CONSTRUCTION METHODOLOGY

Sheskin South Wind Farm 110kV Grid Connection

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1.0 Introduction

The purpose of this document is to outline and explain the construction techniques and methodologies which will be implemented during the construction of the Sheskin South Wind Farm 110kV grid connection to the existing Bellacorick 110kV substation. The grid connection will consist entirely of underground cabling (UGC) with the majority of the UGC to be installed within the public road network and some elements in forestry access tracks.

The UGC works will consist of the installation of 6 No. ducts in an excavated trench to accommodate 3 No. power ducts, 2 No. fibre communications ducts to allow communications between the Sheskin South Wind Farm Substation and the existing Bellacorick 110kV substation and 1 No. earth continuity conductor duct.

This document is intended to be used as an aid to understand the methodologies to be employed during construction. 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 proposed development.

The grid connection cabling trench is not included in the planning application for the proposed Sheskin South Wind Farm. However, the methodologies and techniques to be implemented in the construction of the grid connection cabling trench are assessed in the Environmental Impact Assessment Report (EIAR).

2.0 Proposed Grid Connection Route

The UGC route is approximately 6.9km in length and runs in a predominately north westerly direction from the existing Bellacorick 110kV substation to the Sheskin South Wind Farm substation location utilising public local road networks, existing access tracks and forestry access tracks.

The exact location of the UGC within the curtilage of the existing access tracks, public local road network and forestry access tracks may be subject minor modification following confirmatory site investigations, to be undertaken prior to construction of the proposed wind farm development, to confirm the conditions predicted in the EIAR (Environmental Impact Assessment Report). The cable location will take into consideration Mayo County Council and all other relevant stakeholder requirements. Installation of the cable will be carried out in line with the methodologies outlined in this document and all relevant environmental protection measures included in the EIAR.

Figure 1 outlines the proposed UGC grid connection route, with the total length of each road type detailed in Table 2.

Table 1 - Sheskin South Wind Farm to Bellacorick 110kV Substation – UGC Route Location Summary

Table 1 – Approximate UGC Route Location of Preliminary Design:		
ESB Access Rd	**Public Roads**	**Forestry Roads**
109m	4,710m	2,075m

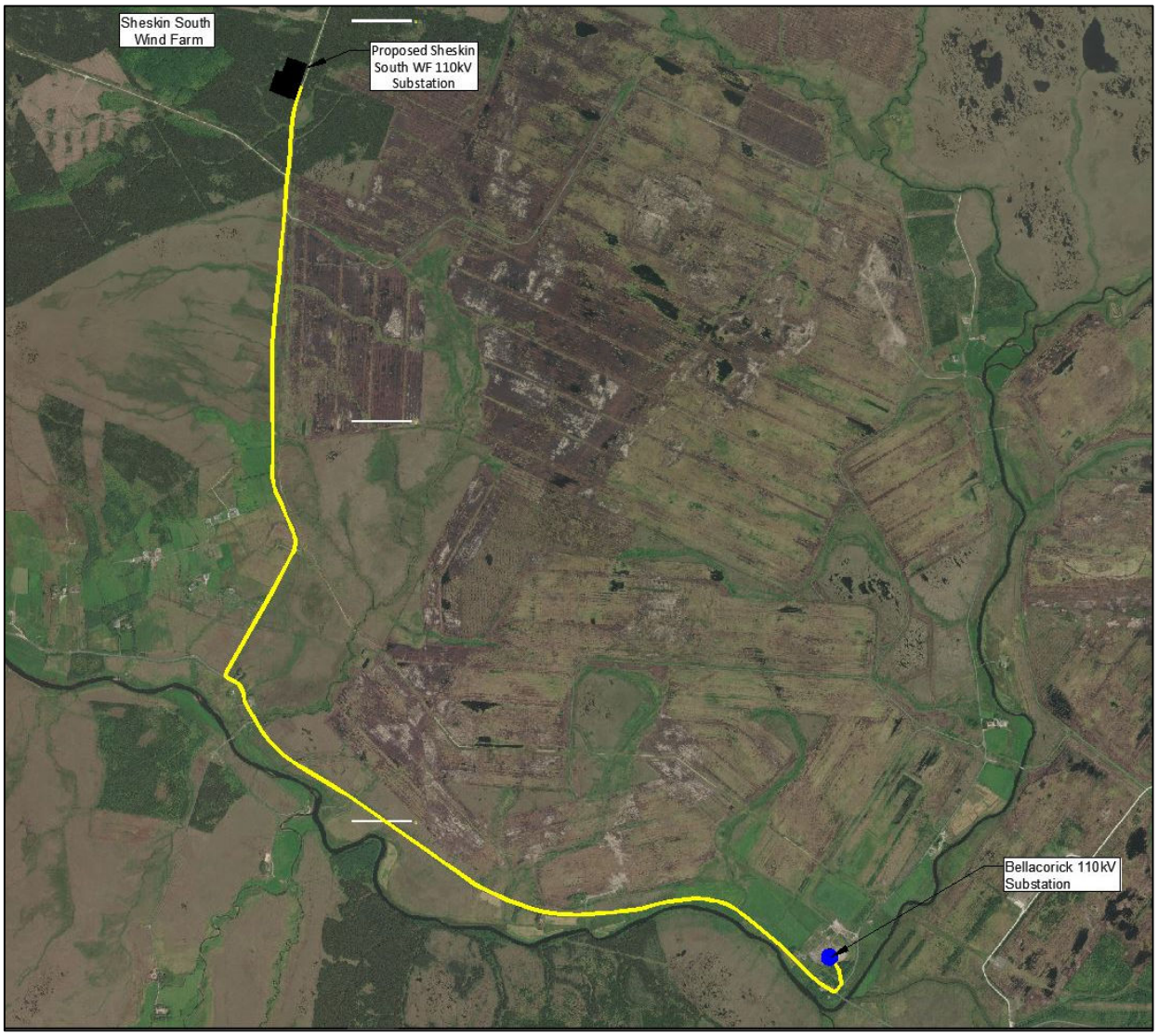


Figure 1 - Grid Connection Route Layout Plan

Table 2 below separates the UGC route into a number of sections and describes the specific construction requirements of each individual section with access routes to the work areas. All plant and equipment employed on the works will be subject to good site organisation (signage, vehicles parked within works areas etc.) and hygiene (washing down plant and cleaning road surfaces, as required), particularly during construction activities.

Table 2 - Summary of Grid Connection Design Route	
Section	**Description**
Section 1 UGC 6,894 m	**UGC from Bellacorick 110kV substation to L52926 Via N59.** The underground cable route initially begins within the site of the existing Bellacorick substation. The UGC then runs southeast for approx. 109m utilising the Bellacorick substation entrance road until it reaches the public road (L-52925). Here the UGC briefly runs in a southerly direction along the L-52925 for approx. 50m where the UGC then turns to the west heading northwest along the national road (N-59). The UGC traverses five

	culverts and two bridges (Bridge 1 & Bridge 2). After circa. 3654m the route will head north after 'Our Lady's Church' onto the L-52926 Bridge 2 crossing will require the implementation of Horizontal Directional Drill method (HDD) due to insufficient deck cover within the bridge. **Features** Section 1 contains 5 No. joint bays. Joint bays, described in Section 4.5 below, will be located below ground, within the curtilage of the existing road and finished to the required roads specification. All joint bays will have associated communication chambers and mentioned joint bays will also include earth link boxes which will have a surface access hatch which will match existing ground levels. • Joint Bay 01 (JB01) will be located in the entrance road of Bellacorick 110kV Substation. An earth link box will also be located at this joint bay location. • Joint Bay 02 (JB02) will be located within the (N-59) roadway, approximately 841m northwest of JB01. • Joint Bay 03 (JB03) will be located within the (N-59) roadway, approximately 772m west of JB02. • Joint Bay 04 (JB04) will be located within the (N-59) roadway, approximately 781m northwest of JB03. • Joint Bay 05 (JB05) will be located within the (N-59) roadway, approximately 771m northwest of JB04. Section 1 has 2 No. bridge crossings: The UGC route crosses over tributary watercourses to the Owenmore River. These bridges are described in further detail below in Section 6.5. • The first bridge (Bridge 1) crosses over a tributary stream to the Owenmore River. Located on the N59 approximately 357m west of JB03. Sufficient clearance exists within the bridge structure and will be crossed utilising the ducts in a flat formation method in the bridge deck. • The second bridge (Bridge 2) crosses over a tributary stream to the Owenmore River. Located on the N59 approximately 370m northwest of JB05. Insufficient clearance exists within the bridge structure and will cross this bridge utilising the HDD method. Section 1 has 5 No. Culvert Crossings. A standard culvert crossing method is described in drawing no. 05796-DR-229 (All drawings referred to in this document are included in Appendix 4-6 of the EIAR).
Section 2 UGC 6,894 m	**UGC from L52926 to Wind Farm Substation.** The route will traverse this local tertiary road (L-52926) mainly northeast for approx. 1007m where it then merges onto a forestry access road.

The UGC runs mainly north on this forestry access road for approx. 1993m where it enters the Sheskin South Wind Farm substation site location on the west. The UGC traverses four culverts and Bridge 3.

Bridge 3 crossing will require the implementation of Horizontal Directional Drill method (HDD) due to insufficient deck cover within the bridges.

Features

Section 2 contains 4 No. joint bays.

Joint bays, described in Section 4.5 below, will be located below ground, within the curtilage of the existing road and finished/reinstated to the required roads specification. All joint bays will have associated communication chambers and mentioned joint bays will also include earth link boxes which will have a surface access hatch which will match existing ground levels.

- Joint Bay 06 (JB06) will be located within the (L-52926) roadway, approximately 785m northwest of JB05.
- Joint Bay 07 (JB07) will be located within the (L-52926) roadway, approximately 781m north of JB06.
- Joint Bay 08 (JB08) will be located within the forestry access roadway, approximately 777m north of JB07. An earth link box will also be located at this joint bay location.
- Joint Bay 09 (JB09) will be located within the forestry access roadway, approximately 775m north of JB08. An earth link box will also be located at this joint bay location.

Section 2 has 1 No. bridge crossings:

The UGC route crosses over a large stream. Insufficient clearance exists within the bridge structures across these waterway networks. This bridge is described in further detail below in Section 6.5.

- Bridge 3 crosses over a large stream. Located on the forestry access roadway approximately 306m north of JB09. Insufficient clearance exists within the bridge structure and will cross this bridge utilising the HDD method.

Section 2 has 4 No. Culvert Crossings. A standard culvert crossing method is described in drawing no. 05796-DR-229.

Note: The precise location of the UGC route within the curtilage of the existing access tracks, public roads and forestry tracks may be subject to minor modifications following confirmatory site investigations prior to the construction phase of the proposed wind farm development.

3.0 Description of Proposed Electrical Infrastructure

The proposed 110kV substation will consist of both EirGrid and IPP Control Room buildings, HV electrical equipment and associated infrastructure including palisade fences and concrete post and rail fences. The installation of HV electrical equipment will include a 110/33kV Transformer (TRAFO) with associated equipment along with:

- Cable Sealing End (CSE);
- Surge Arrestor (SA);
- Earth Disconnect (DT);
- Current /Voltage Transformer (CT/VT);
- House Transformer (HT);
- Circuit Breaker (CB);
- Lightning Mast (LM);
- 110kV underground cable to Bellacorick 110kV Station comprising 3 No Power Ducts, 2 No Telecoms Ducts and 1 No Earth Continuity Duct;
- Diesel Generator;
- Security Fencing and Cameras.

4.0 Description of Proposed Battery Energy Storage System (BESS)

The proposed development comprises a battery-based energy storage system (BESS) adjacent to the proposed Sheskin South Wind Farm 110kV Substation.

The development primarily consists of steel containers assembled in rows at the development site. Prior to installing the steel containers, clearance of the site area, levelling of the ground surface and creation of a hard stand will be undertaken. These containers and the adjacent infrastructure house the batteries, inverters, transformers, fire suppression equipment and associated electrical components. The containers will be mounted onto concrete plinth foundations. The containers shall be spaced to allow airflow around the containers, feeding their climate control systems.

In addition to the modular steel containers, other components of the development include:

- A grid transformer within the electrical compound;
- Above ground cable junction boxes/ cabling cabinets and cable racks/steel trunking facilitating the necessary electrical connections between containers;
- Underground ducting and cabling;
- A security fence around the perimeter of the proposed development;
- Communications equipment;
- Lightning protection poles;

5.0 Access Routes to Work Area

The proposed grid route will consist entirely of UGC. Where the proposed underground cable will be installed predominantly within the existing roads network, it will be accessed via the existing road network. The contractor(s) will be required to utilise the local public road network in the vicinity of the work area

and from there utilise private tracks, where appropriate. Prior to the commencement of development, precise access arrangements will be agreed with the respective landowners.

A detailed Traffic Management Plan will be prepared and agreed with Mayo County Council, prior to the commencement of construction.

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 proposed 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.

6.0 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 Mayo County Council. All work on public roads will be subject to the approval of a road opening license application by Mayo 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 150m sections, and no more than 100m will be excavated without the majority 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 appropriately within the works area so as not to cause additional obstruction or inconvenience to road users or local residents. The traffic signals 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. Access for local residents can be accommodated, although traffic flows during works may have to minimised.

All traffic management measures will comply with those outlined in the EIAR and will be incorporated into a detailed Traffic Management Plan (TMP) to be prepared, in consultation with Mayo County Council, prior to the commencement of UGC construction.

7.0 Road Opening Licence

The proposed UGC works will require a road opening licence under Section 254 of the Planning and Development Act 2000-2015 from Mayo County Council. A Traffic Management Plan (TMP) will be agreed with Mayo County Council prior to the commencement of the development. This 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 Mayo County Council in advance of the preparation of the TMP.

8.0 UGC Construction Methodology

The UGC trench will consist of 3 no. 160mm diameter HDPE power cable ducts and 2 no. 125mm diameter HDPE communications duct to be installed in an excavated trench, typically 825mm wide by 1315mm deep, with variations on this design to adapt to service crossings and watercourse crossings. The power cable ducts will accommodate 1 No. power cable per duct. The communications duct will accommodate a fibre cable to allow communications between the Sheskin South Wind Farm substation and Bellacorick 110kV substation. The inclusion 1 No. earth continuity conductor duct will also be required.

The ducts will be installed and the trench reinstated in accordance with the specifications of the Roads Section within Mayo County Council where installed in public roads and reinstated in accordance with the landowner's requirements where installed in private lands. The installation of the electrical cabling/fibre cable will be pulled through in one section in approximately 700 to 850m section lengths. Construction methodologies to be implemented and materials to be used will ensure that the UGC is installed in accordance with the requirements of the Council and private landowners.

8.1 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 within the EIAR where relevant;
- All existing underground services along the UGC route shall be identified on site prior to the commencement of construction works;
- Traffic management measures will be implemented in accordance with those included in Section 14.1 of the EIAR, and a detailed Traffic Management Plan will be prepared and agreed with Mayo County Council;
- The excavated trench will be approximately 825mm in width and approximately 1315mm deep both within the public road network and within private lands;
- The 160mm diameter HDPE cable ducting will be placed into the prepared trench, inspected and backfilled as per **Error! Reference source not found.** & **Error! Reference source not found.**.
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 50m from surface water features and all stockpiling locations will be subject to approval by the Site Manager and Project Environmental Clerk of Works (ECoW);
- Excavated material shall be employed to backfill the trench where appropriate and any surplus material will be transported to one of the proposed on-site borrow pits;

- 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. (Please refer to Chapter 9 of the EIAR)
- Where required, grass will be reinstated by either seeding or by replacing with grass turves;
- No more than a 100m 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 on average of 1 no. day to complete a 100m section;
- Where the cable is being installed in a roadway, temporary reinstatement may be provided to allow larger sections of road to be permanently reinstated together;
- Works will only be conducted in normal working hours of Monday to Friday 07:00 to 19:00 and Saturday 07:00 to 13:00, with no works on Sundays or Bank Holidays except in exceptional circumstances or in the event of an emergency;
- Following the installation of ducting, pulling the cable will take approximately 1 no. days between each joint bay, with the jointing of cables taking approximately 1 week per joint bay location.

Equipment:

- 1 Excavator Operator;
- 2-3 General Operatives;
- 1 no. tracked excavator (only rubber tracked machines will be allowed on public roads);
- 1 no. dumper or tractor and trailer.

Materials:

- Ready-mix Concrete (delivered to site);
- Trench backfilling material (excavated material and aggregates) to relevant specifications;
- 160mm diameter HDPE ducting;
- 125mm diameter HDPE ducting;
- 63mm diameter HDPE duct;
- Temporary Surface Reinstatement Materials.

Figure 2 - Typical 110kV Underground Duct Installation

8.2 Ducting Installation Methodology

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

- Grade, smooth and trim trench floor when the required 1315mm depth and 825mm 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 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.
- 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 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 landowners, unless otherwise agreed with local authority *(Figure 3).*
- 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 4).*
- 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 at a later date. All the works should be witnessed by ESBN Clerk of Works (CoW) as required.

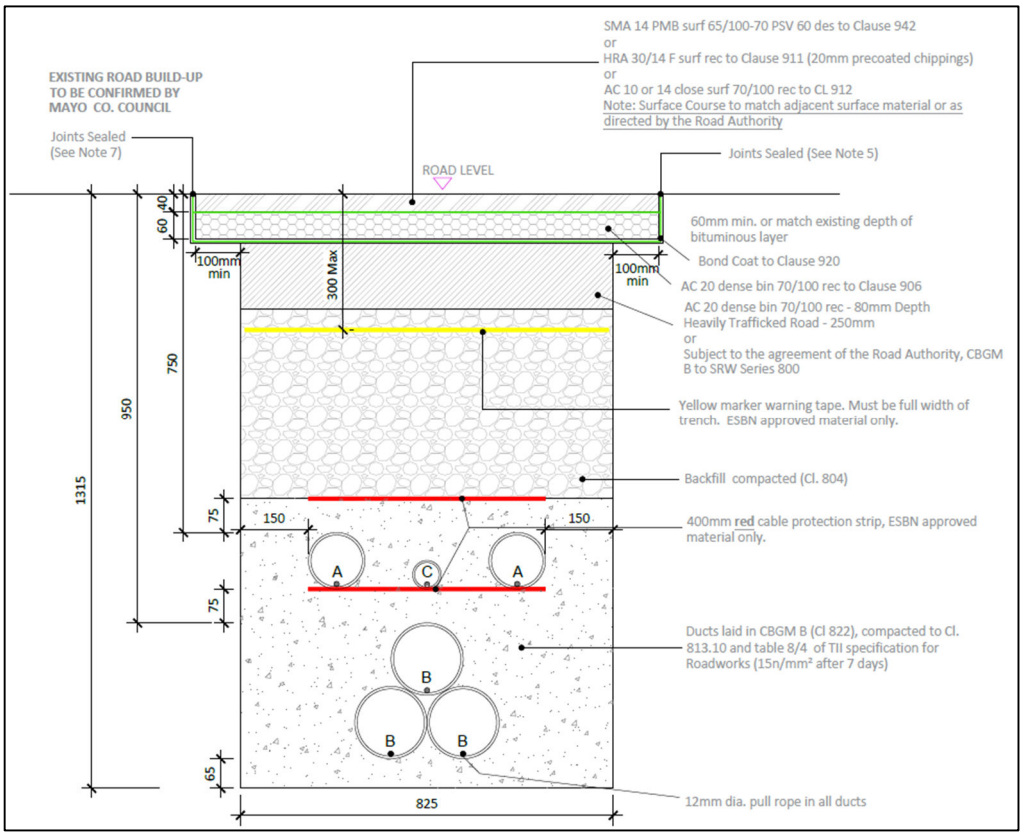


Figure 3 - Typical Trench in Road Section

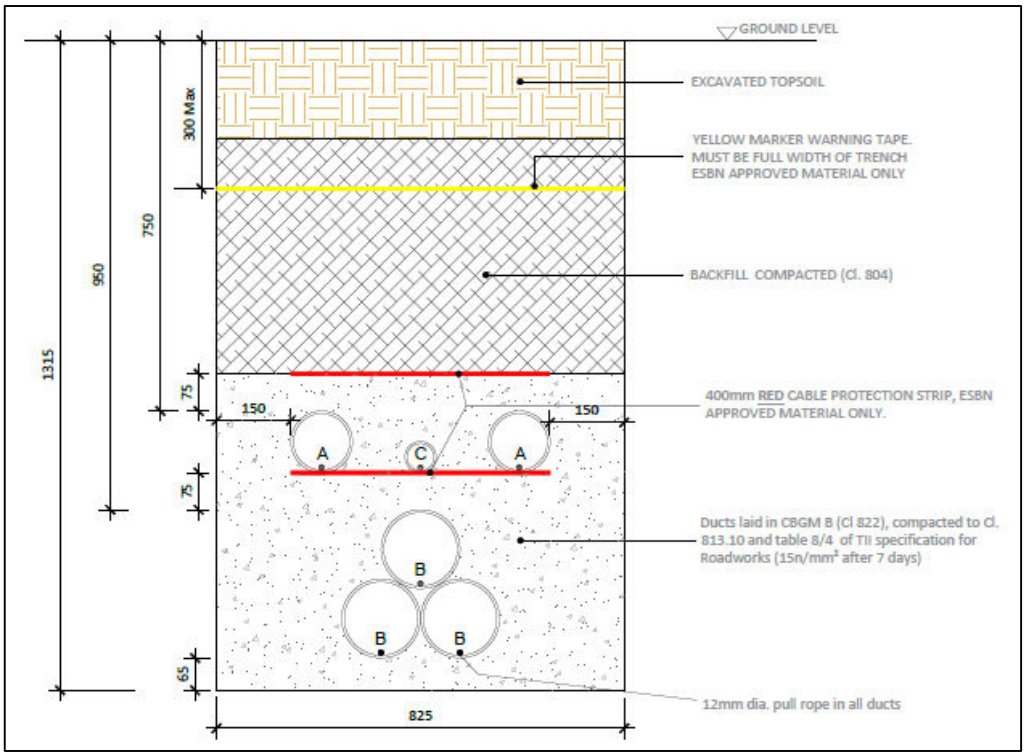


Figure 4 - Typical Trench in Off-Road Section

8.3 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.

8.4 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 ESB standards.

Marker posts will be used on non-roadway routes to delineate the duct route and joint bay positions. Corrosion proof aluminium triangular danger signs, with a 700mm base, and with centred lightning symbol, on fluorescent yellow background shall be installed in adequately sized concrete foundations. Marker posts shall also be placed in the event that burial depth is not to standard. The precise siting of marker posts will be dictated by ESBN as part of the detailed design process.

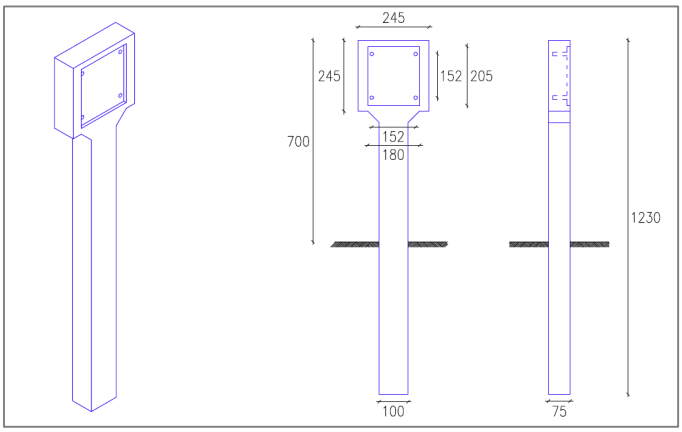


Figure 5 - ESB Marker Posts

8.5 Major Watercourse Crossings

The cable route will involve 3 No. bridge crossings including 2 No. HDD crossings. 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.

The underground cable will encounter no. 9 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 intended crossing methodology for each of the 9 no. culverts is included in Appendix A

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 ***Error! Reference source not found.*** and **Error! Reference source not found.** and can be found in drawing 05796-DR-229.

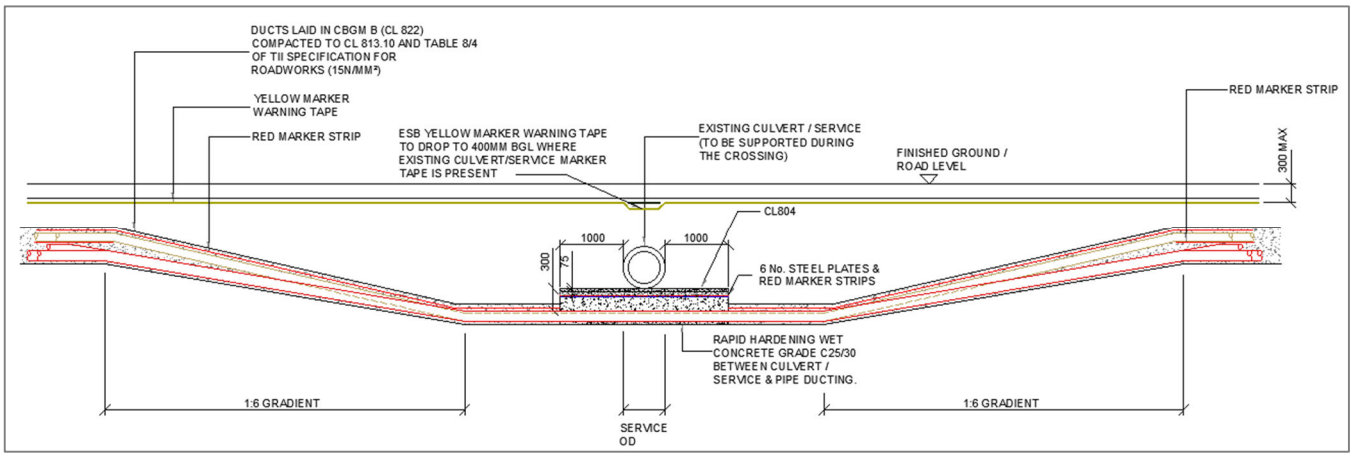


Figure 6 – 110kV UGC Culvert/Service Undercrossing

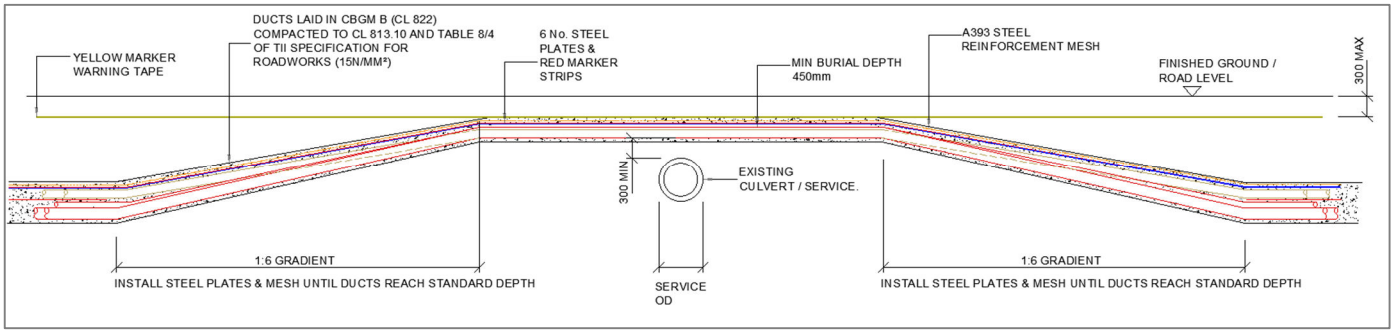


Figure 7 - 110kV UGC Culvert/Service Overcrossing

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.

8.5.1 Bridge 1 – Crossing Details

ITM Coordinates: 495239.23, 820466.06

Bridge 1 is located on the N59 approx. 357m west of JB03 crossing over a Stream, which is a tributary to the Owenmore River. The bridge has sufficient room to install the cable to ESBN and EirGrid specifications (450mm cover to top of ducts) and the suitability of the bridge appears to be adequate to accommodate the works. Therefore, the ducts can be installed in flat formation within the deck of the bridge.

Bridge ID: MO-N59-011.00, See Drawing 05796-DR-250 for further details.

Figure 8 - Bridge 1 within the N59

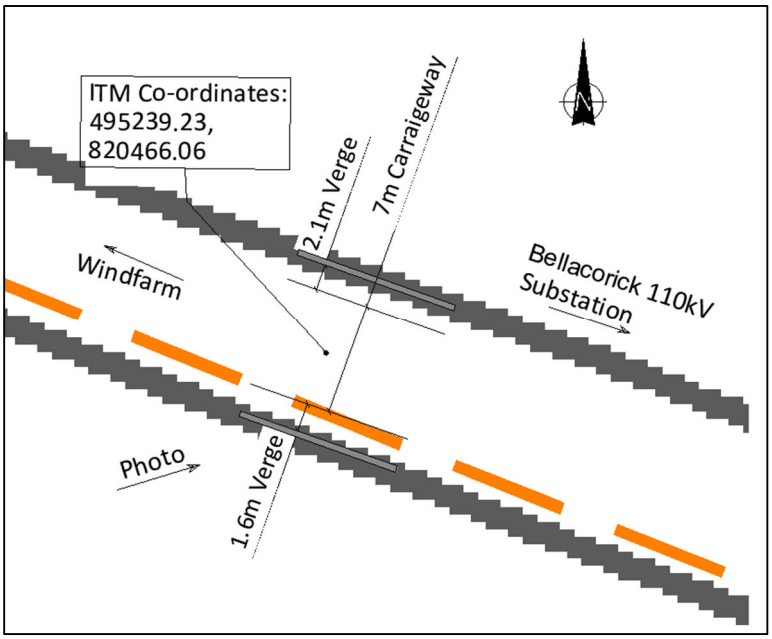


Figure 9 - Bridge 1 superimposed within OSI background

8.5.2 Bridge 2 – Horizontal Directional Drilling

ITM Coordinates: 493980.55, 821376.31

Bridge 2 is located on the N59 approx. 370m northwest of JB05 crossing over a Stream, which is a tributary to the Owenmore River. The bridge deck has insufficient room to install the cable to ESBN and EirGrid specifications (450mm cover to top of ducts) and the suitability of the bridge is inadequate to accommodate the scope of 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. Drilling will take place from the road carriageway**.** The methodology for HDD is outlined in section 8.6 below.

Bridge ID: MO-N59-012.00, See Drawing 05796-DR-251 for further details.

Figure 10 - Bridge 2 within the N59

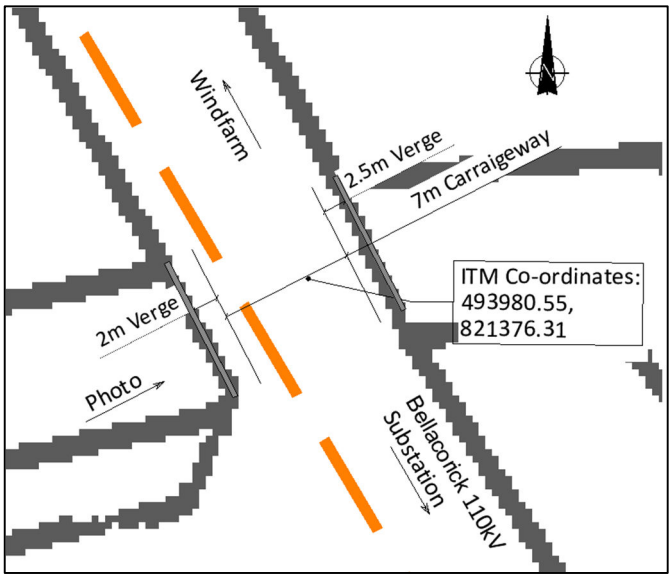


Figure 11 - Bridge 2 superimposed within OSI background

8.5.3 Bridge 3 – Horizontal Directional Drilling

ITM Coordinates: 494169.25, 824312.50

Bridge 3 is located on the forestry access roadway approximately 306m north of JB09 crossing over a large stream. Bridge 3 has insufficient room to install the cable to ESBN and EirGrid specifications (450mm cover to top of ducts) and the suitability of the bridge is inadequate to accommodate the proposed 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. Drilling will take place from the road carriageway**.**

See Drawing 05796-DR-252 for further details.

Figure 12 - Bridge 3 within the forestry access roadway

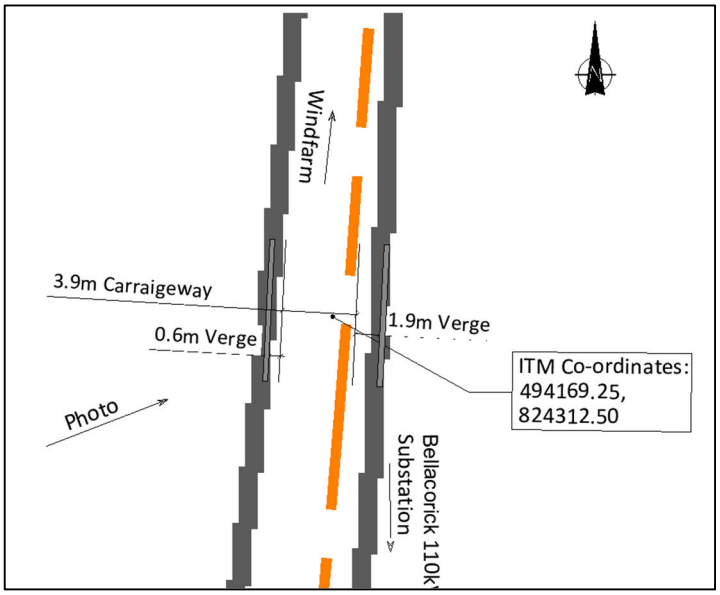


Figure 13 - Bridge 3 superimposed within OSI background

8.6 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 are a number of bridges 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. 40m^2 will be fenced on both sides of the river crossing,

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 Mayo 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.

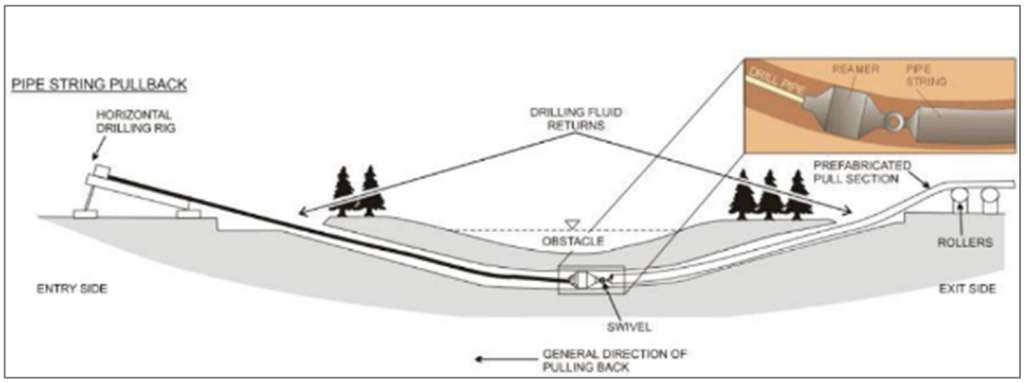


Figure 14 - Typical HDD Installation

8.7 Storage of Plant Machinery

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

8.8 Joint Bays and Associated Chambers

Joints Bays are to be provided approximately every 700m to 850m along the UGC routes to facilitate the jointing of 2 no. lengths of UGC. 110kV Joint Bays are typically 2.5m x 6m x 2.05m pre-cast concrete

structures installed below finished ground level. Joint Bays will be located in the non-wheel bearing strip of roadways, however given the narrow profile of local roads this may not always be possible.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between Sheskin South Wind Farm and the existing Bellacorick 110kV Substation. Earth sheath links are used for earthing and bonding cable sheaths of underground power cables, installed in a flat formation so that the circulating currents and induced voltages are eliminated or reduced. Earth sheath link chambers and communication chambers are located close to joint bays. Earth sheath link chambers and communication chambers will typically be pre-cast concrete structures with an access cover at the 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. The marker posts will consist of a corrosion-proof aluminium triangular danger sign, with a 750mm 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.

The precise siting of all Joint Bays, Earth Sheath Link Chambers and Communication Chambers, within the curtilage of the public road, is subject to approval by ESBN and EirGrid.

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

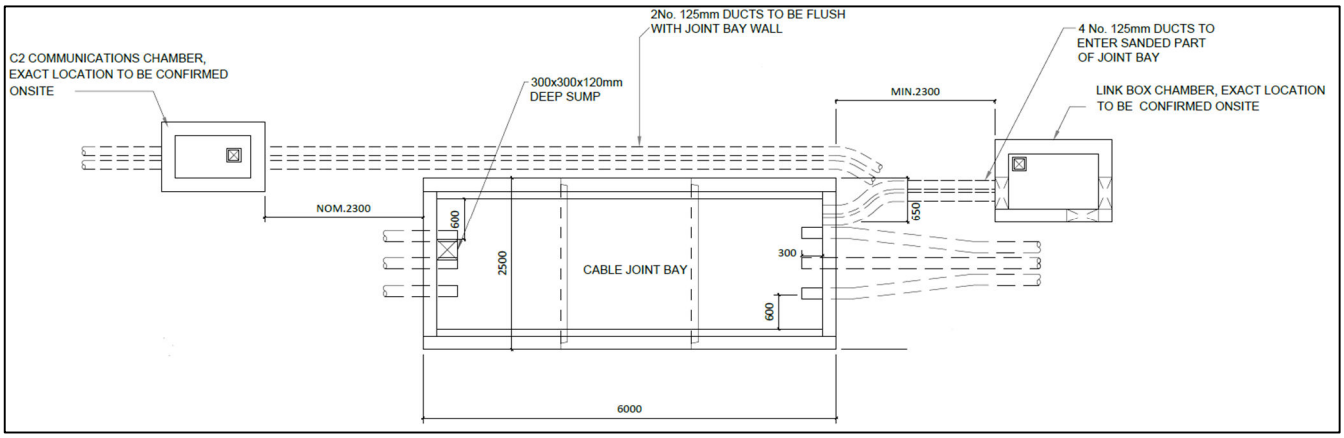


Figure 15 - 110kV Joint Bay Plan Layout

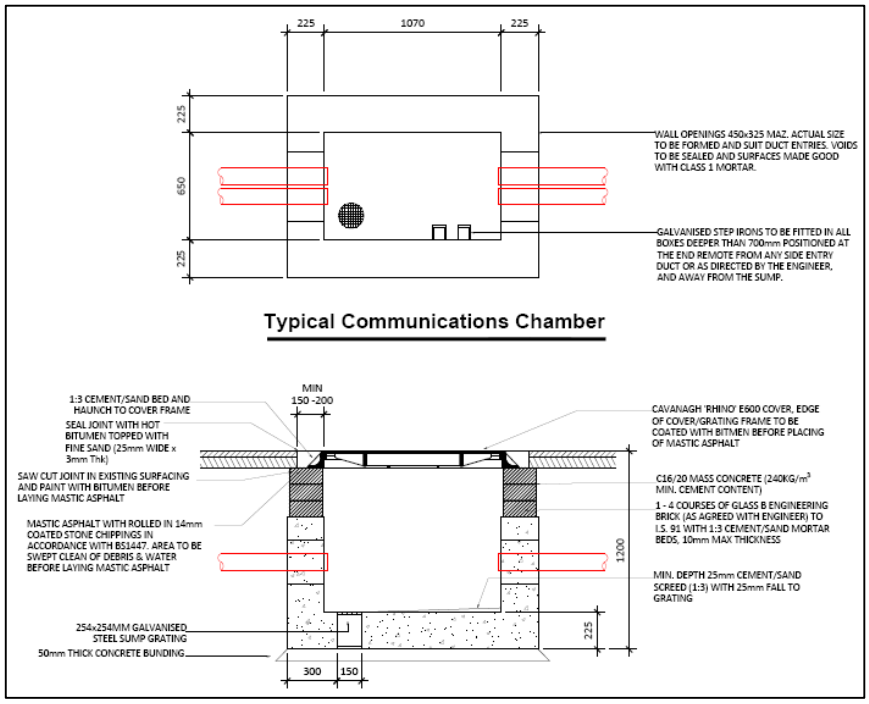


Figure 16 - Typical Communications Chamber

Figure 17 - Typical Sheath Link Chamber

9.0 Best Practice Design and Construction & Environmental Management Methodology

Prior to commencement of construction works the contractor will draw up detailed Method Statements which will be informed by this 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 pocketbook*. (C762) 4th edition. CIRIA;
- CIRIA *Environmental Good Practice on Site (fourth edition) (C741) 2015*.

The grid connection 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 compounds within the proposed Sheskin South Wind Farm site 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 taken into account when planning construction activities to minimise risk of run off from site;
- Provision of 50m 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 spill kits 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 Wind 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 50m hydrological buffer at all times.

10.0 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.

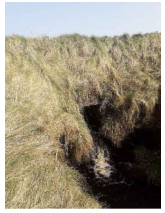
Appendix A

Culvert Crossing Schedule

ISO A2 420mm x 594mm

Project Management Initials: Designer: POS Checked: GH Approved: RG

Culvert Crossing Schedule

Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Crossing Methodology	Photo
1.	750 Ø	Concrete Pipe	1530	OVERCROSSING	 
2.	450 Ø (X1) 900 Ø (X1)	Concrete Pipe	2250	OVERCROSSING	 
3.	UNKNOWN OVERGROWN	TBC	TBC	TBC	 
4.	915 high x 530 wide	Stone Masonry Box	1750	OVERCROSSING	 
5.	750 Ø	Concrete Pipe	3000	OVERCROSSING	 

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PROJECT

Sheskin South Wind Farm 110kV Grid Connection

CLIENT

Ireland FuturEnergy

SSE Renewables

CONSULTANTS

MKO

NOTES: -

- No structural surveys have been carried out and the proposals are subject to detailed design.
- Crossings are in compliance with EirGrid specification requirements for shallow formation, min depth, etc.
- Additional culverts may be encountered on the route.

LEGEND: -

ISSUE/REVISION

I/R	DATE	DESCRIPTION
F00	22.02.23	Issued for Information

PROJECT NUMBER

05-796

SHEET TITLE

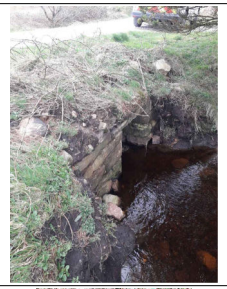
Culvert Crossing Schedule
Sheet 1 of 2
Culverts 1 to 5

SHEET NUMBER

05796-DR-253

ISO A2 420mm x 594mm

Culvert Crossing Schedule

Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Crossing Methodology	Photo
6.	900 high x 700 wide	Stone Masonry Box	550	UNDERCROSSING	 
7.	600 Ø	Concrete Pipe	1100	OVERCROSSING	 
8.	450 Ø	HDPE Twin Walled Pipe	1250	OVERCROSSING	 
9.	450 Ø	HDPE Twin Walled Pipe	1150	OVERCROSSING	 

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SHEET TITLE

Culvert Crossing Schedule
Sheet 2 of 2
Culverts 6 to 9

SHEET NUMBER

05796-DR-253

Project Management Initials: Designer: POS Checked: GH Approved: RG