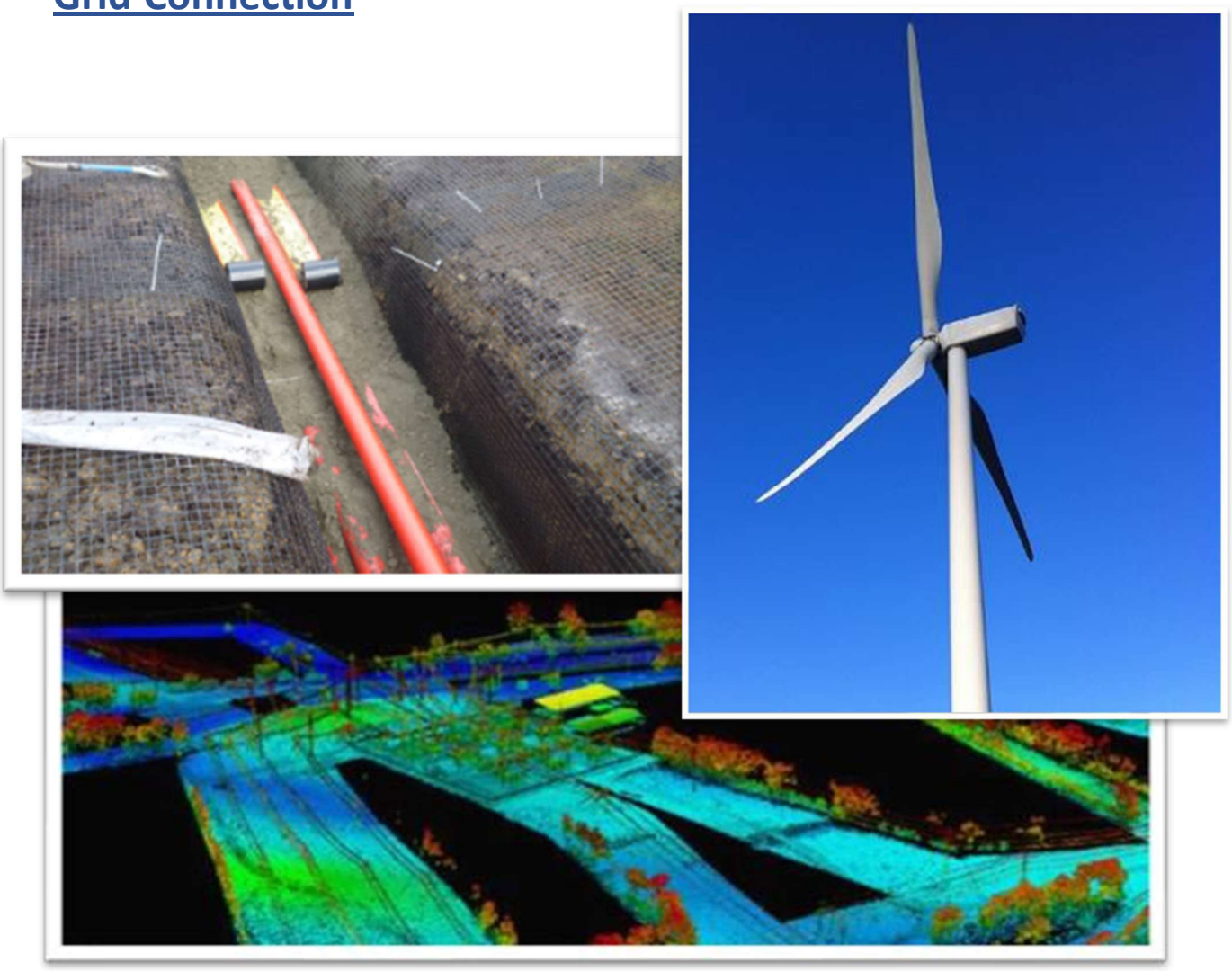
Outline Construction Methodology

Cummeennabuddoge Wind Farm
Grid Connection



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Clients: FEI C/o Gavin & Doherty Geosolutions Ltd.

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1.0 Introduction

The purpose of this document is to outline and explain the construction techniques and methodologies which will be implemented during construction of the Cummeennabuddoge Wind Farm 110kV grid connection to the existing Ballyvouskill 220kV substation. The grid connection will consist entirely of underground cabling (UGC) with the majority of the UGC to be installed within internal forestry road networks.

The UGC works will consist of the installation of 6 No. ducts in an excavated trench to accommodate 3 No. power cables, 2 No. fibre communications cable to allow communications between the Cummeennabuddoge Wind Farm Substation and Ballyvouskill 220kV substation and 1 No. earth continuity conductor.

This document is intended to be used as an aid to understand the methodologies to be employed during construction and should be read in conjunction with all other specialist reports which accompany the planning application. In addition, this document is in outline form only. The detailed Method Statements will be prepared in respect of each aspect of the development, by the appointed contractor.

2.0 110kV Underground Cable Route

The UGC route is approximately 3.6km in length and traverses in a west to north westerly direction from the existing Ballyvouskill 220kV substation to the Cummeennabuddoge Wind Farm substation location utilising existing agricultural grassland pasture, existing access tracks and private forestry access tracks.

The exact location of the UGC within the curtilage of the existing access tracks and private forestry access tracks will be delineated closer to the design stage. There will be a deviation away from inherent access tracks, that will require a permanent service track above the cable circuits. This shall be a 3m hardcore stone blinding track will be used on the surface of the trackway to demarcate the cable area. This hardcore surface track will substantiate a load axle weight of minimum 10 tonnes. The ground composition will need to be tested to ascertain the sublayers beneath the surface, confirmatory site investigations shall be undertaken prior to construction.

The proposed UGC runs in parallel with existing UGC for a section of the route. Where running in parallel with the existing 110kV and 38kV Garrow-Ballyvouskill underground circuits, all ESB safety procedures, as outlined within the HSA “Code of Practice for Avoiding Danger from Underground Services”, will be adhered to throughout the duration of construction. Given the conduction properties of the existing underground cables and the proposed grid connection cables for Cummeennabuddogue, there will be a requirement to maintain a separation between circuits, so far as these are thermally independent of each other, typically with an offset of 2m to 3m.

GPR and slit trenches will be formed regularly along the route to determine the precise locations of the existing circuits. During detailed design, consultation with EirGrid and ESB regarding cable installation will occur. Running cables in parallel is a common practice in the industry.

The cable location will take into considerations from Cork County Council and all other relevant stakeholders’ requirements. Installation of the cable will consider all environmental protection measures forming part of the planning application for the development at Cummeennabuddoge wind farm and accompanying technical reports.

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

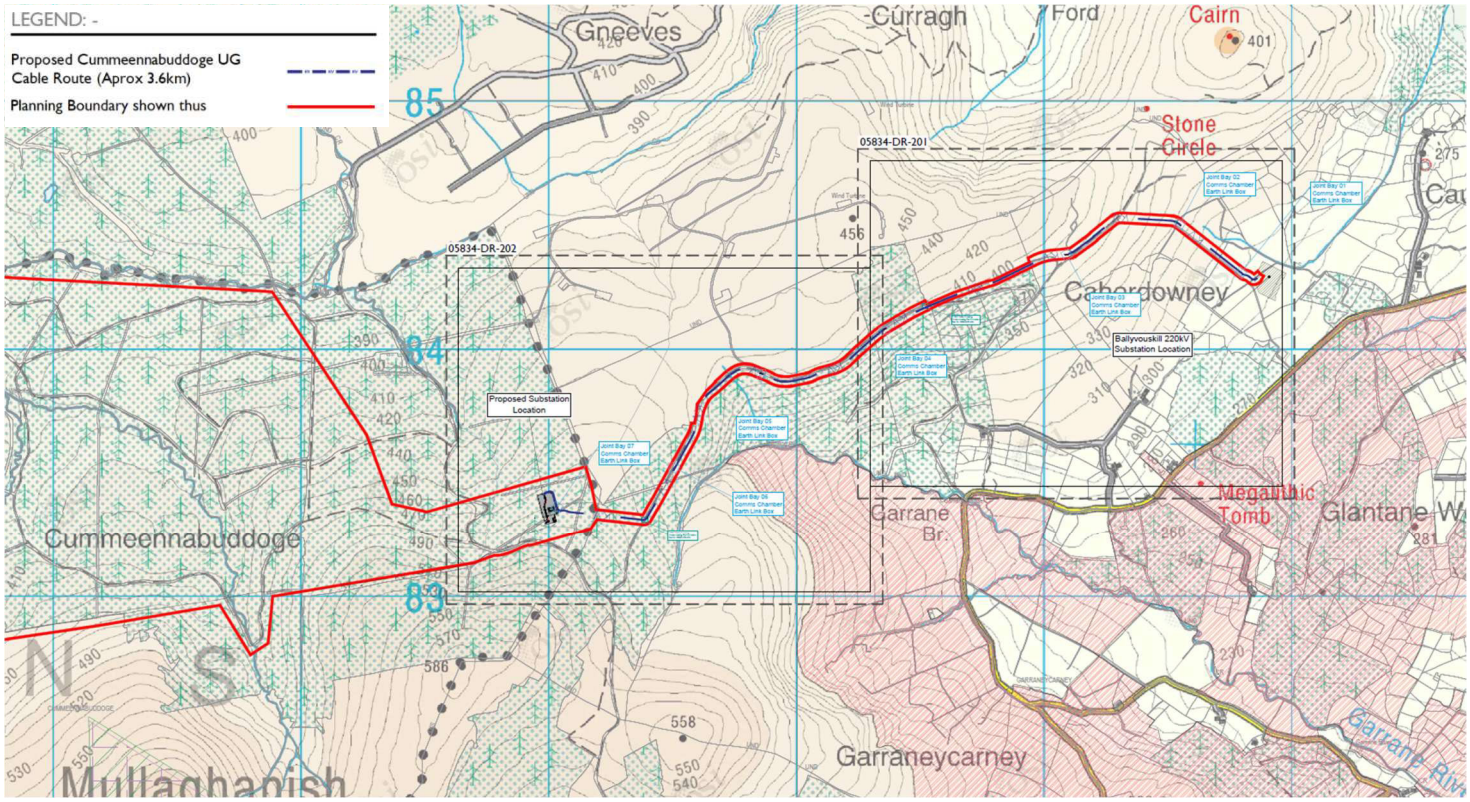


Figure 1 - Grid Connection Route Layout Plan

Table 1 – Approximate UGC Route Location of Preliminary Design:	
Existing Forestry Track	**Newly Formed Service Tracks**
2.0km	1.6km

Table 1: Cummeennabuddoge Wind Farm to Ballyvouskill 220kV Substation – UGC Route Location Summary

Table 2 separates the UGC route into several sections and describes the specific construction requirements of each individual section along with assessment of access routes to the work areas.

Table 2 - Summary of Grid Connection Design Route	
Section	**Description**
Section 1 UGC	**UGC from Ballyvouskill 220kV substation to 110kV UGC Undercrossing (Chainage 1500m)** The underground cable route initially begins within the townland of Caherdowney, Co. Cork where from Ballyvouskill 220kV substation compound, the UGC departs the substation on the southwestern boundary, with no access track to be constructed in association with the UGC. The route will begin going through rough tracks through fields, onto the hillside, then onto the existing forestry track that comes from the site. It is proposed that the UGC route will under-cross existing EirGrid cable infrastructure (Garrow underground circuit) in flat formation, refer to drawing 05834-DR-236. ***Features*** ***Section 1 contains 3 No. joint bays***. Joint bays will be located below ground and finished/reinstated as per Forestry Road Manual (Guidelines for the design, construction and management of forest road) and as per private landowner reinstatement requirements. 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 within a permanent service track at [Chainage – 70m] • Joint Bay 02 (JB-02) will be located southwest of JB-01, within an existing forestry access road [Chainage – 390m] • Joint Bay 03 (JB-03) will be located southwest of JB-02, within an existing forestry access road [Chainage – 900m] ***Section 1 will require 1 No. service crossings:*** Existing Garrow underground cable infrastructure is encountered along the proposed route and the crossing schedules will be prepared at detailed design to identify under or over methods to cross these existing buried services. ***Section 1 has 2 No. culvert crossings:*** A culvert schedule has been prepared to identify under or over methods to cross these existing minor watercourses. Please refer to Figure 11 and Figure 12. For further detail regarding the watercourse crossing methodology, reference Section 6.0.
Section 2 UGC	**110kV UGC Undercrossing to Cummeennabuddoge Wind farm site location (Chainage 3560m)** Upon navigating the 110kV UGC undercrossing, the UGC route continues southwest utilizing forestry roads for approximately 3100m where the route again encounters a 110kV UGC crossing, envisaged to be undercrossed in flat formation (Ref. Drawing 05834-DR-236). At this point, the UGC will depart the forestry access road network to carry west to head towards the location of Cummeennabuddoge windfarm and subsequently reaches the windfarm site boundary with the UGC terminating at chainage 3560m.

	Features ***Section 2 contains 4 No. joint bays***. Joint bays will be located below ground and finished/reinstated as per Forestry Road Manual (Guidelines for the design, construction, and management of forest road), finished/reinstated to the required roads specification and reinstated to landowner preference where applicable. 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 southwest of JB-03, within an existing forestry access road *[Chainage – 1700m]* • Joint Bay 05 (JB-05) will be located southwest of JB-04, within an existing forestry access road *[Chainage – 2265m]* • Joint Bay 06 (JB-06) will be located southwest of JB-05, within a permanent service track *[Chainage – 2850m]* • Joint Bay 07 (JB-07) will be located southwest of JB-06, within a permanent service track *[Chainage – 3460m]* ***Section 1 will require 1 No. service crossings:*** Existing ESBN infrastructure is encountered along the proposed route and the crossing schedules will be prepared at detailed design to identify under or over methods to cross these existing buried services. ***Section 2 has 12 No. culvert crossings:*** A culvert schedule has been prepared to identify under or over methods to cross these existing minor watercourses. Please refer to Figure 11 and Figure 12. For further detail regarding the watercourse crossing methodology, reference Section 6.0.

Table 2: Summary of Grid Connection Design Route

3.0 Access Routes to Work Area

Much of the underground cable route will be installed within existing forestry access track networks and therefore will be accessed via the existing road network. Use of the local public road network will be limited to access for materials and plant delivery where necessary and will not be used for heavy plant movements during construction works.

Prior to the commencement of construction, the contractor will assess all access routes and determine any additional access requirements which will be incorporated as part of the method statement. All plant and equipment employed during the works (e.g. diggers, tracked machines, footwear etc.) will be inspected prior to arrival on site and on leaving site and cleaned where necessary to prevent the spread of invasive aquatic / riparian species.

4.0 UGC Construction Methodology

The UGC will consist of 3 No. 160mm diameter HDPE power cable ducts, 2 No. 125mm diameter HDPE communications duct and 1 no. 125mm diameter earth continuity duct to be installed in an excavated trench, standardly 825mm wide by 1,315mm deep (refer to drawing 05834-DR-220), with variations on this design to adapt to service crossings and watercourse crossings, etc. 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 Cummeennabuddoge Wind Farm substation and Ballyvouskill 220kV substation. The inclusion 1 No. earth continuity

conductor duct will also be required. The ducts will be installed, the trench reinstated in accordance with the Forestry Road Manual (Guidelines for the design, construction, and management of forest road), private third-party landowners and Cork County Council specifications. Once all are satisfied, then the electrical cabling/fibre cable is pulled through the installed ducts in approximately 650/850m sections at the joint bay locations, denominated within drawings 05834-DR-200-202. Construction method statements and templates will be implemented to ensure that the UGC is installed in accordance with the correct requirements, materials, and specifications of ESBN and EirGrid.

4.1 Trenching Methodology

The following section outlines the methodology to be followed during trenching works: -

- The Contractor, and their appointed Site Manager, will prepare a targeted Method Statement concisely outlining the construction methodology and incorporating all mitigation and control measures included within the EIAR and as required by planning conditions where relevant;
- All existing underground services along the UGC route shall be confirmed prior to the commencement of construction works;
- At watercourse crossings, the contractor will be required to adhere to the environmental control measures outlined within the EIAR and the detailed Construction Environmental Management Plan (CEMP);
- Where the cable route intersects with culverts, the culvert will remain in place (where possible) and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with ESB and Irish Water specification documents SPEC-301013 and IW-CDS-5020-01/02/03/04 respectively;
- Stockpiles will be located a minimum of 60m from surface water features and all stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECoW);
- Excavated material shall be employed to backfill the trench and for reinstatement works elsewhere in the site where appropriate, as outlined in Technical Appendix 10-3 Peat Management Plan of the EIAR. Any surplus material will be transported to the on-site borrow pit;
- Any earthen (sod) banks to be excavated will be carefully opened with the surface sods being stored separately and maintained for use during reinstatement;
- Where required, grass will be reinstated by either seeding or by replacing with grass turves;
- No more than a 65m section of trench will be opened at any one time. The second 65m will only be excavated once most of the reinstatement has been completed on the first;
- The excavation, installation and reinstatement process will take on average of 1 no. day to complete a 100m section;
- There will be no instream works;
- 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;
- 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.

Figure 2 - Standard 110kV Underground Duct Installation

4.2 Ducting Installation Methodology

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

1. Grade, smooth and trim trench floor when the required 1315mm depth and 825mm width have been obtained (Figure 3).
2. Place bedding layer of Cement Bound Granular Mixture B (CBGM B) material in accordance with the specification and compact it so that the compacted thickness is as per the drawings.
3. Lay the bottom row of ducts in trefoil formation as detailed on the design drawings. Use spacers as appropriate to establish horizontal duct spacing. Fit a secure cap / bung to the end of each duct run to prevent the ingress of dirt or water.
4. Carefully surround and cover ducts with CBGM B in accordance with the design drawings and specifications and thoroughly compact without damaging ducts.
5. Place cable protection strips on compacted CBGM B directly over the ducts.
6. Lay the top row of ducts onto the freshly compacted CBGM B including the cable protection strips above the bottom row of ducts. Place a secure cap at the end of each duct to prevent the ingress of dirt or water.
7. Carefully surround and cover ducts with CBGM B material in accordance with the drawings and thoroughly compact without damaging ducts.
8. Place red cable protection strip on top of compacted CBGM B over each set of ducts as shown on the drawings.
9. Place and thoroughly compact CBGM B material or Clause 804 backfill, or soil backfill as specified and place warning tape at the depth shown on the drawings.
10. For unsurfaced/grass sections, service tracks shall be installed along the cable route providing suitable and safe access for maintenance and cable pulling vehicles at all joint bay locations and along any section of the cable route that are not located within the public road, as per EirGrid specification CDC-GFS-00-001-R1 *(Figure 3).*

11. Clean and test the ducts in accordance with the specification by pulling through a brush and mandrel. Install 12 mm polypropylene draw rope in each duct and seal all ducts using robust duct end seals fitted with rope attachment eyes in preparation for cable installation later. All the works should be witnessed by ESBN Clerk of Works (CoW) as required.

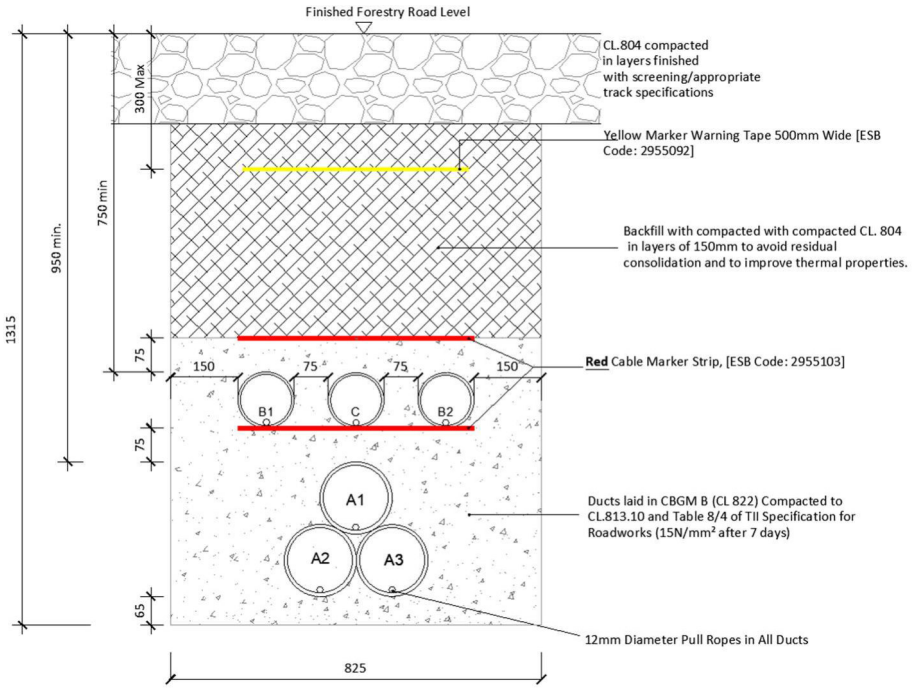


Figure 3 - Standard Trench in Forestry Road Section

4.2.1 UGC Installation through newly formed Service Tracks (Chainage 400m-1500m, Chainage 3100m-3600m)

A minimum 3m hardcore stone blinding track designed for heavy plant movement (10t axle loading) will be installed to provide safe access for inspection, maintenance, and fault repair along the entire cable route. The service track which accompanies the UG cable route will be suitably designed for allow for uninterrupted access to service chambers and joint bays.

4.2.2 UGC Installation on Existing Forestry Tracks (Chainage 0m-400m, Chainage 1500m-3100m)

A section of the 110kV route is located within existing forestry access tracks. The location where the cable is laid will depend on several factors such as width of track, bends along the track and crossings. Where the existing forestry access track needs to be widened, hardcore stone blinding will be brought in to build up the area to the same level of the track. The excess material from the track will be used elsewhere on reinstatement works.

4.3 Marker posts

Surface cable markers will be placed along the route where cable depth is unavoidably shallow, due to constraints such as existing services, to indicate the precise location of the UGC. These markers will be metallic plates in accordance with ESBN and EirGrid standard documents SPEC-191213-AXT, CDS-GFS-00-001-R1 respectively.

Marker posts will be used on non-roadway routes to delineate the cable route and joint bay positions. Corrosion proof aluminium triangular danger sign, with 700mm base, and with centred lightning symbol, on engineering grade fluorescent yellow background shall be installed in adequately sized concrete foundations. Marker post shall also be placed if burial depth is not to standard. Siting of marker posts to be dictated by ESBN as part of the detailed design process (Figure 4).

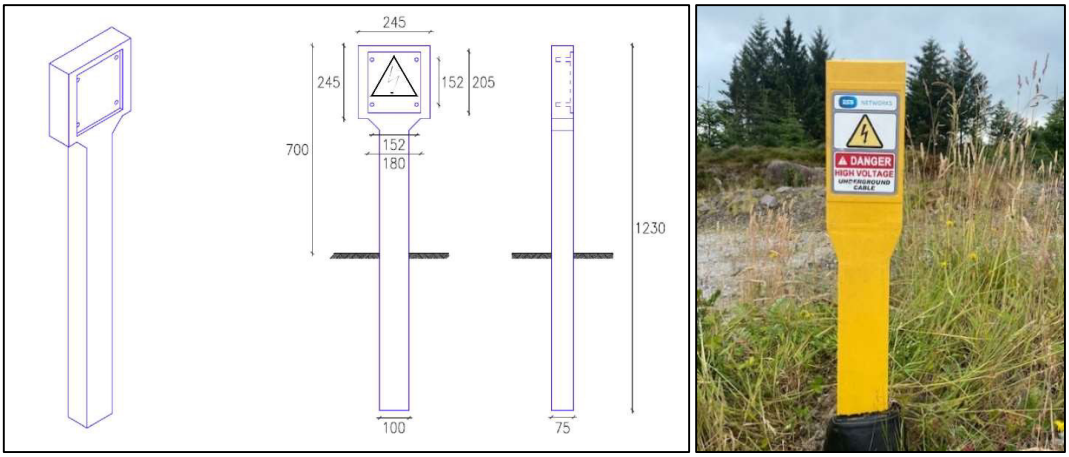


Figure 4 - Standard ESB Marker Posts Example

4.4 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 compounds to be located within the Cummeennabuddoge Wind Farm. Oils and fuels will be stored in an appropriately bunded area within the temporary construction compounds.

4.5 Joint Bays and Associated Chambers

Joints Bays are to be installed approximately every 650m - 850m along the UGC route to facilitate the jointing of 2 No. lengths of UGC. Joint Bays are Standardly 6m x 2.5m x 2.05m pre-cast concrete structures installed below finished ground level. Joint Bays will be in the non-wheel bearing strip of roadways, however given the narrow profile of local roads this may not always be possible.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between Cummeennabuddoge Wind Farm substation and the existing 220kV node at Ballyvouskill. Earth Sheath Link Chambers are also required at every joint bay along the cable route. Earth Sheath Links are used for earthing and bonding cable sheaths of underground power cables, so that the circulating currents and induced voltages are eliminated or reduced. Earth Sheath Link Chambers and Communication Chambers are near Joint Bays. Earth Sheath Link Chambers and Communication Chambers will Standardly be pre-cast concrete structures with an access cover at finished surface level.

The precise siting of all Joint Bays, Earth Sheath Link Chambers and Communication Chambers is subject to approval by ESBN. Marker posts will be used on non-roadway routes to delineate the duct route and joint bay positions.

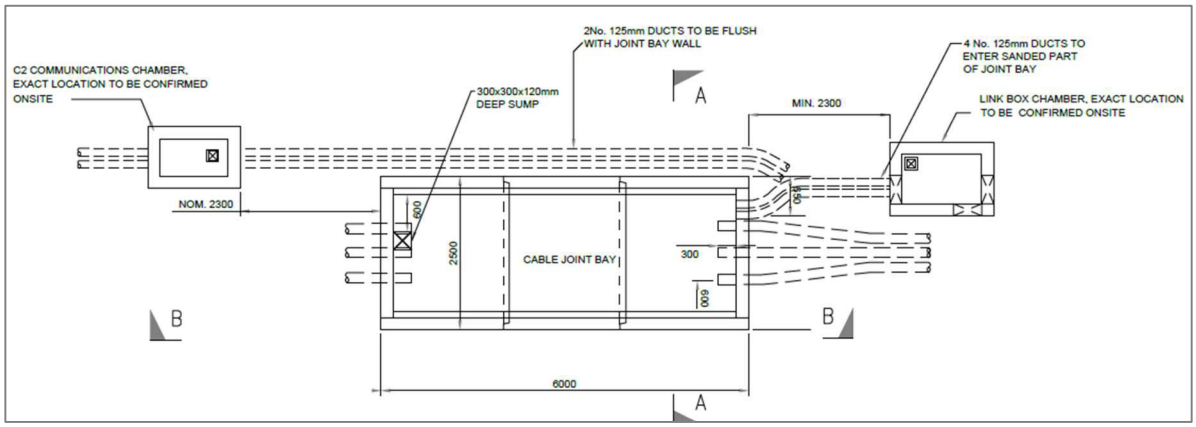


Figure 5 - 110kV Joint Bay Plan Layout

4.6 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. If the ground slopes from the working area toward a watercourse or if there is evidence of solids washing off the works area toward nearby watercourses or drains, a silt fence with straw bales, will be interposed between the works area and the watercourse.

All excavated material will be stored near the excavations and reused for reinstatement works, with the exception of excess material to be removed to an approved waste facility. Any soil required for reinstatement that will be temporarily stockpiled on site will be placed at least 60m back from the nearest major watercourse on level ground and at least 10m back from minor watercourses. Temporary stockpiles will be ringed at the base by silt fencing and be regularly monitored by a designated competent person for signs of solids escape. In which case an additional line of silt fencing with straw bales will be added in line with the relevant 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.

The risk of concrete reaching surface waters is considered very low given that all concrete will be poured into the pit excavated for the joint bay so that spills will be contained. The basic requirement therefore is that all pouring operations be constantly supervised to prevent accidental spillages occurring outside the pit.

Temporary storage of cement bound sand (if required) will be on hardstand areas only where there is no direct drainage to surface waters and where the area has been bunded e.g. using sandbags and geotextile sheeting or silt fencing to contain any solids in run-off.

The following steps outline the methodology for joint bay construction and reinstatement:

1. The contractor will excavate a pit for joint bay construction, including for a sump in one corner.
2. Grade and smooth floor; then lay a 75 mm depth of blinding concrete (for in situ construction) or 50 mm thick sand (for pre-cast concrete construction) on 200 mm thick Clause 804 granular material.
3. In situ construction. Construct 200 mm thick reinforced concrete floor slab with sump and starter bars placed for walls as detailed on the drawings.
4. In situ construction. Construct 200 mm thick reinforced concrete sidewalls as detailed on the drawings. *(*Figure 6*)*

Figure 6- Standard joint bay under construction (in-situ)

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. (Figure 7)

Figure 7 – Example of completed joint bay prior to cable installation (in-situ)

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

Figure 8 - Standard 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 are placed over the constructed joint bay and are then removed at the cable installation stage of the project.
9. Later to facilitate are cable installation and jointing, reinstating traffic management signage, securing individual sites, re-excavating three consecutive joint bays and storing excavated material for reuse.
10. The cable is supplied in pre-ordered lengths on large cable drums (Figure 9). 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 (Standard 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)

Figure 10 - HV cable jointing container

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:

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

5.0 Existing Services

To facilitate the installation of the underground cable, it may be necessary to locate existing underground services within the curtilage of the access track or in close proximity to Ballyvouskill Substation. As denoted in Section 2.0, the proposed UGC runs in parallel with the existing 110kV Garrow-Ballyvouskill underground circuits for a section of the route. In advance of any construction activity, the contractor will undertake detailed surveys and scans of the UGC route to confirm the presence/location of any existing services. Consultation with the asset owner and any other relevant service providers to determine the requirement for specific excavation and to schedule a suitable time to carry out works, will be performed in conjunction with the aforementioned detailed surveys.

6.0 Watercourse Crossings

Crossing existing culverts will be implemented using open trenching with either an undercrossing or an overcrossing, depending on the depth of the culvert. A schedule of the culverts has been identified at this stage where the crossing method to be implemented has be detailed. (Ref 05834-DR-240 to 05834-DR-244 for Culvert Schedule detail). The culvert crossing methods are detailed in Figure 11 and Figure 12 below.

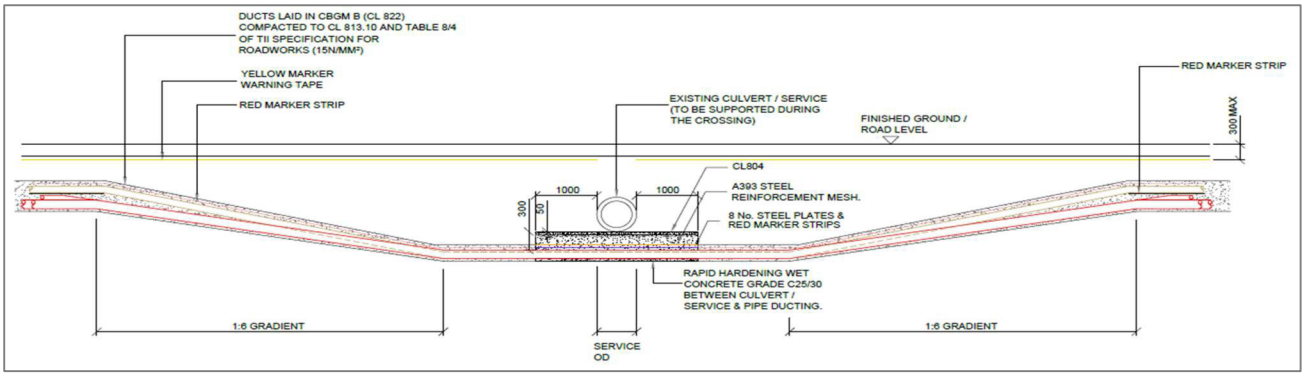


Figure 11 – 110kV UGC Culvert Undercrossing

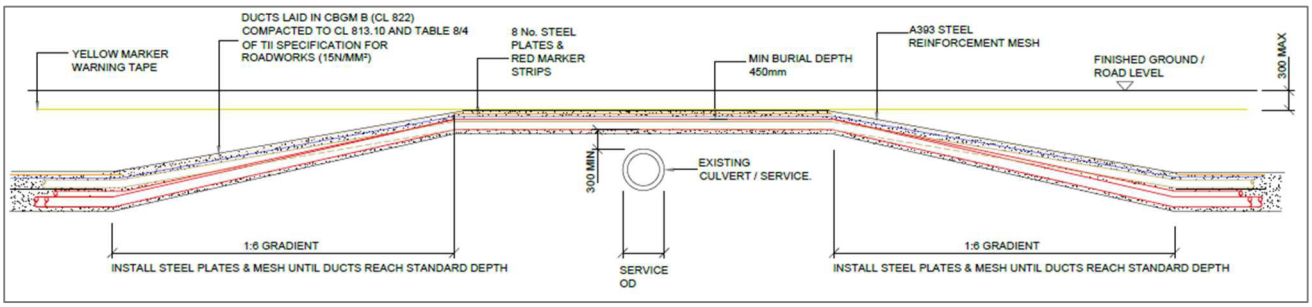


Figure 12 - 110kV UGC Culvert Overcrossing

Inland Fisheries Ireland have published guidelines relating to construction works along water bodies entitled 'Requirements for the Protection of Fisheries Habitats during Construction and Development Works at River Sites", and these guidelines will be strictly adhered to during the construction of the development.

7.0 Reinstatement of Private Land

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

8.0 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 EIAR, 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 ECoW where relevant.

The following documents will contribute to the preparation of the method statements in addition to those measures outlined in Section 9.0 Implementation of Environmental Protection Measures – Section 11.0 Waste Management and below: -

- Inland Fisheries Ireland (2016) *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters*. Inland Fisheries Ireland*, Dublin,*
- *National Roads Authority (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*. National Roads Authority, Dublin;
- E. Murnane, A. Heap and A. Swain. (2006) *Control of water pollution from linear construction projects.* Technical guidance (C648). CIRIA;
- E. Murnane et al., (2006) *Control of water pollution from linear construction projects*. Site guide (C649). CIRIA.
- Murphy, D. (2004) Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin;
- H. Masters-Williams et al (2001) *Control of water pollution from construction sites. Guidance for consultants and contractors* (C532);
- Enterprise Ireland (unknown). *Best Practice Guide (BPGCS005) Oil storage guidelines;*
- Law, C. and D'Aleo, S. (2016) *Environmental good practice on site pocket book*. (C762) 4th edition. CIRIA;
- CIRIA *Environmental Good Practice on Site (fourth edition) (C741) 2015*.

The proposed works will be carried out by employing accepted good work practices during construction, and environmental management measures set out in the EIAR and NIS (Natura Impact Statement).

9.0 Implementation of Environmental Protection Measures

All environmental protection measures contained with the EIAR and NIS (Natura Impact Statement) which accompanies the planning application are incorporated into the live CEMP and construction method statements prior to the commencement of development and will be included in the construction MS*. The Project Manager and Site Manager will be responsible for the implementation of measures following consultation with the Environmental Manager and ECoW where necessary.

10.0 Invasive Species Best Practice Measures

Please refer to Chapter 8: Biodiversity of the EIAR for details.

11.0 Waste Management

All waste products (general waste, plastic, timber, etc.) arising during the construction phase will be managed and disposed of in accordance with the provisions of the Waste Management Act 1996 and associated amendments and regulations. A WMP is included as an appendix to the live CEMP, Appendix 4-1 of the EIAR.

12.0 Programme

Please refer to Chapter 4: Project Description of the EIAR for the programme.

Appendix 1 – Culvert Schedule

Culvert Crossing Schedule					
Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Crossing Methodology	Photo
C1.	600 Ø	TWIN CONCRETE PIPE	1200	OVERCROSSING	
C2.	300 Ø	CONCRETE PIPE	700	OVERCROSSING	
C3.	700 Ø	CONCRETE PIPE	1200	OVERCROSSING	
C4.	700 Ø	CONCRETE PIPE	1000	OVERCROSSING	

Figure 13 - Culvert Crossing Schedule (Culvert 1-4)

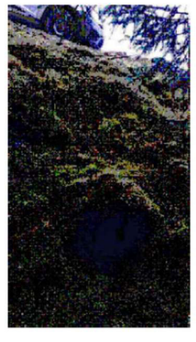
Culvert Crossing Schedule					
Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Crossing Methodology	Photo
C5.	400 Ø	TWINWALL	1200	OVERCROSSING	
C6.	400 Ø	TWINWALL	1700	OVERCROSSING	
C7.	400 Ø	CONCRETE PIPE	1350	OVERCROSSING	
C8.	600 Ø	CONCRETE PIPE	1400	OVERCROSSING	

Figure 14 - Culvert Crossing Schedule (Culvert 5-8)

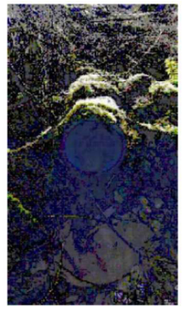
Culvert Crossing Schedule					
Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Crossing Methodology	Photo
C9.	300 Ø	TWINWALL	370	UNDERCROSSING	
C10.	400 Ø	TWINWALL	1100	OVERCROSSING	
C11.	400 Ø	TWINWALL	1200	OVERCROSSING	
C12.	600 Ø	CONCRETE PIPE	1350	OVERCROSSING	

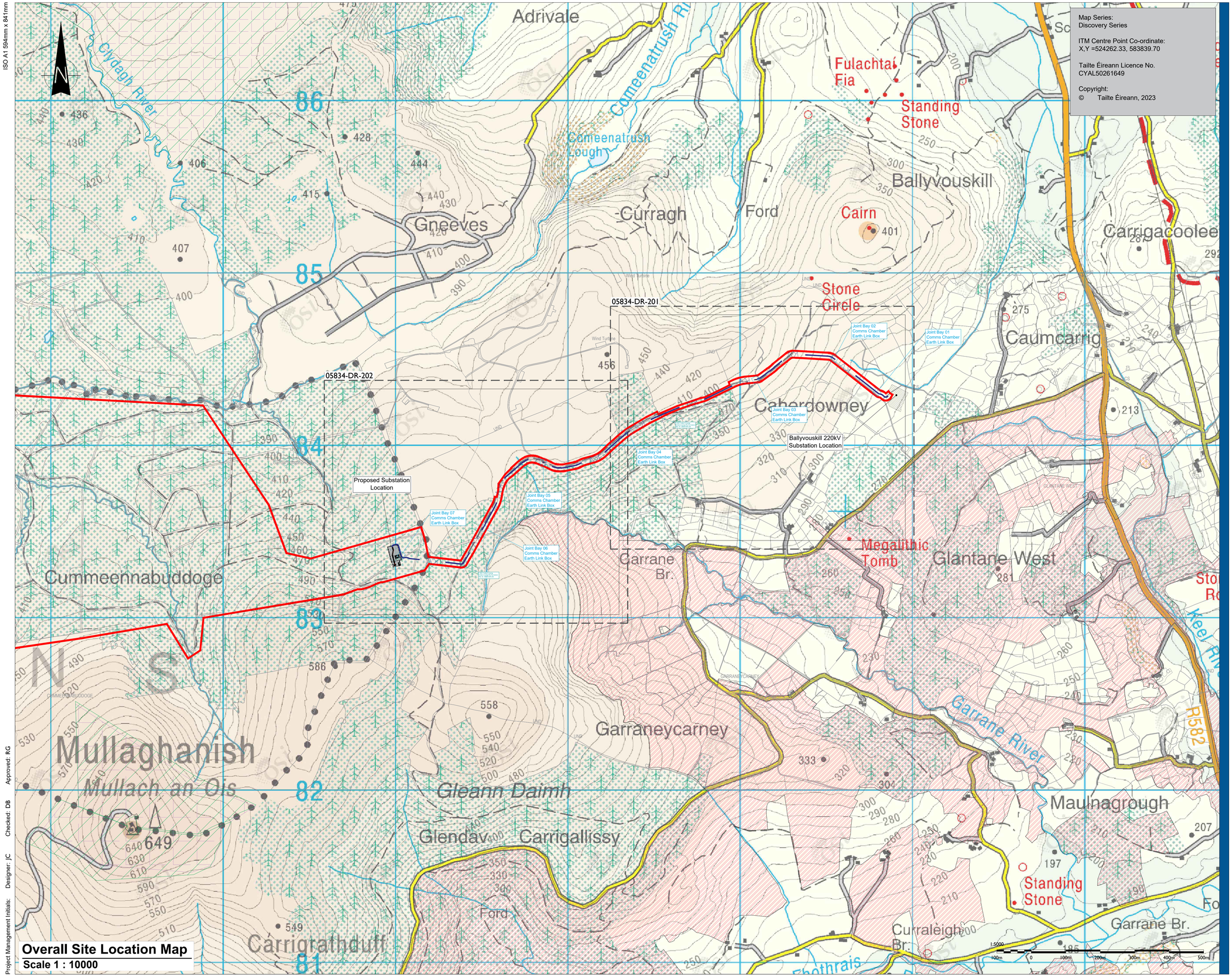
Figure 15 - Culvert Crossing Schedule (Culvert 9-12)

Culvert Crossing Schedule					
Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Crossing Methodology	Photo
C13.	600 Ø	CONCRETE PIPE	1100	OVERCROSSING	
C14.	400 Ø	TWINWALL	400	UNDERCROSSING	

Figure 16 - Culvert Crossing Schedule (Culvert 13-14)

ISO A1 594mm x 841mm

Approved: RG
Checked: DB
Designer: JC
Project Management Initials:



Overall Site Location Map
Scale 1 : 10000

Map Series:
Discovery Series

ITM Centre Point Co-ordinate:
X,Y =524262.33, 583839.70

Tailte Éireann Licence No.
CYAL50261649

tli GROUP

Head Office
Beenreigh,
Abbeydorney,
Tralee, Co. Kerry
Ireland
Tel: 00353 66 7135710

Regional Office
Basepoint Business Centre
Stroudley Road, Basingstoke,
Hampshire,
RG24 8UP, UK
Tel: 00 44 1256406664

PROJECT

Cummeennabuddoge Wind Farm 110kV Grid Connection

CLIENT

GDG GAVIN & DOHERTY GEOSOLUTIONS

CONSULTANTS

FuturEnergy Ireland

NOTES: -

- This drawing is to be used only for the purpose of the planning application and is subject to detailed design.
- Position of underground cable and location of joint bays, links boxes and comms chambers may vary depending on site conditions.
- Position of link boxes and comms chambers is to be agreed onsite with EirGrid/ESB.
- Other services may be encountered on the route.

LEGEND: -

Proposed Cummeennabuddoge UG Cable Route (Aprox 3.6km)

Planning Boundary shown thus

Special Protected Area shown thus

PHNA shown thus

ISSUE/REVISION

P4	14.05.24	Issued for Planning
P3	20.03.24	Issued for Planning
P2	15.12.23	Issued for Planning
P1	27.04.23	Issued for Planning
I/R	DATE	DESCRIPTION

PROJECT NUMBER

05-834

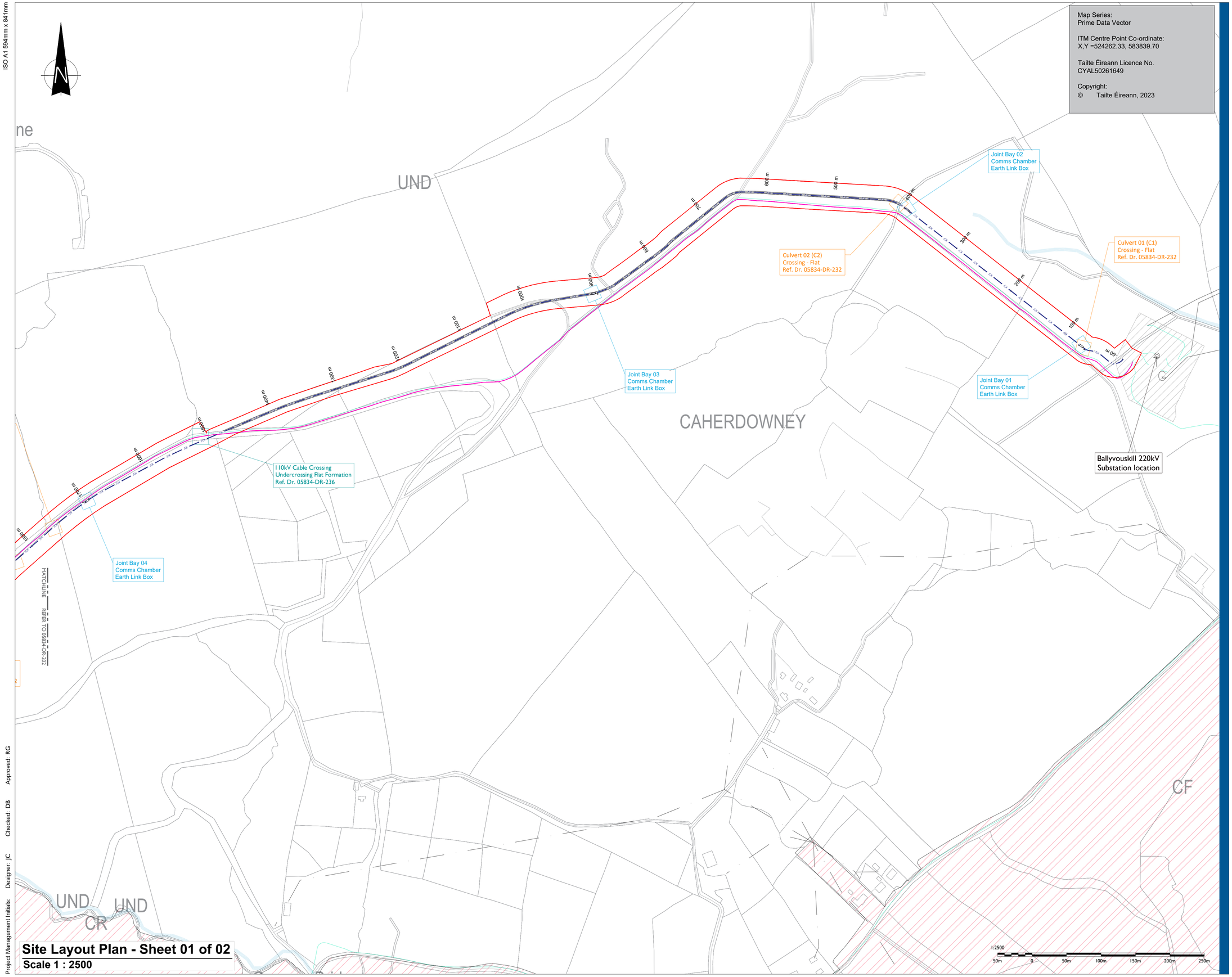
SHEET TITLE

Overall Site Location Map

SHEET NUMBER

05834-DR-200

ISO A1 594mm x 841mm



Project Management Initials: Designer: JC Checked: DB Approved: RG

tli GROUP

Head Office
Beenreigh,
Abbeydorney,
Tralee, Co. Kerry
Ireland
Tel: 00353 66 7135710

Regional Office
Basepoint Business Centre
Stroudley Road, Basingstoke,
Hampshire,
RG24 8UP, UK
Tel: 00 44 1256406664

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- Other services may be encountered on the route.

LEGEND: -

- Proposed Cummeennabuddoge UG Cable Route (Aprox 3.6km)
- Garrow 110kV UG Cable Route
- Planning Boundary shown thus
- Existing Rivers & Streams shown thus
- Existing ESB OHL & UGC HV Network
- Existing ESB OHL MV & LV Network
- Existing ESB UGC MV Network
- Special Protected Area shown thus
- Permanent Eirgrid Standard Service Track shown thus

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P4	14.05.24	Issued for Planning
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PROJECT NUMBER

05-834

SHEET TITLE

Site Layout Plan
Sheet 01 of 02

SHEET NUMBER

05834-DR-201

ISO A1 594mm x 841mm

Map Series:
Prime Data Vector

ITM Centre Point Co-ordinate:
X,Y =524262.33, 583839.70

Tailte Éireann Licence No.
CYAL50261649

Culvert 03 (C3)
Crossing - Flat
Ref. Dr. 05834-DR-232

Culvert 04 (C4)
Crossing - Flat
Ref. Dr. 05834-DR-232

Culvert 07 (C7)
Crossing - Flat
Ref. Dr. 05834-DR-232

Culvert 06 (C6)
Crossing - Flat
Ref. Dr. 05834-DR-232

Culvert 10 (C10)
Crossing - Flat
Ref. Dr. 05834-DR-232

Culvert 09 (C9)
Crossing - Flat
Ref. Dr. 05834-DR-232

Culvert 11 (C11)
Crossing - Flat
Ref. Dr. 05834-DR-232

Culvert 12 (C12)
Crossing - Flat
Ref. Dr. 05834-DR-232

Culvert 13 (C13)
Crossing - Flat
Ref. Dr. 05834-DR-232

Culvert 05 (C5)
Crossing - Flat
Ref. Dr. 05834-DR-232

Culvert 08 (C8)
Crossing - Flat
Ref. Dr. 05834-DR-232

Joint Bay 05
Comms Chamber
Earth Link Box

Culvert 14 (C14)
Crossing - Flat
Ref. Dr. 05834-DR-232

Joint Bay 07
Comms Chamber
Earth Link Box

Joint Bay 06
Comms Chamber
Earth Link Box

Proposed 110kV
Substation location

110kV Cable Crossing
Undercrossing Flat Formation
Ref. Dr. 05834-DR-232

MATCHLINE REFER TO 05834-DR-201

Garrane River

LKS

UND

CR

1:2500
50m 0 50m 100m 150m 200m 250m

Project Management Initials:
Designer: JC
Checked: DB
Approved: RG

Site Layout Plan - Sheet 02 of 02
Scale 1 : 2500

tli GROUP

Head Office
Beenreigh,
Abbeydorney,
Tralee, Co. Kerry
Ireland
Tel: 00353 66 7135710

Regional Office
Basepoint Business Centre
Stroudley Road, Basingstoke,
Hampshire,
RG24 8UP, UK
Tel: 00 44 1256406664

PROJECT

Cummeennabuddoge Wind Farm 110kV Grid Connection

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- Position of link boxes and comms chambers is to be agreed onsite with EirGrid/ESB.
- Other services may be encountered on the route.

LEGEND: -

- Proposed Cummeennabuddoge UG Cable Route (Aprox 3.6km)
- Garrow 110kV UG Cable Route
- Planning Boundary shown thus
- Existing Rivers & Streams shown thus
- Special Protected Area shown thus
- Permanent Eirgrid Standard Service Track shown thus

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P1	27.04.23	Issued for Planning
I/R	DATE	DESCRIPTION

PROJECT NUMBER

05-834

SHEET TITLE

Site Layout Plan
Sheet 02 of 02

SHEET NUMBER

05834-DR-202