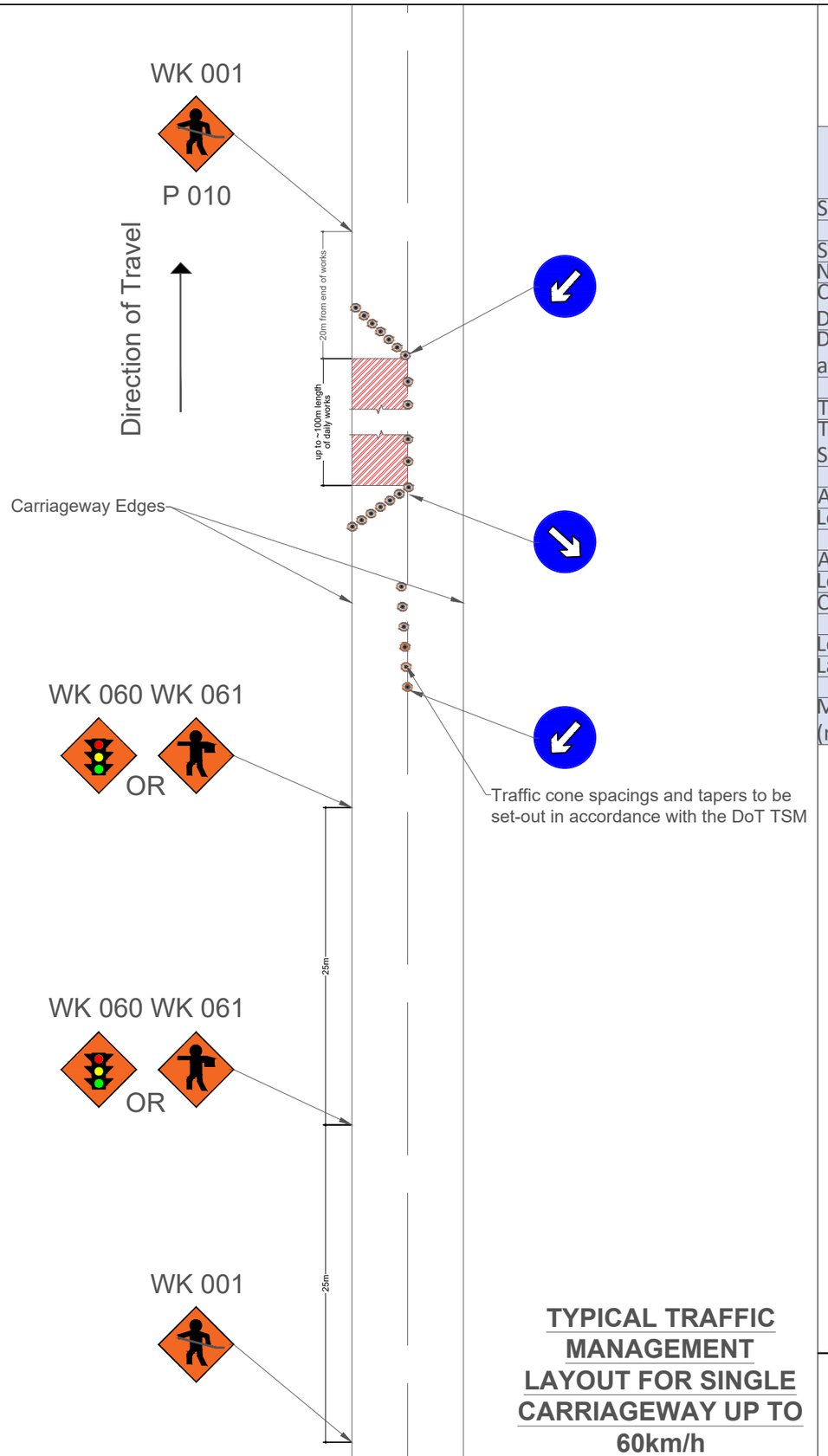

TYPICAL TRAFFIC MANAGEMENT LAYOUT FOR SINGLE CARRIAGEWAY UP TO 60km/h

Design Parameters	Roadworks Type A (Full-Time)	Roadworks Type B (Part-Time)	Roadworks Type C (Short Duration)
Speed Limit	**50 or 60km/h**		**50 or 60km/h**
Temporary Signs			
Sign Visibility (m)	**50**		**50**
Number of Signs	**3**		**2**
Cumulative Distance (m)	**75**		**50**
Distance between advance signs (m)	**25**		**25**
Minimum Rate of Taper			
Taper at Lane (m)	**1 in 15**		**1 in 5**
Taper at Hard Shoulder (m)	**1 in 10**		**1 in 5**
Maximum Lamp Spacing			
At Taper (m)	**6**		**6**
Longitudinal (m)	**12**		**12**
Maximum Cone Spacing			
At Tapers (m)	**3**		**3**
Longitudinal (m)	**6**		**6**
Cone Height (mm)	**750**		**750**
Safety Zone			
Longitudinal (m)	**25**		**5**
Lateral (m)	**0.5**		**0.5**
Minimum Lane Width			
Min Lane Width (m)	**3**		**3**

Notes:

1. Refer to Section 8.3.2 for definition of design parameters.
2. 45 degree taper is required at active temporary traffic controlled layouts with cones at 1m centres.
3. Cone spacing shown is the maximum permitted. Where geometry or any other site specific reason dictates the spacing shall be reduced accordingly.
4. The optimum lane width for all classes of vehicles is 3.25m. This may be reduced to a minimum of 3.0m. Below this, HGVs and buses must be marshalled past the works. The absolute minimum lane width, if only cars and light vehicles are present, is 2.5m. Refer to paragraphs 8.3.1.2 to 8.3.1.4 of the department of Transport Traffic Signs Manual.

EXTRACT FROM THE DoT TRAFFIC SIGNS MANUAL TABLE 8.3.2 FOR SINGLE CARRIAGEWAY UP TO 60km/h

Notes:

1. Works to be carried out in accordance with all relevant Local Authorities and contract requirements.
2. Sequence of works to be agreed on site.
3. Ideally a c.3m wide single lane traffic width (minimum 2.5m) to be maintained at all times with Traffic Management Operatives (TMO) to marshall larger HGVs when required.
4. All signs to be reflective.
5. Exact sign positions to be agreed on site.
6. Existing statutory signs are to be protected if the do not conflict with proposed signage, otherwise existing signs should be covered or temporarily relocated.
7. All traffic cones shall conform to BSN EN 13422:2004 and have a reflective sleeve.
8. Minimum height of cones to be 750mm.
9. Appropriate safety zones, lateral and longitudinal to be provided and maintained at all times.
10. Pedestrians are to be assisted by additional TMO's (Traffic Management Operatives) if required.
11. All accesses (pedestrian and vehicular) to be maintained at all times.
12. Temporary traffic signs, traffic delineators and road markings to be in accordance with 'The Traffic Signs Manual, Department of Transport November 2012' - Chapter 8.
13. Traffic Management illustrated for Planning Purposes Only and will be subject to detailed Individual Traffic Management Plans for each element of the project.
14. Sign number WK 060 (Temporary Traffic Signals) or WK 061 (Flagman Ahead) to be used as appropriate subject to agreement with the Local Authorities.
15. Advance warning signage to be provided in advance of and during the works to warn road users of upcoming and ongoing trenching works

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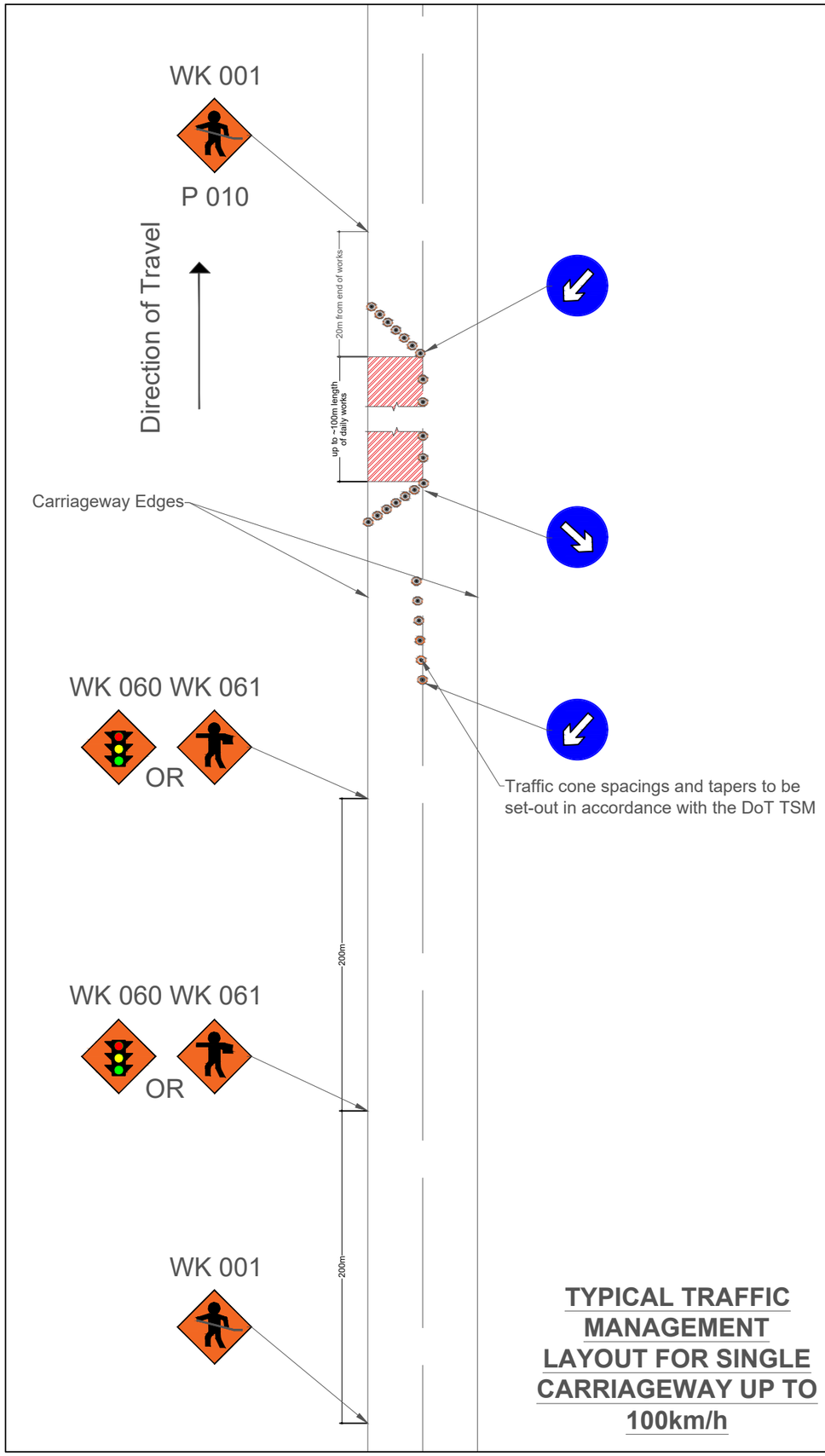
Ballymena Office: T:02825650413 E: info@neo-environmental.co.uk

Project: Ballyteige SID
Client: Renewable Energy Systems (RES) Ltd
Drawing: Traffic Management General Arrangement Up to 60km/h

Project No.: NEO01104
Drawing No.: NEO01020_018I_A Figure 6.4

Drawn	Checked	Approved
JM	MM	PN

Scale	Date	Status	Rev
NTS@A3	22/03/2023	PLAN	A



Traffic cone spacings and tapers to be set-out in accordance with the DoT TSM

TYPICAL TRAFFIC MANAGEMENT LAYOUT FOR SINGLE CARRIAGEWAY UP TO 100km/h

Design Parameters	Roadworks Type A (Full-Time)	Roadworks Type B (Part-Time)	Roadworks Type C (Short Duration)
Speed Limit	**80km/h or 100km/h**		**80km/h or 100km/h**
Temporary Signs			
Sign Visibility (m)	**120**		**120**
Number of Signs	**4**		**3**
Cumulative Distance (m)	**800**		**600**
Distance between advance signs (m)	**200**		**200**
Minimum Rate of Taper			
Taper at Lane (m)	**1 in 55**		**1 in 40**
Taper at Hard Shoulder (m)	**1 in 30**		**1 in 20**
Maximum Lamp Spacing			
At Taper (m)	**6**		**6**
Longitudinal (m)	**12**		**12**
Maximum Cone Spacing			
At Tapers (m)	**3**		**3**
Longitudinal (m)	**12**		**12**
Cone Height (mm)	**750**		**750**
Safety Zone			
Longitudinal (m)	**60**		**45**
Lateral (m)	**1.2**		**1.2**
Minimum Lane Width			
Min Lane Width (m)	**3**		**3**

Notes:

1. Refer to Section 8.3.2 for definition of design parameters.
2. 45 degree taper is required at active temporary traffic controlled layouts with cones at 1m centres.
3. Cone spacing shown is the maximum permitted. Where geometry or any other site specific reason dictates the spacing shall be reduced accordingly.
4. The optimum lane width for all classes of vehicles is 3.25m. This may be reduced to a minimum of 3.0m. Below this, HGVs and buses must be marshalled past the works. The absolute minimum lane width, if only cars and light vehicles are present, is 2.5m. Refer to paragraphs 8.3.1.2 to 8.3.1.4 of the department of Transport Traffic Signs Manual.

EXTRACT FROM THE DoT TRAFFIC SIGNS MANUAL TABLE 8.3.2 FOR SINGLE CARRIAGEWAY UP TO 100km/h

Notes:

1. Works to be carried out in accordance with all relevant Local Authorities and contract requirements.
2. Sequence of works to be agreed on site.
3. Ideally a c.3m wide single lane traffic width (minimum 2.5m) to be maintained at all times with Traffic Management Operatives (TMO) to marshall larger HGVs when required.
4. All signs to be reflective.
5. Exact sign positions to be agreed on site.
6. Existing statutory signs are to be protected if the do not conflict with proposed signage, otherwise existing signs should be covered or temporarily relocated.
7. All traffic cones shall conform to BSN EN 13422:2004 and have a reflective sleeve.
8. Minimum height of cones to be 750mm.
9. Appropriate safety zones, lateral and longitudinal to be provided and maintained at all times.
10. Pedestrians are to be assisted by additional TMO's (Traffic Management Operatives) if required.
11. All accesses (pedestrian and vehicular) to be maintained at all times.
12. Temporary traffic signs, traffic delineators and road markings to be in accordance with 'The Traffic Signs Manual, Department of Transport November 2012' - Chapter 8.
13. Traffic Management illustrated for Planning Purposes Only and will be subject to detailed Individual Traffic Management Plans for each element of the project.
14. Sign number WK 060 (Temporary Traffic Signals) or WK 061 (Flagman Ahead) to be used as appropriate subject to agreement with the Local Authorities.
15. Advance warning signage to be provided in advance of and during the works to warn road users of upcoming and ongoing trenching works

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Ballymena Office: T:02825650413 E: info@neo-environmental.co.uk

Project: Ballyteige SID
Client: Renewable Energy Systems (RES) Ltd
Drawing: Traffic Management General Arrangement Up to 100km/h
Project No.: NEO01104
Drawing No.: NEO01020_019I_A Figure 6.5

Drawn	Checked	Approved
JM	MM	PN

Scale	Date	Status	Rev
NTS@A3	22/03/2023	PLAN	A

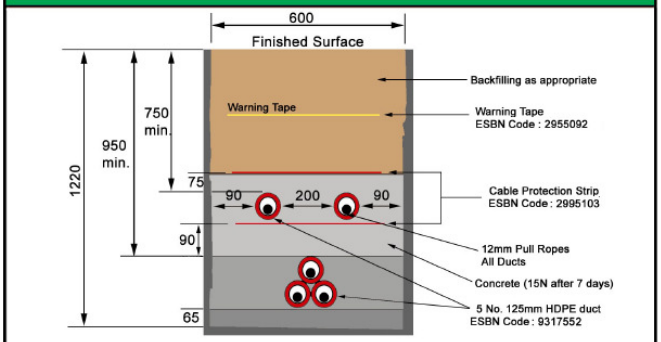
Standard Specification for ESB 110kV Networks Ducting/Cabling (Minimum Standards)

Note 1 : ESB Networks reserves the right not to accept ducting which does not conform to these standards and dimensions
Note 2 : Refer to ESB Networks for Specific job Specification. These instructions do not apply to LV/MV/38kV/220kV cable
Note 3 : All materials (ducts, marker tapes/strips, duct surrounds, mandrels and brushes) must be ESB approved materials

ESB Networks
Rev 0: Date 09-10
Approved:

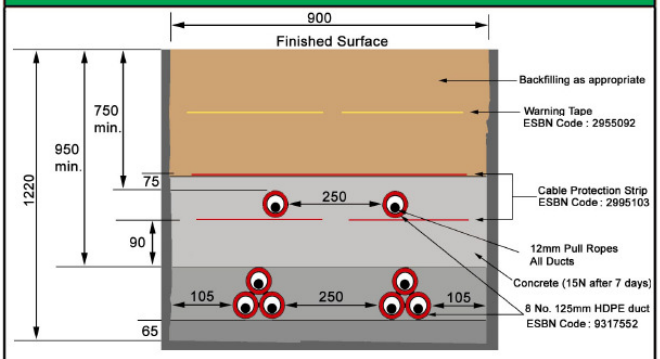
Document No:DTIS-230908-BUV

1A 110kV Single Circuit Standard Trench Cross-Section

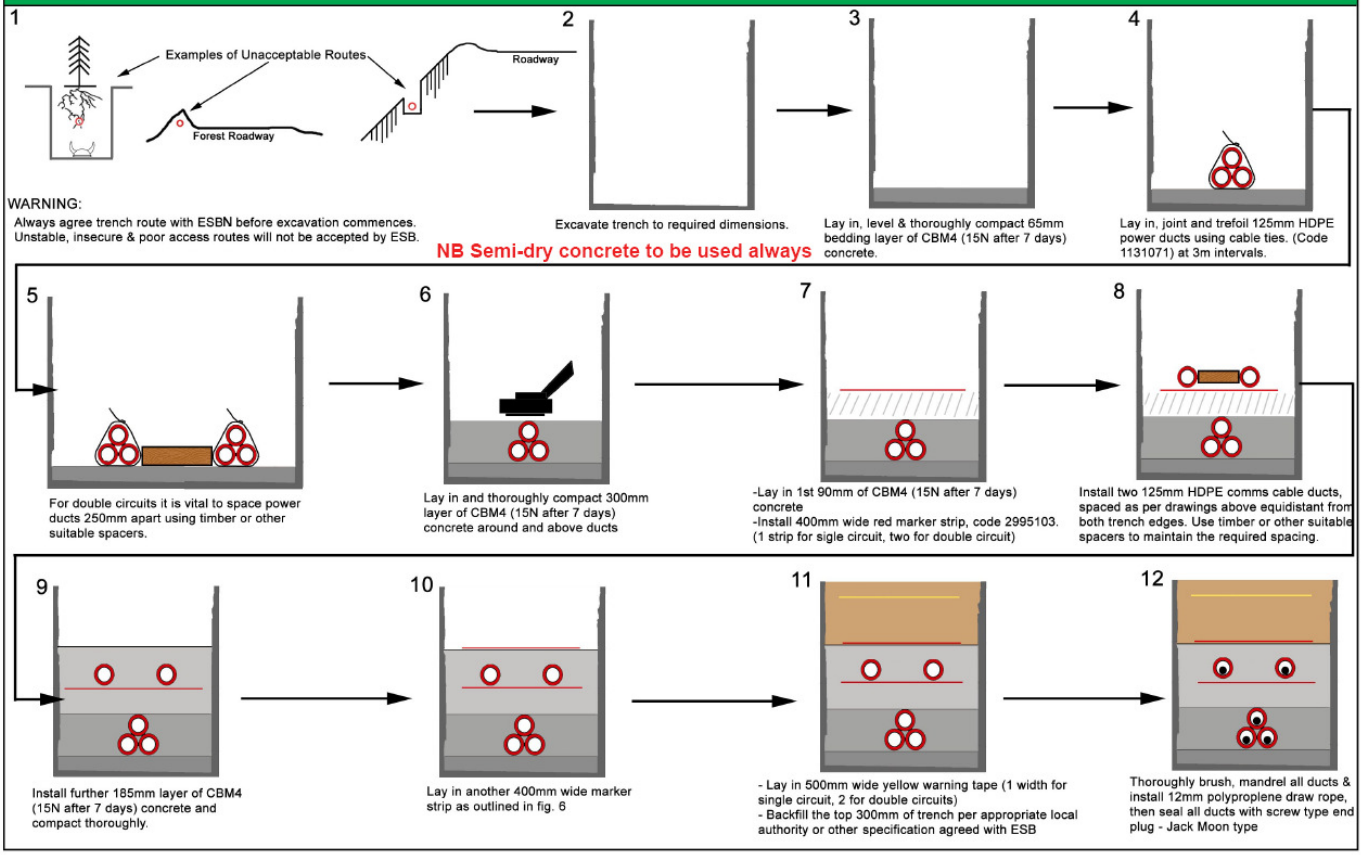


Note : Only 1ESBN comms duct maybe required if ESBN specify
Note : Maximum duct depth ≤ 1.5m to top of trefoil group

1B 110kV Double Circuit Standard Trench Cross-Section



1C Trench Installation Sequence



WARNING:
Always agree trench route with ESBN before excavation commences.
Unstable, insecure & poor access routes will not be accepted by ESB.

Excavate trench to required dimensions.

NB Semi-dry concrete to be used always

Lay in, level & thoroughly compact 65mm bedding layer of CBM4 (15N after 7 days) concrete.

Lay in, joint and trefoil 125mm HDPE power ducts using cable ties. (Code 1131071) at 3m intervals.

For double circuits it is vital to space power ducts 250mm apart using timber or other suitable spacers.

Lay in and thoroughly compact 300mm layer of CBM4 (15N after 7 days) concrete around and above ducts

-Lay in 1st 90mm of CBM4 (15N after 7 days) concrete
-Install 400mm wide red marker strip, code 2995103. (1 strip for sigle circuit, two for double circuit)

Install two 125mm HDPE comms cable ducts, spaced as per drawings above equidistant from both trench edges. Use timber or other suitable spacers to maintain the required spacing.

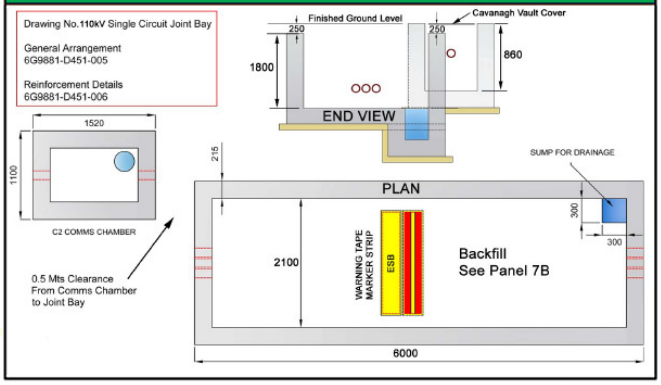
Install further 185mm layer of CBM4 (15N after 7 days) concrete and compact thoroughly.

Lay in another 400mm wide marker strip as outlined in fig. 6

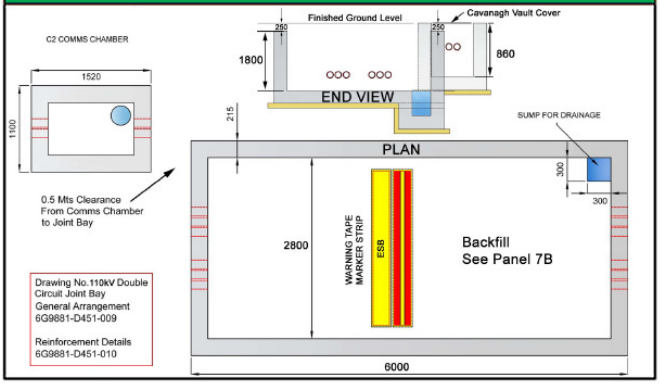
- Lay in 500mm wide yellow warning tape (1 width for single circuit, 2 for double circuits)
- Backfill the top 300mm of trench per appropriate local authority or other specification agreed with ESB

Thoroughly brush, mandrel all ducts & install 12mm polyproplene draw rope, then seal all ducts with screw type end plug - Jack Moon type

2A 110kV Single Circuit Joint Bay



2B 110kV Double Circuit Joint Bay

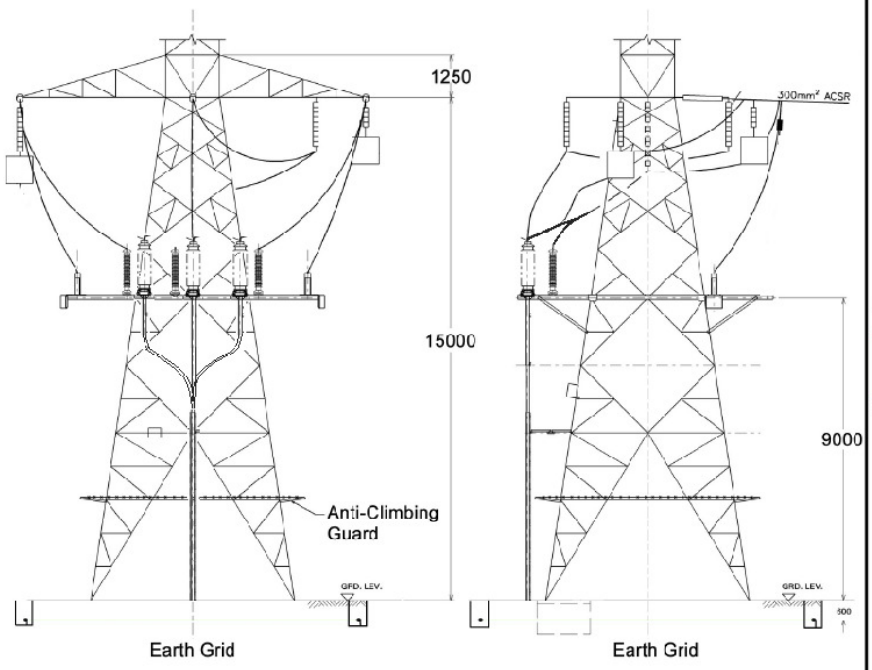


Standard Specification for ESB 110kV Networks Ducting/Cabling (Minimum Standards)

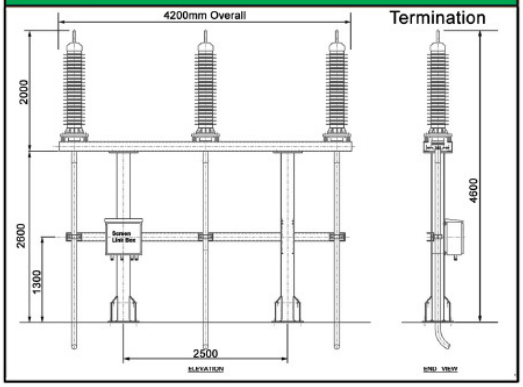
Note 1 : ESB Networks reserves the right not to accept ducting which does not conform to these standards and dimensions
Note 2 : Refer to ESB Networks for Specific job Specification. These instructions do not apply to LV/MV/38kV/220kV cable
Note 3 : All materials (ducts, marker tapes/strips, duct surrounds, mandrels and brushes) must be ESB approved materials

ESB Networks
Rev 0: Date 09-10
Approved:

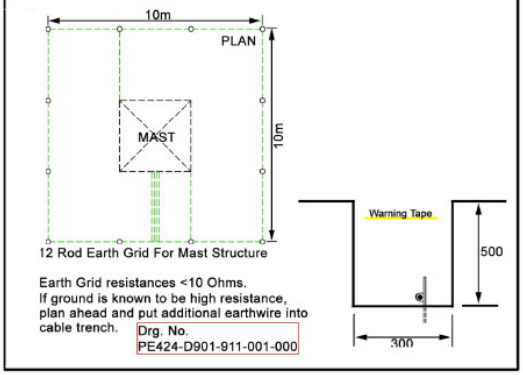
3A 110kV Cable End Mast Termination



3B Typical 110kV Termiantion Arrangement for Substations



3C Earth Grids

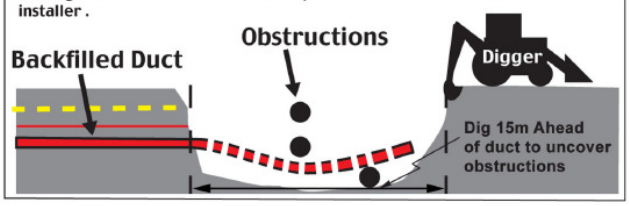


Earth Grid resistances <10 Ohms.
If ground is known to be high resistance, plan ahead and put additional earthwire into cable trench.

Drg. No.
PE424-D901-911-001-000

4A Obligation of Duct Installer to Minimise the Number and Severity of Duct Bends

The duct installer must minimise the number and severity of preformed bends in ground with obstructions and other utility service crossings by opening ground 15m ahead of backfilled duct, wherever practical to do so. This safety obligation, which may require use of steel plating, allows the duct installer to pick the least bendy duct route through utility crossings and obstructions . Otherwise, numerous sharp unrecorded duct route deviations will be present making cable installation considerably more difficult and less safe for the cable installer .

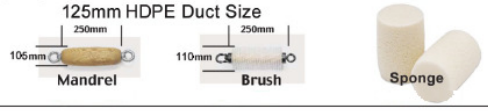


4B Standard for Brushing, Mandrelling, Roping and End-Capping of 110kV Ducts

All Ducts must be:
- Thoroughly brushed and mandrelled to prove ducts against debris /excessive deflection
- Roped using 12mm polyproplene rope with certified safe breaking load of 1.5 tons -- all rope joints to be properly spliced and PVC taped over. Approved Supplier Silver Strand Bunclana Donegal, ph (074) 9382503 - 500m drum lengths available to minimise splicing/coil handling
- Sealed using endcaps against grit and water getting into them
  NB: Replace mandrels once mandrel wear indicators or grooves are worn down
  Replace brushes once brush diameter falls 5mm below dimensions in table below
- Approved endcaps, both disposable and reusable types, are available from suppliers of approved ESBN ducting
- Approved ESBN Mandrel and brush suppliers :

Brandon Agencies, Rathnew, Co Wicklow: Phone 0404 20500 (Brushes & Mandrels)
IS Varian, Greenhills Industrial Estate, Walkinstown, Dublin 12 Phone: 01-4501150 (Brushes Only)
Clydesdale UK Phone 0044 1234 855 855 (Brushes & Mandrels)
Tynagh Network Systems, Loughrea, Co Galway. Phone: 091 842206 (Brushes & Mandrels)

125mm HDPE Duct Size

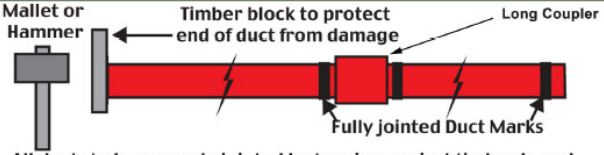


4C Approved ESBN ducting for 110kV cables

- Use only solid wall high impact resistance ESBN approved HDPE red ducting to IS 370colour standard and ESBN specification 16113 (7.1mm minimum wall thickness) Discoloured or unidentified ducting not acceptable. All duct material must be approved by ESB Networks.
- Lightweight flexible corrugated twinwall ducting is not acceptable to ESBN irrespective of manufacturer

- Current approved HDPE Duct and duct bend manufacturers are:
  Lynplast (bend fittings only), Uponor-Radius Systems, Wavin, Quality Plastics, Emtelle

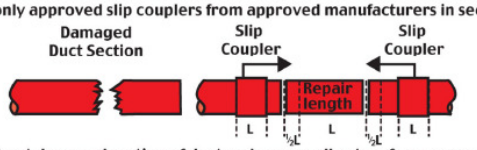
4D Specification for Duct Jointing for 110kV Cables



All ducts to be securely jointed by tapping against timber board on each duct until the black depth insertion mark is reached
Always smear duct lubricant on coupler rubber ring

4E Repair of Existing Ducts

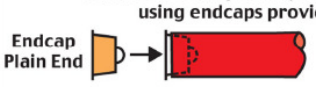
Use only approved slip couplers from approved manufacturers in section 4C



- **Cut out damaged section of duct and ensure all cut surfaces are square and free from sharp edges**
- **Slide, position and centre the repair couplers on the centering marks**

4F Sealing of Ducts

All ducts to be permanently sealed at both ends of duct run
Ducts to be temporarily sealed during installation using endcaps provided with each bale



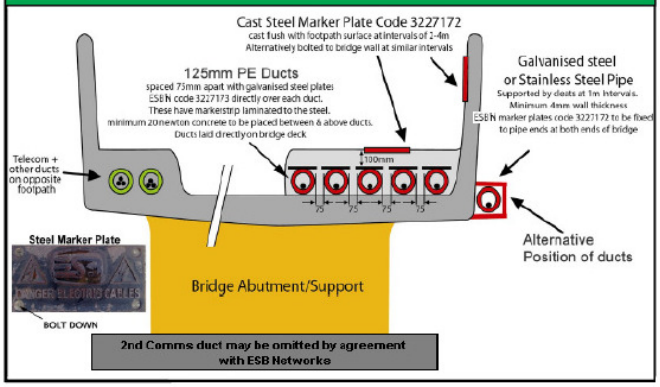
ESBN Code 125mm: 9317583

Standard Specification for ESB 110kV Networks Ducting/Cabling (Minimum Standards)

Note 1 : ESB Networks reserves the right not to accept ducting which does not conform to these standards and dimensions
Note 2 : Refer to ESB Networks for Specific job Specification. These instructions do not apply to LV/MV/38kV/220kV cable
Note 3 : All materials (ducts, marker tapes/strips, duct surrounds, mandrels and brushes) must be ESB approved materials

ESB Networks
Rev 0: Date 09-10
Approved:

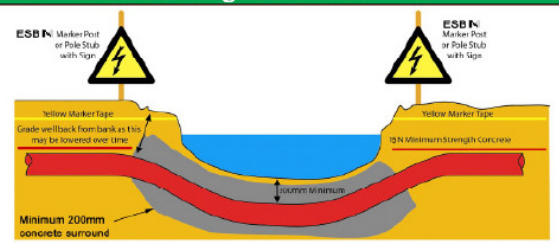
5A Bridge Crossings: Restricted Footpath Designs



5B Bridge Crossings: Restricted Footpath Designs

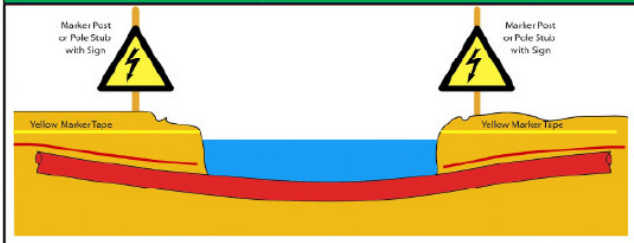
1. The design must be agreed with the bridge authority. Position in footpath is preferred.
2. Minimum cover over ducts on footpath 100mm.
3. **Where duct cover is >600mm, marker strip 75mm above ducts and marker tape (300mm below surface) + steel surface markers suffice**
4. Red ducting is not suitable for cable run external to bridges.
5. Where possible galvanised steel/stainless steel piping should be used, all joints must be free of weld burrs on inside. Alternatively heavy duty 10mm wall thickness black HDPE material with cast steel marker plates attached must be used to permanently warn of presence of electric cable.

6A River/Stream Crossings: Standard Where Burial/Drilling IS Possible



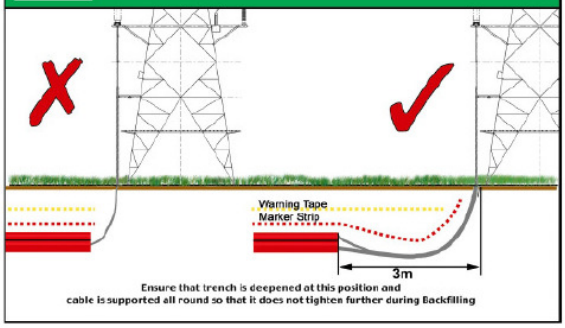
1. Depth of burial below bottom of river or stream to be agreed with relevant authority (if applicable)
2. If normal red ducting is installed by trenching, it must be encased in CBM4 (15N after 7 days) concrete to prevent uplift and to provide mechanical protection. Seal any joints to prevent concrete entering duct.
3. If drilled crossing is practical, use heavy red wall coiled HDPE duct (**sections 2.2 & 2.9 in MV/LV manual**)
4. Install an ESBN marker post on both sides of the crossing - ESBN code 8327355 or use stub pole minimum 2.0m above ground level & warning sign 8238339.
5. Where circumstances require it a large steel pipe can be installed into which a number of standard ESBN duct sizes are pulled in (**see section 2.9.4 of MV/LV manual for guidance**)
6. If crossing a tidal section of a river or stream a foreshore licence will be required

6B River/Stream Crossings: Standard Where Burial/Drilling IS NOT Possible



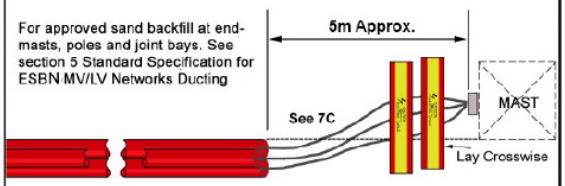
1. Installation on base of river or stream to be agreed with relevant authority (if applicable)
2. Heavy wall steel pipe to be used free of weld beads/swarf. Minimum 8mm steel wall thickness to be used. Encase in CBM4 (15N after 7 days) concrete for corrosion protection, minimum 100mm surround
3. Install an ESBN marker post on both sides of the crossing. ESBN code 8327355 or use stub pole minimum 2.0m above ground level & warning sign 8238339.
4. Ensure a smooth connection using rubber coupler between crossing pipe size and ESBN standard duct as the steel pipe size will usually differ from the standard ESBN ducting. Alternatively run ESBN ducting right through the steel pipe
5. If crossing a tidal section of a river or stream a foreshore licence will be required

7A Cable End Mast Position



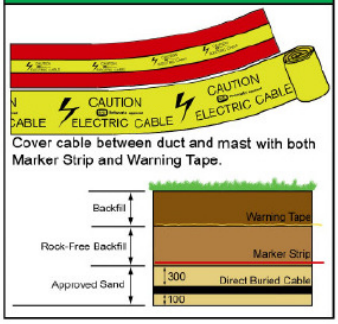
Ensure that trench is deepened at this position and cable is supported all round so that it does not tighten further during Backfilling

7B Cable End Mast Position



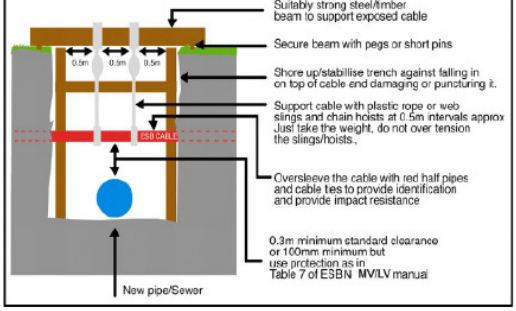
Offset trefoil to line up with edge of mast for ease of cable pulling.
Never install ducting right up to mast with long radius bend attached.
Both marker strip and warning tape to be used between duct and mast (laying the marker strip crosswise as shown above).

7C Cable End Mast - Marker Strip/Tape

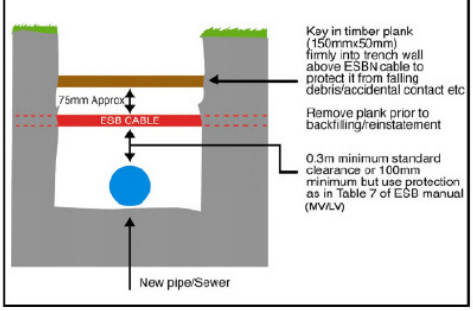


Cover cable between duct and mast with both Marker Strip and Warning Tape.

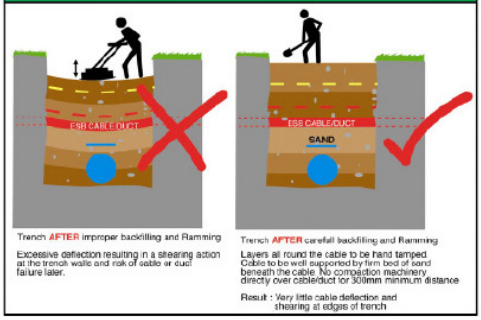
8A Supporting ESBN Cables/Ducts During Trenching Works



8B Supporting ESBN Cables/Ducts During Trenching Works



9 Avoidance of Cable Damage Due to Improper Backfilling at Cable Crossings



Trench **AFTER** improper backfilling and Ramming

Excessive deflection resulting in a shearing action at the trench walls and risk of cable or duct failure later.

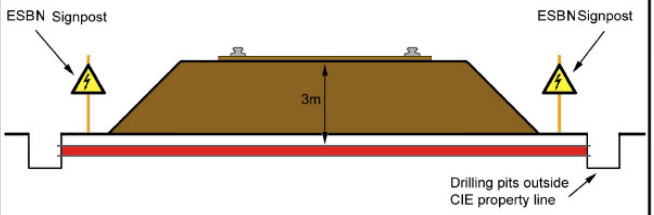
Trench **AFTER** carefull backfilling and Ramming

Layers all round the cable to be hand tamped. Cable to be well supported by firm bed of sand beneath the cable. No compaction machinery directly over cable/duct for 300mm minimum distance

Result : Very little cable deflection and shearing at edges of trench

Standard Specification for ESB 110kV Networks Ducting/Cabling

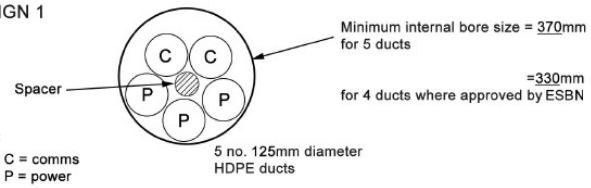
10A 110kV Railway Crossing Details



Formal licence for crossing and approval required from Iarnrod Eireann
Accurately record crossing location & erect marker posts.

10B TypicalDirectional Drill/Thrust Bore Duct Bore Details

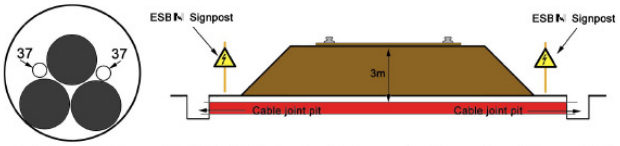
DESIGN 1



Alternatively use 2 x 37mm HDPE ducts for comms cables with C2 chamber on each side of the crossing to permit pulling along entire route. (See 10C)
All interstitial space to be bentonited thoroughly to maintain cable rating.
Accurately record crossing location & erect marker posts.

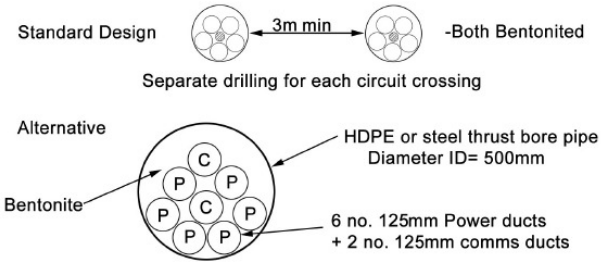
10C Typical Directional Drill/Thrust Bore Duct Bore Details

ALTERNATIVE DESIGN



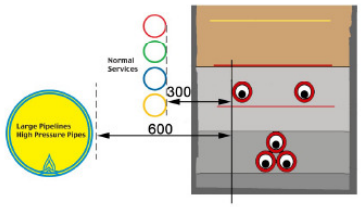
Install 1 no. 300mm ID SDR 17.6 duct with 3 no. short length cables pulled into this pipe along with 2 x 37mm comms ducts.
Full cable joint bays are required on either side of crossing along with C2 chambers for this design .
This method is used where it is not not practical to install large diameter pipe -eg. risk of ground upheaval or presence of obstructions.
All interstitial space to be thoroughly bentonited to maintain cable rating.
Accurately record crossing location & erect marker posts.

10D Typical Double Circuit Bore Crossing



All crossings to be accurately recorded and signposts erected given impracticality of marker tape.

11 Minimum Standard Clearances to Other Services

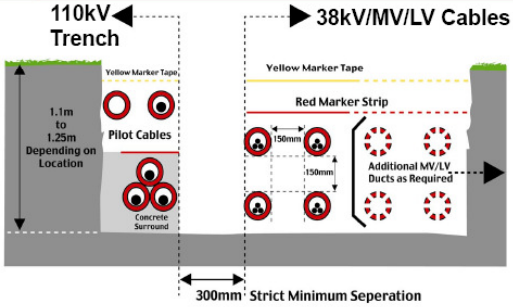


Clearances less than the above at pinch points and crossings requires placement of additional mechanical protection (concrete slab/brick) and agreement of ESBN

ESBN ducts must never be laid over other services on parallel runs, except with the written prior agreement of the other utilities and ESBN

Other services must never be laid directly over ESBN ducts on parallel runs

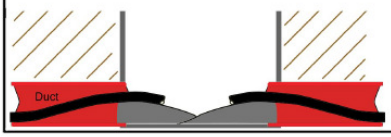
12 Combined 110kV & 38kV Cable Runs



NB. Where it is necessary to employ this formation, the seperation distance of 300mm should be strictly controlled and monitored to minimise derating (see MV/LV manual page 180)
Detailed calculations and design to be agreed between ESBN / ESBI

13 Sealing and Protection of 110kV Cables Once they Exit Ducts

Ducts to be thoroughly sealed using ESBN tyco approved water sealant and 4hr fire rating approved for firestop.
NB - All joint bay entries to be thoroughly sealed to prevent sand washout and subsidence.

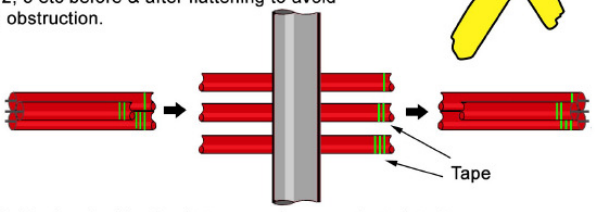


Sandbags or other durable support for cable as it exits ducts to prevent damage to cable sheath

14 Duct Crossovers Are Not Allowed

Be especially careful when going from flat to trefoil formation in vicinity of services

Eliminate this possibility by marking ducts 1, 2, 3 etc before & after flattening to avoid an obstruction.



NB. If using double circuit, tape mark power ducts 1 to 6

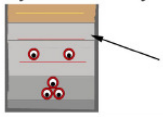
15 Crossing Dumps/Contaminated Ground

Thoroughly seal all joints with adhesive water-tight duct jointing compound and pressure test for airtightness.
Gasketed couplers alone are inadequate.

Fusion welded couplers are also acceptable but require red over-taping.

NB. Avoid whenever possible due to: Subsidence, methane gas & severe thermal derating risks.
Seek advice from ug networks section to ensure rating of cable is adequate (derating of 50% can occur)
NB. Waste oils and chemicals can also seriously damage cables

Seal all duct joints with duct adhesive compound or use continuous duct lengths & seal all duct ends in joint bays. Alternatively weld pipes.



Concrete is continued up to 300mm of final surface to offset derating (CBM4 - 15N after 7 days)

SAFE SYSTEM OF WORK PLAN (SSWP)

HEALTH AND SAFETY AUTHORITY

WORKING ON ROADS

Plan No. ☐

PART 1

Job Details	Resources Required	Emergency Details
Employer Name: _____	Worker Skills: _____	**Contact Names & Tel No.**
Responsible Person/Supervisor: _____	_____	1. _____
Number of Workers: _____	_____	2. _____
Specific Location: _____	_____	3. _____
Description of Works: _____	Plant/Equipment: _____	First Aider: _____
_____	_____	_____
_____	_____	Location of First Aid Box:
_____	_____	_____
Start Date: _____	Hazardous Materials: _____	**WORK PERMITS REQUIRED**
NOTE: A new SSWP must be completed when the task or the environment changes.	_____	Hot ☐ Electricity ☐ Excavation ☐
	_____	Confined Space ☐ Other ☐
		Method Statement Yes ☐ No ☐

Before Works Starts the following MUST be in place Tick the ✓ circle when confirmed

PART 2

SELECT HAZARD OR ACTIVITY | **SELECT CONTROL** — **All controls identified below must be in place before work starts**

Tick the ☑ box to identify controls required; Tick the ✓ circle when control is in place.

LA1

PART 2

HAZARD OR ACTIVITY	CONTROL — Tick the ☑ box to identify controls required; Tick the ✓ circle when control is in place.									
Excavation	Batter Back	Trench Box	Sheet Piling	Shoring	Environment Risk Assess	Back Fill	Spoil Back	Chock	No Undermining	Ladder/ Access/Egress
	Exclusion Zone	Barriers	Covers	Pumping	Safe Stacking	Propping	Lighting	Examination & Inspection	Weather	Warning Signs
Falls and Falling Objects	Risk Assess	Scaffolding	Working Platform	Trestle Platform	Edge Protection	MEWP	Safe Ladder	Tie Ladder	Open Holes	Propping
Sewers/Culverts/ Mains/Services	Service Supplier	Divert / Off	Survey Map	Detect & Mark	Permit to Work	Hand Dig	Over Head Lines	Barriers	No Flames	Gas Bottle Storage
Working Close to Water	Edge Protection	Working Platform	Safety Line/Grab Line	Personal Floatation Device	Life Ring	Boat	Fall Arrest & Rescue	Diving	Coffer Dam	Platform & Crane
Substances	Storage/Labels	Safety Data Sheet	Hand Wash	No Eating	Biological Agents	Survey/Risk Assess	Permit to Work	Litter Picker	Cover Cuts	Wash Hands
Asbestos Cement Water Pipes	Identity/Survey	Risk Assess	Procedure	Dust/Wetting	Waste Removal	Examination & Inspection	Confined Space	Risk Assess	Survey	Permit to Work
Other Items	Housekeeping	Lighting	Ground Conditions	Degassing/Purging	Street Structures/ Drawings	Fire Control/Assembly	Emergency Procedures	Detect/Monitor	Tripod	Communication
Health	Assess Health Effects	Health Surveillance	Manual Handling	Risk Assess	Mechanical Aids	Work Organisation	Training	Identify	Other	Other
PPE	Safety Helmet	Safety Boot/Hi-Vis	Eye Protection	Safety Gloves	Ear Protection	Dust Mask	Respiratory Equipment	Face Protection	Safety Harness	Other

PART 3

Hazards, activities and controls on this SSWP identified by: _____ **Date:** _____ **Time:** _____

Controls put in place by: _____ **Date:** _____ **Time:** _____

I have been made aware of the hazards & controls for this activity. **Signed by Team:**

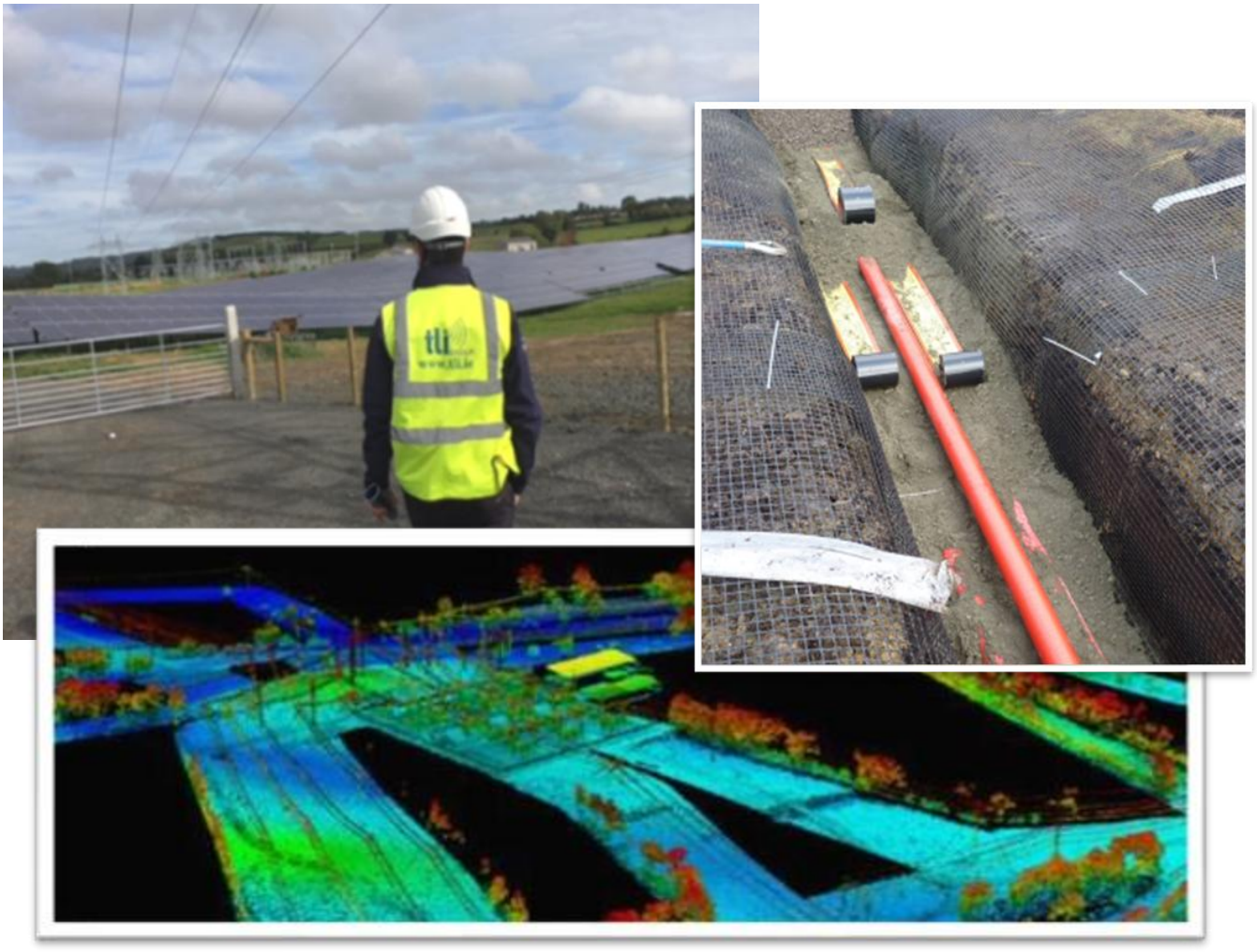
NOTE: **This list of Hazards and Controls is not exhaustive and is in no particular order.**

IF IT'S NOT SAFE DON'T DO IT AND INFORM SITE MANAGEMENT

Outline Construction Methodology

Colehill 110kV Substation

Grid Connection



Report Ref: 051064-R01-08

Clients: Renewable Energy System Limited

Revision:	Designer:	Checked:	Date:	Notes:
01	LR	DB	08.10.24	Issued for Information
02	LR	GC	23.10.24	Issued of information
03	LR	GC	01.11.24	Issued of information
04	LR	GC	30.07.25	Issued for Planning
05	LR	DB	19.09.25	Updated the number of joint bays
06	LR	DB	30.09.25	Issued for Planning
07	DBro	JC	23.10.2025	Issued for Planning
07	DBro	RG	11.11.2025	Final Issue for Planning

Table of Contents

Table of Figures

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 Future Colehill 110kV tail fed substation and Future 110kV underground grid connection to the existing ESB owned Thornsberry 110kV substation.

The future 110kV Tail Fed substation and future 110kV grid connection will be subject to a Strategic Infrastructure Development (SID) application to An Coimisiún Pleanála in accordance with section 182A of the Planning and Development Act 2000.

The future 110kV grid connection will originate from Thornsberry 110kV Substation and the 110kV grid connection route will consist entirely of underground cable. The underground high voltage (HV) ducting route will be installed in public roads and solar farmlands. The 110kV grid connection will require a single circuit 110kV UGC travelling from Thornsberry 110kV Substation to the proposed Colehill Solar Farm Substation.

Each trench will consist of the installation of 3 No. Power ducts in an excavated trench, 1 No. fibre communications cable to allow communications between Colehill Solar Farm 110kV Substation and Thornsberry 110kV substation, 1 No. spare communications duct and 1 No. earth continuity conductor duct.

This document is intended to be used as an aid to understand the methodologies to be employed during construction and should be read in conjunction with all other specialist reports which accompany the Planning Application. In addition, this document will be revised and updated prior to the commencement of any construction activities, detailed method statements will be prepared in respect of each aspect of the proposed development.

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

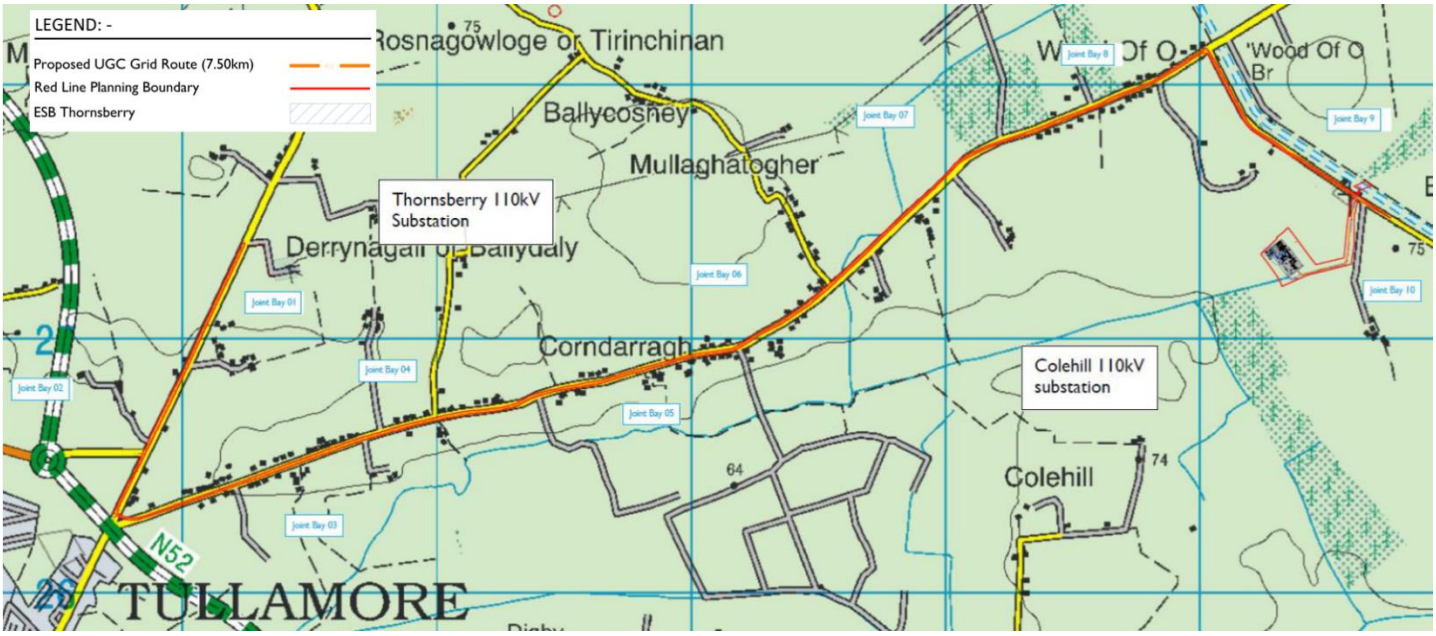


Figure 1 - Grid Connection Route Layout

2.0 Future Colehill Solar Farm 110kV Substation

Colehill Solar Farm 110kV Substation will connect via underground cable (UGC) circuits to accommodate a grid connection from Thornsberry 110kV Substation and will be subject to this application to An Coimisiún Pleanála. The future 110kV substation will be designed and constructed to meet all required EirGrid standards. An area will be levelled and built to the required level with stone filling material, capped by high-quality compacted stone. One building will be constructed using traditional techniques for small buildings (i.e. concrete block walls, timber and slate tile roof). Foundations will be built for all proposed electrical infrastructure. All electrical equipment will be installed to meet EirGrid requirements. Perimeter fencing will be constructed around the substation compound for security and safety purposes.

On the Independent Power Producer (IPP) side, the control room and switch room will consist of modular structures installed on a raised platform to facilitate cable routing. These units will be coupled to form two main buildings, each comprising one control room and two switch rooms. Furthermore, the design includes provisions for two harmonic filters and two capacitor banks to enhance power quality, the installation of these components will depend on the results of electrical studies carried out during the design stage and will only be implemented if necessary. The IPP compound will also include two 33kV/110kV transformers to step up the voltage and connect to a dedicated bay within the future substation. Supporting infrastructure such as toilet facilities, access roads, and crane standing areas have been incorporated. As Figure 2 shows.

Construction will include foundations, blockwork, roofing, low-voltage electrical fit-out, cladding, and building finishes. The transformers, gantry, and structural steelwork will be installed in the transformer compound. Structural steelwork and lightning masts will be erected in the busbar compound. Electrical equipment will be installed once the control building and compounds are complete. Fencing will be provided for security, and permanent access roads will serve the substation compound.

The expected duration of work is expected to be approximately 12 months.

The following section outlines the methodology to be followed during construction works of the new Colehill Solar Farm 110kV substation.

1. The substation compound and drainage will be marked out by a qualified engineer.
2. A drainage system will be excavated and installed around the compound area.
3. 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.
4. A layer of geotextile material will be laid over the footprint of the compound.
5. 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.
6. Each layer will be compacted using a vibrating roller.
7. Earthing cable will be laid underground around the substation for connection to the various electrical components during the electrical fit out phase.
8. Permanent access roads will be constructed to allow site vehicular activity in and out of construction area.
9. Adequate lighting will be installed around the compound on the lighting masts within the compound.
10. 110kV cable sealing ends and associated accessories will be required to link the 110kV grid connection into the substation. The support structures will be located outdoors.

11. Transformers will be installed in bunded enclosures within the substation compound.

The electrical installation is expected to take 30 weeks and includes the following:

- Delivery and installation of 2 No 33/110kV transformer. 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.

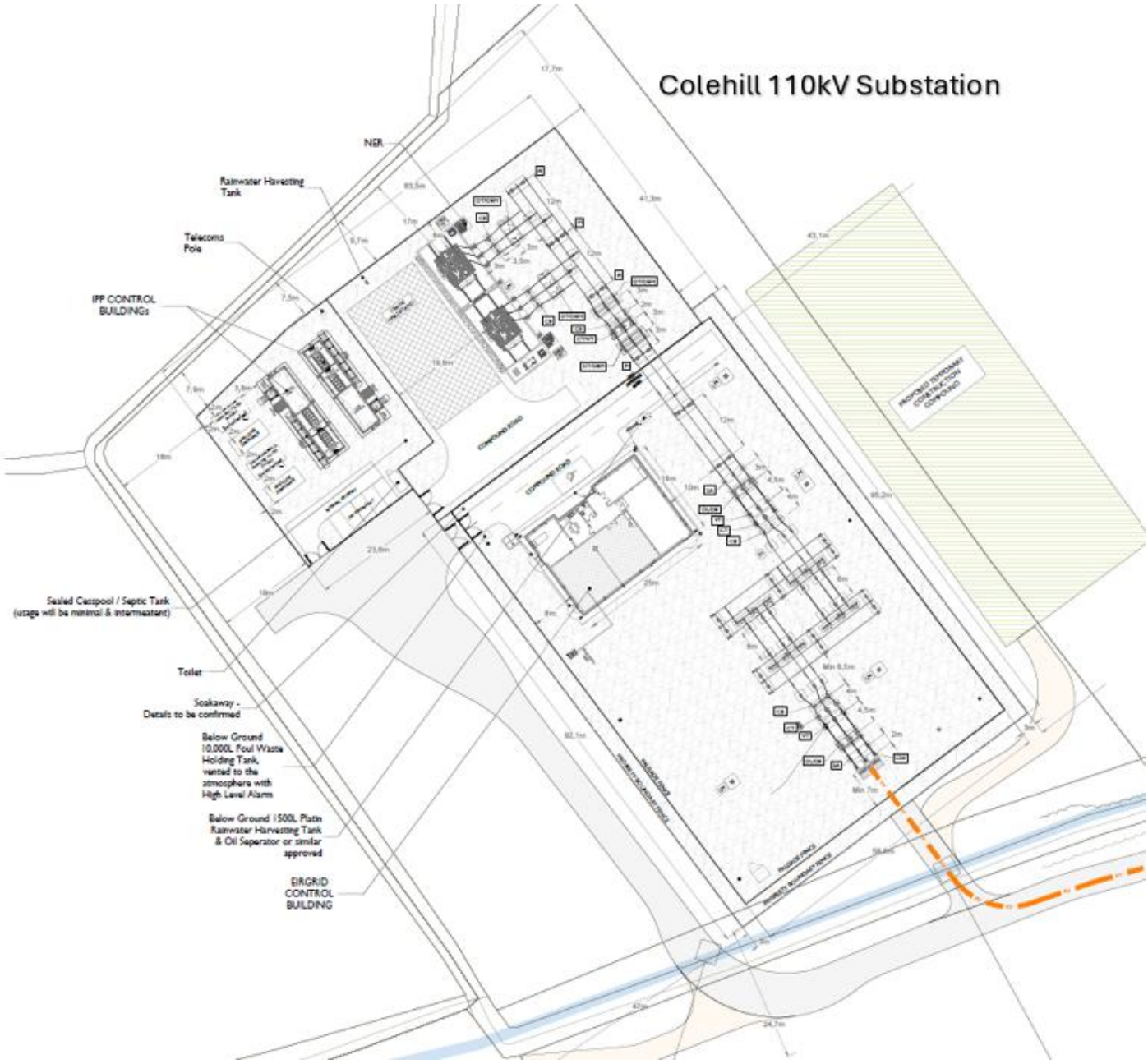


Figure 2 - Future Colehill Solar Farm 110kV Substation Layout Plan

3.0 Grid Connection Route

The proposed route is approximately 7.50km in length and carries predominantly in an easterly direction from the existing ESB Thornsberry 110kV substation to the proposed Colehill 110kV Substation. The proposed route is located within the carriageway of regional and local roads and access tracks on approach to the Colehill Substation.

In advance of any work commencing on the Grid Connection, there will be a rigorous design process, which will require obtaining site investigation surveys and liaison with the local authorities' roads department and ESBN/EirGrid to ensure the least disturbance during construction, described in Section 4.0. This process will inform how best to construct the grid connection route for the appointed contractor, identifying the final location of the grid cable and joint bays which will be subject to micrositing. These works will all be contained within the application boundary and confines of the assessment within this planning application.

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

Table 1 – Approximate Route Location of Preliminary Design:	
Public Roads (UGC)	**Private road/land (UGC)**
6800m	700m

Table 1: Ballyteige Solar Farm to Thornsberry 110kV Substation – UG Cable Location Summary

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

Table 2 - Summary of Grid Connection Route	
Section	**Description**
UGC Section – Road L-1024	**Thornsberry 110 kV substation → section of regional road (L-1025)** The proposed underground cable route initiates at the bellmouth entrance to Thornsberry 110kV substation. The Grid route will carry in a south westerly direction initially, within the L-1024, before approaching and converging onto the L-1025 respectively, Chainage - 1150m. ***Features*** **Section 1 contains 2 Nr. Joint Bays** located below ground and finished/reinstated to the required roads specification • Joint Bay 01 (JB01) will be located in the proximity of Thornsberry 110kV Substation bell mouth entrance, Chainage – 0m. Joint Bay 01 has been strategically located to serve as a potential demarcation point between contestable and non-contestable works. The necessity for its construction and use is subject to the final connection agreement with ESB/EirGrid • Joint Bay 02 (JB02) will be located approx. 850m south of Thornsberry 110kV Substation entrance, Chainage – 850m.

Table 2 - Summary of Grid Connection Route	
Section	**Description**
UGC Section	**Junction with Road L-1025 → Junction with Wood of O road** The route continues east along the L-1025 within the road curtilage. Existing services have been identified from data collection, with ESB Network, Uisce Eireann and telecom services found to be evident. At approximately 4180m chainage the Corndarragh Stream box culvert must be crossed by the grid connection cable. If the cables are installed atop the culvert structure the minimum cover required to the cables (450mm) may not be achievable. In this case a potential HDD will be used to drill safely beneath the stream/culvert with minimum disturbance to the local environment. The final design of the grid connection cable in this location will be subject to a full site investigation of the culvert, river and available cover. A full description of potential HDD works in this area is provided in Section 6.0 A detailed survey of services has been conducted to evaluate different crossing alternatives for each culvert. The various strategies for each culvert are described in Section 7.0. Several overhead telecoms and ESB OHL services have been identified along the route. Coordination with the providers will be sought in advance of the construction stage. Finally, the route continues in an easterly trajectory, along the L-1025, up to Chainage 5950m. At this point, the grid connection route turns south onto the Wood of O, ***Features*** **Section 2 contains 6 Nr. Joint Bays** located below ground and finished/reinstated to the required roads specification • Joint Bay 03 (JB03) will be located within the local road curtilage (L-1025), Chainage – 1680m • Joint Bay 04(JB04) will be located within the local road curtilage (L-1025), Chainage – 2520m • Joint Bay 05(JB05) will be located within the local road curtilage (L-1025), Chainage – 3290m • Joint Bay 06(JB06) will be located within the local road curtilage (L-1025), Chainage – 4080m • Joint Bay 07(JB07) will be located within the local road curtilage (L-1025), Chainage – 4850m • Joint Bay 08(JB08) will be located within the local road curtilage (L-1025), Chainage – 5650m ***Main Points of Interest:*** • Existing 38kV underground line passing through Road L-1025 to be crossed under), Chainage – 1700m • 1 Nr potential HDD Crossing of the Corndarragh Stream • 2 Nr. Culvert under crossings

Table 2 - Summary of Grid Connection Route	
Section	**Description**
UGC Section Woof of O road & Solar farm access	**Wood of O road → Ballyteige Solar Farm** The route continues south within the Wood of O roadway for a further 0.850km, to approach the current arable farm entrance, which will be the main entrance for Ballyteige Solar Farm. ***Features*** **Section 3 contains 2 Nr. Joint Bays** located below ground and finished/reinstated to the required roads specification • Joint Bay 09 (JB09) will be located within the local road curtilage, Chainage – 6400m • Joint Bay 10 (JB10) will be located within the access track to the Solar farm site, Chainage – 7150m ***Point of Interest:*** • 2 Nr. Culvert under crossings

Table 2 Summary of Proposed Grid Connection Route

The number of joint bays along the route has been selected and proposed as a feasible approach to future-proofing cable installation. The criteria considered include:

- Minimizing environmental impact.
- Reducing disruption to the neighbourhoods during construction.
- Facilitation proper cross-bonding of the cable and sheath-bonding.
- Ensuring sufficient working space during construction.
- Other relevant factors.

4.0 Preliminary Site investigations

Site investigations will be carried out along the route to inform final detailed design.

The following items may be carried out:

- Slit trenches at locations of major service crossings (Half Road width).
- Trial holes along the route to ascertain ground conditions and thermal resistivity of the soil.
- Trial holes at all chamber positions to ascertain ground conditions and thermal resistivity of the soil
- Traffic Management – Single lane closure where necessary.

Equipment:

- 4x4 vehicle
- Soil compactor
- Wheeled dumper
- Concrete vibrator
- 360° tracked excavator

5.0 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, typically 825mm wide by 1,315mm deep, with variations on this design to adapt to service crossings and watercourse crossings, etc. The power cable ducts will accommodate 1 No. phase cable per duct. The communications duct will accommodate a fibre cable to allow communications between the Colehill 110kV Substation and Thornsberry 110kV substation. The inclusion of 1 No. earth continuity conductor duct will also be required.

The ducts will be installed, and the trench reinstated in accordance with the local road's authority within Offaly County Council where installed on public roads and reinstated in accordance with the landowner's requirements where installed on private lands. The installation of the electrical cabling/fibre cable will be installed by pulling them through the ducts between joint bays. Construction methodologies to be implemented and materials to be used will ensure that the UGC is installed in accordance with the requirements of the Council and private landowners.

5.1 Trenching Methodology

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

- The Contractor, and their appointed Site Manager, will prepare a targeted Method Statement concisely outlining the construction methodology and incorporating all mitigation and control measures included within the planning application and accompanying reports and as required by planning conditions where relevant;
- All existing underground services shall be identified on site prior to the commencement of construction works;
- At watercourse crossings, the contractor will be required to adhere to the environmental control measures outlined within the planning application and accompanying reports, the detailed Construction Environmental Management Plan (CEMP),
- Where the cable route intersects with culverts, the culvert will remain in place (where possible) and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with ESB and Irish Water specifications;
- In the event that culverts require removal for ducting installation, it is proposed that a suitable method of damming the water source and pumping the water around the work area would be set out in a method statement and agreed with the relevant stakeholders. Once the ducts are installed the culvert will be reinstated to match existing levels and dimensions. If works of this nature are required, the contractor will liaise with Inland Fisheries Ireland in advance of works;
- Traffic management measures will be implemented in accordance with those included in the CTMP.
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 15m from surface water features and all stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECoW);
- Excavated material shall be employed to backfill the trench where appropriate and any surplus material will be transported off site and disposed 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 100m section;
- Where the cable is being installed in a roadway, temporary reinstatement may be provided to allow larger sections of road to be permanently reinstated together;
- 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 3 - 110kV Underground Duct Installation

5.2 Ducting Installation Methodology

Trenching and ducting works, shall employ the following step by step methodology:

1. Grade, smooth and trim trench floor when the required 1315mm depth and 825mm 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 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 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 test the ducts in accordance with the specification by pulling through a brush and mandrel. Install 12 mm polypropylene draw rope in each duct and seal all ducts using robust duct end seals fitted with rope attachment eyes in preparation for cable installation at a later date. All the works should be witnessed by ESBN Clerk of Works (CoW) as required.

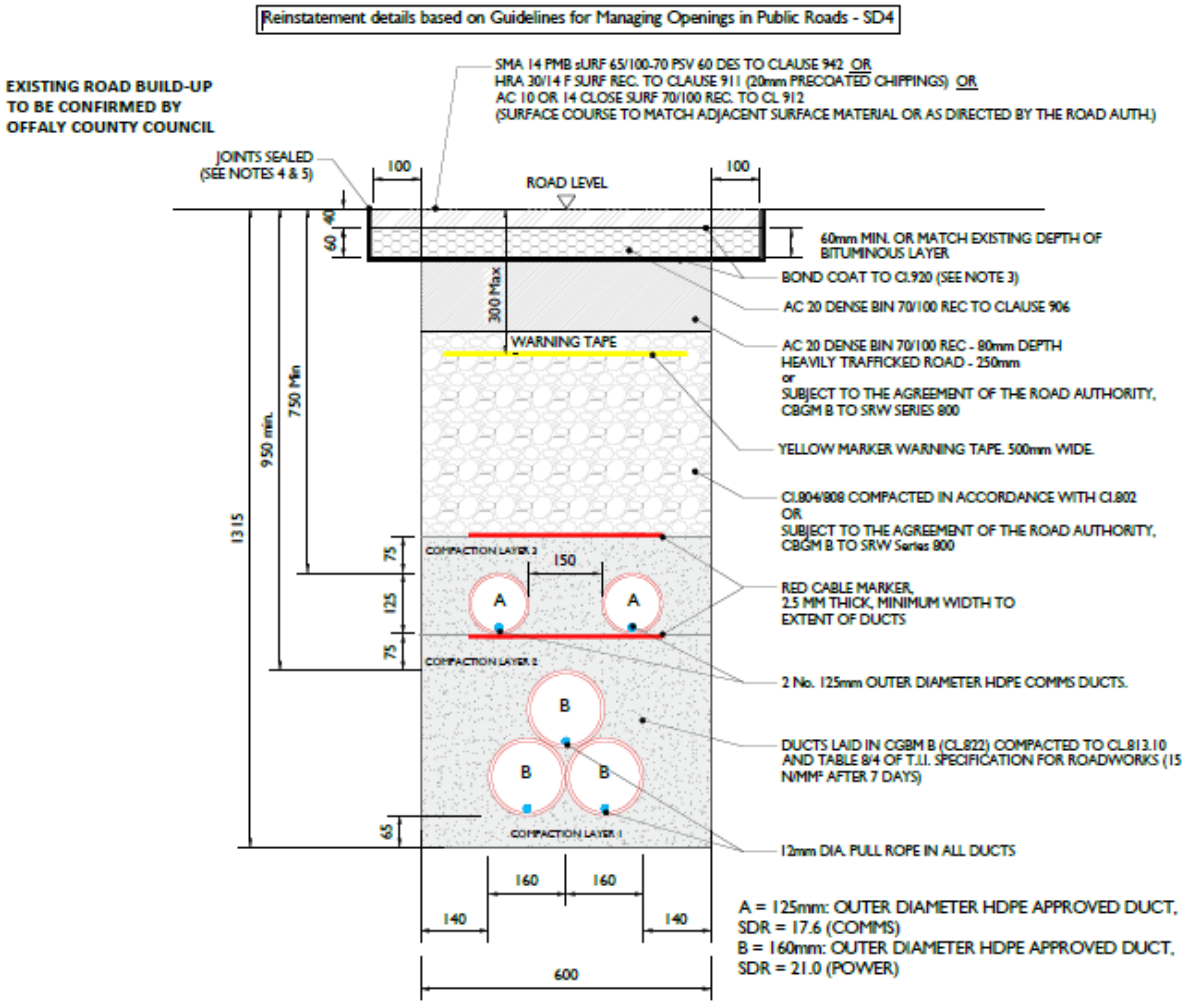


Figure 4 - Trench ducting with Permanent Reinstatement

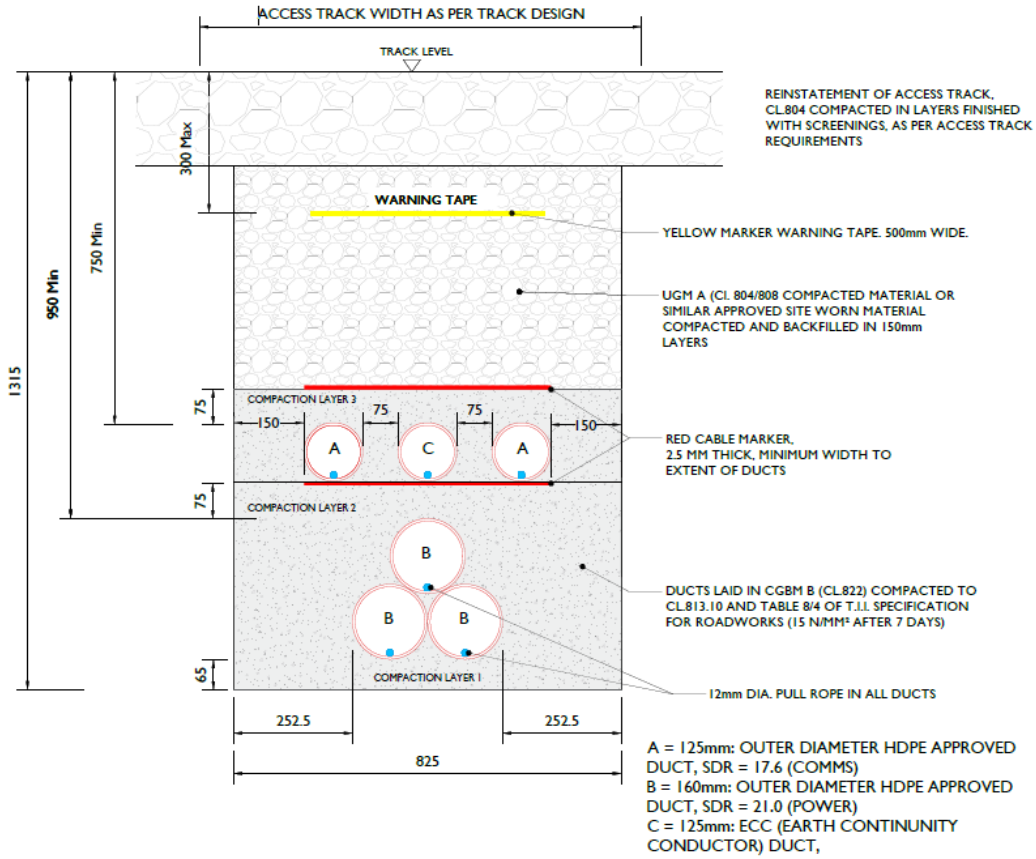


Figure 5 - Trench ducting in Off-Road Section

5.3 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 ESB standards.

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

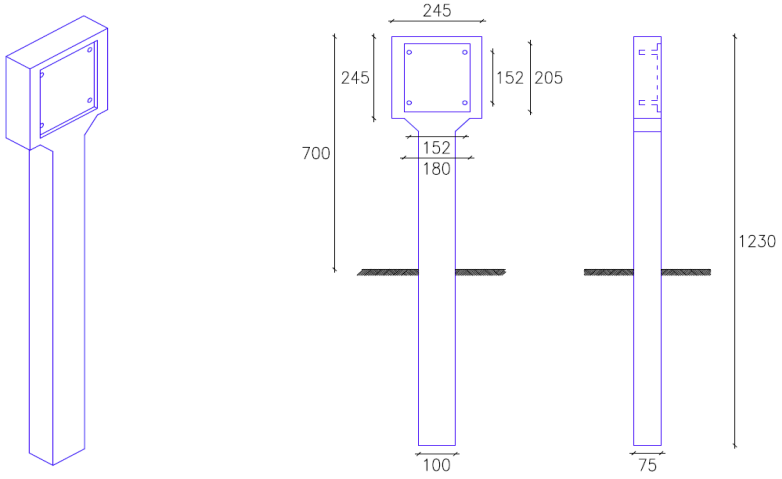


Figure 6 - ESB Marker Posts

5.4 Managing Excess Material from Trench

All excavated material will be temporarily stored adjacent to the trench before re-use in the trench reinstatement (where applicable). Stockpiles will be restricted to less than 2m in height. Where excess material exists, it may be used in the reinstatement of the Solar Park sites or disposed of at a licensed facility.

5.5 Storage of Plant and Machinery

All plant, machinery, and equipment will be stored on-site within the works area or within the temporary construction compound to be located within the permitted Solar Park site. Oils and fuels will not be stored on-site and will be stored in an appropriately bunded area within the temporary storage compound.

5.6 Joint Bays and Associated Chambers

Joint bay locations have been selected to meet EirGrid standards and ensure proper sheath bonding. However, their full design is subject to site investigation and liaison with the Local Authority, EirGrid/ESBN and other relevant stakeholders to ensure their placement causes minimal disruption during construction. For this reason, joint bays are to be provided approximately every 750 to 850 meters along the UGC routes. 110kV Joint Bays are typically 6 m x 2.5 m x 2.05 m pre-cast concrete structures installed below the finished ground level. Joint Bays will be located in the non-wheel bearing strip of roadways, however given the narrow profile of local roads this may not always be possible.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between Colehill 110kV Substation and the existing 110kV substation at Thornsberry, Co Offaly. Communication Chambers are located close to Joint Bays and will typically be pre-cast concrete structures with an access cover at the finished surface level. Earth Sheath Link Chambers are required at every joint bay along the cable route. Earth Sheath Links are used for earthing and bonding cable sheaths of underground power cables, so that the circulating currents and induced voltages are eliminated or reduced. Earth Sheath Link Chambers and Communication Chambers are located in close proximity to Joint Bays. Earth Sheath Link Chambers and Communication Chambers will typically be pre-cast concrete structures with an access cover at finished surface level. Refer to Figure 7 & Figure 8.

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. The marker posts will consist of a corrosion-proof aluminium triangular danger sign, with a 750mm base, and with a centered lightning symbol, on an engineering grade fluorescent yellow background. They will be installed inadequately sized concrete foundations and will also be placed where the cable has not been buried to the standard depth, due to existing road conditions. Drawings of the joint bays and communication chambers are included within this planning package.

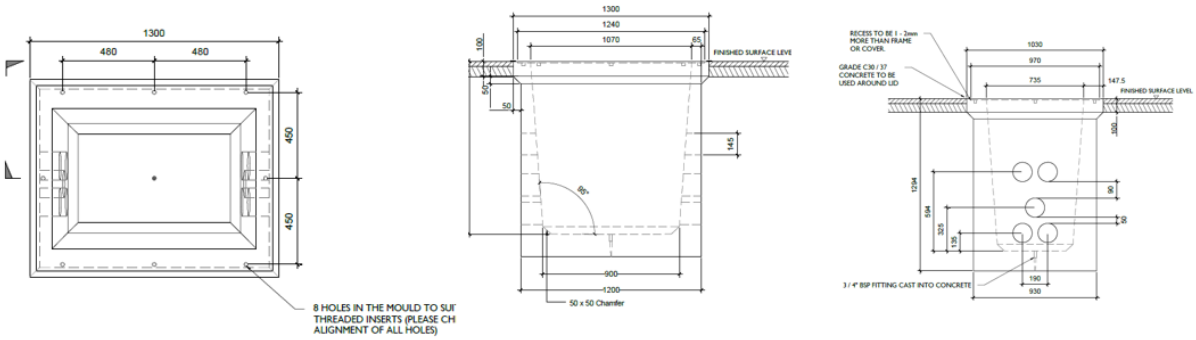


Figure 7 - Typical Communications Chamber

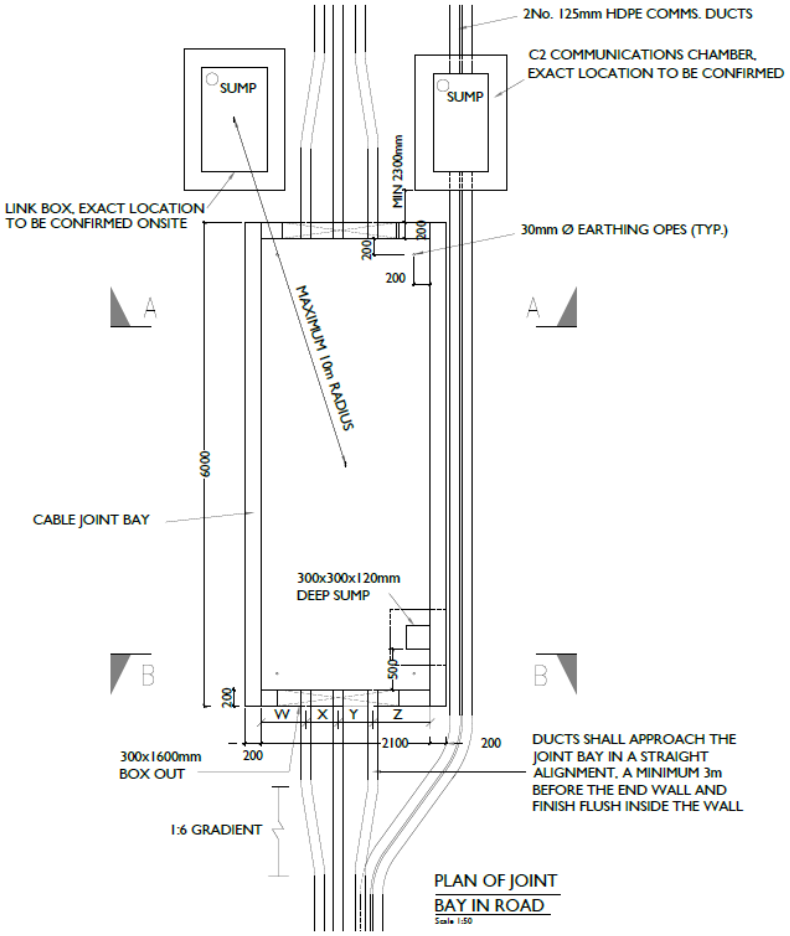


Figure 8 - Typical Joint Bay Plan Layout

5.7 Methodology for Joint Bay Construction and Installation

In advance of commencing 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. Any soil required for reinstatement that will be temporarily stockpiled on site will be placed at least 15m back from the nearest watercourse on level ground and will be ringed at the base by silt fencing and be regularly monitored by a designated competent person for signs of solids escape. In which case an additional line of silt fencing with straw bales will be added in line with the relevant 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 sand-bags and geotextile sheeting or silt fencing to contain any solids in run-off.

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

1. The contractor will excavate a pit for joint bay construction, including for a sump in one corner.
2. Grade and smooth floor; then lay a 75 mm depth of blinding concrete (for in situ construction) or 50 mm thick sand (for pre-cast concrete construction) on 200 mm thick Clause 804 granular material.
3. In situ construction. Construct 200 mm thick reinforced concrete floor slab with sump and starter bars placed for walls as detailed on the drawings.
4. In situ construction. Construct 200 mm thick reinforced concrete sidewalls as detailed on the drawings. *(Figure 9)*

Figure 9 - Typical 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 to Co. Council/TII Specification for Roadworks. *(Figure 9)*

Figure 10 - Completed joint bay prior to cable installation (in-situ)

6. Pre-cast concrete construction. Place pre-cast concrete sections on sand bedding. *(Figure 10)*

Figure 11 - Typical 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.

5.8 Cable Installation/ Cable Pulling

The electrical cable is supplied in pre-ordered lengths on large cable drums (Figure 12). Once the ducting installation works are completed, the ducts have a 12mm polyethylene rope blown through them. This guide rope is then used for proving the ducts by attaching a mandrel, a sponge and brush, for cleaning the duct installed. Once the ducting is proved, the electrical cables (situated on a drum) are pulled through the ducting by a specialised mechanical winch. The electrical 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**.** Installing "one section" of electrical cable normally involves pulling three individual conductors into three separate ducts via the winch. The winch will also monitor the tension on the cables being pulled so as not to damage the cables. The cable pulling 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 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.

Figure 12 - Typical Cable Pulling Drum Set Up

Once the "two sections" of cable 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. Following the completion of jointing and duct sealing works in the joint slab, 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 300 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
- 63mm diameter HDPE ducting
- Precast Chamber Units
- Earth Sheath Link Box

6.0 Horizontal Directional Drilling

Horizontal Direction Drilling (HDD) is a method of drilling under obstacles such as motorways, railway lines, bridges, watercourses, existing UG infrastructure, etc. This method is employed where installing the ducts using standard trenched installation methods is not possible and instead, cable ducts are installed by drilling under the obstacle.

The proposed drilling methodology is as follows: -

- A works area of circa 40m^2 for the HDD entry side, and circa 20m^2 on the HDD exit side, will be required for the HDD equipment and vehicles. These areas will be fenced off during the HDD implementation.
- The drilling rig and fluid handling units will be located on the entry side and will be appropriately bunded using sandbags, which will contain any fluid spills and stormwater run-off.
- Entry and exit pits (approximately 2m (w) x 3m (L) x 1m deep) will be excavated using an excavator, and the excavated material will be temporarily stored within the works area and used for reinstatement or disposed of to a licensed facility.
- The HDD pilot bore will be undertaken using a wireline guidance system. Assembly will be set up by the drilling team and steering engineer.
- The pilot bore will be drilled to the pre-determined profile and alignment under the watercourse crossings.
- The steering engineer and drill team will monitor the drilling works to ensure that modelled stresses and pressures are not exceeded.
- The drilled cuttings will be flushed back by drilling fluid to the entry and exit pits and re-cycled for re-use.
- Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit side which will then be pulled back to the entry side as part of the pre-reaming/hole opening process to enlarge the hole to the correct size.
- When the pre-reaming/hole opening/hole cleaning has been completed, a reamer of a slightly smaller diameter than the final cut will be installed on the drill string to which the ducts will be attached for installation.
- The drilling fluid will be disposed of at a licensed facility.
- The ducts will be cleaned and proven, and their installed location surveyed.
- The entry and exit pits will be reinstated to the specification of EirGrid and any requirements of Offaly County Council.

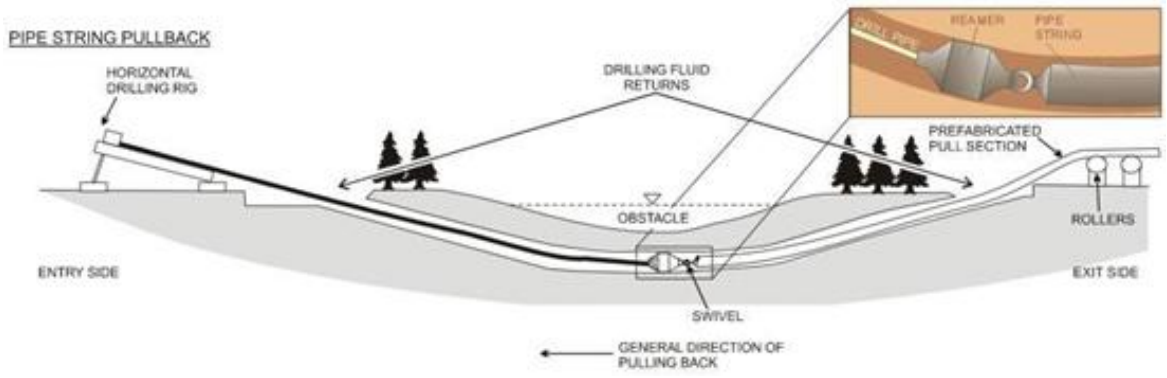


Figure 13: Typical HDD Installation (not to scale)

6.1 Corndarragh Stream Crossing Horizontal Direction Drilling [Chainage 4180m]

The proposed cable route may require a Horizontal Directional Drilling (HDD) crossing where the route intersects the Corndarragh Stream. In this case, the cable will cross under the watercourse using a trenchless HDD method, subject to detailed design and liaising with Offaly County Council.

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

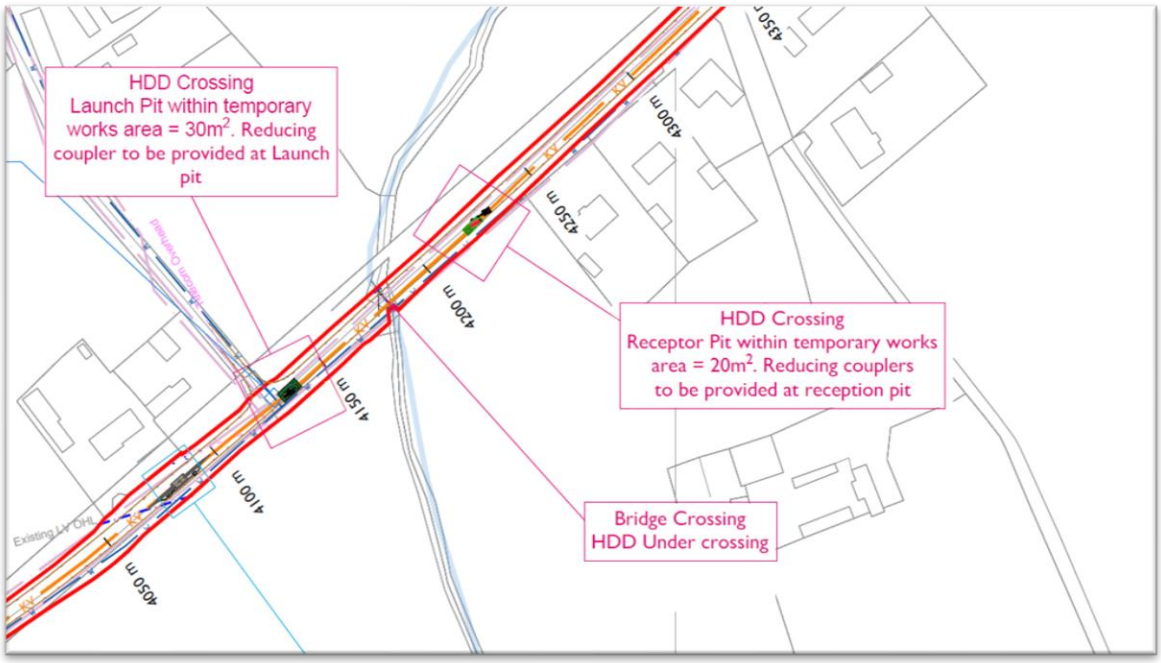


Figure 14: HDD Crossing of the Corndarragh Stream

7.0 Watercourse Crossings

The proposed cable route will cross an additional number of culverts. Where the cable route intersects with existing watercourses, a detailed construction method statement will be prepared by the Contractor before the commencement of construction and is to be approved by the relevant environmental agency.

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

Culvert Nr 1: Chainage 4690m

Due to the size of this culvert, an HDD method will not be required. The available space between the top of the culvert and the road (more than 875mm) will allow for crossing of the culvert, as illustrated in Figure 15. To achieve this arrangement, the gradual ascent of the ducts must maintain a constant gradient of 1:6. Once the culvert has been crossed, the descent of the ducts must maintain the same gradient.

Culvert Nr 2: Chainage 5000m

Due to the size of this culvert, an HDD method will not be required. The available space between the top of the culvert and the road (more than 875mm) will allow for crossing of the culvert, as illustrated in Figure 15. To achieve this arrangement, the gradual ascent of the ducts must maintain a constant gradient of 1:6. Once the culvert has been crossed, the descent of the ducts must maintain the same gradient.

Culvert No 3: Chainage 6630m

Due to the size of this culvert, an HDD method will not be required. The available space between the top of the culvert and the road (more than 875mm) will allow for crossing of the culvert, as illustrated in Figure 15. To achieve this arrangement, the gradual ascent of the ducts must maintain a constant gradient of 1:6. Once the culvert has been crossed, the descent of the ducts must maintain the same gradient.

Culvert No 4: Chainage 7050m

Due to the size of this culvert, an HDD method will not be required. The available space between the top of the culvert and the road (more than 875mm) will allow for crossing of the culvert, as illustrated in Figure 15. To achieve this arrangement, the gradual ascent of the ducts must maintain a constant gradient of 1:6. Once the culvert has been crossed, the descent of the ducts must maintain the same gradient.

Open Drain: Chainage 7250m

An open drain has been found at chainage mark, 7050m respectively. Owing for the construction traffic that will be required to traverse this crossing, a detail to allow for the grid connection route, under cross beneath a proposed twin wall piped culvert to enable construction activities as been proposed. Refer to drawing 051064-DR-139 for details.

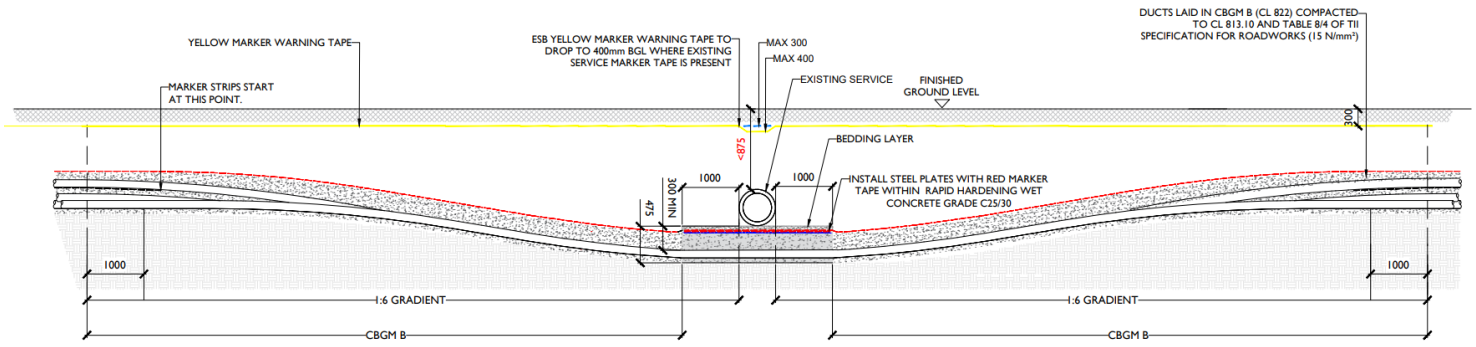


Figure 15 - UGC Culvert Undercrossing

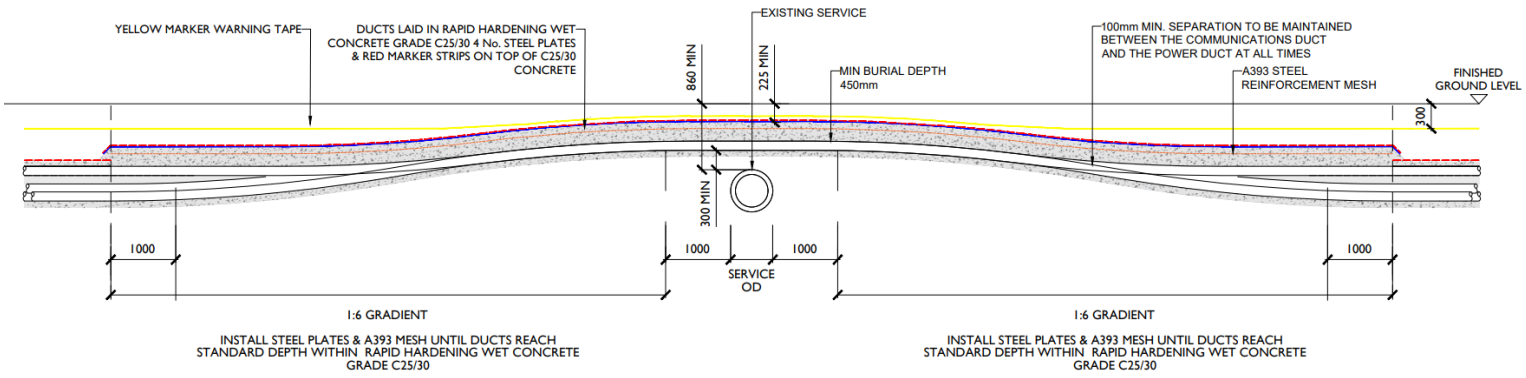


Figure 16 - UGC Culvert Overcrossing

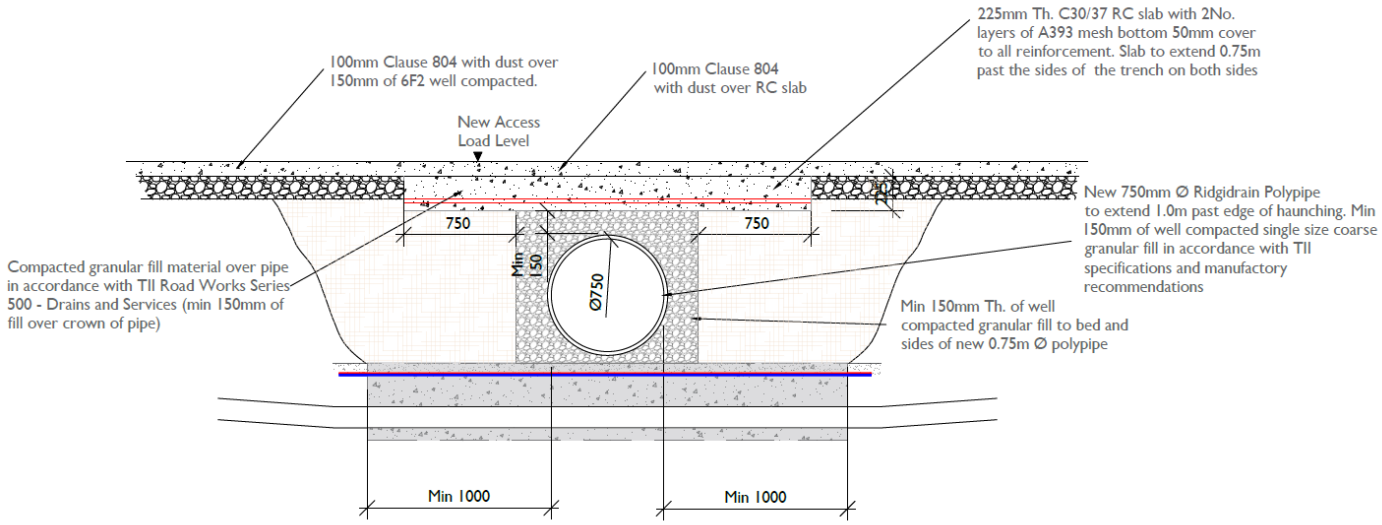


Figure 17 Open Drain crossing arrangement

8.0 Drainage Management Plan.

The measures described in this section will be adopted during the construction phase in order to manage on-site drainage in accordance with current best practice and legislation.

The Site Manager shall contact:

- The Client;
- Environmental Protection Agency ("EPA") 24-hour emergency incident line 1890 33 55 99;
- Inland Fisheries 24-hour pollution line 1890 34 74 24. The pollution hotline number shall be referenced in the construction site rules and displayed in the Site Office, within the Ballyteige Solar Farm facility, and in the Emergency preparedness & response plan.

Each Contractor working with controlled substances shall supply appropriate spill kits which shall be kept on site. The spill kits shall be made accessible at all times to all site personnel.

8.1 Silt Control

Silt-laden runoff should be expected from any areas of recently exposed soil. There is also potential for pollution to occur from machinery used in the construction.

The introduction or artificial materials required (e.g. silt fencing, straw bales, sand bags etc.) will need to be deployed onsite and will be removed on completion of the works. A suitable buffer and barriers (silt fences) will be provided between any excavated material and any surface water features to prevent sediment washing into the receiving water environment.

Discharge from the silt control measures will be discharged into an area of vegetation for dispersion or infiltration, in accordance with Sustainable drainage system (SuDS) techniques. Where drains or watercourses are crossed with underground cables the release of sediment will be prevented through the implementation of best practice construction methodologies.

8.2 Additional Mitigation Measures

- 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 very wet periods and predominantly aiming to carry out works during the summer season.
- The contractor will carry out visual examinations of local watercourses from the proposed works during the construction phase to ensure that sediment is not above baseline conditions. In the unlikely event of water quality concerns, the Environmental Manager and ECoW will be consulted.
- Excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows.
- Entry by plant equipment, machinery, vehicles, and construction personnel into watercourses or wet drainage ditches shall not be permitted. All routes used for construction traffic shall be protected against migration of soil or wastewater into watercourses.
- Cabins, containers, workshops, plant, materials storage, and storage tanks shall not be located near any surface water channels.

9.0 Access Routes to Work Area

The majority of the proposed underground cable will be installed within the public road network and therefore will be accessed via the existing road network. Where the cable route is located on private lands, such as at the solar farm, the contractor(s) will be required to access these from the local public road network in the vicinity of the work area and from there, traverse the consenting and permitted, predominantly within the private lands proposed access tracks.

A detailed Construction Traffic Management Plan will accompany this planning application. In the event that planning consent is granted for the proposed development, the CTMP will be updated prior to commencement of development to address the requirements of any relevant planning conditions, including any additional mitigation measures, which are conditioned and will be submitted to the planning authority for written approval.

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

10.0 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 Offaly County Council.

All work on public roads will be subject to the approval of a road opening license application. The contractor will prepare detailed traffic management plans for inclusion as part of the road opening applications. Where road widths allow, the UGC installation works will allow for one side of the road to 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 60m sections, and no more than 100m 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 Offaly County Council in advance of UGC construction.

10.1 Site Access

Access to the cable route shall be achieved using existing access points on the road network. Where existing access points are utilised, existing visibility splays will be assessed. Should existing visibility splays not conform with relevant standards (NRA DMRB, Offaly County Development Plan), improvements will be required. These improvements will generally consist of trimming of existing foliage within the road corridor.

Where sufficient sight lines cannot be achieved by improvements, it is proposed that the appointed contractor shall use a safe system of flagmen for the control of traffic during all access/egress operations at these access points.

Each flagman on-site will be a CSCS trained person in Signing, Lighting and Guarding at Roadworks.

10.1.1 Local Road Network

The majority of access/egress to the works sites shall be facilitated from the local roads network. The appointed contractor shall utilise a safe system of permanent flagmen for the control of traffic during all access / egress operations at each site location/access point onto the Public Road Network and where sufficient sight lines cannot be achieved on the Local Road Network as stated above.

10.1.2 Local Access for Residents

Every effort shall be made during construction to minimise disruption to local residents along the underground cable route. Local access to and from properties will be facilitated by the appointed contractor's flagmen during the construction phase of the various trench sections. Where trenches are under construction and impeding access to a particular entrance, temporary trench crossings will be made by means of steel plates which the contractor will lift into position when access or egress is required.

10.2 Temporary Signage

The appointed contractor shall undertake consultation with the relevant authorities for the purpose of identifying and agreeing signage requirements. Advanced Warning Signage shall be installed a minimum of one week prior to works commencing at each works location.

All signage will comply with Chapter 8 of the Department of Transport Traffic Signs Manual, 2019.

The contractor shall ensure:

- Consultation with the relevant authorities is carried out to agree signage requirements.
- Temporary signage is provided indicating each site access route and location for contractors and associated suppliers.
- Temporary signage is provided where active or static traffic control is in place.

10.3 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.

10.4 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.

10.5 Co-ordination of Works

Throughout the duration of the project the appointed contractor will liaise with Offaly 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.

10.6 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.

10.7 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.

10.8 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

10.9 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.
- 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.

10.10 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 110kV 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.

11.0 Construction Hours

Standard working hours will be determined as a condition of planning. The proposed working hours for construction will be 8.00am to 8.00pm Monday to Friday and 8.00am to 6.00pm on Saturday (if required), with no works on Sundays or Bank Holidays except in exceptional circumstances or in the event of an emergency. All site personnel will be required to wear project notification labelling on high visibility vests and head protection so that they can be easily identified by all workers on site and the public.

12.0 Best Practice Design and Construction & Environmental Management Methodology

Before commencement of construction works the contractor will draw up detailed Method Statements which will be informed by this Outline Construction Methodology, measures proposed within the CEMP, and the guidance documents and measures listed below. This method statement will be adhered to by the contractors and will be overseen by the Project Manager, Environmental Manager, and ECoW where relevant.

The following documents will contribute to the preparation of the method statements in addition to those measures proposed below:-

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

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

- All materials shall be stored at the temporary compound within the Solar Park sites and transported to the works zone immediately before construction;
- Where drains and watercourses are crossed with underground cables, the release of sediment will be prevented through the implementation of best practice construction methodologies.
- Weather conditions will be taken into account when planning construction activities to minimise the risk of runoff from the site;
- Provision of 50m exclusion zones and barriers (silt fences) between any excavated material and any surface water features to prevent sediment from washing into the receiving water environment;
- If dewatering is required as part of the proposed works e.g. in trenches for underground cabling or in wet areas, water must be treated before discharge;
- The contractor shall ensure that silt fences are regularly inspected and maintained during the construction phase;
- If very wet ground must be accessed during the construction process bog mats/aluminum panel tracks will be used to enable access to these areas by machinery. However, works will be scheduled to minimise access requirements during the winter months;
- The contractor shall ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall is required, and the Contractor is required to prepare a contingency plan for before and after such events;
- The contractor will carry out visual examinations of local watercourses from the proposed works during the construction phase to ensure that sediment is not above baseline conditions. In the unlikely event of water quality concerns, the Environmental Manager and ECoW will be consulted;

- Excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows.
- Only emergency breakdown maintenance will be carried out on site. Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures.
- Appropriate containment facilities will be provided to ensure that any spills from vehicles are contained and removed off-site. Adequate stocks of absorbent materials, such as sand or commercially available spill kits shall be available;
- Concrete or potential concrete contaminated water run-off will not be allowed to enter any watercourses. Any pouring of concrete (delivered to site ready mixed) will only be carried out in dry weather. Washout of concrete trucks shall be strictly confined to a designated and controlled wash-out area within the solar park sites; remote from watercourses, drainage channels, and other surface water features;
- Entry by plant equipment, machinery, vehicles, and construction personnel into watercourses or wet drainage ditches shall not be permitted. All routes used for construction traffic shall be protected against migration of soil or wastewater into watercourses;
- Cabins, containers, workshops, plant, materials storage, and storage tanks shall not be located near any surface water channels and will be located beyond the 50m hydrological buffer at all times.

13.0 Access Tracks

The proposed grid route will consist entirely of UGC. Where the proposed underground cable will be installed within grassland, it will be accessed via the existing road network. A permanent access track will be required over the centre the cable route alignment to access the solar farm substation. This will consist of a 3m minimum wide track with a ten-tonne axle weight load bearing capacity. The contractor(s) will be required to utilise the local public road network in the vicinity of the work area and from there utilise private tracks, where appropriate. Before the commencement of development, precise access arrangements will be agreed upon with the respective landowners.

A detailed CTMP will be prepared, and agreed upon with Offaly County Council, before the commencement of construction.

Access tracks will consist of granular Clause 804 with a layer of dust over for a surface dress. This track will be required to spread the weight of machinery over a greater area to prevent damage to the ground. If necessary, a low ground pressure excavator may also be utilised. This machine is designed to spread its weight across a wider area thereby reducing the pressure exerted on the ground. Access routes will be carefully selected to avoid any damage to the land.

Local consultation will be carried out with all relevant landowners to ensure that any potential disturbance will be minimised. Before the commencement of construction, the contractor will assess all access routes and determine the requirement. Any such requirements will be incorporated into the relevant method statement.

Figure 18 – Permanent Access Tracks into development

14.0 Relocation of Existing Services

To facilitate the installation of the proposed UGC, it may be necessary to relocate existing underground services such as water mains, telecoms, or existing cables. In advance of any construction activity, the contractor will undertake additional surveys of the proposed route to confirm the presence or otherwise of any services. If found to be present, the relevant service provider will be consulted to determine the requirement for specific excavation or relocation methods and to schedule a suitable time to carry out works.

14.1 Underground Cables

If existing underground cables are found to be present, a trench will be excavated, and new ducting and cabling will be installed along the new alignment and connected to the network on either end. The trench will be backfilled with suitable material to the required specification. Warning strip and marking tape will be laid at various depths over the cables as required. Marker posts and plates will be installed at surface level to identify the new alignment of the underground cable, and the underground cables will then be re-energised.

14.2 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.

15.0 Reinstatement of Private Land

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

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 emergency, 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 Invasive Species Best Practice 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.

18.0 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.

19.0 Archaeology

The following are the mitigation measures that will be carried out during construction where required.

- If required a project archaeologist will be appointed to oversee the project.
- Demarcation of protective buffer zones around cultural heritage sites where there is a potential for disturbance during the construction phase and inclusion of the same in site induction.

20.0 Programme

Estimates for the duration of the construction works are included in the table below. Please note that some of the elements are likely to happen concurrently, therefore the overall start-to-finish duration is estimated to be six months.

Table 3: Estimated Construction Duration	
Development Element	**Estimated Construction Duration**
Colehill Solar Farm Substation	12 months
Underground Cable route	6 months

Table 3 - Estimated Construction Duration