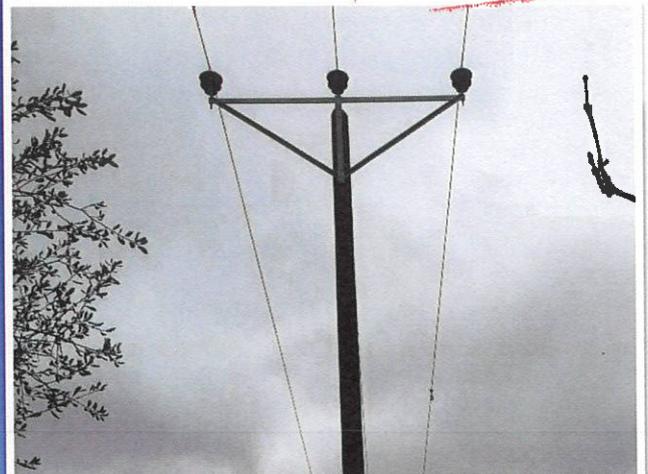
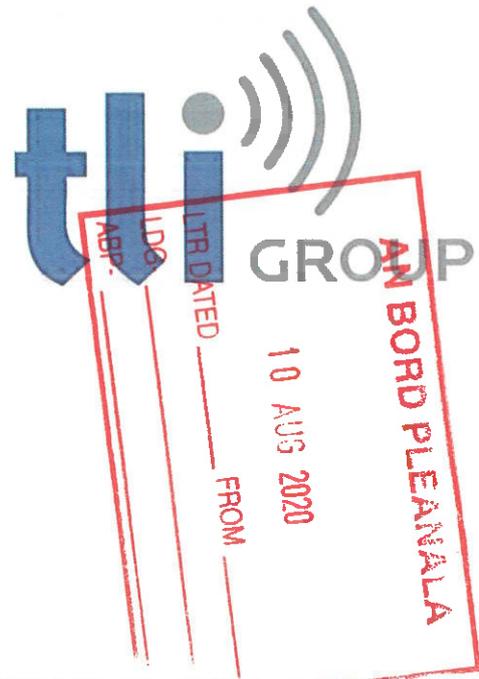


Outline Construction Methodology – 38kV Underground Cable

Clondardis Solar Park
Grid Connection Design



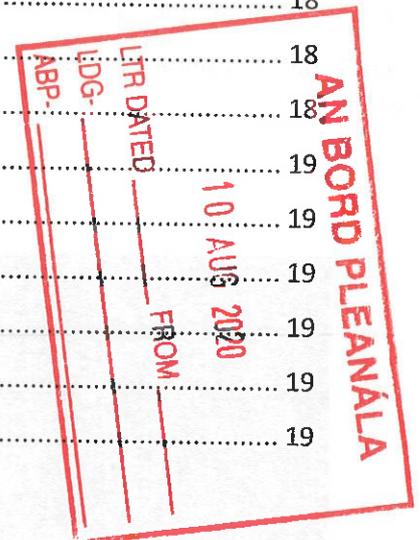
April 2020
Report Ref: 05-745-001-00
Client: **Harmony Solar**

Revision:	Designer:	Checked:	Date:	Notes:
00	AF	RG	20/05/2020	For Client Review
01	AD	RG	29/05/2020	For Section 5 Application



Contents

1.0	Introduction	4
2.0	Proposed Grid Route	4
3.0	Preliminary Site Investigations.....	5
3.1	UG Cable Route:	5
4.0	UGC Construction Methodology.....	5
4.1	Trenching Methodology.....	7
4.2	Managing Excess Material from Trench	9
4.3	Storage of Plant and Machinery.....	9
4.5	Joint Bays and Associated Chambers	9
5.0	Assessment of Proposed Route and Construction Requirements.....	13
6.0	Best Practice Design and Construction & Environmental Management Methodology.....	15
7.0	Access Routes to Work Area.....	16
8.0	Traffic Management.....	17
9.0	Road Opening Licence	18
10.0	Relocation of Existing Services.....	18
11.1	Underground Cables	18
11.2	Gas Networks	19
11.3	Water Mains.....	19
11.0	Reinstatement of Private Land	19
12.0	Implementation of Environmental Protection Measures	19
13.0	Invasive Species Best Practice Measures	19
14.0	Waste Management.....	19



1.0 Introduction

The purpose of this document is to outline and explain the construction techniques and methodologies which will be implemented during construction of the proposed Clondardis Solar Park 38kV grid connection to the existing ESB owned Mullingar 110kV substation. The grid connection will consist of an underground cable (UGC). The UGC works will consist of the installation of 4 no. ducts in an excavated trench to accommodate 3 no. power cables, and 1 no. fibre communications cable to allow communications between the Clondardis Solar Park Substation and Mullingar 110kV substation. This document is intended to be used as an aid to understand the methodologies to be employed during construction and should be read in conjunction with all other specialist reports which accompany the planning application. In addition, this document is in outline form only and will be revised and updated prior to the commencement of any construction activities, and detailed Method Statements will be prepared in respect of each aspect of the proposed development.

2.0 Proposed Grid Route

The proposed UGC is approximately 5km in length and runs in an easterly direction from the Clondardis Solar Park to the existing ESB Mullingar 110kV substation. The proposed route is located within the Clondardis Solar Park site, the carriageway of regional and local roads, and across private lands. The exact location of the underground cable within the proposed site boundary is subject to minor modification following a further detailed assessment to be undertaken prior to construction and following consultation with Westmeath County Council and all other relevant stakeholders, having regard to all environmental protection measures outlined in the planning application and accompanying technical reports.

Image 1, below, outlines the proposed UGC route, with each section of the route being discussed in detail at Table 1.



Image 1: Grid Connection Route Location

Tables 1 and 2 of this report outline the preliminary design features of the UGC and proposed route.

Table 1 – Approximate Route Location of Preliminary Design:			
Solar Park Site (UGC)	Local Roads (UGC)	Regional Roads (UGC)	ESB Access Track (UGC)
704m	1082m	3,195m	119m

Table 1: Clondardis Solar Park to Mullingar 110kV Substation – UG Cable Location Summary

3.0 Preliminary Site Investigations

It would be proposed to carry out Preliminary site investigations along the cable route prior to construction to confirm design assumptions.

The following items may be carried out:

1 UG Cable Route:

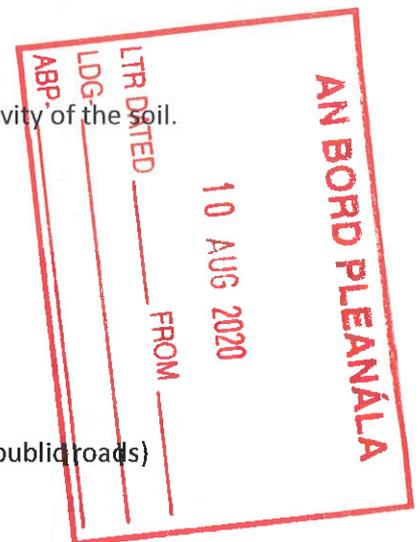
Slit trenches at locations of major service crossings (Full road width).

5 No. trial holes along the route to ascertain ground conditions and thermal resistivity of the soil.

Traffic Management – Single lane Closure with Stop/Go system in place.

Equipment:

- 4x4 vehicle
- Concrete vibrator
- Wheeled dumper
- Soil compactor
- 360° tracked excavator (only rubber tracked machines will be allowed on public roads)



4.0 UGC Construction Methodology

The proposed UGC will consist of 3 no. 110mm diameter HDPE power cable ducts and 1 no. 110mm diameter HDPE communications duct to be installed in an excavated trench, typically 600mm wide by 1,220mm deep, with variations on this design to adapt to bridge crossings, service crossings and watercourse crossings. The power cable ducts will accommodate 3 no. power cables. The communications duct will accommodate a fibre cable to allow communications between the Clondardis Solar Park substation and Mullingar 110kV substation. The ducts will be installed, the trench reinstated in accordance with landowner/Westmeath County Council specification, and then the electrical cabling/fibre cable is pulled through the installed ducts in approximately 650/750m sections. 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 ESB.

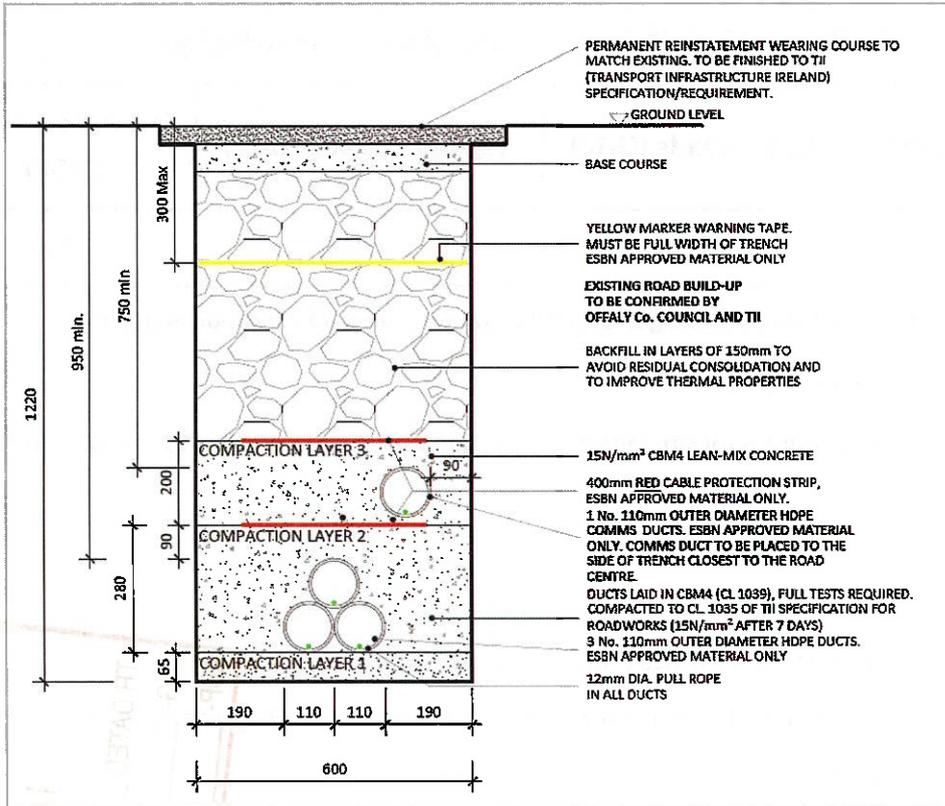


Image 2: Typical Trench in Roadway

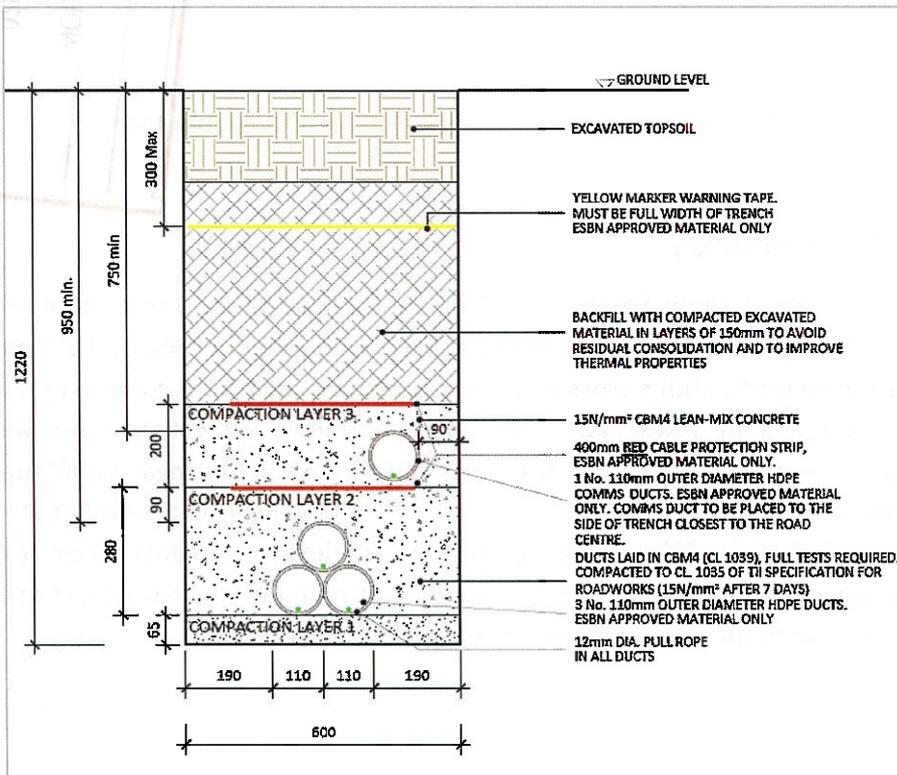


Image 3: Typical Trench in Off Road Section

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 ESB as part of the detailed design process.

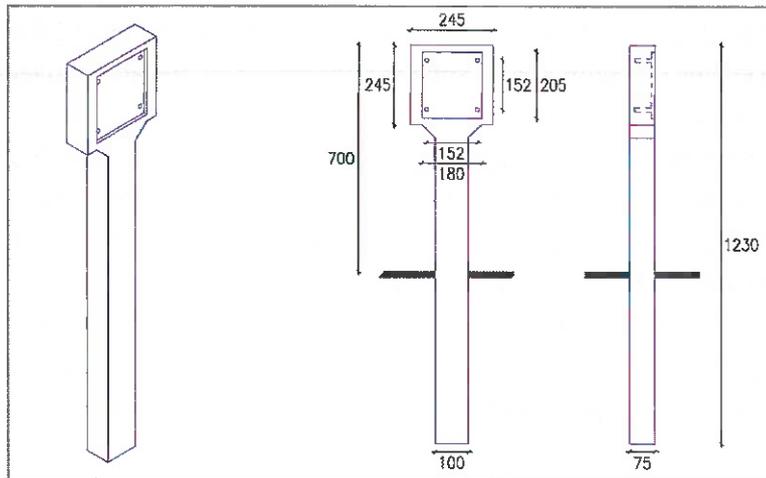


Image 4: Typical ESB Marker Posts Example

4.1 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 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 and Irish Water specifications;
- In the event that 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 Westmeath County Council;
- The excavated trench will be approximately 600mm in width and approximately 1220mm deep both within the public road network and within private lands;
- The base of the excavated trench will be lined with sand bedding to be imported to site from a local licensed supplier. The 110mm diameter HDPE cable ducting will be placed into the prepared trench, inspected and backfilled as per Images 2 & 3;
- 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 Ecological Clerk of Works (ECoW);
- Excavated material shall be employed to backfill the trench where appropriate and any surplus material will be transported off site and disposed of at a fully authorised soil recovery site;
- Any earthen (sod) banks to be excavated will be carefully opened with the surface sods being stored separately and maintained for use during reinstatement;
- The excavated trench will be dewatered if required, from a sump installed within the low section of the opened trench. Where dewatering is required, dirty water will be fully and appropriately attenuated, through silt bags, before being appropriately discharged to vegetation or surface water drainage feature;
- Where required, grass will be reinstated by either seeding or by replacing with grass turves;
- No more than a 100 metre section of trench will be opened at any one time. The second 100 metres will only be excavated once 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 08:00 to 20:00 and Saturday 08:00 to 18:00, with no works on Sundays or Bank Holidays except in exceptional circumstances or in the event of an emergency;
- Following the installation of ducting, pulling the cable will take approximately 1 no. day between each joint bay, with the jointing of cables taking approximately 1 no. day.

Equipment:

- 2-3 General Operatives;
- 1 Excavator Operator;
- 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;

- 110mm diameter HDPE ducting;
- Temporary Surface Reinstatement Materials.

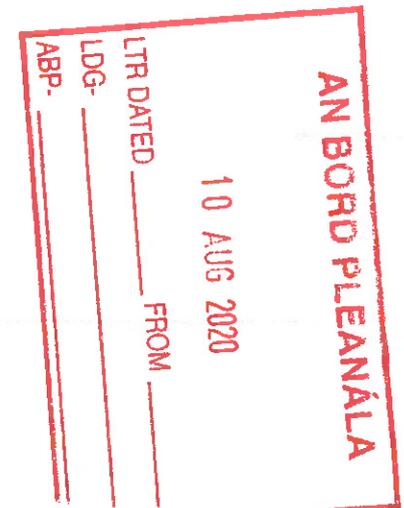


Image 5: Typical 38kV Underground Duct Installation

4.2 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 exists, it may be used in the reinstatement of the Clondardis Solar Park site or disposed of to a licensed facility.

4.3 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 permitted Clondardis Solar Park. Oils and fuels will not be stored on site and will be stored in an appropriately bunded area within the temporary storage compound.

4.5 Joint Bays and Associated Chambers

Joint Bays are to be provided approximately every 650m - 750m along the UGC route to facilitate the jointing of 2 no. lengths of UGC. Joint Bays are typically 1.6m x 4.5m x 1.275m 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 the Clondardis Solar Park substation and the existing 110kV substation at Mullingar. Earth Sheath Link Chambers are also required approximately every second joint bay along the cable route. 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 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. The marker posts will consist of a corrosion proof aluminium triangular danger sign, with 750mm base, and with centred lightning symbol, on engineering grade fluorescent yellow background. They will be installed in adequately sized concrete foundations and will also be placed where the cable has not been buried to the standard depth, due to existing road conditions.

Equipment:

- 2-3 General Operatives
- 1 Excavator Operator
- 360° tracked excavator (only rubber tracked machines will be allowed on public roads)
- 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;
- 110mm diameter HDPE ducting
- Precast Chamber Units / Construction materials for chambers

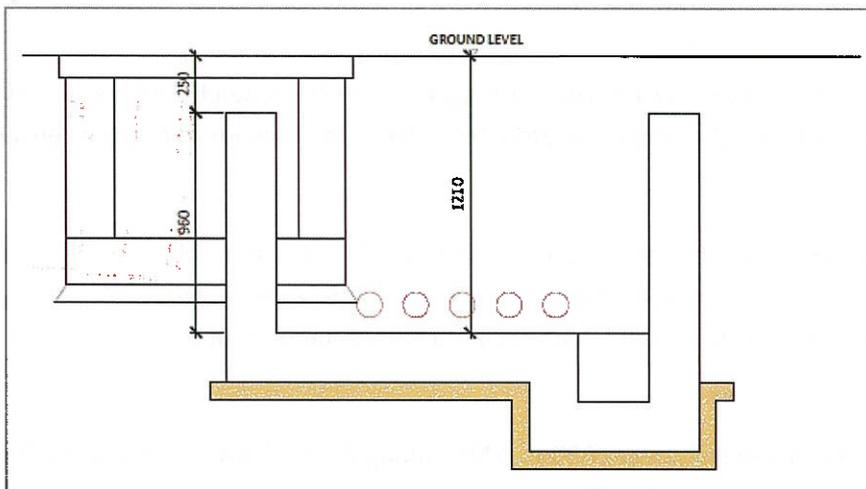


Image 7: Typical Section Through Joint Bay and Link Box

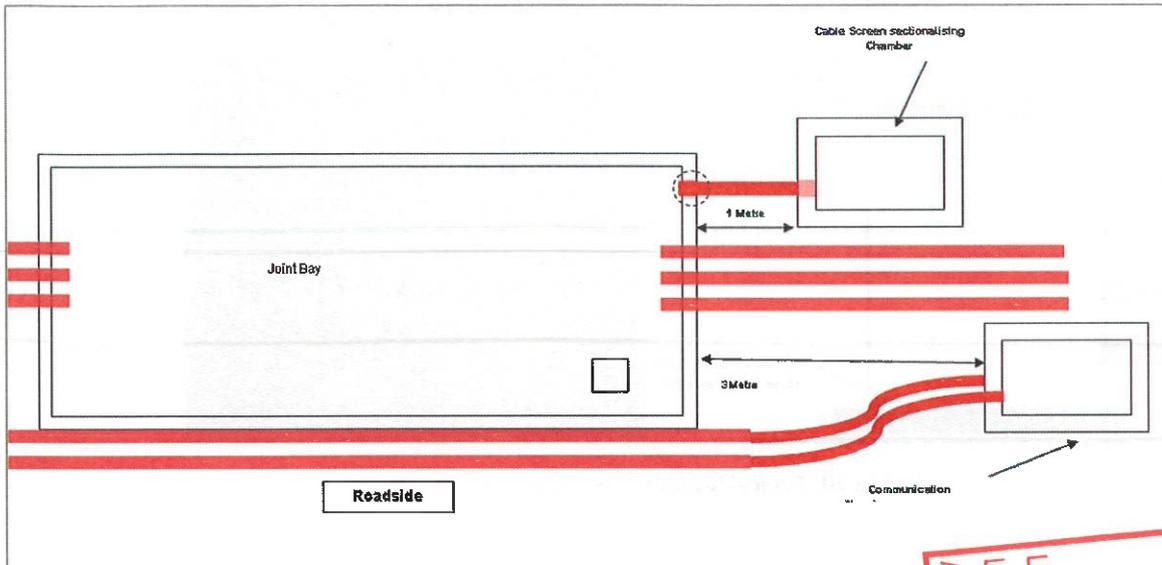
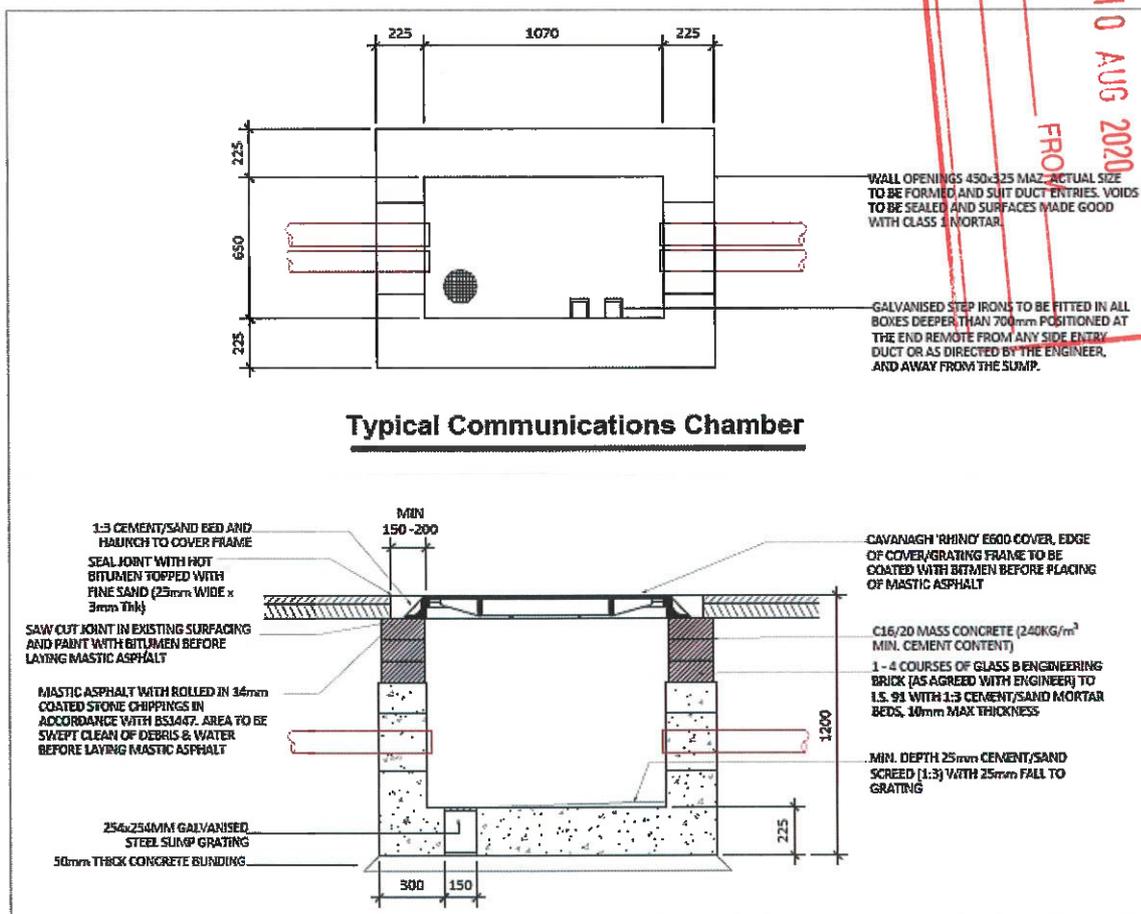


Image 8: Typical Joint Bay and Link Box Plan Details



LTR DATED _____
 LDG- _____
 ABP- _____
 10 AUG 2020
 AN BORD PLEANÁLA

Image 9: Typical Communications Chamber

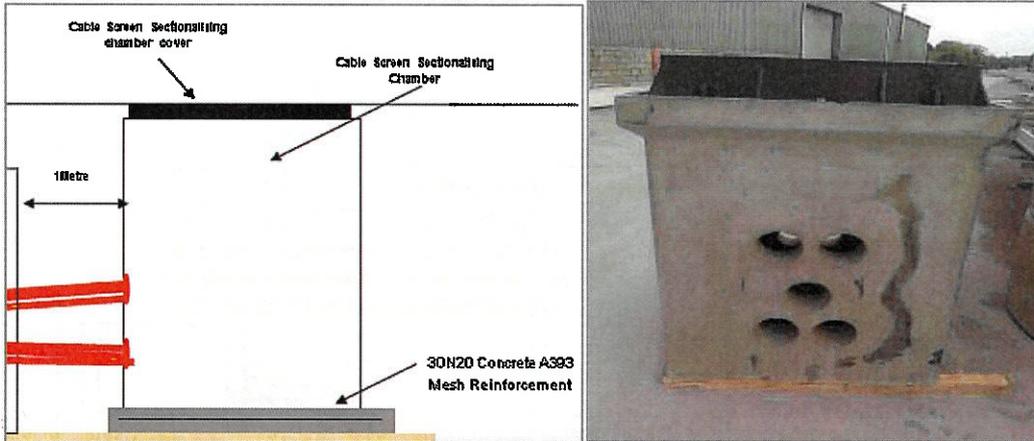


Image 10: Typical Sheath Link Chamber



5.0 Assessment of Proposed Route and Construction Requirements

The table below separates the transmission line route into a number of sections and describes the specific construction requirements of each individual section.

Table 2 - Summary of Preliminary Grid Connection Design Route	
Section	Description
<p>Section 1</p> <p>UGC</p> <p>796 m</p>	<p>UGC from Mullingar 110kV Substation to R393 Road</p> <p>The proposed UGC from the Mullingar 110kV substation to the R393 Road will be routed through the Local Road L1701 and located in the carriageway of the road.</p> <p>The UGC will exit the Mullingar 110kV Station through main ESB entrance and continue onto the L1701 road. Immediately after leaving the Mullingar 110kV Substation the UGC route passes through a highly residential area. The UGC route will continue in a south westerly direction until it meets the R393.</p> <p><u>Features</u></p> <p>Section 1 contains 1 no. joint bay. Joint bays will be located below ground and finished/reinstated to the required national roads specification. Joint bays will have associated communication chambers and link boxes which will have a surface access hatch which will match existing ground levels.</p> <ul style="list-style-type: none"> Joint Bay 01 (JB01) will be located in the L1701 local road. JB01 will be located approx. 711m from the Mullingar 110kV Substation. <p>Section 1 must navigate water main piping on both sides of the L1701, from the Mullingar Substation as far as the R393.</p>
<p>Section 2</p> <p>UGC</p> <p>3195 m</p>	<p>UGC within R393 Road</p> <p>Having changed to a north west direction the UGC runs along the Regional R393 road for approx. 3195m. The route passes the water treatment plant for Mullingar. The route continues in this direction until it meets the local L5802 road and changes to a southerly direction.</p> <p>Section 2 remains in the R393 road carriageway.</p> <p><u>Features</u></p> <p>Section 2 contains 4 no. joint bays. Joint bays will be located below ground and finished/reinstated to the required national roads specification. Joint bays will have associated communication chambers and link boxes which will have a surface access hatch which will match existing ground levels.</p> <ul style="list-style-type: none"> Joint Bay 02 (JB02) will be located adjacent to the Mullingar Water treatment plant. This is located approx. 760m north east of JB01. Joint Bay 03 (JB03) will be located within the R393 roadway, approx. 762m north west of JB02.

AN BORD PLEANÁLA
 10 AUG 2020
 LTR DATED
 LDG
 ABF

	<ul style="list-style-type: none"> • Joint Bay 04 (JB04) will be located within the R393 roadway, approx. 689m south of JB03. • Joint Bay 05 (JB05) will be located within the R393 roadway, approx. 690m south of JB04. <p>There is a water main running the entirety of the length of road, from the water treatment plant to the junction at the L1701 there is a water main on both sides of the road.</p>
<p>Section 3 UGC 409 m</p>	<p>UGC in L5802 Local Road</p> <p>Section 3 of the grid connection is an UGC from the R393 to the solar park site in local road.</p> <p>The UGC stays in the L5802 carriage way for the entirety of this section.</p> <p><u>Features</u></p> <p>Section 1 contains 1 no. joint bay. Joint bays will be located below ground and finished/reinstated to the required national roads specification. Joint bays will have associated communication chambers and link boxes which will have a surface access hatch which will match existing ground levels.</p> <ul style="list-style-type: none"> • Joint Bay 06 (JB06) will be located in the L5802 local road. JB06 will be located approx. 760m from JB05. <p>There is a water main on the right-hand side heading towards the Solar Park</p>
<p>Section 4 UGC 704 m</p>	<p>UGC from L5802 Road to Clondardis Solar Park substation</p> <p>The proposed UGC from the L5802 Road to the Clondardis Solar Park substation will be routed through the solar park and located within or immediately adjacent to the internal road network which will be constructed as part of the permitted solar park development.</p> <p>Access routes to the work areas will be via the solar park access points. All plant and equipment employed on the proposed works will be subject to good site organisation and hygiene, particularly during construction activities.</p>
<p>Refer to Image 1 and to the planning drawings submitted for location details.</p> <p>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.</p>	

Table 2: Summary of Preliminary Grid Connection Design Route

6.0 Best Practice Design and Construction & Environmental Management Methodology

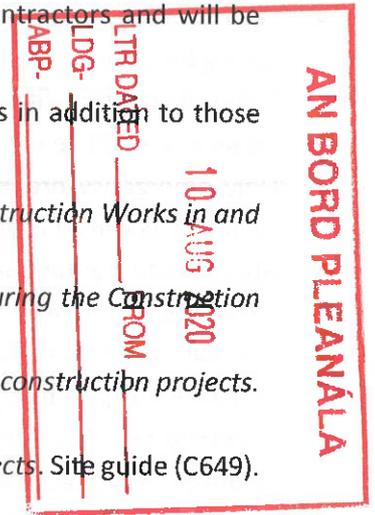
Prior to commencement of construction works the contractor will draw up detailed Method Statements which will be informed by this Outline Construction Methodology, environmental protection measures included within the planning application, measures proposed within the CEMP, and the guidance documents 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 pocket book*. (C762) 4th edition. CIRIA;
- CIRIA *Environmental Good Practice on Site (fourth edition) (C741) 2015*.

The proposed works will be carried out by employing accepted good work practices during construction, and environmental management measures such as those discussed below. Please note that the following measures will be supplemented by further specific environmental protection measures that will be included in method statements prepared for specific tasks during the works and will form part of the detailed CEMP.

- All materials shall be stored at the temporary compound within the Clondardis Solar Park 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 containment facilities will be provided to ensure that any spills from vehicles are contained and removed off site. Adequate stocks of absorbent materials, such as sand or commercially available spill kits shall be available;
- Concrete or potential concrete contaminated water run-off will not be allowed to enter any watercourses. Any pouring of concrete (delivered to site ready mixed) will only be carried out in dry weather. Washout of concrete trucks shall be strictly confined to a designated and controlled wash-out area within the Clondardis Solar Park 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 waste water 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.

7.0 Access Routes to Work Area

The proposed grid connection will be all UGC. The majority of the proposed underground cable will be installed within the public road network and therefore will be accessed via the existing road network. Where the cable route is located on private lands, contractor(s) will be required to utilise the local public road network in the vicinity of the work area and from there utilise private farm 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 Westmeath County Council, prior to the commencement of construction. Some work areas will require a road closure, particularly on the L70152, where it is not possible to safely implement a Stop/Go system. Where road closures are necessary, a suitable diversion will be implemented using appropriate signage, following consultation with Westmeath County Council.

Access routes will be carefully selected to avoid any damage to land. Local consultation will be carried out with all 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.

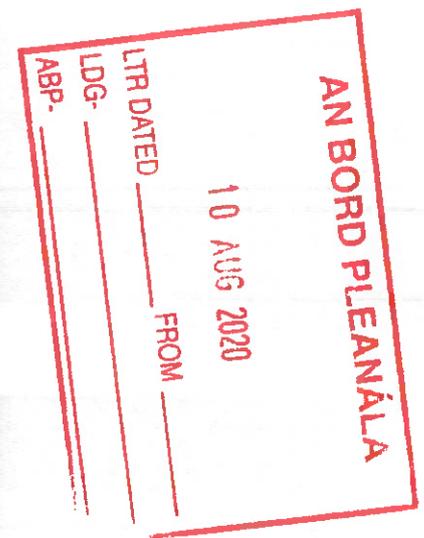


Image 13: Temporary Aluminium Panel Tracks

8.0 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 (2019) and in agreement with Westmeath County Council. All work on public roads will be subject to the approval of a road opening license application. The contractor will prepare detailed traffic management plans 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 remain open to traffic at all times by means of an automated 'Stop/Go' traffic management system, where a minimum 2.5m-3m roadway will be maintained at all times. The 'Stop/Go' system will be implemented along the R393, L1701 and L5802. Temporary traffic signals will be implemented, on the approach and through the works area, 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 200m 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 within the works area so as not to cause additional obstruction or inconvenience to road users or 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, if required.

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

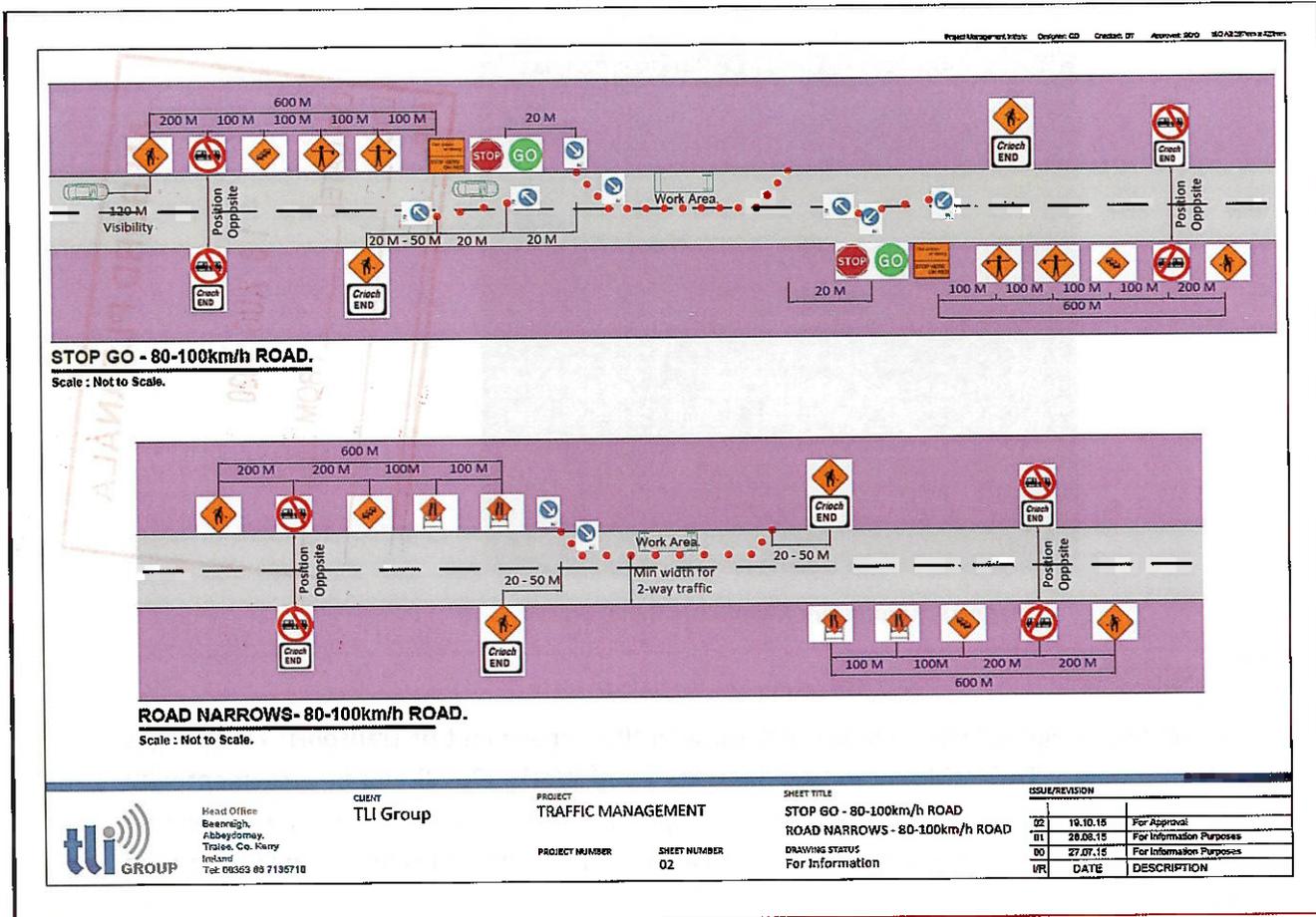


Image 14. Sample Traffic Management Layout

9.0 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 Westmeath County Council. A Traffic Management Plan (TMP) will be agreed with Westmeath 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 Westmeath County Council in advance of the preparation of the TMP.

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, gas networks 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.

11.1 Underground Cables

If existing underground cables are found to be present, a trench will be excavated, and new ducting and cabling will be installed along the new alignment and connected to the network on either end. The trench will be backfilled with suitable material to the required specification. Warning strip and marking tape will be laid at

various depths over the cables as required. Marker posts and plates will be installed at surface level to identify the new alignment of the underground cable, with the underground cables will then be re-energised.

11.2 Gas Networks

Consultation with Gas Networks Ireland must take place before starting works where gas pipes are present. Gas Networks Ireland will advise on the safety measures required and will arrange for the exact location of the pipe to be marked out on site.

11.3 Water Mains

The water supply will be turned off by the utility so work can commence on diverting the service. The section of existing pipe will be removed and will be replaced with a new pipe along the new alignment of the service. The works will be carried out in accordance with the utility standards.

11.0 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. This work will be carried out in consultation with the landowner and in line with any relevant measures outlined in the planning application, CEMP and planning conditions.

12.0 Implementation of Environmental Protection Measures

All environmental protection measures contained with the EIA/EIS which accompanies the planning application 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.

13.0 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.

14.0 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 will be prepared by the contractor prior to the commencement of construction. All waste material will be disposed of at a fully licensed facility.

