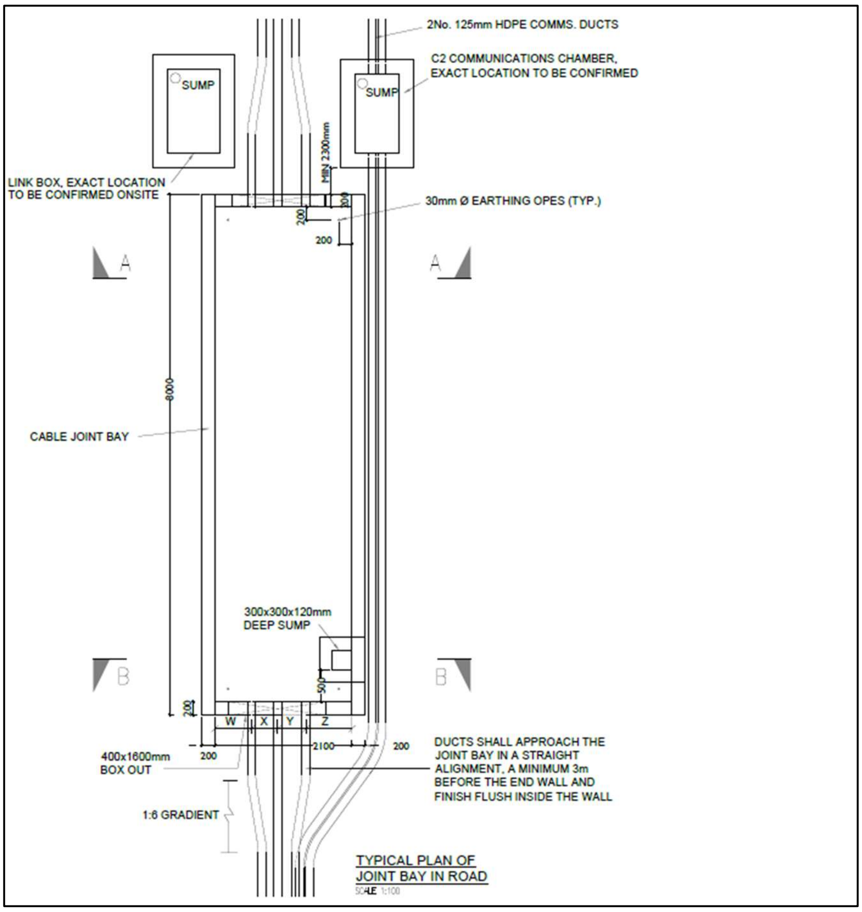

Figure 14: 220kV Joint Bay Details

4.4 Joint Bay Construction and Cable Installation

Before starting to construct, the area around the edge of the proposed joint bay which will be used by heavy vehicles will be surfaced with a terram cover 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 sandbags covered with terram 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 15m 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 ECM.

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 ECM.

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 sand-bags 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: Typical Joint Bay Under Construction

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 Co. Council/TII Specification for Roadworks.

Figure 16: Joint Bay Under Construction

Pre-cast concrete construction. Place pre-cast concrete sections on sand bedding.

Figure 17: Typical Joint Bay Prior to Cable Installation

6. 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.
7. 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.
8. At a later date 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.
9. 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 Set-up)

10. 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

11. 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:	**Materials:**
• 360° Tracked Excavator (13 tonne normally, 22 tonne for rock breaker). • Tracked Dumper or Tractor and Trailer • Chains/small tools	• Sand for Pipe Bedding • Blinding Concrete where necessary • Clause 804. • 200mm Diameter HDPE Ducting. • 125mm Diameter HDPE Ducting. • Precast Chamber Units • Construction Materials for Chambers • Link Box

Table 3 Equipment and Materials for UGC Ducting

5 Substation Construction

The proposed 220kV GIS switching substation shall be constructed to loop-in to the existing Cashla - Flagford 220kV Overhead Line.

A typical two-story 220kV modular GIS substation building is outlined in Figure 20.

Figure 20: Typical 220kV GIS Switching Substation

The proposed construction scope of works shall require the relevant personnel, machinery and materials as outlined in Table 4.

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 • Timer • Cladding • Doors

Table 4: Equipment and Materials for Substation Construction

5.1 Substation details

1. The overall substation and battery compound is circa 107.41m by 131.16m, with a total area of 13598m^2. This is made up of a EirGrid 220kV GIS Compound, an IPP compound and a BESS compound.
2. The EirGrid 220kV GIS compound is circa 40.5m by 99m (the footprint is irregularly shaped), surrounded by a 2.6m high palisade fence and post and rail property boundary fence with a total area of circa 3860m^2.
3. The IPP compound shall be circa 52.1m x 107.4m, with an area of 5594m^2.
4. A battery storage compound shall be circa 38.6m x 107.4m, with an area of 4143m^2.
5. The substation compound and drainage shall be marked by a qualified engineer.
6. A drainage system shall be installed around the compound area.
7. Topsoil and subsoil shall be removed from the footprint of the compound using an excavator. The excavated material shall be temporarily stored in adjacent berms for later use during reinstatement works.
8. A Layer of geotextile material shall be laid over the footprint of the compound as outlined in Figure 22.
9. Using an excavator, a base of clause 804 material shall be laid followed by a 6F2 layer which will provide a finished surface. Clause 804 material is a specific type of granular material used in road construction and sub-base layers consisting of crushed stone, crushed concrete or a mixture of both. 6F2 material is a granular fill material consisting of crushed concrete crushed brick or reclaimed construction aggregate.
10. Each layer shall be compacted using a vibrating roller.
11. Earthing cable shall be laid underground around the vicinity of the substation for connection to various electrical components during the electrical fit out phase.
12. The construction of the substation compounds consists of a 220kV two-storey switching GIS building and associated outdoor electrical equipment.
13. Adequate lighting shall be installed around the compound on the lighting masts.
14. Lighting protection masts with an approximate height of 18m shall be installed to provide Lightning protection to the substation compound.
15. The electrical installation is estimated to last 24 weeks and includes the following:
    a. Delivery and installation of all High Voltage Equipment
    b. Wiring and cabling of High Voltage/ Low Voltage equipment, protection and control circuits
    c. Commissioning of all newly installed equipment.

6 Best Practice Design and Construction and Environmental Management Methodology

Prior to commencement of construction works, the contractor shall draw up detailed method statements which shall be informed by this Outline Construction Methodology, environmental protection measures included within the planning application, measures proposed within the CEMP, and the guidance documents and best practice measure listed below. This methos statement shall be adhered to by relevant contractors and shall be overseen by the Project Manager, Environmental Manager and Ecological Clerk of Works ECoW.

The following documents shall 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.
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The proposed works shall be carried out by employing accepted good working practices during construction, and environmental management measures such as those discussed in section 6.1. 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.

6.1 Good Work Practices

- All materials shall be stored at the temporary compound within the site and transported to the works zone immediately prior to construction.
- Weather conditions shall be considered when planning construction activities to minimise risk of run off from the site.
- If dewatering is required as part of the proposed works e.g., trenches or wet areas, water must be treated prior to discharge.
- The contractor shall ensure that slit fences are regularly inspected and maintained throughout the construction phase.
- If excessively wet ground must be accessed during the construction process, bog mats/. Aluminium tracks will be used to enable access to these areas by machinery. However, works shall 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, with the Contractor required to prepare a contingency plan for before and after such events.
- The contractor shall carry out visual inspections 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 Environmental Clerk of Works shall be consulted.
- Excavations shall be left open for minimal periods to avoid acting as a conduit for surface water frows.
- Only emergency breakdown maintenance will be carried out onsite. Emergency procedures and spillage kits shall be available and construction staff shall familiarise with emergency procedures.
- Appropriate containment facilities shall be provided to ensure that any spills from vehicles are contained and removed offsite. Adequate stock of absorbent materials such as sand or commercially available spill kits shall be available.
- Concrete or potential concrete contaminated water run-off shall 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 site: 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, material storage and storage tanks shall not be located near any surface water channels and shall be always located beyond the 50m hydrological buffer.

7 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 as shown in Figure 21 and 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.

Figure 21: Timber Roadway Bog Matt (Left) Temporary Aluminium Panel Tracks (Middle) Crushed Rock (Right)

Figure 22: Crushed Rock Roadway Build-up with Geo Textile

8 Traffic Management

Traffic management and road signage shall 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 shall prepare detailed traffic management plans if applicable.

All traffic management measures shall comply with those outlined in the accompanying Traffic Management Report and shall be incorporated into a detailed Traffic Management Plan to be prepared following consultation with Galway County Council prior to the commencement of the development.

9 Reinstatement of Private Land

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

10 Implementation of Environmental Protection Measures

All environmental protection measures contained within the outline CEMP which accompanies the planning application shall 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 shall be responsible for the implementation of measures following consultation with the Environmental Manager and ECoW where necessary.

11 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.

Please refer to the Natura Impact Statement and CEMP for further details.

12 Waste Management

Waste products (general waste, plastic, timber, etc.) arising during the construction phase will be managed and disposed of in accordance with the provision of Waste Management Act 1996 and associated amendments and regulation, and a Waste Management Plan (WMP) shall 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. Refer to the accompanying CEMP submitting within the planning application for further information.

13 Programme

Estimates for the duration of the construction works are included in Table 5. Some elements may happen concurrently; therefore, the start-to-finish duration is estimated to be 18 months.

Table 5: Estimated Construction Duration (Activities Run Concurrently)	
Development Element	**Estimated construction Duration**
Construct Loop-in 220kV towers.	3.5 Months
Construct 220kV gantry and compound.	3.5 Months
220kV GIS Switching Substation.	18 Months
Total	18 Months

Table 5: Estimated Construction time Duration.