Appendix 2. Project Description

2.7. Construction Methodology Grid Connection Report (TLI, 2026)

CONSTRUCTION METHODOLOGY

Athenry OCGT Peaker Plant
220kV Grid Connection Report

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1.0 Introduction

1.1 Overview

TLI Group (The Consultant") was engaged by Bord Gais Energy c/o Atkins Realis ("The Client") to prepare this Construction Methodology report for the Athenry Open Cycle Gas Turbine (OCGT) Peaking Plant Development, grid connection route to Cashla 220kV Substation.

The report forms part of the Strategic Infrastructure Development (SID) application for the same development which has been submitted to An Bord Pleanála in accordance with section 182A of the Planning and Development Act 2000.

1.2 Purpose of this document

The purpose of this document is to outline and explain the construction techniques and methodologies which will be implemented during construction of the proposed Athenry Grid Route from Athenry Open Cycle Gas Turbine (OCGT) Peaking Plant Development to Cashla 220kV Substation. The UGC works will consist of the installation of 6 No. ducts in an excavated trench to accommodate 3 No. power cables, 1 No. fibre communications cable to allow communications between proposed Athenry OCGT Peaking Plant and Cashla 220kV Substation, 1 No. spare fibre communications cable and 1 No. earth continuity duct.

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. Detailed Method Statements will be prepared in respect of each aspect of the proposed development.

2.0 220kV UGC Grid Connection Route

The proposed 220kV UGC is approximately 8km in length and will transport electricity from the proposed 220kV substation connecting the Athenry OCGT Peaker Plant to the existing 220kV Cashla substation.

For the majority of the route, the underground cable (UGC) navigates the public road network in an eastward direction from Cashla 220kV substation to the Athenry OCGT Peaker Plant. The UGC route predominantly traverses within the public road curtilage, with some minor sections traversing within privately owned lands. This is necessitated by the use of a horizontal directional drilling (HDD) section to cross the M6 motorway in two separate locations and the M17 motorway in one location. The exact location of the underground cable within the public road network may be subject to minor modification following further assessments to be undertaken prior to construction and following consultation with EirGrid and ESB Networks, while having regard to all environmental constraints outlined in the SID application.

Drawings 300101269-DR-100 through 300101269-DR-115 outline the proposed grid route.

Figure 1 - Grid Route from Cashla 220kV substation to Peaker Plant

3.0 220kV EirGrid AIS 2 Bay Substation

The proposed substation will be designed and constructed to meet all the required EirGrid standards. An area will be levelled and built to the required level with stone fill material, capped by high quality compacted stone. Two control buildings will be constructed using traditional techniques for constructing small buildings (i.e. concrete block walls, timber and slate tile roof). Foundations will be built for all of the proposed electrical infrastructure. All the electrical equipment will be installed to EirGrid requirements. Perimeter fencing will be constructed around the substation compound for security and safety purposes.

The control building works will consist of foundation works, block work, roofing, low voltage electrical fit out, cladding and building finishing works. The busbar compound structural steelwork will be erected with lightning masts also installed. Substation electrical equipment will be installed once the control building and compound is complete. Fencing will be erected around the compound for security/protection. Permanent access roads will also be installed to allow trafficking in and out of the proposed substation compound, access road to loop in interface mast structures and internal access road for compound use.

The expected duration of work is expected to be approximately 12 months. The proposed construction scope will require the personnel, machinery and materials as follows:

Equipment

- Up to 10 Electrical/Civil Crews
- Excavators
- 360˚ tracked excavators (13 ton normally, 22 ton for rock breaker)
- Tracked dumpers / tractors and trailers
- Crane
- Hoist
- Power Tools
- Generator
- Scaffolding
- Substation Electrical Equipment

Materials:

- Stone
- Geotextile
- Lighting
- Paving.
- Fencing.
- Steel
- Concrete
- Timber
- Cladding
- Doors

The following section outlines the methodology to be followed during construction works of the new Athenry Peaker Plant 220kV substation.

1. The substation compound has a total area of 6,284m2. Earthworks will be undergone so the compound is level, with a finish compound level of 55.5m.
2. The substation compound and drainage will be marked out by a qualified engineer.
3. A drainage system will be excavated and installed around the compound area.
4. Topsoil and subsoil will be removed from the footprint of the compound using an excavator. The excavated material will be temporarily stored in adjacent berms for later use during reinstatement works.
5. A layer of geotextile material will be laid over the footprint of the compound.
6. Using an excavator, a base layer of Clause 804 material will be laid followed by a 6F2 capping layer which will provide the finished surface.
7. Each layer will be compacted using a vibrating roller.
8. Earthing cable will be laid underground around the substation for connection to the various electrical components during the electrical fit out phase.
9. The construction of a 6,284m² substation compound comprising of approximately 450m² single story 220kV substation control building, 300m² single story MV building and associated outdoor electrical equipment, including 1 no. 33/220kV transformer, associated internal access road, including 2.6m high station perimeter fencing will be built.
10. Permanent access road will be constructed to allow site vehicular activity in and out of construction area.
11. Adequate lighting will be installed around the compound on the lighting masts within the compound.
12. A 220kV cable sealing end and associated accessories will be required to incorporate the Cashla UGC 220kV cable into the substation.
13. A Transformer will be installed in bunded enclosures within the substation compound.

The electrical installation is expected to take 20 weeks and includes the following:

- Delivery and installation of 33/220kV transformer. These are unusually large, and the deliveries will be managed in accordance with regulations governing the movement of large loads.
- Delivery and installation of all other HV equipment.
- Wiring and cabling of HV/LV equipment, protection and control cabinets.
- Commissioning of all newly installed equipment.

The 220kV substation will be based on EirGrid design specifications. The substation compound will consist of EirGrid and IPP Control Room buildings, High Voltage (HV) electrical equipment and associated infrastructure including palisade fences and concrete post and rail fences. The installation of HV electrical equipment will include a 220/33kV Transformer with associated equipment along with:

- Cable Sealing End (CSE);
- Surge Arrestor (SA);
- Earth Disconnect (DA, DB, DL, DT);
- Current /Voltage Transformer (CT/VT);
- House Transformer (HoT);
- Circuit Breaker (CB);
- Lightning Masts (LM);
- Back-Up Diesel Generator;
- Harmonic filters if required by EirGrid;
- Capacitor Bank if required by EirGrid;
- Fire/Blast Wall;
- Telecoms Pole;

Table 1 – Length of UGC Route based on Planning Design:	
Public Road	**Third Party Lands**
6050m	1662m

Table 2 below divides the UGC route into a number of segments and describes the specific construction requirements of each individual segment, with mention of access routes to the proposed work areas. All plant and equipment employed for the proposed works will be subject to good site organisation and hygiene routines.

Table 2 - Summary of Proposed UGC Route	
Section	**Description**
Section 1 **Ch. 0m – 1600m**	The proposed grid route commences by exiting the proposed joint bay, residing within the bell mouth outside the gate of Cashla 220kV substation. The UGC route sweeps right converging onto the L-7109, where the UGC will traverse in a southern direction within the public road network. The grid route will continue within the local roadway, residing within the centre median of the narrow road for circa 840m, towards the townland of Lisheenkyle. The UGC encounters the right junction for the L-71093 public roadway. The underground cable will sweep right and converge onto this public road section where it will traverse southwards, following the centre alignment of the roadway in a similar method as the previously mentioned road section. Remaining within the curtilage of the public road for approximately 500m, the UGC reaches the boundary of the public road section upon entering private land road (Ch. 1300m). The grid route remains within the curtilage of the discarded road section (public domain before the construction of the motorway) that is now under private ownership. The UGC continues south for 20m and reaches the M6 motorway infrastructure (Ch. 1350m). A Horizontal Direction Drilling (HDD) trenchless technology method will be implemented to facilitate underground cabling crossing the motorway asset, this least intrusive installation method should also mitigate any damage to the motorway corridor and associated furniture. Upon traversing the Motorway section via HDD method, the UGC emerges (Ch. 1450m). The grid route remains within the road curtilage of the discarded road section (public domain before the construction of the motorway) that is now under private ownership. Remaining within the curtilage of the public road for approximately 50m, the UGC continues south trajectory, entering the boundary of the public road section, departing privately owned road section. ***Features*** **Section 1 contains 2 Joint Bays** located below ground and finished/reinstated to the required 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. • Joint Bay 01 (JB-01) will be located outside the gate and within the bell mouth of Cashla 220kV substation, Chainage – 0m • Joint Bay 02 (JB-02) will be located south of JB01 within the public roadway L-7109, Chainage – 760m • Joint Bay 05 (JB-05) will be located south of the M6 Motorway HDD crossing within the private land road Chainage – 1520m

	Section 1 will encounter a multitude of service crossings: Existing utility infrastructure such as ESBN, underground telecoms and community Water Pipe Infrastructure will be encountered along the grid route, crossing schedules will be prepared at detailed design to identify under or over methods to cross these existing buried services. **Section 1 will require 1 No. HDD crossing:** A Horizontal Directional Drilling (HDD) is the preferred method to traverse the section of Motorway. The HDD will be implemented to bore a minimum depth of 5000mm beneath the motorway. The utilisation of this least intrusive installation method should also mitigate any damage to the motorway structure and features.
Section 2 **Ch. 1600m – Ch.3000**	The UGC progresses for a distance of approx. 80m before sweeping left and heading north, departing the local roadway L-71093 and converging onto the L-7109 local roadway. The grid route traverses within the left lane heading in a south-eastward trajectory for approx. 100m, and within the centre of the public road as the road width becomes narrow for another 420m before encountering the T junction onto the L-7108. The UGC will sweep left, heading eastward within the middle of the L-7108 for approximately 480m. On reaching traversing the distance of 480m, the Grid Route will encounter the right-hand junction for L-71082 roadway. The UGC will converge onto the local roadway L-71082 within the townland of Caherbriskaun. The UGC changes trajectory heading eastwards parallel with the L-7108 roadway and passing the residences to the south of the spur road for an approx. 300m. Upon traversing this section of road, the underground cable route encounters the M6 motorway asset on a second occasion. A Horizontal Direction Drilling (HDD) trenchless technology method will be implemented to facilitate underground cabling crossing the motorway asset. Upon traversing the Motorway section via HDD method, the UGC emerges north of the M6 within the Galway City and County Council owned lands. The grid route remains within the road curtilage of the maintenance road section traversing approximately 40m north where the UGC will return to the L-7108 and converge right, heading eastward on the L-7108. ***Features*** **Section 2 contains 1 Joint Bays** located below ground and finished/reinstated to the required 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. • Joint Bay 04 (JB-04) will be located within the public roadway within L-7108 Chainage – 2290m ***Section 2 will encounter a multitude of service crossings:*** Existing utility infrastructure such as ESBN, Telecoms and Community Water Pipe Infrastructure will be encountered, and the crossing schedules will be prepared at detailed design to identify under or over methods to cross these existing buried services.

	<u>Section 2 will require 1 No. HDD crossing:</u> A Horizontal Directional Drilling (HDD) is the preferred method to traverse the section of Motorway. The HDD will be implemented to bore a minimum depth of 5000mm beneath the motorway. The utilisation of this least intrusive installation method should also mitigate any damage to the motorway structure and features.
Section 3 **Ch. 3000m – Ch. 6750m**	The UGC progresses eastward within the centre of the L-7108 towards the residential townlands of Knocknacreeva and Caraunduff, remaining within the extents of the public road network of the carriageway along the L-7108, the UGC saliently traverses within the roadway in parallel to existing watermain services, and passes numerous residential entrances along the public road corridor for approximately 2200m. Upon navigating the roadway, the grid route will encounter the junction for the L-3103 in the townland Castlelambert. The underground grid route sweeps right at the junction, continuing eastward within the public road curtilage eastward of Castlelambert for 250m. Upon traversing the 250m distance, the UGC sweeps away from the public road and navigates into Galway City and County Council propertiered lands in an offroad section for an approximately 90m within the offroad terrain before encountering the M18 motorway asset. A third, and final HDD is implemented as the least intrusive method of crossing the motorway. Upon traversing the Motorway section via HDD method, the UGC emerges to the other side of the M6 within the Galway City and County Council propertiered lands. The UGC traverses eastwards for approximately 45m within Galway City and County Council propertiered lands, where the UGC will encounter the L-3103 local secondary road and converge onto the public road section and continue in an eastward trajectory within a single lane. The UGC traverses along the public road corridor for approximately 850m, where the route continues within an access track to the OGCT facility. ***Features*** **<u>Section 3 contains 5 Joint Bays</u>** located below ground and finished/reinstated to the required 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. • Joint Bay 05 (JB-05) will be located east of JB04 within the public roadway L-71082 at Chainage – 3180m • Joint Bay 06 (JB-06) will reside within the curtilage of the public roadway L-7108. Chainage – 4080m • Joint Bay 07 (JB-07) will be saliently located within the extents of the L-7108. Chainage – 4970m • Joint Bay 08 (JB-08) will be saliently located, in close proximity, east of the identified area for HDD receptor area infrastructure within the public owned area at Castlelambert Bridge (L-3103). Chainage – 5840m

	• Joint Bay 09 (JB-09) will be located within the public roadway L-3103. Chainage – 6710m ***<u>Section 3 will encounter a multitude of service crossings:</u>*** Existing utility infrastructure such as ESB, Telecoms and Irish Water will be encountered, the UGC will be saliently placed within the residential road to avoid service outages where possible. A crossing schedule will be prepared at detailed design to identify under or over methods to cross these existing buried services. ***<u>Section 3 will encounter a High-Pressure Gas Main:</u>*** The UGC will encounter a High-Pressure Gas Main at coordinates X = 545591.5, Y = 728250.1. The UGC crossing existing gas line in a perpendicular manner. The Gas supply will be turned off by GNI so work can commence on crossing the service. Open trenching with either an undercrossing or an overcrossing methos will be implemented depending on the depth of the Gas Network Pipe. **<u>Section 3 will require 1 No. HDD crossing:</u>** A Horizontal Directional Drilling (HDD) is the preferred method to traverse the section of Motorway. The HDD will be implemented to bore a minimum depth of 5000mm beneath the motorway. The utilisation of this least intrusive installation method should also mitigate any damage to the motorway structure and features.
Section 4 **Ch. 6750m – Ch. 8100m**	From this point, the UGC will turn right, to continue within an access track to the OGCT facility. Carrying within private land, traversing in a south-westerly direction for approximately 350m. The UGC then maintain a south-west traversal for approximately 700m onto the site of the proposed OCGT facility. The UGC will terminate at the cable ceiling ends of within the OCGT facility. ***Features*** **<u>Section 4 contains 1 Joint Bay</u>** located below ground and finished/reinstated to the required 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. • Joint Bay 10 (JB-10) will be located within the access track to the OCGT facility Chainage – 7560m ***<u>Section 4 will encounter no service crossings</u>***

4.0 Preliminary Site Investigations

It will be required to carry out preliminary site investigations along the cable route prior to construction to confirm design assumptions.

The following items may be carried out for the grid connection cable route:

- Slit trenches at locations of service crossings (full road/track width).
- Trial holes at all joint bay positions to ascertain ground conditions and thermal resistivity of the soil.
- Boreholes at HDD locations to ascertain ground conditions.

Traffic Management – Single Lane closure with Stop/Go system in place as required.

Equipment:

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

Site Investigations will be required for the detailed design of foundations and compound build-ups prior to construction and to inform project costs prior to detailed design.

The site investigation works will be scoped and specified by a geotechnical engineer during detailed design but will generally include the following:

- Boreholes: will be carried out at the location of EirGrid and IPP Buildings to determine the depth of bedrock.
- Trial holes: will be carried out in order to obtain information on the ground conditions and measure the thermal resistivity of the soil.
- Dynamic probes: will be carried out to determine soil strength/density characteristics.
- Dynamic Cone Penetrometers and Pavement Cores: will be carried out for pavement design.

It is anticipated that these site investigation works will take approximately 1 week to complete for the substation and the grid connection cable route.

5.0 Road Opening Licence

The grid connection works will require a road opening licence under Section 254 of the Planning and Development Act 2000-2015 from Galway County Council. A Traffic Management Plan (TMP) will be agreed with Galway County Council prior to the commencement of the development. The TMP will outline the location of traffic management signage, together with the location of any necessary road closures and the routing of appropriate diversions. Where diversions are required, these will be agreed with Galway County Council in advance of the preparation of the TMP.

Under the road opening licence, there is an obligation on the licence holder to provide up to date programmes. These programmes will include a breakdown of where traffic management systems will be utilised or where there is a requirement for a road closure for intermediatory weeks. Traffic management systems shall be employed during the construction works to allow access for local residents only and to create a safe passageway in the vicinity of Heavy Goods Vehicles (HGV's). The negative impact on the existing local roads due to construction activities will be negligible as all road openings and permanent reinstatements will be in accordance with the Purple Book "Guidelines for Managing Openings in Public Roads. Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads"

6.0 Access Routes to Work Area

The majority of the underground cable will be installed within the public road network and proposed access tracks and will therefore be accessed via the existing road network and the designated site access. Where the cable route is located on private lands, the contractor(s) will be required to utilise the local public road network in the vicinity of the work area.

A detailed Traffic Management Plan will be prepared and agreed with Galway County Council prior to the commencement of construction. Some work areas will require a temporary road closure where it is not possible to safely implement a Stop/Go system. Where temporary road closures are necessary, a suitable diversion will be implemented using appropriate signage, following consultation and agreement with Galway County Council.

Careful and considered local consultation will be carried out, as per conditions of planning, to minimise the amount of disturbance caused during works. All plant and equipment employed during the works (e.g. diggers, tracked machines, footwear etc.) will be inspected prior to arrival and departure from site. Vehicles will be cleaned on access and egress to prevent the spread of invasive species, dust and soil to the surrounding areas. Refer to Chapter 10 – Traffic and Transport of the EIAR for further detail.

7.0 Traffic Management

Traffic management and road signage will be in accordance with the Department of Transport: Traffic Signs Manual - Chapter 8: Temporary Traffic Measures and Signs for Road Works and in agreement with Galway County Council. Refer to Chapter 10 – Traffic and Transport of the EIAR for further detail on traffic.

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 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 temporary road closure will be required. Suitable traffic diversions will be implanted. The UGC will be usually installed in 30m sections, and no more than 50m will be excavated without the majority of the previous section being reinstated.

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. temporary signing will be implemented to facilitate safe access to/from the sites for heavy vehicles associated with the development. It is also recommended that suitable temporary signing is provided in advance of the site accesses in order to warn other road users of the likely presence of construction vehicles making turning movements.

All construction vehicles will be parked within a designated works area so as not to cause additional obstruction or inconvenience to road users or residents. The time of deliveries to the sites are to be limited in order to ensure that construction activities at the sites do not adversely impact on network operation during peak periods. Limiting the time of site deliveries will also protect residential amenity for people living in properties close to the site.

Temporary 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 will be put in place across the excavation to allow traffic to flow on both sides of the road.

All traffic management measures will comply with those outlined in the construction stage Traffic Management Plan. This will be compiled prior to construction by the main contractor in consultation with Galway County Council in advance of UGC construction.

7.0.1 Main cable construction

The first road closure event will be to facilitate the main cable construction, and TLI anticipate the construction duration for the total 8km cable length will be in the order of a 6-month period.

The works on the Regional Road will comprise a single lane closure only with traffic management measures adapted as shown on the TMP Cinnte Safety drawings with Stop / Go systems in place as is standard practice for utility installation on a 2-lane public road.

The road closures on the 2 no. local 'L' roads will be arranged to maintain full uninterrupted access for local residents. This will be facilitated via limiting trench lengths to sequential 30 to 50m sections which will reduce to very short 2 to 5m sections adjacent individual property access points. This will ensure residents entry and egress from one side of a property access point is maintained at all times. This is shown on the Cinnte Safety Traffic Management drawings which shows a study of a typical L road residential access point and shows how access is maintained during cable construction.

7.0.2 Testing and Commissioning

Road closures for commissioning will be in the order of 2 weeks per Local Road and 2 weeks for the Regional Road (The Regional Road will only comprise a single lane closure with a stop-go system in place). The Commissioning process comprises cable testing at the joint bays of which only 5 no. are in trafficked areas of public roads. It is anticipated that a maximum of 1 week commissioning duration will be required per individual joint bay.

7.0.3 Final Road Surface Repaving

The cable trench excavation will be repaved and complete prior to testing. Hence testing occurs after completion of the civils construction work. The Joint Bay construction is complete at this point too with testing facilitated via standard manhole access into the joint bay chamber. There will be 2 no. articulated vehicles required at each joint bay during testing. The articulated vehicles come complete with all the testing equipment.

7.1 Routing of Construction Traffic

Project construction HGV traffic will be directed away from communities in so far as practicable to minimise the effect on these communities. The national and regional road network will be utilised as much as possible to minimise local disruption. However, it should be noted that in order to access sites, the local road network will be required.

7.2 Recommended Traffic Management Speed Limits

Adherence to posted/legal speed limits will be emphasised to all staff/suppliers and contractors during induction training. Drivers of construction vehicles/HGVs will be advised that vehicular movements in speed limits of 30 km/h shall be implemented for construction traffic in sensitive areas such as school locations. Such recommended speed limits will only apply to construction traffic and shall not apply to general traffic. It is not proposed to signpost such speed limits in the interest of clarity for local road users.

7.3 Co-ordination of Works

Throughout the duration of the project the appointed contractor will liaise with Galway County Council in order to identify any other works being carried out in the vicinity of the sites e.g. road surfacing works and will co-ordinate the works with the local authorities so as to mitigate against any impacts arising from conflicting works.

The contractor will also liaise with the management of any other large construction projects in the vicinity of the sites in order to co-ordinate deliveries.

Where multiple vehicles may be entering and exiting a site, e.g. for spoil removal, then a spotter will be put in place to direct construction traffic onto the road and appropriate signage placed on both sides of the site access point to warn road users.

7.4 Road Cleaning

Regular inspections of the road network in the vicinity of the sites will be required to be carried out. Where required, the contractor will carry out road sweeping operations employing a suction sweeper to remove any project related dirt and material deposited on the road network by construction related vehicles.

7.5 Emergency Procedures

The appointed contractor's emergency procedure will form part of the project Traffic Management Plan once known. The emergency procedure will include the following:

- As soon as an employee witnesses an incident vehicle/ machine they will raise the alarm and will contact a member of management and the emergency services on either 999 or 112 and provide the GPS Coordinates (where required).
- Activities on site before the emergency services arrive shall be overseen by the onsite emergency co-ordinator.
- If the person is trapped underneath the vehicle/ machine is not in an increasing level of danger, no attempt will be made by site personnel to remove the victim until the emergency services arrive on site.
- If, however there is a severe danger that the situation might deteriorate before the emergency services arrive, the vehicle/ machine shall be secured by means of tying back with adequate ropes and chains attached to other close by machines. Once the vehicle/machine is secure and the scene is safe, a trained first aider can administer first aid to the casualty.
- The onsite emergency co-ordinator will appoint a person to wait at the site entrance or closest point to where the emergency services have been directed to escort the emergency services to the injured person and the scene of the emergency.

- No attempt shall be made to turn an overturned vehicle/machine into its correct position until the victim is removed safely.
- The onsite emergency co-ordinator will appoint a person to go to the hospital if a casualty/casualties are taken there and will keep the company informed.
- The onsite emergency co-ordinator will ensure that the scene is preserved for investigation.

7.6 Enforcement of Traffic Management Plan

All project staff and material suppliers will be required to adhere to a final TMP. As outlined above, the principal contractor shall agree and implement monitoring measures to confirm the effectiveness of the TMP. Regular inspections / spot checks will also be carried out to ensure that all project staff and material suppliers follow the agreed measures adopted

7.7 Mitigation Measures

The impact of the proposed Development has been identified as temporary in nature with only short sections of road disrupted at any point in time. However, it is still important that any impact is minimised as far as possible and, in light of this, the following mitigation measures have been considered:

- A dedicated person will be appointed for the management of the deliveries during the construction stage. It will also be this person's duty to make sure the construction routes are adhered to without fail.
- The Applicant will conduct a pre- and post-construction condition survey on the public road, with the developer liable to repair any damage to the public road attributed to the construction of the proposed development.
- Deliveries will be scheduled to avoid morning and evening peak hours. This will avoid HGV traffic arriving during the morning peak hours and creating conflict with local residents' commute or school run. Construction personnel will be encouraged to car-pool, or to travel to site in minibuses.
- During the construction phase, clear construction warning signs will be placed on the approach to the site access point, in accordance with Chapter 8 of the Traffic Signs Manual. The site entrance points will also be appropriately signed. Access to the construction site will be controlled by onsite personnel and all visitors will be asked to sign in and out of the site by security/site personnel. Site visitors will receive a suitable Health and Safety site induction and Personal Protective Equipment ("PPE") will be worn.
- To control, prevent and minimise dirt on the access route and emissions of dust and other airborne contaminants during the construction works, the following mitigation measures will also be implemented.
- Wheel washing facilities should consist of a water bowser with pressure washer. The bowser will contain water only and no other additives. Run-off from this activity will be directed to the drainage situated on the lower boundary of the construction compound. All drivers will be required to check that their vehicle is free of dirt, stones and dust prior to departing from the site.
- Drivers will adopt driving practices that minimise dust generation including a 30km/h internal access road speed limit; and
- Any dust generating activities will be avoided or minimised, wherever practical, during windy conditions.

- Once construction of the Proposed Development is completed, all machinery and equipment will be removed and hard standing within the Solar Farm site excavated. The area will be regraded with the stockpiled topsoil to a natural profile. Road surfaces, road markings, etc. will be fully reinstated as is and in such a manner that there is no change to the operation of the local road network.

7.8 Summary

The outlined strategies to mitigate transport-related impacts during the proposed development's construction phase. It highlights that traffic during construction will be transient, with no ongoing traffic impacts post-construction. The plan focuses on minimizing congestion, environmental impacts, and safety risks, particularly regarding the 220kV Underground Cable (UGC) installation. It estimates trip generation and HGV deliveries, emphasizing that no new accesses or intensified accesses will result from construction. The plan includes details on working hours, temporary compounds, parking arrangements, site access control, traffic management measures, traffic routing, deliveries, enforcement, complaint management, staff movements and travel, as well as controls for noise, mud, and debris. Regular monitoring and reviews are planned, as are a suite of mitigation measures, in order to ensure the plan's effectiveness.

8.0 Construction Hours

Construction activities will predominantly take place during standard hours, operating from 07:00 to 18:00 Monday to Friday, with Saturday works limited to 07:00 to 14:00 for the Peaker Plant and AGI. No construction works will occur on Sundays, Bank Holidays or Public Holidays, except in emergencies. While these hours will generally be followed, some flexibility may be required to maintain programme efficiency. In certain cases, work may need to take place outside standard hours to achieve key milestones or address unforeseen events, with any such extensions undertaken only following consultation with Galway County Council.

Where works are scheduled outside normal hours, appropriate measures will be implemented to minimise disruption to the community, including noise, lighting, and traffic controls. Local authorities and nearby residents will be notified in advance of any planned out-of-hours activity, and clear communication lines will be maintained throughout the project to address concerns. Although not anticipated routinely, emergency or safety-critical works may occur beyond standard hours when essential, and these will be kept to the minimum necessary.

9.0 Underground Cable Construction Methodologies

The UGC will consist of 3 No. 200mm diameter HDPE power cable ducts, 2 No. 125mm diameter HDPE communications duct and 1 no. 63mm diameter HDPE earth continuity duct to be installed in an excavated trench, 700mm wide by 1425mm deep, with minor variations on this design to adapt to underground service crossings and Motorway crossings. The power cable ducts will accommodate 1 No. power cables per duct. The communications duct will accommodate a fibre cable to allow communications between the Peaking Plant Facility and Cashla 220kV substation. The inclusion 1 No. earth continuity conductor duct will also be required.

If services are found to be present, the relevant service provider will be consulted with in order to determine the requirement for specific clearance requirements, excavation or relocation methods and to schedule a suitable time to carry out works.

Relevant information will also be provided to the local authority and the employed crews to mitigate against any conflicts with existing buried services. It is an obligation of the developer/licence holder to install underground cable infrastructure in line with EirGrid functional specifications, for safety, constructability, and maintenance reasons. The

new infrastructure shall be designed / installed as per these standards, to ascertain a separation from any existing 3rd party services (i.e. Water, Telecom, etc) and inclusive from any High Voltage /Medium Voltage or Low Voltage cables that may also be present. This minimum clearance requirement is incorporated into the H.S.A. Code of Practice on "Avoiding Danger from Buried Services". Electricity cables/ducts must not be laid above other existing services except at crossing positions.

The trench surface reinstatement will be in accordance with the local road's authority within Galway County Council where installed on public roads and reinstated in accordance with the landowner's requirements where installed on private lands. Traffic management measures will be implemented in accordance with those included in the Traffic Management Report, and a detailed Traffic Management Plan will be prepared and agreed with Galway County Council.

9.1 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;
- Where the cable route intersects with culverts, the culvert will remain in place (where possible) and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with EirGrid and 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 chapter, and detailed Traffic Management Plan
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height.
- Excavated material shall be employed to backfill the trench where appropriate and any surplus material will be transported off site and disposed 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 100m section of trench will be opened at any one time. The second 100m 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 30m 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 (Temporary reinstatement to be agreed with the local roads authority in Galway County Council).

- 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 week per joint bay location.

The excavation, installation and reinstatement process will take on average of 1 day to complete a 30m section.

Figure 2 – Example of 220kV Underground Duct Installation

9.2 Ducting Installation Methodology

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

1. Grade, smooth and trim trench floor when the required 1425mm depth and 700mm width have been obtained.
2. Place bedding layer of Cement Bound Granular Mixture B (CBGM B) material in accordance with the specification and compact it so that the compacted thickness is as per the drawings.
3. Lay the bottom row of ducts in trefoil formation as detailed on the design drawings. Use spacers as appropriate to establish horizontal duct spacing. Fit a secure duct cap to the end of each duct run to prevent the ingress of soil, debris or water.
4. Carefully surround and cover ducts with CBGM B in accordance with the design drawings and specifications and thoroughly compact without damaging ducts.
5. Place red cable warning marker strips on compacted CBGM B directly over the full width of the ducts.
6. Lay the top row of ducts onto the freshly compacted CBGM B including the cable warning marker strips above the bottom row of ducts. Place a secure duct cap at the end of each duct to prevent the ingress of dirt, debris or water.
7. Carefully surround and cover ducts with CBGM B material in accordance with the drawings and thoroughly compact without damaging ducts.
8. Place red cable warning marker strip on top of compacted CBGM B over each set of ducts as shown on the drawings.
9. Place and thoroughly compact CBGM B material or Clause 804 backfill or soil backfill as specified and place yellow warning tape at the depth shown on the drawings.

10. For concrete and asphalt/bitmac road sections, carry out immediate permanent reinstatement in accordance with the specification and to the approval of the local authority and/or private landowners, unless otherwise agreed with local authorities.
11. Clean and prove(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. Works should be witnessed by ESBN Clerk of Works (CoW) as required.

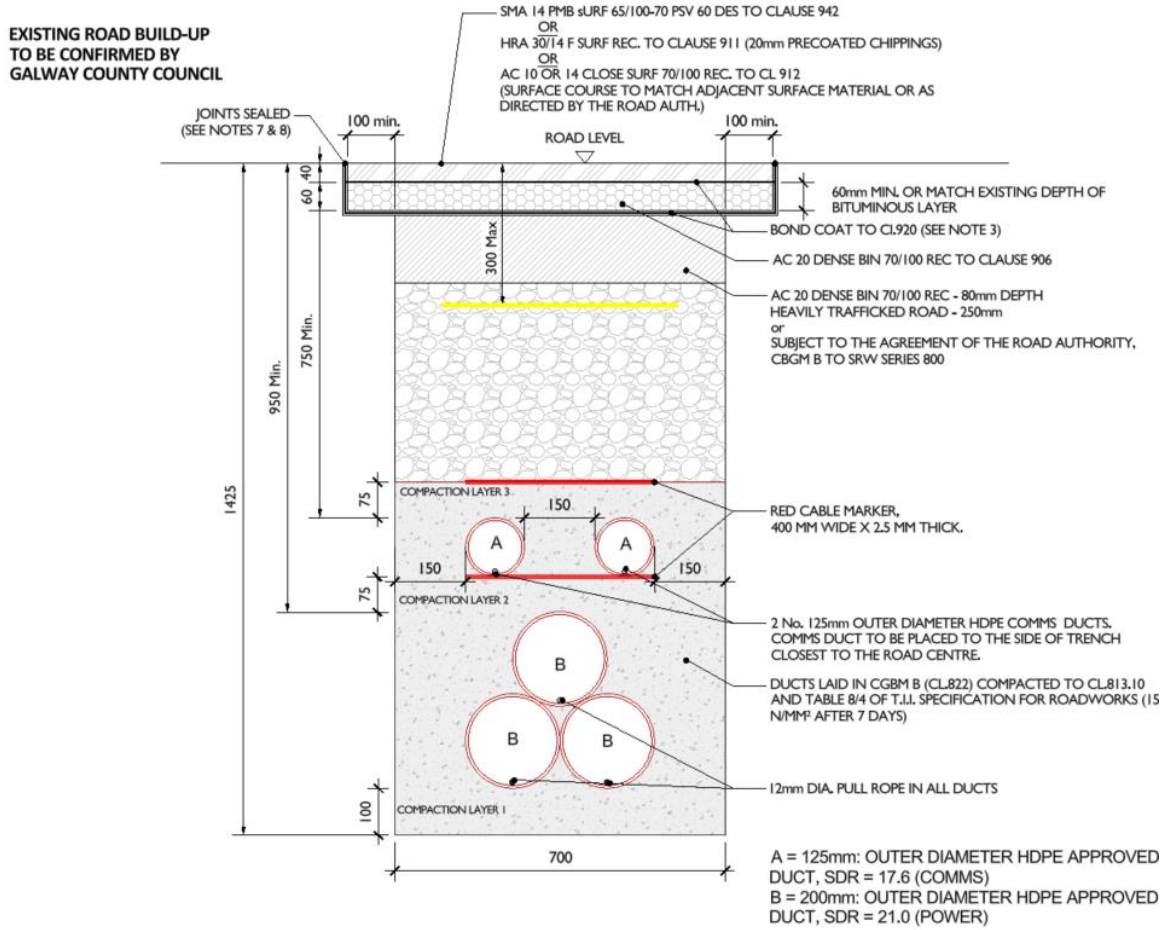


Figure 3 – Standard 220kV Trench Detail

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:

- CBGM B Duct Surround
- Ready-mix Concrete where necessary (delivered to site);
- Trench backfilling material (excavated material and aggregates) to relevant specifications;
- 200mm diameter HDPE power ducting;
- 125mm diameter HDPE ducting;
- 63mm diameter HDPE ducting;

- Temporary Surface Reinstatement Materials

9.2.1 On Public Road

Where the route is within public road carriages and where possible the trench will be installed in the non-trafficked strip between the wheel marks on the road. The cable route will be micro-sited based on the presence of existing utilities and the nature of the road and the adjoining terrain. It is preferable to excavate a trench within the middle of the roadway to reduce vehicle loading traversing over the ducting. Temporary reinstatement may be provided to allow larger sections of road to be permanently reinstated together.

9.2.2 On Private Lands

Where the cable is installed in private tracks, the location where the cable is laid will depend on several factors, Private Landowner agreements, topography, crossing points. Due to the length of the grid route being installed on private lands, the ESBN may request an access track that will be required over the centre of the cable route alignment for future cable / joint bay access purposes.

The access track will consist of a 3m minimum wide track with a ten-tonne axle weight load bearing capacity, capable of supporting construction vehicles. The ESBN 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. Before the commencement of development, precise access arrangements will need to be agreed upon with the respective landowners.

Where access tracks within private lands are not possible along the route, work areas will be reinstated with excavated soil and either seeded 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 in consultation with the landowner and in line with any relevant measures outlined in the planning application, CEMP and planning conditions.

9.3 Joint Bays and Associated Chambers

Joints Bays are to be installed as shown on drawings accompanying the planning application and approximately every 750m-1000m along the UGC route to facilitate the jointing of 2 No. lengths of cable. 220kV Joint Bays are typically 8m x 2.5m x 2.05m pre-cast concrete structures installed below 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 the event of a joint bay and associated chambers being installed within narrow road profiles, there may be a requirement for a temporary construction passing bays to facilitate works and local community access to residencies along the closed road sections.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between the Athenry Peaker Plant Substation and the existing 220kV substation at Cashla. Earth Sheath Link Chambers are also required at every joint bay along the cable route (See Figure 4 below). 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 EirGrid. Marker posts will be used on non-roadway routes to delineate the duct route and joint bay positions.

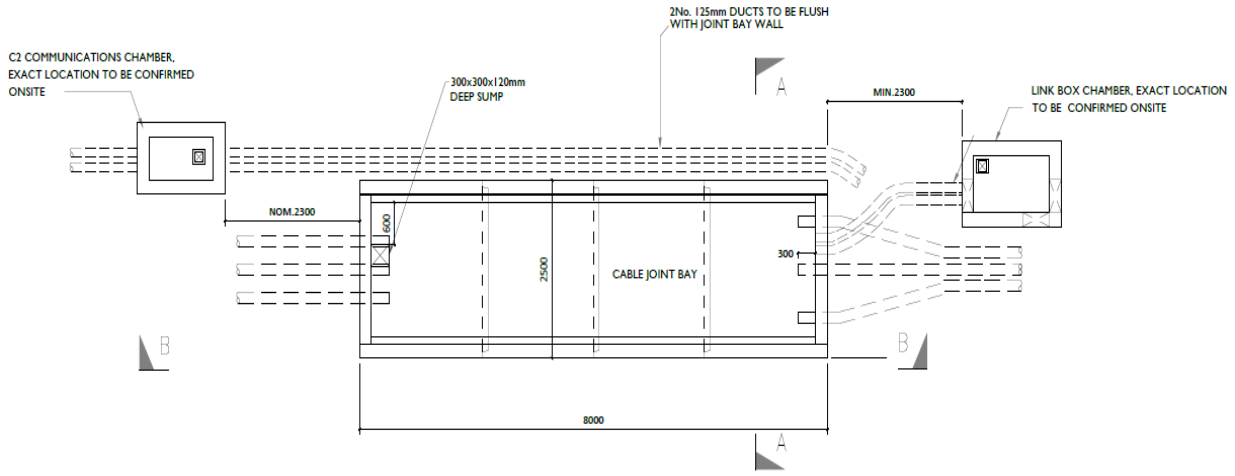


Figure 4 - 220kV Joint Bay Plan Layout

9.4 Joint Bay Construction and Cable Installation

Before starting construction, the area around the edge of the joint bay which will be used by heavy vehicles will be surfaced with a 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. Silt fencing with straw bales will be interposed between the works area and any watercourses.

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. If necessary, an additional line of silt fencing with straw bales will be added in line with the relevant environmental control measures.

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

Figure 5 - Robust Settlement Tank for Silt of Solid Discharge

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 6 – 220kV 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 7 below)

Figure 7 - Completed Joint Bay prior to cable installation (in-situ)

6. Pre-cast concrete construction. Place pre-cast concrete sections on sand bedding. (Figure 8 below)

Figure 8 - Joint Bay under construction (pre-cast)

7. Where joint bays are located under the road surface the joint bay will be backfilled with compacted layers of Clause 804 and the road surface temporarily reinstated as specified by the local authority.
8. Precast concrete covers may be used as temporary reinstatement of joint bays at off road locations. These covers are placed over the constructed joint bay and are then removed at the cable installation stage of the project.
9. 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.
10. The cable is supplied in pre-ordered lengths on large cable drums (Figure 9 below). 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 9 - HV cable pulling procedure (Typical drum set-up)

11. Once the "two sections" of cable (total of 6 conductors) are pulled into the joint bay, a jointing container is positioned over the joint bay and the cable jointing procedure is carried out in this controlled environment. (Figure 10 below).

Figure 10 - HV cable jointing container

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

Equipment:

- 2-3 General Operatives
- 1 Excavator Operator
- 360˚ tracked excavator (13 ton normally, 22 ton for rock breaker)
- 1 no. tracked dumper or tractor and trailer.

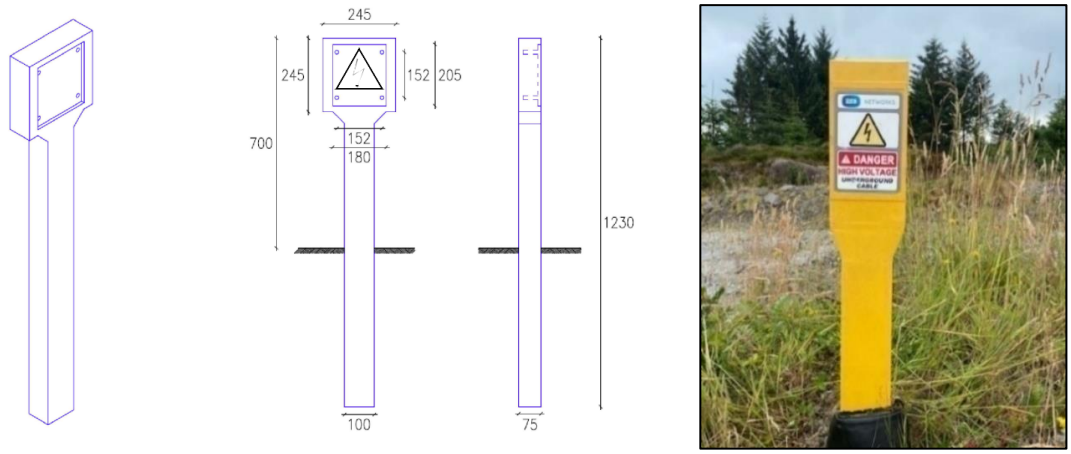
Materials:

- Thermal sand for pipe bedding
- Blinding Concrete where necessary
- Clause 804 Material
- 200mm diameter HDPE ducting
- 125mm diameter HDPE ducting
- 63mm diameter HDPE ducting
- Precast Chamber Units / Relevant construction materials for chambers
- Earth Sheath Link Box

9.5 Marker Posts

Marker posts will be used on non-roadway routes to delineate the cable route and joint bay positions and other agreed positions (line of sight, at bends location and property boundaries). Corrosion proof aluminium triangular danger sign, with 700mm base, and with centred lightning symbol, on engineering grade fluorescent yellow background shall be installed in adequately sized concrete foundations. Marker post shall also be placed in the event that burial depth is not to standard. Siting of marker posts to be dictated by ESBN as part of the detailed design process. (Figure 11 below).

Figure 11 - Marker Post Example



9.6 Storage of Plant and Machinery

All plant, machinery and equipment will be stored on site within the UGC works area or within the temporary construction compound to be located at the proposed Athenry OCGT Peaker plant area. Oils and fuels will be stored in an appropriately bunded area within the temporary construction compounds.

10 Relocation of Existing Services

In order to facilitate the installation of the underground cables, it may be necessary to relocate existing underground services such as water mains, telecom networks or existing cables. In advance of any construction activity, the contractor will undertake detailed surveys and scans of the UGC route to confirm the presence or otherwise of any services. If found to be present, the relevant service provider will be consulted to determine their requirements for relocation methods and to schedule a suitable time to carry out works.

Ongoing liaison with Irish Water and Bord Gais Energy will be maintained during the construction programme, to ensure no disruption of services for the duration of the contract.

High Voltage (HV) cables contained with the curtilage of the local road network will encounter a minimal number of existing bridges, culverts, drainage, gullies etc. It is not uncommon during the installation underground cable infrastructure to encounter such features. Prior to work commencing, the contractor employed on behalf of the Road opening Licence holder shall immediately inform the road authority and shall agree the appropriate remedial measures. The placement of any apparatus or anything other through or affecting an existing culvert requires the prior permission. Best practice procedures around culvert/drainage crossings will be to install the cable ducting beneath all drainage, culverts and services. Where possible, culverted drains will be remain insitu, with the cable infrastructure crossing beneath without disturbance or above if sufficient cover is available. Stone culvert or any legacy infrastructure (as stated in the observation) is a relatively straight forward process in terms of replacement. Again, this remedial work will be communicated with the local authority prior to work commencement and shall agree the appropriate actions and measures to replace and install more modern plastic pipework. Once the underground cable infrastructure is fully installed, there will be a negligible impact in terms of cost and complexity to future maintenance.

Prior to work commencement of any excavation works, it is the responsibility of the developer to locate all existing services, and to safeguard same during construction, including the requirement to provide a location plans, maps and other relevant information to the local authority and the employed crews to mitigate against any conflicts with existing buried services. It is an obligation of the developer/licence holder to install underground cable infrastructure in line with EirGrid functional specifications, for safety, constructability, and maintenance reasons. The new infrastructure shall be designed / installed as per these standards, to install as far as it is practically possible from existing 3rd party services (i.e. Water, Telecom etc) and inclusive from any High Voltage /Medium Voltage or Low Voltage cables that may also be present. This minimum clearance requirement is incorporated into the H.S.A. Code of Practice on “Avoiding Danger from Buried Services”. Electricity cables/ducts must not be laid above other existing services except at crossing positions.

10.1 Existing Underground Utilities

10.1.1 HV Underground Cable (UGC) Crossings & Parallel Runs

The proposed UGC may be required to cross existing High voltage UGC apparatus surrounding the Cashla 220kV substation compound**.** Each individual crossing or parallel run will need to be individually assessed on a case-by-case basis. Site investigation works along with detailed surveying techniques and consultation with EirGrid/ESB Networks will be required to determine the locations, depths, configurations, and ratings of any existing UGC routes.

A minimum separation distance between the cables will need to be adhered to in order to comply with EirGrid/ESB Networks requirements. The EirGrid/ESB Networks preferred undercrossing method will be used where possible. A crossing method can be seen in Figure 12 below. Where undercrossing of the existing UGC routes is not possible an overcrossing method will be used. All UGC crossings will need to be agreed with EirGrid/ESB Networks as part of the design approval process. The UGC crossings have been designed in line with EirGrid/ESB Networks specifications.

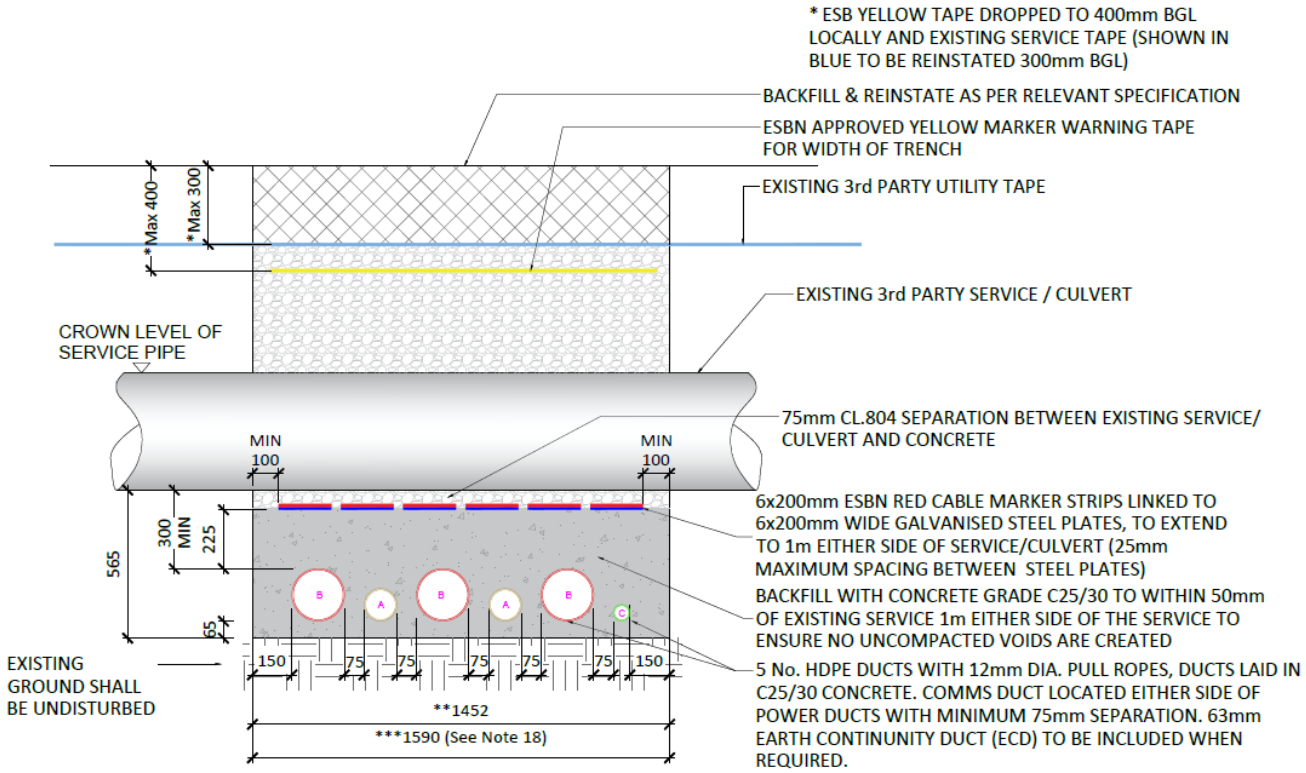


Figure 12 – Example of 220kV UGC Cable Undercrossing

10.1.2 Water Mains

Uisce Eireann will need to be consulted and advised on details of the project proposals in the form of a completed Building-over or Near an Irish Water Asset Application Form and associated technical information largely comprising drawings and schedules with details of proposed crossings etc with as much available information as possible. Uisce Eireann will be involved in the early engagement on projects that may involve any infrastructure which may be located near their assets with the intention of identifying as early as possible, if bespoke design measures or diversions are necessary.

The water supply will be turned off by the utility so work can commence on diverting or crossing the service. The section of the 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.

10.1.3 Gas Mains

Where the cable route intersects with the existing Gas Network, a detailed construction method statement will be prepared by the Contractor prior to the commencement of construction. Where possible, crossing existing gas lines be implemented using open trenching with either an undercrossing or an overcrossing, depending on the depth of the Gas Network Pipe. In the event that the gas pipeline is encountered. The Gas supply will be turned off by GNI so work can commence on crossing the service. The section of the existing pipe may be removed and replaced with a new pipe along the new alignment of the service to be confirmed by GNI at detail design and construction stage. The works will be carried out in accordance with GNI requirements, cognisant EirGrid standard requirements of maintaining a minimum clearance of 600m from minimum clearances to High Pressure 3rd party services.

11 HDD Crossing

The UGC route must cross the M6 in two sperate instances and cross the M17 in one instance. The M6 crossings are located to the south of Cashla Substation and the M17 crossing located the northwest of the OCGT facility.

A Horizontal Directional Drilling (HDD) is the TII preferred method to traverse these sections as the least intrusive method of crossing the motorway assets as per the September 2024 revision of Transport Infrastructure Ireland (TII) publication DN-STR-03012, the TII publication now includes a statement as follows:

"Service ducts / pipes (including drainage pipes) shall not be located on or adjacent to any external face of a structure. The attachment of service ducts / pipes (including drainage pipes) to the exterior of any structure shall not be permitted.

Electricity cables 10kV or greater shall not be located on or over road structures, including buried structures. Where electricity cables 10kV or greater are required to cross a road structure they shall pass below the structure, at a sufficient depth so as to remove the potential for any impacts on the structure during operation".

Three HDD Motorway Crossings are required for the cable route, and this is detailed below.

11.1 Horizontal Directional Drilling

Horizontal Direction Drilling (HDD) is a method of drilling under obstacles, such as Bridges, Motorways, railways, watercourses, 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 or where non-intrusive methods of crossing are required. To cross the Motorway sections, it is recommended to implement the HDD method to facilitate underground cabling with consideration of these factors.

The utilisation of this least intrusive installation method (HDD) should also mitigate any damage to the existing structures and abutments. Additional precautionary measures (e.g. silt fences, sandbags etc) will also be put in place for all areas of natural drainage from the area of works, these measures will prevent material draining from the Horizontal Directional Drilling works into any adjacent drainage ditches and adjacent folios.

The HDD bore will be required to travel a minimum depth of 5000mm beneath the motorway asset. The depth of the HDD bores can be further increased to a max depth of approx. 6000mm (if required) to further mitigate any potential disturbances to the motorway structure and the associated features.

The HDD options can be achieved by excavating temporary drill pits (launch pit and a receptor pit) within the discarded local road network previously used by public vehicles before construction of the motorway at a maximum span of circa. 120m. The road sections containing these temporary pits at either side of the bridge structures will be incorporated into a buffer zone covering an area of circa 40m2 for the launch pit and circa 20m2 for the receptor pit which will be fenced on both sides of the crossing location.

The launch pit and receptor pit (approx. 2m (W) x 3m (L) x 1m deep) temporarily installed will adhere to a minimum separation distance of 10m from the motorway network. These conditions will be further determined by the Drilling Contractor when undertaking the scope of works. Additional precautionary measures (e.g. silt fences, sandbags etc) will also be put in place for all areas of natural drainage from the area of works. These measures will prevent material draining from the HDD Bore method from entering into any adjacent lands and motorway features or drainage ditches.

Aspects of this crossing method which could give rise to potential impacts will be addressed by best practice construction methods under the following headings:

1 Site access and ground preparation,
2 Bentonite preparation, injection and re-cycling,
3 Bentonite release
4 Site re-instatement.

11.1.1 Site access and ground preparation:

There is existing access to the works area around the HDD launch and reception areas at serviced by discarded section of localised roadways, which are longer being maintained by the local authority, Road department respectively. These discarded sections of localised road are surface dressed asphalted roads.

11.1.2 Bentonite preparation, injection and re-cycling:

The area around the bentonite batching, pumping and re-cycling plants will be bunded using terram and sandbags in order to contain any spillages. Spills of bentonite or bentonite contaminated with drill arisings from any aspect of the bentonite handling process will be cleaned up immediately and transported off site for disposal at a licensed facility. Any bentonite spills on the road will be immediately visible and be removed to secure skips on site.

11.1.3 Bentonite release

A number of geologies are considered unsuitable for HDD because they increase the chances of bentonite being lost and eventually breaking up through the overburden soils. A standard example is fissured or fractured rock.

A thorough geotechnical assessment of the proposed crossings will be undertaken to determine the suitability of the site for this installation method. The drilling process will be constantly monitored to detect any possible leaking of bentonite into the surrounding geology and possible breakout. This can be gauged by monitoring pumping rates and pressures as well as observing for a bentonite plume. If any of these signs appear, then drilling and bentonite pumping will be stopped immediately, and an attempt made to bypass the affected section by using a higher viscosity bentonite mix. If this fails, then an alternative crossing alignment or an alternative crossing method will be considered. This would only arise in cases where the soil through which the HDD was directed is unsuitable for this process. Site Investigations will be used to inform the final design of the HDD i.e. depths and route of the drill shot under crossings.

11.1.4 Site reinstatement:

All the temporary surface dressings on discarded roads, access tracks and working areas will be removed for offsite disposal and stored topsoil replaced and reseeded. The area will be reinstated to the satisfaction of the landowner.

11.2 Drilling Fluids Circulation System

During the works, the bore is supported by drilling fluids, which also assist in cutting the soil and removing the cuttings from the bore. The drill rig circulation system consists of five tanks, two solids separating cycles, a mud pump and mud-mixing hopper. Both a high-speed linear shale shaker and a desander/desilter are used to remove solids from the system. The drilling rig and fluid handling units may be placed on bunded 0.5 mm PVC contain any fluid spills

The drilling fluid volume, pressure, pH, weight and viscosity are monitored constantly. The amount of cuttings produced is also monitored, to prevent over cutting and ensure hole cleaning is maintained.

Drilling fluid returns are circulated through mud cleaners by centrifugal pumps and then pumped back downhole. Solids removed from the drilling fluid are directed into tipping skips. Drilling fluids returning to the surface are diverted through a conductor pipe to a mud pan on the surface. This mud is then lifted to the shale shaker by a hydraulically powered centrifugal pump. The mud returns are pumped to the circulation system trailer by means of a bunded centrifugal pump.

11.3 Bore Construction

The surveyor at the driller's console uses a steering system guided by tri-axial magnetometers and accelerometers, which provide real time directional information, to navigate the bores. The pilot bore may be steered horizontally and vertically as it progresses and can also be curved to bypass obstacles.

The drill unit, with a removable head matched to the soil conditions, pilot bores underground with a series of drill stems that push and rotate the head. Once the first pilot hole is completed, a hole-opener or back reamer is attached to the drill stem at the exit side and pulled back through the bore to the entry side. This enlarges the bore wall to accommodate the ducting and allow the cable to be pulled into place. A drill pipe is added at the exit side to provide a mechanical presence constantly within the bore.

11.4 Pipe Stringing and Ducting Pull Through

Following the completion of the bore, the ducts need to be laid out in a single straight line. The ducts will then be welded together and once all of the welds are completed, a towing assembly consisting of tow heads, a swivel and a reamer is used to pull the ducts into the bore. Close attention is paid to modelled drag forces during pullback with constant monitoring of load stress undertaken to ensure that modelled tensile stress, collapse pressures, hoop stress and buckling stress are not exceeded.

11.5 Traffic Management

No disruption to traffic on the M17 motorway or the M6 motorway crossings is anticipated, as the works will be carefully planned, monitored and managed, and the construction techniques and methodologies are well established.

Figure 13 - HDD Rig and reciprocal recycling

Figure 14 - Receptor Pit with ducts coils released

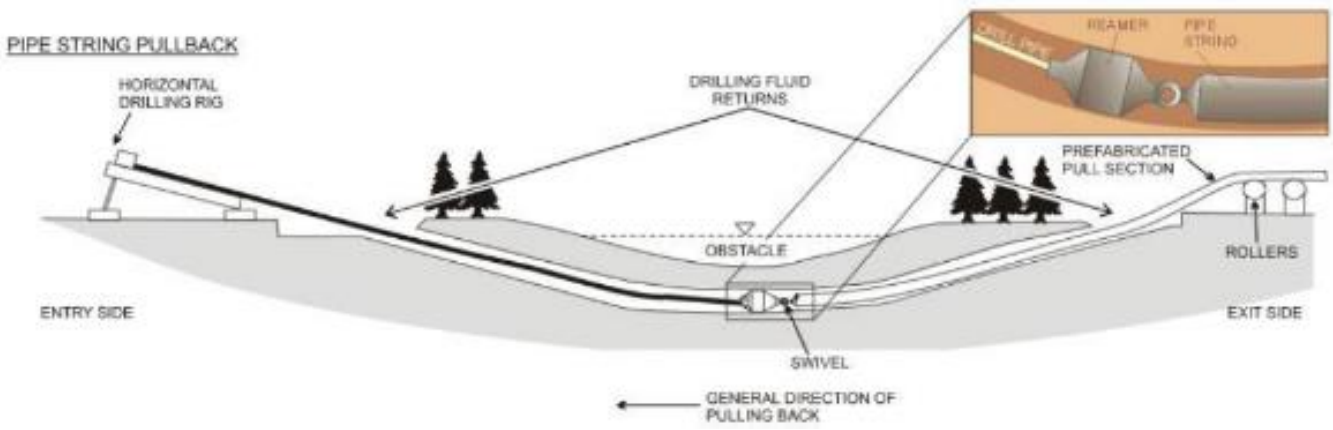


Figure 15 Profile View of HDD Methodology

11.3 HDD Location 1 – M6 Motorway Crossing Point 1

The first location to be assessed for HDD was a crossing point to cross the M6 motorway infrastructure (Ch. 1350m). At this location the L-71093 crosses the M6 with a flyover bridge. Before reconverging onto this section of local primary roadway. The grid connection route will traverse beneath the motorway carriageway, adhering the Transport infrastructure Ireland) TII protocol guidelines (DN-STR-03012-06, section 5.5 services), It is recommended to implement the HDD method to facilitate underground cabling as the least intrusive method of crossing the motorway roads and structures.

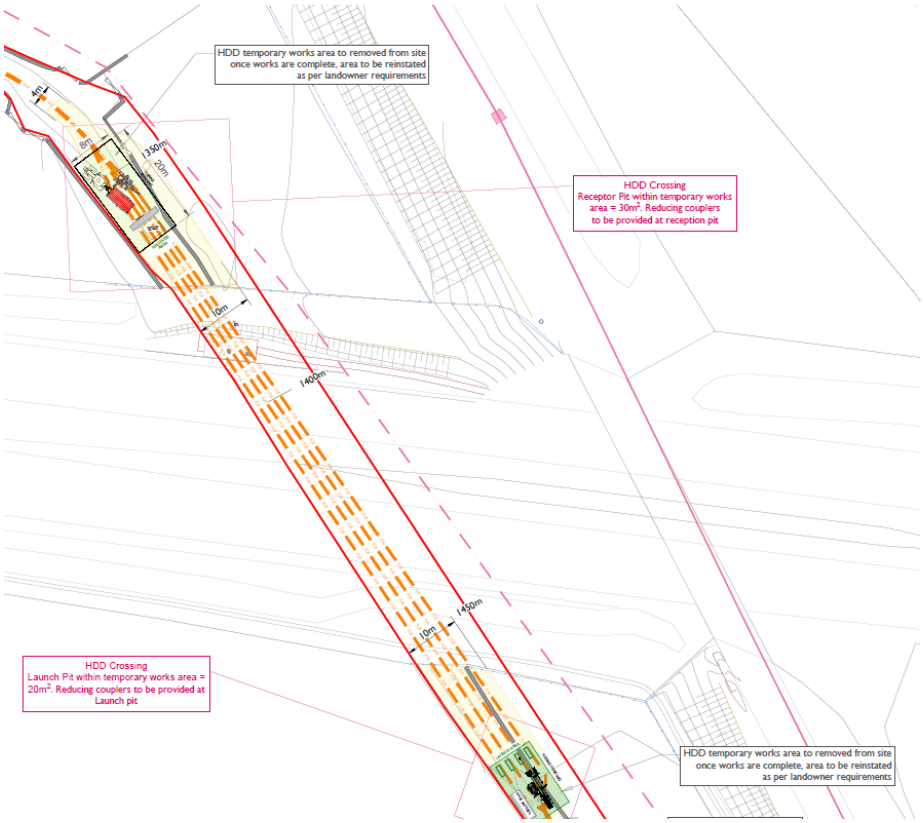


Figure 16 HDD Location 1 – M6 Crossing

The HDD bore will be required to travel a minimum depth of 5000mm beneath the motorway asset. The depth of the HDD bores can be further increased to a max depth of approx. 6000mm (if required) to further mitigate any potential disturbances to the roadways and structures.

Upon traversing the Motorway section via HDD method, the UGC emerges and remains within the road curtilage of the discarded road section (public domain before the construction of the motorway) that is now under private ownership.

The Horizontal Directional Drilling (HDD) trenchless methods would avoid trench works and traffic management systems in the designated area. The HDD options can be achieved by excavating temporary drill pits (launch pit and a receptor pit) on either side of the motorway corridor with a maximum span of circa. 120m. The road sections containing these temporary pits at either side of the motorway will be incorporated into a buffer zone covering an area of circa 40m2 for the launch pit and circa 20m2 for the receptor pit which will be fenced on both sides of the crossing location.

The launch pit and receptor pit (approx. 2m (W) x 3m (L) x 1m deep) temporarily installed will adhere to a minimum separation distance of 10m from the motorway network. These conditions will be further determined by the Drilling Contractor when undertaking the scope of works with respect to the Local Authorities environment and planning sectors. Additional precautionary measures (e.g. silt fences, sandbags etc) will also be put in place for all areas of natural drainage from the area of works.

See Drawing 300-101269-DR-138-P2 for further details.

11.4 HDD Location 2 – M6 Motorway Crossing Point 2

The second location to be assessed for HDD was a crossing point to cross the M6 motorway infrastructure (Ch. 2950m). A Horizontal Direction Drilling (HDD) trenchless technology method will be implemented to facilitate underground cabling crossing the motorway asset. Upon traversing the Motorway section via HDD method, the UGC emerges north of the M6 within the Galway City and County Council owned lands (Folio GY113107F).

The proposed crossing point is within an area of slight undulating geographical gradients. The proposed launch/receptor pit locations are located on a similar level gradient than that of the motorway which is advantageous in achieving the desired drilling profile required for the HDD

The drilling path and profile will be confirmed by the appointed drilling contractor prior to construction to ensure these concerns are addressed.

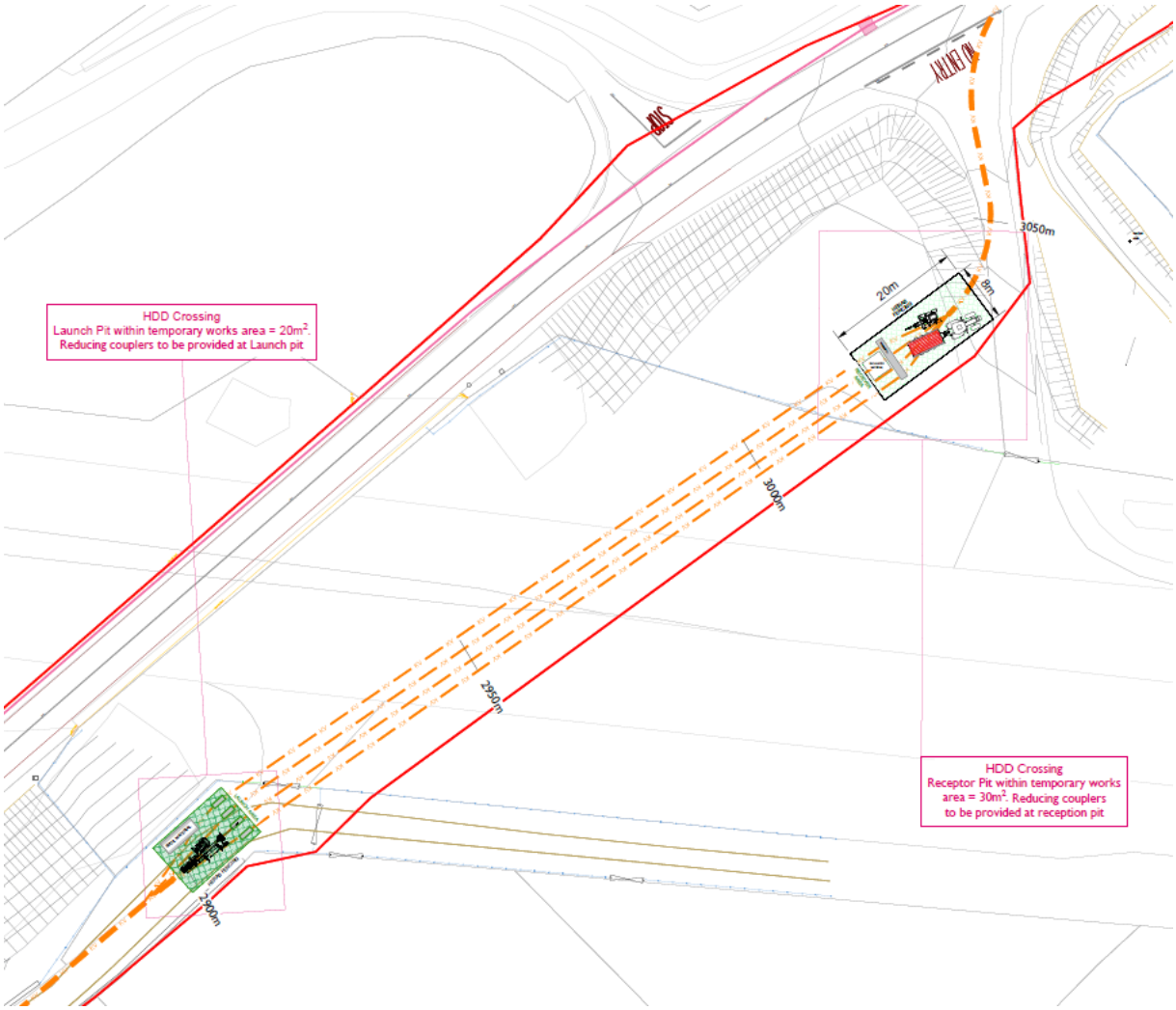


Figure 17 - HDD Location 2 Route Option

The HDD remains within the curtailment of the maintenance road section.

The Horizontal Directional Drilling (HDD) trenchless methods would avoid trench works and traffic management systems in the designated area. The HDD options can be achieved by excavating temporary drill pits (launch pit and a receptor pit) on either side of the motorway corridor with a maximum span of circa. 120m. The road sections containing these temporary pits at either side of the motorway will be incorporated into a buffer zone covering an area of circa 40m2 for the launch pit and circa 20m2 for the receptor pit which will be fenced on both sides of the crossing location.

The launch pit and receptor pit (approx. 2m (W) x 3m (L) x 1m deep) temporarily installed will adhere to a minimum separation distance of 10m from the motorway network. These conditions will be further determined by the Drilling Contractor when undertaking the scope of works with respect to the Local Authorities environment and planning sectors. Additional precautionary measures (e.g. silt fences, sandbags etc) will also be put in place for all areas of natural drainage from the area of works.

See Drawing 300-101269-DR-139-P2 for further details.

11.5 HDD Location 3 – M17 Motorway Crossing

A third, and final HDD is implemented as the least intrusive method of crossing the M17 motorway (Ch.5670m).

Upon traversing the Motorway section via HDD method, the UGC emerges to the other side of the M17.

The proposed crossing point is within an area of slight undulating geographical gradients. The proposed launch/receptor pit locations are located on a similar level gradient than that of the motorway which is advantageous in achieving the desired drilling profile required for the HDD

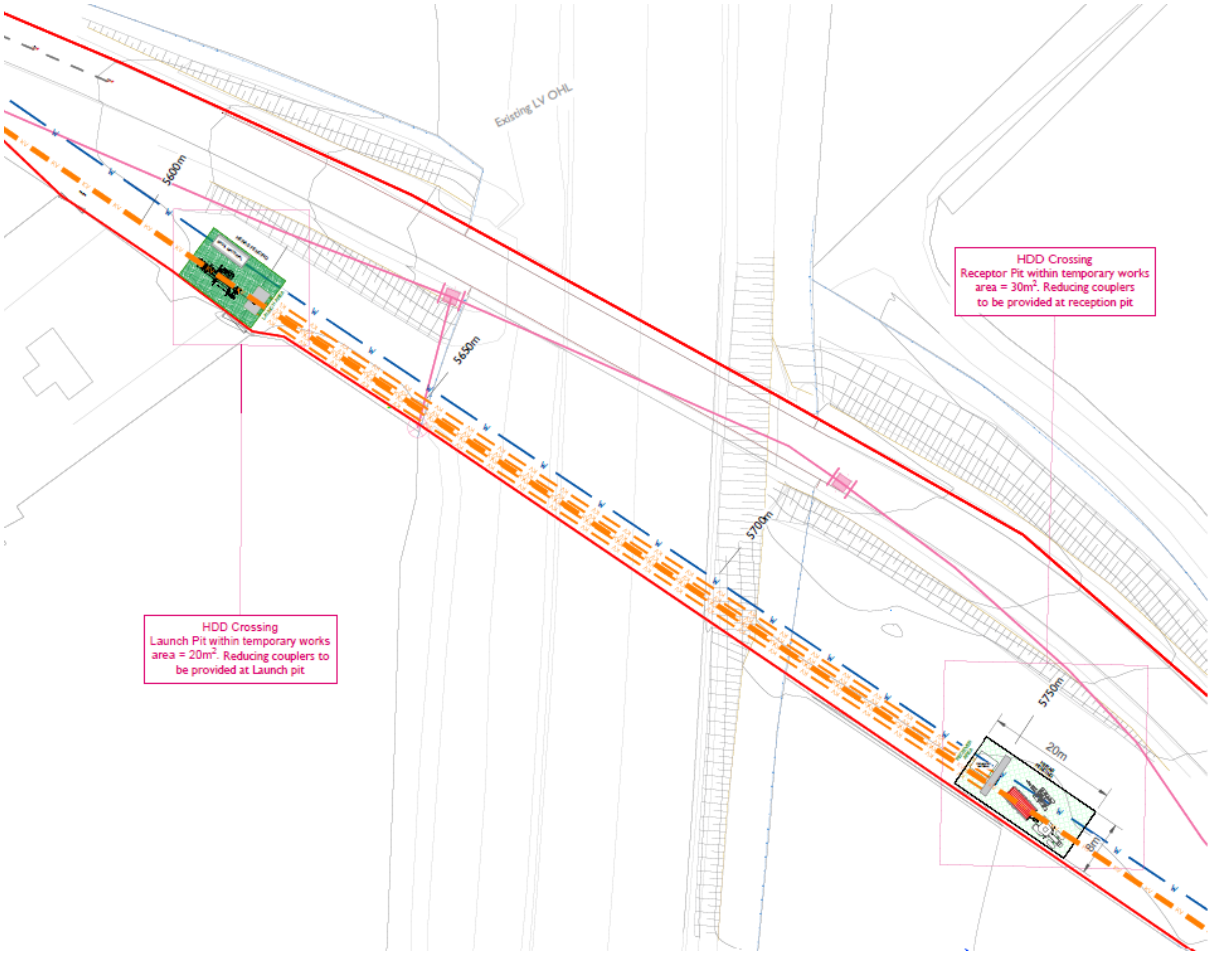


Figure 18 - HDD Location 3 Route Option

Upon encountering the M17 within the curtailment of Galway City and County Council propertiered lands in an offroad section, a third and final HDD is implemented within the within the offroad terrain as the least intrusive method of crossing the motorway.

Upon traversing the Motorway section via HDD method, the UGC emerges to the other side of the M6 within the Galway City and County Council propertiered lands. A HDD trenchless method will be implemented to facilitate underground cabling crossing the motorway asset. The HDD bore will be required to travel a minimum depth of 5000mm beneath the motorway asset. The depth of the HDD bores can be further increased to a max depth of approx. 6000mm (if required) to further mitigate any potential disturbances to the roadways and structures. Upon traversing the Motorway section via HDD method, the UGC emerges North of the M6 within the Galway City and County Council owned lands .

The Horizontal Directional Drilling (HDD) trenchless methods would avoid trench works and traffic management systems in the designated area. The HDD options can be achieved by excavating temporary drill pits (launch pit and a receptor pit) on either side of the motorway corridor with a maximum span of circa. 120m. The road sections containing these temporary pits at either side of the motorway will be incorporated into a buffer zone covering an area of circa 40m2 for the launch pit and circa 20m2 for the receptor pit which will be fenced on both sides of the crossing location.

The launch pit and receptor pit (approx. 2m (W) x 3m (L) x 1m deep) temporarily installed will adhere to a minimum separation distance of 10m from the motorway network. These conditions will be further determined by the Drilling Contractor when undertaking the scope of works with respect to the Local Authorities environment and planning sectors. Additional precautionary measures (e.g. silt fences, sandbags etc) will also be put in place for all areas of natural drainage from the area of works.

See Drawing 300-101269-DR-140-P2 for further details.

12.0 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.

12.1 Cable Installation

The electrical cable is supplied in pre-ordered lengths on large cable drums. Once the ducting installation is complete the guide rope is used for proving the ducts by attaching a mandrel, a sponge or brush, for cleaning the duct. Once the ducting is proved, the electrical cables (situated on a drum) are pulled through the ducts by a specialised mechanical winch. The electrical cable will be connected to the winch rope using suitably sized and rated cable pulling stocking and swivel or the pulling head fitted by the cable manufacturer. Installing “one circuit” of electrical cable involves pulling three individual conductors into three separate ducts via the winch. The winch will monitor the tension on the cables being pulled so as not to damage them. The winch must be set at a predetermined cut off pulling tension as specified by the designer.

Cable lubricant is applied to the outside of the cables being pulled through the ducts. 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 cables.

Figure 19 - Cable Pulling Operation Example

Once the cables are pulled, a jointing container is positioned over the joint location, and the cable jointing procedure is carried out in this controlled environment. Following the completion of jointing and duct sealing works, cement-bound sand will be placed and compacted in approximately 200 mm layers to the level of the cable joint base to provide vertical support. Additional layers of cement-bound sand will be installed and compacted until the cement-bound sand is level with the top of the joint. An additional 100 mm cement-bound sand layer, and cable protection strips will then be installed. This will then be backfilled with cement-bound sand to a depth of 250 mm below surface and permanent reinstatement carried out including placement of warning tape at 300 mm depth below the finished surface level.

13.0 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, environmental protection measures included within the planning application, measures 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 Ecological Clerk of Works (ECoW) where relevant.

The following documents will contribute to the preparation of the method statements in addition to those measures 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 works will be carried out by employing accepted best working practices during construction, including the environmental management measures listed 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 Athenry Peaker Plant Project site and transported to the works zone immediately prior to construction;
- Weather conditions will be considered when planning construction activities to minimise risk of run off from site;
- Provision of 15m 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 works e.g. in trenches for underground cabling or in wet areas, water will be treated prior to discharge;
- For smaller volume dewatering requirements, a standard Hi-flow silt dewatering bag can be used. For large volume dewatering requirements settlement tanks would be used.
- 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, with the Contractor required to prepare a contingency plan for before and after such events;
- The contractor will carry out visual examinations of local watercourses from the 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;
- Measures will be taken to avoid concrete or concrete contaminated water run-off from entering 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 temporary construction compound at the substation site, remote from watercourses, drainage channels and other surface water features;
- A designated trained operator experienced in working with concrete will be employed during the concrete pouring phase;
- Concrete wastewater can be pumped into a skip to settle out; settled solids will need to be appropriately disposed of off-site;
- Wash-down water from exposed concrete surfaces will be trapped to allow sediment to settle out and reach neutral pH before clarified water is released to the drain system or allowed to percolate into the ground;
- Where dust suppression is considered to be required by the Contractor, such requirements and methodology shall be subject to the agreement with the Ecological Clerk of Works;

- 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.

The following mitigation measures will be undertaken specifically with regard to horizontal directional drilling:

- A geotechnical assessment shall be carried out prior to horizontal directional drilling and drilling shall only be carried out at locations where conditions are suitable for the control of drilling materials.
- All works will be supervised by a qualified environmental engineer.
- No works will be undertaken near the river corridor or river banks. Reception and launch pits for the directional drilling process shall be excavated a minimum of 20m from the stream banks.
- No construction activity will take place in riparian areas. Stockpiling of construction materials, refuelling of machinery and overnight parking will take place elsewhere in the temporary compound on the proposed Athenry Peaker Plant site. Concrete truck chute cleaning will take place in a separate appropriate location.
- The area around the bentonite batching, pumping, and recycling plants shall be bunded using terram and sandbags in order to contain any spillages.
- Silt fencing will be erected 5m from the reception and launch pits used for directional drilling.
- Horizontal directional drilling works shall not take place at periods of high rainfall and shall be scaled back or suspended if heavy rain is forecast.

14.0 Invasive Species Best Practices Measures

Invasive species can be introduced into a location by contaminated plant, machinery, and equipment that 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. Waste Management

15.0 Waste Management

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

16.0 Emergency Response Plan

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

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

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

17.0 Programme

Some of the elements are likely to happen concurrently, therefore the overall start-to-finish duration is estimated to be 12 months