Environmental Impact Assessment Report

# NISA

*North Irish Sea Array*

Volume 2: Introductory Chapters

# Chapter 9

# Construction Strategy - Onshore

Statkraft

CIP Copenhagen Infrastructure Partners

GoBe APEM Group

ARUP

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# 9. Construction Strategy – Onshore

## 9.1 Introduction

The North Irish Sea Array (NISA) Offshore Wind Farm (hereafter referred to as the 'proposed development'), is the subject of this Environmental Impact Assessment Report (EIAR) and is a combination of offshore infrastructure and onshore infrastructure.

A detailed description of the offshore and onshore elements of the proposed development is provided in Volume 2, Chapter 6: Description of the Proposed Development- Offshore (hereafter referred to as the Offshore Description chapter) and Chapter 7: Description of the Proposed Development – Onshore (hereafter referred to as the Onshore Description chapter). These chapters are accompanied by figures which show the proposed development infrastructure: Figures 6.1-6.2 show the offshore infrastructure and Figures 7.1-7.3 show onshore infrastructure. A series of planning drawings are also provided in Appendix 7.1.

For clarity, while the proposed development is assessed as a whole, the interface between onshore and offshore infrastructure is the high-water mark (HWM) as defined by Ordnance Survey Ireland mapping. For the purposes of the EIAR, the construction strategy of the proposed development landward of the HWM (i.e., onshore infrastructure) is described in this chapter. The construction strategy of the proposed development seaward of the HWM (i.e., offshore infrastructure) is described in Chapter 8: Construction Strategy – Offshore (hereafter referred to as the Offshore Construction chapter). Refer also to Image 6.1 of the Offshore Description chapter which illustrates the offshore and onshore infrastructure of the proposed development and the interface between them.

This chapter, which has been prepared in accordance with Part 1 of Annex IV of the EIA Directive, describes the strategy to construct the onshore elements and associated infrastructure of the proposed development.

All works associated with the onshore infrastructure are contained within the onshore development area, i.e. that area within the proposed development boundary within which the onshore infrastructure is located. The construction works associated with the onshore infrastructure comprise:

- Landfall site: construction works for the landfall above the HWM are described within this chapter. Construction works associated with the landfall below the HWM (offshore infrastructure) are described in the Offshore Construction Chapter.
- Grid Facility: construction works associated with the construction of the grid facility - which includes the compensation substation and Bremore substation – are contained within this chapter.
- Onshore Cable Route: construction works associated with the construction of the onshore cable route - and connection into the existing electricity transmission network at Belcamp substation – are contained within this chapter.

In respect of this chapter, it is also noted that:

- Detail on the competent experts that have prepared this chapter is provided in Appendix 1.1 in Volume 8;
- Detail on the extensive consultation which has been undertaken with a range of stakeholders during the development of the EIAR is set out in Appendix 1.2; and
- A glossary of terminology, abbreviations and acronyms is provided at the beginning of Volume 2 of the EIAR.

## 9.2 Approach to Construction Strategy

For the purposes of the EIAR and planning consent, it is assumed that the proposed development will be located anywhere within the proposed development boundary. To that end, the construction footprint required for the onshore infrastructure is smaller than the proposed development boundary extent.

Where alternative onshore construction techniques or developing technologies will be considered, all methodologies have been described within this chapter. Where flexibility relates to the final location of onshore infrastructure, the construction strategy described is applicable irrespective of where the infrastructure is finally located within the proposed development boundary. Existing known constraints within the proposed development boundary which will be avoided by the construction footprint are detailed within the relevant EIAR assessment chapters. Refer to Section 7.2.2 of the Onshore Description chapter for further details on flexibility.

The onshore development area (i.e., the area within which the onshore development is located, landward of the HWM) is shown on Figures 7.1 through 7.3 and on planning drawing 281240-ARP-ONS-DR-PL-1098 and includes all project elements required for construction, including ancillary infrastructure such as site access tracks, site compounds, and temporary working areas for site facilities. All aspects of the proposed development (including construction footprint) will be located within the proposed development boundary.

f public roads: the proposed development boundary for these sections will generally be the width of the public road, and the working corridor width for construction purposes will generally be limited to one side of the carriageway. The proposed development boundary provides flexibility during the construction stage if minor re-routing is required to accommodate local road network conditions. The cable route will be constructed under a rolling lane closure arrangement, with temporary traffic management in accordance with Chapter 8 of the Traffic Signs Manual. At certain narrow sections of road, where there is insufficient space to accommodate the traffic running lane and the excavation, temporary road closures will be required during construction of that specific section. These sections of road closures are outlined in Volume 4, Chapter 24: Traffic and Transportation. There are also seven locations where the onshore cable route deviates off-line from public roads and traverses private lands.

The approach to construction which has been adopted for the purpose of this EIAR is described in Sections 9.3 to 9.11 herein.

An Onshore Construction Environmental Management Plan (Onshore CEMP) (refer to Volume 8, Appendix 9.1), has been prepared to provide minimum requirements that the contractor(s) will be required to implement during the construction phase of the proposed development.

The Onshore CEMP sets out the principles and control procedures to minimise the impact of the proposed development on the environment during the construction phase. Upon appointment the contractor(s) will develop more detailed construction methodologies ensuring that all contractor(s) proposals, policies, and procedures, comply with the minimum requirements detailed in the Onshore CEMP and any relevant licensing conditions.

## 9.3 Construction Programme and Phasing

Subject to obtaining planning consent and the relevant permits and licences, construction of the onshore elements of the proposed development is anticipated to commence in 2026/27, with completion expected in 2028/29 (circa 24 months of construction).

### 9.3.1 Landfall site

The landfall is where the two offshore export cables from the offshore wind farm come ashore. As previously mentioned, the interface between onshore and offshore elements is the HWM with the landfall acting as the conduit between the two. The landfall site covers the area from where the offshore export cables are brought onshore to the connection at the grid facility. The works at the landfall site generally comprise:

- Horizontal directional drilling (HDD) of the offshore export cables from the HWM (transition between offshore and onshore) to the location of the landfall transition joint bays (TJBs), including HDD contractor compounds and associated works
- Construction of the landfall TJBs and the jointing of the offshore and onshore export cables; and ancillary infrastructure such as an access track, entrance and marker posts
- Laying of the onshore export cables via open cut trench from the location of the TJBs to the grid facility, including a HDD crossing of the Dublin-Belfast railway line, joint bays, HDD contractor compounds and associated works.

The construction works at the landfall site are separated into two (2) activities, the offshore export cable HDD and construction of the TJBs, and the onshore export cables between the TJBs and the grid facility. The overall construction duration for the landfall HDD is 10 months, with the overall construction of the railway HDD being c. 2 – 3 months. These two activities are likely to be sequential rather than overlap. These two activities may take place consecutively or may overlap, with the overall construction duration anticipated to be approximately 12-13 months.

The HDD works for both the offshore export cables and the crossing of the Dublin-Belfast railway line will generally continue 24 hours a day. Drilling of both bores may be carried out simultaneously to accelerate the works programme.

#### *9.3.1.1 Offshore Export Cable (landfall)*

The establishment of the landfall HDD contractor compound and associated enabling works will take approximately four (4) weeks. The HDD drilling and duct pull-back for the offshore export cables will take up to eight (8) weeks for each cable, working 24-hours a day. Following the HDD, construction of the TJBs will begin, taking approximately another eight (8) weeks.

With the landfall TJBs complete, the offshore export cables can be pulled ashore to connect to the TJBs, taking up to eight (8) weeks, following which the site can be reinstated, which will take up to four (4) weeks.

Including site setup and reinstatement the offshore export cable (landfall) construction activities will take up to forty (40) weeks (10 months). Refer to Table 9.1 for the anticipated sequence of construction.

**Table 9.1 Outline Construction Programme – Offshore Export Cable to landfall TJBs**

| Activity | Approximate Timing |
|---|---|
| Offshore export cable (landfall) HDD contractor compound and access track establishment | 1 month (4 weeks) |
| HDD for 2 No. offshore export cables (landfall) | 4 months (16 weeks) |
| TJB construction | 2 months (8 weeks) |
| Cable pull from offshore to TJBs | 2 month (8 weeks) |
| Offshore export cable (landfall) HDD contractor compound reinstatement | 1 months (1 weeks) |

#### *9.3.1.2 Onshore Export Cable from Transition Joint Bays to Grid Facility*

The onshore export cables between the TJBs and the grid facility will be laid using open cut trenching, with a HDD crossing under the Dublin-Belfast railway.

The establishment of the HDD contractor compound and the cable route corridor will take approximately two (2) weeks to complete. The railway HDD drilling and duct pull-back under the Dublin Belfast railway line will take up to three (3) weeks for each cable, six (6) weeks in total. Following the HDD, the construction of any joint bays will begin, taking approximately another eight (8) weeks.

The open cut trenching for the rest of the onshore export cable will take approximately four (4) weeks.

With the infrastructure complete the cable can be pulled between the landfall TJBs and the grid facility, including under the railway line taking up to two (2) weeks and any jointing of cables at joint bays can be undertaken. The site area and the trenches can then be reinstated, which will take approximately two (2) weeks.

Including site setup and reinstatement, the onshore export cable construction activities will take up to twenty-four (24) weeks (6 months), ref to Table 9.2 for anticipated sequence of construction.

**Table 9.2 Outline Construction Programme – Onshore Export Cable Route from TJBs to Grid Facility**

| Activity | Approximate Timing |
|---|---|
| Railway HDD contractor compound establishment | 2 weeks |
| HDD for 2 No. onshore export cables (railway crossing) | 6 weeks |
| HDD contractor compound reinstatement | 2 weeks |
| Onshore export cable route working corridor establishment | 2 weeks |
| Open-cut trenching for onshore export cable (incl. R132 crossing) | 2 weeks |
| Cable pulling and jointing for onshore export cable, including railway crossing | 2 weeks |
| Onshore export cable route reinstatement | 2 weeks |
| Joint bay construction | 8 weeks |

### 9.3.2 Grid Facility

The timeline in Table 9.3 sets out the anticipated programme for the construction and commissioning of the grid facility, which includes the compensation substation and Bremore substation. It is expected that construction and commissioning works at the grid facility site will take approximately twenty-four (24) months with certain activities taking place in parallel.

**Table 9.3 Outline Construction Programme – Grid Facility**

| Activity | Approximate Timing |
|---|---|
| Grid facility contractor compound establishment | 1 month (4 weeks) |
| Site set-up | 1 month (4 weeks) |
| Site preparation, civil construction and GIS building construction | 12 months (52 weeks) |
| Electrical installation and pre-commissioning | 8 months (32 weeks) |
| Reinstatement / Landscaping | 1 month (4 weeks) |
| Commissioning and energisation | 4 months (16 weeks) |

### 9.3.3 Onshore Cable Route

The timeline in Table 9.4 sets out the anticipated programme for the construction of the underground onshore cable route from the Bremore substation at the grid facility to the existing transmission system at Belcamp substation. It is expected that construction works along the onshore cable route will take approximately twenty-four (24) months, with some activities, at different locations, taking place in parallel. However, for the majority of the cable route, the duration of works would be much less than 24 months.

Prior to construction, cable design, procurement and manufacturing will take place. Cable detailed design and procurement will take up to six (6) months. Cable manufacturing will take up to 24 months.

At watercourse crossings, there are a number of options for some of these crossings in terms of construction methodology. A worst case in terms of duration is considered for these crossings to inform the anticipated construction programme.

**Table 9.4 Outline Construction Programme – Onshore Cable Route**

| Activity | Approximate Timing |
|---|---|
| Cable contractor compounds establishment, including access track (duration is per compound and they may be done in parallel) | 1 month (4 weeks) |
| Cable trenching, duct laying and reinstatement. | 12 months (52 weeks) |
| HDD contractor compound and access, set-up, HDD and duct pull-back. Blakes Cross North - Ballough Stream (Wx11) | 2 months (8 weeks) |
| HDD contractor compound and access, set-up, HDD and duct pull-back. Blakes Cross South - Deanestown Stream & Ballyboghill Stream (Wx12 & 13) | 2 months (8 weeks) |
| HDD contractor compound and access, set-up, HDD and duct pull-back. M1 Crossing | 2 months (8 weeks) |
| In-line watercourse crossing using HDD method: set-up, bore and duct installation (duration is per HDD crossing) | 1 month (4 weeks) |
| In-line watercourse crossing using open-cut trench method (duration is per watercourse crossing) | 1 month (4 weeks) |
| Off-line watercourse crossings including access (and HDD contractor compound set-up, HDD and duct installation where off-line HDD crossing is employed) – duration is per crossing. | 2 months (8 weeks) |
| In-line open cut crossing over bridge/culverts (within the bridge deck) (duration is per crossing) | 2 weeks |
| Cable installation and joint bay construction | 10 months (40 weeks) |
| Cable jointing | 10 months (40 weeks) |
| Reinstatement | 3 months (12 weeks) |
| Cable testing | 3 months (12 weeks) |
| Full cable energised | 1 month (4 weeks) |

Due to the narrow widths of certain roads, temporary full road closures with associated traffic diversions are likely to be necessary at some sections of the onshore cable route. These roads are set out in Section 24.4 of Volume 4, Chapter 24: Traffic and Transportation and the expected full road closure durations, taking account of mitigation measures proposed, are set out in section 24.6 of the same chapter.

For the remainder of onshore cable route works on public roads, partial road closures (lane closures) will be in place during construction.

Installation of the onshore cable will be undertaken on a rolling basis. Where no obstacles or constraints exist within or near the onshore cable route, it is expected that progress rates for the trench excavation and installation of ducts will be up to:

- 80m/day in farmland and on road sections with full road closure
- 60m/day on roads with single lane closure; and
- 30m/day on roads maintaining two-way traffic.

These progress rates may reduce where obstructions and underground utility services are encountered. In particularly congested areas (i.e. significant utilities presence or where any utilities may need to be re-located), the progress rates will likely reduce further but progress rates in these areas have been considered in the overall construction programme.

Connection to the Belcamp substation is expected to take a total of two (2) months and is planned to be carried out near the end of the cable laying/pulling programme. It is anticipated that a connection will be made to either/both of the existing substation and the consented extension[1], which is likely to be developed by Eirgrid prior to construction of the proposed development. The connection will include constructing a joint bay at the substation compound boundary and laying ducts from this joint bay into the substation compound to the connection point, in accordance with EirGrid requirements. With the ducts installed a cable will be installed from the connection point to the new joint bay and the cables jointed accordingly. The construction of the Belcamp substation extension will not affect the construction duration or connection strategy.

An outage at the Belcamp substation will be scheduled by EirGrid to allow the connection works to take place safely. The outage will be agreed with EirGrid as part of their work to securely coordinate outages on the Transmission System.

## 9.4 Temporary Contractor Compounds

Construction of the proposed development will require temporary landtake to accommodate construction activities in addition to the permanent land take required to accommodate the onshore infrastructure of the proposed development as described in Section 7.2.3 of the Onshore Description chapter.

Land will be temporarily required to accommodate on-site activities such as contractor compounds, associated access tracks, off-road sections of the onshore cable route for HDD and local construction working areas.

### 9.4.1 Primary Contractor Compounds

Three primary contractor compounds will be established to support the construction works, comprising the grid facility contractor compound which will support the construction of the grid facility and two cable contractor compounds (the Bremore cable contractor compound and the Blakes Cross cable contractor compound) which will support the construction of the cable routes.

These compounds will be between approximately 9,500m$^2$ and 12,500m$^2$ in area and will provide the following:

- Space for materials lay down
- Road access
- Securely fenced site
- Space for parking (59 staff parking spaces are assumed to be provided at the grid facility contractor compound and 87 spaces each at the two cable contractor compounds)
- Wheel wash, through which all trucks exiting the contractor compounds will be required to pass. All water from the wheel wash will be collected, fully contained, and dispatched for treatment and disposal off-site
- Construction waste storage
- Site Offices
- Electricity supplied by mains at the three compounds
- IT/telecommunication connection
- Water supplied from the watermain, or bowser, depending on availability of mains supply; and

[1] [1] Fingal County Council planning application ref: F23A/0040 https://planning.agileapplications.ie/fingal/application-details/94329

- Welfare facilities at the sites, with foul wastewater disposed of by removal off-site.

The cable contractor compounds will be used for the external storage of plant, ducts, protective tiles, warning tapes, duct surround materials etc.

Most deliveries will be made to the lay down areas, within the compounds, during normal working hours. The 220kV cables and accessories will be held in the cable contractor compounds and will be delivered to the cable installation site on the day of the cable pull.

After construction is completed, all temporary structures and facilities will be removed, and the contractor compounds/lay down areas will be reinstated to their original condition.

### 9.4.2 HDD Contractor Compounds

HDD contractor compounds will be required for the HDD operations at the following locations:

- At the landfall site for the onshore export cables entry site a compound up to 7,500$m^2$ in area will be provided within agricultural land
- At the railway crossing a compound will be provided either side of the crossing (entry and exit), each up to 1,500$m^2$ in area
- At Wx11 (Blakes Cross North) a compound will be provided either side (entry and exit), each up to 1,500$m^2$ in area
- At the M1 crossing a compound will be provided either side (entry and exit) each up to 1,500$m^2$ in area
- At watercourse crossings where an off-line HDD option is selected a compound either side of the crossing will be provided (entry and exit) within agricultural land up to 1,500$m^2$ in area; and
- At watercourse crossings where an in-line HDD option is selected a compound either side of the crossing will be provided (entry and exit) within the road corridor.

The HDD contractor compounds will accommodate the following:

- Drilling unit
- Drill strings
- Drilling mud (naturally occurring non-toxic lubricant for the drill operation) equipment
- Workshops
- Self-contained welfare facilities
- Offices
- Stores
- Material storage
- Construction waste storage
- Road access
- Vehicle parking
- Gate facility to control access and egress, as well as providing security
- Wheel wash prior to exiting
- Temporary power, either via connection to existing electricity supply or from diesel generator
- Secure bunded area for fuel storage and chemicals, and generators
- Signage and lighting

- Water bowser parking; and
- Surface water runoff management.

Where an in-line HDD crossing is required the HDD contractor compound will be arranged in a longer/linear fashion to contain the equipment within the road corridor.

### 9.4.3 Summary of Contractor Compounds, Working Areas and Associated Access Points

The locations of the contactor compounds and working areas, including associated access points, are listed in Table 9.5 below. These are shown on drawings 281240-ARP-ONS-CR-DR-PL-1101 through 281240-ARP-ONS-CR-DR-PL-1164 (*Proposed Onshore Cable Route Map*) contained in Appendix 7.1.

Access is required to each of these compounds and working areas for the duration of the construction phase. Temporary access tracks/haul roads will be constructed to each of the compounds. In some instances, these access points and access tracks will be retained for the operational phase, to allow ongoing inspection, maintenance and emergency repairs to the onshore cables. More detail on these access points and associated access tracks/haul routes is provided in Section 9.5.2.2 below.

**Table 9.5 Construction compounds and working areas**

| Name | Type | Construction access point | Access Point Type | Drawing reference |
|---|---|---|---|---|
| Grid facility contractor compound | Primary construction compound | B | Realigned & Permanent Access Point | 281240-ARP-ONS-CR-DR-PL-1109 |
| Bremore cable contractor compound | Primary construction compound | C | New & Temporary Access Point (construction phase only) | 281240-ARP-ONS-CR-DR-PL-1109 |
| Blakes Cross cable contractor compound | Primary construction compound | H | New & Permanent Access Point | 281240-ARP-ONS-CR-DR-PL-1131 & 1132 |
| Landfall HDD contractor compound | HDD construction compound | A | Existing Access Point - existing field access from private road (temporary access during construction, access retained for operational phase) | 281240-ARP-ONS-CR-DR-PL-1101 & 1102 |
| Railway HDD entry site contractor compound | HDD construction compound | A | Existing Access Point - existing field access from private road (temporary access during construction, access retained for operational phase) | 281240-ARP-ONS-CR-DR-PL-1101 & 1102 |
| Railway HDD exit site contractor compound | HDD construction compound | C | New & Temporary Access Point (construction phase only) | 281240-ARP-ONS-CR-DR-PL-1109 |
| Water Crossing Wx10 off-line water crossing working area | Working area | E3 & E4 | New & Temporary Access Points (construction phase only) | 281240-ARP-ONS-CR-DR-PL-1124 |
| Water Crossing Wx11 HDD entry site contractor compound | HDD construction compound | F | Existing Access Point (temporary access during construction, access retained for operational phase) | 281240-ARP-ONS-CR-DR-PL-1129 |
| Water Crossing Wx11 HDD exit site contractor compound | HDD construction compound | G | Existing Access Point (temporary access during construction, access retained for operational phase) | 281240-ARP-ONS-CR-DR-PL-1130 |

| Name | Type | Construction access point | Access Point Type | Drawing reference |
|---|---|---|---|---|
| Water Crossing Wx12 and 13* HDD entry site contractor compound | HDD construction compound | H | New & Permanent Access Point | 281240-ARP-ONS-CR-DR-PL-1131 & 1132 |
| Water Crossing Wx12 and 13* HDD exit site contractor compound | HDD construction compound | I | Existing & Temporary Access Point (construction phase only) | 281240-ARP-ONS-CR-DR-PL-1131 & 1132 |
| M1 HDD entry site contractor compound | HDD construction compound | J | Existing Access Point (temporary access during construction, access retained for operational phase) | 281240-ARP-ONS-CR-DR-PL-1135 & 1136 |
| M1 HDD exit site contractor compound | HDD construction compound | K | Existing Access Point (temporary access during construction, access retained for operational phase) | 281240-ARP-ONS-CR-DR-PL-1137 |
| Water Crossing Wx22 HDD entry site contractor compound | HDD construction compound | L | Existing Access Point (temporary access during construction, access retained for operational phase) | 281240-ARP-ONS-CR-DR-PL-1148 & 1149 |
| Water Crossing Wx22 HDD exit site contractor compound | HDD construction compound | M | Existing & Temporary Access Point (construction phase only) | 281240-ARP-ONS-CR-DR-PL-1149 |
| Water Crossing Wx25 and Belcamp substation connection working area | Working area | N | Existing Access Point (temporary access during construction, access retained for operational phase) | 281240-ARP-ONS-CR-DR-PL-1155 |

## 9.5 Construction Methods

### 9.5.1 Pre-Construction Surveys

Prior to the commencement of construction works the following pre-construction confirmatory surveys will be completed, as required:

- Pre-construction confirmatory habitat or species surveys specified as part of the biodiversity mitigation measures
- Confirmatory ground investigations
- Targeted ground investigations (GI) for HDD crossings
- Up to date utility survey check (desktop and site based)
- Topographic survey
- Access route condition survey; and
- Pre-construction, photographic site condition survey.

In addition, the Developer will inform the affected landowners and businesses about the activities, specific works, and the construction schedule via community events, website updates, leaflet drops and doorstep meetings with closest residents. There will be a CLO available for the community to liaise with for the duration of the construction period to address any issues or concerns. All landowners will be contacted prior to access being required on their lands and a date of commencement for the works will be provided to the landowner before any work begins.

### 9.5.2 Enabling Works

In preparation for commencing construction the following enabling works will be undertaken within the proposed development boundary.

#### *9.5.2.1 Contractor Compounds*

The following enabling works will be undertaken at each of the contractor compounds:

- Measures to ensure safe access and egress to working areas and contractor compounds are set out in the Contractor's Construction Traffic Management Plan prepared as part of the Onshore CEMP (Appendix 9.1 – Volume 8) and will be set up in accordance with Chapter 8 of the Traffic Signs Manual
- Install secure hoarding or fencing (2.4 metres in height as a minimum) around each of the compounds that will remain in-situ for the duration of the construction works
- Remove vegetation and strip and store topsoil, ensuring any stockpiles are covered and surrounded with silt fencing
- Create a level platform using crushed stone
- Install vehicle set down and material storage areas in each of the contractor compounds
- Install the site offices and welfare facilities; and
- Undertake all required utility services connections and diversions.

#### *9.5.2.2 Site Entrances and Access Tracks*

As outlined above, access to all working areas and compounds will be required for the construction phase, in the locations listed in Table 9.5. As noted, in some instances, only temporary access, during the construction phase, is required. For others, permanent access tracks will be constructed, to allow for ongoing inspection, maintenance, and emergency repair of the onshore cable, during the operational phase. Details of both temporary and permanent access tracks/haul routes and site entrances are provided on the planning drawings in Appendix 7.1, specifically Drawing No. 281240-ARP-ONS-XX-DR-PL-3013 - Typical Access Road and Temporary Haul Road Details.

Where the access tracks/haul routes cross existing drainage channels or field ditches, other than watercourses (refer to section 9.5.5.11 for details of watercourse crossing), the channel or ditch would be culverted with a suitably sized pipe or box culvert and the access track / haul routes constructed over. The pipe or culvert for access tracks / haul routes required for construction only will be removed post construction and the channel / ditch reinstated to its existing condition. Where the access track is being retained on a permanent basis for the operational phase, the pipe or culvert would be retained.

Temporary site access tracks/haul routes will generally be 5 m in width and will be constructed as follows:

- Topsoil and subsoil will be stripped, and soft spots excavated. Soils will be separated and stockpiled. All stockpiles will be covered and surrounded with silt fencing in a designated area
- Capping and subbase layers (crushed stone) will be placed and compacted; a surface layer of UGM-A (Clause 804) dust blinding will then be applied
- All plant movements will be controlled by a qualified supervisor; works will be zoned by barriers ensuring segregation
- Temporary signage will be installed at intervals (speed limits, passing places, overhead services, etc). Warning "goal posts" will be provided where overhead services cross the route; and
- Alternatively, site access may be provided using access mats to reduce the extent of topsoil/subsoil stripping and reduce the volume of crushed stone required as part of the works.

Access to the grid facility will be via the existing R132 road and an existing field entrance. For that purpose:

- All plant movements will be controlled by a qualified supervisor; works will be zoned by barriers ensuring segregation; and
- Upgrade to the associated existing R132 access road tie-in works will be undertaken once the platform and permanent drainage works in the vicinity are complete.

Where permanent access tracks are required, in the indicative locations identified in Table 9.7, the tracks will be formed similar to that above, being 5 m in width and with a stone base layer and stone blinding finish. The entrance from the public road at these permanent access road locations will be finished with a bituminous base and surface course, in accordance with the details on the planning drawing referenced above (Drawing No. 281240-ARP-ONS-XX-DR-PL-3013 - Typical Access Road and Temporary Haul Road Details) and included in Appendix 7.1.

New field gates (lockable galvanised single width and double width gates and posts) will be installed as required at the site entrance locations. Where required, a bituminous bound bellmouth will be provided up to the edge of the public road to facilitate safe vehicular access and egress.

Two new, permanent access points onto the public road are required, at the grid facility (Access Point B) and at Blakes Cross (Access Point H). These two new access points have been designed in accordance with relevant TII standards to ensure safe access/egress.

The permanent access road to the grid facility, unlike the other access tracks, will have a surface dressing or bituminous finish.

The construction of the permanent access tracks and associated road entrance construction works includes the following:

- The proposed entrance will be constructed using an appropriate material, typically placed using an excavator and suitably compacted using a vibrating roller
- Where required, entrance junction works will be carried out under temporary traffic management (lane closure under traffic signal control
- Road embankments required for the site entrance junctions will be profiled using an excavator, to provide an appropriate safe angle of repose
- Where the access tracks cross existing drainage channels or field ditches, the channel or ditch will culverted by a suitably sized pipe or box culvert and the access track constructed over with the channel or ditch profiled to match
- Surfacing of the entrance at access points from the public road will be bituminous e.g., asphalt. The equipment used will include an asphalt paving machine, ride-on rollers, floor saw and planers
- The surface course will be placed prior to completion of construction, when use of the road for site construction traffic has finished
- Permanent entrance gates will be installed to ensure access control
- Entrance gates will be set back an appropriate distance from the edge of the existing road to allow vehicles to safely access and egress the site.

#### *9.5.2.3 Temporary Site Drainage Measures*

To control surface water runoff from the site during construction, temporary drainage will be installed in accordance with the Onshore CEMP (refer to Appendix 9.1 - Volume 8) at the access points listed in Table 9.5.

The Onshore CEMP also sets out the surface water management measures which will be employed to minimise the risk of pollution of soil, storm water run-off or groundwater.

#### *9.5.2.4 Site Clearance for Working Areas*

The topsoil will be stripped and temporarily stored separately at a designated excavated material storage area for re-use in the reinstatement works.

The excavated material storage area will be at least 50m away from any watercourse and material side slopes will be commensurate with the type of material, to ensure slope stability and prevent erosion. The stockpile will be surrounded in silt fencing to protect the surrounding environment.

#### *9.5.2.5 Existing Utilities*

Any area to be excavated will be subject to utilities searches and CAT scanning. Services, if any, subject to utilities searches and investigation during design, will be exposed using intrinsically safe excavation methods i.e., vacuum or hand excavation. Subject to design requirements and in agreement with the relevant service owner/operator, appropriate protection methods (such as steel plating, concrete slab etc.) will be installed.

### 9.5.3 Landfall site

The proposed construction methods for the onshore infrastructure at the landfall site are detailed below. This includes:

- The HDD of the offshore export cable from the HWM to the TJBs
- The construction of the TJBs; and
- The construction of the onshore export cable from the TJBs to the grid facility, including the HDD of the cables below the Dublin-Belfast railway.

#### *9.5.3.1 Horizontal Directional Drilling*

Horizontal Directional Drilling (HDD) is the method of underground cable installation proposed at the land-sea interface for the proposed development (offshore export cable) and for the crossing of the Dublin-Belfast railway line at the landfall site. HDD generally comprises of drilling a bore underground between two points, into which an electrical cable can be installed, without needing to excavate an open trench along the route. To achieve this, a drill rig drills from an onshore entry pit, toward the offshore exit site (reception pit) of the HDD.

***HDD Set-up***

For the offshore export cable HDD, at the landfall site, the contractor will set up a HDD contractor compound within an agricultural field on the landward side of the coastline (i.e. landward of the HWM) which will be approximately 100m by 75m. Refer to Image 9.1 for a typical image of a HDD compound. It will be located at least 50m from the edge of the sea hills/cliffs. Within this HDD contractor compound the contractor will excavate an entry pit to allow the HDD drilling rig to commence drilling at an appropriate cable burial depth. The HDD entry pit will be approximately 2.5m long x 1m wide x 1m deep.

A further HDD crossing is required to cross under the Dublin - Belfast railway line. This will generally be a smaller HDD rig with a compound area as described in section 9.4.2: however, construction will generally follow the same steps as presented herein.


Image 9.1 Typical HDD Contractor Compound / Rig Setup

***HDD Works – Offshore Export Cable (Landfall)***

Within the landfall HDD contractor compound, the typical space required for a HDD rig entry set-up is up to 50m x 50m (within the wider HDD contractor compound), providing room for the drilling rig, bentonite pumping plant, drill sections and mudlab/mudpit.

The HDD works comprise the following main stages:

A. A pilot hole of approximately 300mm diameter will be drilled from onshore to offshore

B. Once the pilot hole has been completed, the reaming process will commence, increasing the diameter of the pilot hole to accommodate the safe installation of HDD duct. The reaming process will continue back and forth for a number of passes to achieve a bore diameter of approximately 1016mm. During the drilling procedure, drilling mud is continuously pumped to the drill head to act as a lubricant. Solids are removed from the returning mud via the mud recycling plant, and the spoil is transported off site or via the mud pit to settle before being removed

C. A Jack-up vessel, barge, or dredger will be used at the reception pit, ‘punch out’ location in the seabed

D. At the HDD exit site, an approximate 30m x 20m reception pit between 1.5m and 2.5m deep will be created at the reception point in the seabed. This is achieved using mass flow excavation or long reach excavators or a combination of both

E. The last forward HDD reamer head will punch through the seabed at the exit pit

F. The HDD reamer will then be disconnected from the drill pipe and recovered by divers

G. The high-density Polyethylene (HDPE) liner pipe (duct) will be pre-assembled offsite and then floated in, connected to the drill pipe, and pulled onshore from the offshore end through the pre-drilled bore into position

H. Steps A – G are then repeated for the second 220kV offshore export cable

I. HDD construction equipment and plant will then be demobilised from site

J. The ducts will then be checked to make sure they are clear for cable pull-in and messenger wires will be installed

K. Cables will then be installed in the ducts by pulling onshore through the ducts from the offshore delivery vessel to the TJBs, and

L. Trenches are then excavated from the HDD entry points to the TJBs and ducts installed and backfilled.

M. Following the completion of the cable pull-in and installation, the following steps will be undertaken to refill the exit pit

   a. Where a long reach excavator is used, material will be side cast for infill following the completion of works at the exit pit; or

   b. In the instance of mass flow excavation being used, an element of dredged material will pile to the side for infill after works. Additional surface sediment from the surrounding area will be brought to the HDD exit pit where necessary. The removal of surficial sediment will be limited to ensure that no “borrowpits” are formed in the surrounding area.

N. Following the reinstatement of the HDD exit pits, external cable protection will be placed in the pit to protect the cable (see Section 8.4.10 of the Offshore Construction Chapter).

The duct installation mitigates the risk of any gravel or sediments being pulled into the duct during the cable installation phase damaging the cable. Other appropriate controls will be employed to mitigate risk of damage to cables during installation such as positive water pressure with outflow of water from the HDD duct during cable pulling, coupled with a series of roller brushes at the duct entry point.

Once commenced, the HDD drilling activities are expected to operate continuously over a 24-hour period until each bore is complete. Consequently, lighting will be provided to provide a safe working area. Directional lighting will be employed to minimise light spill onto adjacent areas and the lighting will be configured to meet health and safety requirements. The overall duration of the landfall works will take 10 months to complete, with the HDD drilling works comprising four (4) months and the cable pulling a further two (2) months. Drilling of both bores may be carried out simultaneously to accelerate the works programme.

The HDD will require a drilling fluid to stabilize the bore, and cool and lubricate the drill head. Typically, an inert, non-toxic bentonite fluid is used, which is a mix of water and bentonite clay.

The bentonite effectively seals the bore maintaining a closed system throughout the drill. The bentonite drilling fluid is circulated down through the drill rods and back up outside the rods in the annulus of the borehole.

Every endeavour will be made to avoid a breakout or frac-out (loss of drilling fluid to the surface) and it will be managed quickly if one occurs. During the HDD boring, the drilling fluid will be ‘self-contained’ with all fluid returned onshore to a recycling pit or tank, where it can be filtered and re-used for drilling purposes. Upon completion of the HDD works, the majority of the drilling fluid can be reused post-treatment, with any waste drilling fluid taken offsite by tanker for treatment and licensed disposal.

Water will be brought to site in tankers (to make up drilling fluid) for lubrication of the bore and to provide the requisite volumes of water to the compound. The water used will be non-saline and non-potable water.

***Anchoring of HDD Rigs***

During the drilling of a pilot hole, reaming out and installation of HDD duct pipe, a HDD rig can exert a considerable pushing and pullback force. This force is generally 30 tonnes but can potentially be up to 300 tonnes. The rig will therefore need to be anchored to the ground and this is usually achieved by either anchoring directly to rock or an anchor block of reinforced concrete to secure each rig during the works.

A temporary anchor block typically consists of a mesh reinforced concrete block of approximate plan dimensions 4.5m x 4m x 1.5m for each HDD, which will be constructed onsite and removed upon completion of the HDD works.

Final details are dependent on specific HDD plant and ground conditions will be confirmed at construction stage, by the contractor. However, the scale and characteristics of the construction works set out above are considered to be suitable to inform a precautionary assessment.

***HDD Works- Railway Crossing***

In the case of the railway crossing constructed by HDD, this will follow similar steps as outlined above for the offshore export cable HDD works at the landfall, albeit noting that both entry and reception pits will be onshore, either side of the railway line.

Within the railway crossing HDD contractor compound, the typical space required for a HDD rig entry set-up is up to 50m x 30m, providing room for the drilling rig, bentonite pumping plant and drill sections for two onshore export cables. A continuous, unbroken duct will be required to be spooled out and pulled through the HDD bore. Space for the string out operation will be provided within/adjacent to the HDD contractor compound but within the proposed development boundary.

#### *9.5.3.2 Transition Joint Bays*

Two cable Transition Joint Bays (TJBs) will be provided where the offshore (subsea) export cables transition to onshore (terrestrial) export cables. At the TJBs, the three-core offshore export cable is split out and each conductor is jointed to three separate onshore single-core export cables. The location of the TJB will depend on the HDD location selected at detailed design stage. Joint bay typical details are provided on planning drawings 281240-ARP-ONS-XX-DR-PL-3006 – 3008, included in Appendix 7.1.

The TJBs will comprise a buried concrete chamber, typically 20m long x 5m wide x 2.5m deep. One chamber will be required for each cable. The chambers will be constructed within an excavated pit, approximately 2.5m deep. The sides of the excavations for the TJBs will be profiled to a safe angle of repose or safely shored using trench support or sheet piling. The TJBs walls will be constructed using reinforced concrete, potentially pre-cast, and the floor of each will be concrete lined to provide a flat, clean working environment. The TJBs may be constructed prior to, or in tandem with, the HDD works in order to minimise construction delays and reduce the length of time for the offshore export cable pull in works.

The offshore and onshore export cables must be joined together in a controlled environment, requiring a purpose designed shed or tent to be placed temporarily on top of each TJB chamber. These will be removed once the onshore and offshore export cables have been jointed.

The TJB chamber is typically backfilled with sand, with the ducts being locally surrounded in concrete and suitable backfill material being provided above the concrete surround. The uppermost layers will be reinstated as per the original ground profile (i.e. subsoil and topsoil). Surplus excavated material will be reused in the general reinstatement of the site where possible or otherwise disposed of as per the construction waste management plan for the proposed development.

Adjacent to each TJB there will be an earth link box. Earth link boxes are used at cable joints and terminations to provide easy access for cable testing and fault location purposes. Earth link boxes will require a number of surface level access covers placed in the vicinity of its associated TJB.

The area around the TJBs will be backfilled with the excavated material upon completion of the jointing works, but permanent access will be required to the earth link boxes during the operational lifetime of the proposed development for maintenance purposes. In addition to the earth link boxes, there will be a requirement for a separate small communications chamber that will house jointing of the fibre optic cables.

After installation and reinstatement of the onshore TJBs, the only visible above ground equipment will be manhole covers to allow access to the earth link boxes and communication chambers. There will be four manhole covers which, where possible, will be positioned close to field boundaries.

The access track to the TJBs for construction will be maintained for permanent access during the operational phase.

#### 9.5.3.3 Open Cut Trenching – Onshore Export Cable

While a HDD crossing of the Dublin-Belfast railway line is required, the rest of the onshore export cable route between the TJBs and the grid facility will be laid using open cut trenching technology. This also includes a crossing of the R132. The methodology for open cut trenching is described in more detail below in Section 9.5.5 for the onshore cable route. Any joint bays located along the onshore export cable will be constructed in accordance with the details in Section 9.5.5.8 below.

#### 9.5.3.4 Cable Installation

Following the completion of the duct installation, each cable of both the offshore export cables and the onshore export cables will be pulled through the ducts and joined at the TJBs and any other joint bays located along the onshore export cable route (e.g. at the Dublin-Belfast railway crossing).

A ground level platform will be constructed at each TJB/joint bay for the cable pull-in winch. The winch will be anchored using kentledge blocks, sheet piles or rock anchors.

**Image 9.2 Typical onshore cable pull-in winch**

Prior to pulling, the cable ducts will be tested to ensure the cable can be pulled through without any obstructions.

#### 9.5.3.5 Existing Railway Bridge (OBB 62)

Access to the landfall area is along a cul de sac road – Bell's Lane - off the R132 and over an existing railway bridge (OBB62) over the Dublin-Belfast Railway line. This bridge will need to accommodate construction traffic accessing the landfall during the construction stage. A structural assessment will be undertaken prior to construction to assess the potential impact of the increased traffic loading and to determine any necessary mitigation and control measures required to be implemented. Any strengthening or other measures needed, up to and including the use of a temporary (bailey) bridge in this location, will be agreed with the landowner and Irish Rail, prior to commencement of construction.

### 9.5.4 Grid Facility

The grid facility, which is required close to the landfall site, will consist of the following:

- The compensation substation
- The Bremore substation; and
- Ancillary site infrastructure.

The substations will comprise various structures, buildings and electrical equipment as described in the Onshore Description chapter. These will be located within a wider site compound. The construction works associated with the grid facility are described below.

#### *9.5.4.1 Substation Platform Construction/Earthworks*

A level platform will be required for each of the 2 no. substations. The earthworks to create the substation platform(s) will be as follows:

- Earthworks will be carried out across the site to create level areas for the two (2) substations, surface water retention pond, access routes and site compound
- Where required, ground will be locally excavated for the cable basements and footings of the external electrical infrastructure
- The ground will be compacted and levelled to form an even working platform
- Suitably graded imported material will be delivered to site by lorry and stockpiled for use in the substation works
- Outside of the building and road footprints, this layer will be topped off with a minimum compacted thickness of 200mm of crushed stone fill material to finished site levels
- Imported material will be placed using excavator and dump trucks, then levelled by mechanical means to the required thickness
- The material will then be compacted by roller in layer thickness defined by the detailed design
- The surface of the final layer will be graded to avoid ponding of water and to direct surface flow to the site drainage
- Any ground, excavated in the course of installing underground services and footings, which is not suitable for reuse on site, or surplus to requirements, will be stockpiled, tested and classified for recovery or disposal. Any excess or unsuitable material from the earthworks will be removed from site to a licenced facility. Refer to Volume 5, Chapter 31: Resource and Waste Management for further information
- Available geotechnical information has not identified any contaminated materials. An additional targeted geotechnical survey will be carried out prior to construction and the treatment of any potentially contaminated materials identified will be defined at this time, as detailed in Chapter 31: Resource and Waste Management.

#### *9.5.4.2 Site Perimeter Fencing*

Permanent fencing will be installed following completion of earthworks. The site perimeter fence will be erected using the following method:

- Marking the line of the fence and then the positions of the fence posts
- Drilling or excavating holes using an excavator with suitable attachment to a depth required to ensure stability of the fence
- Placing the fence posts and infilling the hole with concrete from a concrete skip attached to an excavator or direct from the concrete delivery lorry if access is available
- Placing or pouring a concrete cill below the line of the fence
- Placing fence rails and support members between the fence posts
- Placing of gate sections and support members at access points into the substations; and
- Installing and connecting appropriate earthing.

### *9.5.4.3 Ducts, Troughs and Earthing Grid*

The substations will have an earthing grid installed typically 600mm below platform level. The methodology for the earthing grid installation is as follows:

- The earthing grid will be progressed in conjunction with drainage/ducts/troughs and foundations to ensure it is progressed safely and efficiently. As far as possible open excavations will be avoided, and the excavations will be backfilled the same day. Where necessary, open excavations will be suitably protected
- An excavator will be used to place the earthing grid. If required, imported selected backfill material may also be used to achieve necessary equipment specific earthing ratings.

Electric and fibre optic cables will be installed in ducts and troughs to provide linkage between different elements of the electrical equipment. The ducts and troughs will be installed as follows:

- A tracked excavator will be used
- The sequence of installation will be carefully planned with the drainage and foundations installation to ensure that it can be carried out safely and efficiently
- Ducts and chambers will be installed in shallow excavations. As far as possible, open excavations will be avoided, and the excavations will be backfilled the same day. All open excavations will be protected by barriers
- Excavations for cable troughs will be benched to avoid the need for additional ground support. The base of the excavation will be prepared typically with mass concrete. Precast concrete trough units will be placed using mechanical lifting, using a tracked excavator. The excavations will be backfilled as soon as possible. Precast covers will be placed progressively to avoid a fall hazard of open troughs. Whenever covers are removed or omitted, edge protection/barriers will be provided.

### *9.5.4.4 Site Foundations and Slabs*

Both the compensation and Bremore substations comprise a Gas Insulated Switchgear (GIS) substation building, along with ancillary infrastructure within their own self-contained compounds. The compensation substation also has an outdoor transformer within its substation compound. The substations will have various reinforced concrete foundations to provide support to the GIS buildings and other external electrical equipment.

The proposed methodology for the site foundations and slabs is described below:

<u>Excavation and Blinding</u>

- All excavations will incorporate suitable edge protection
- Excavations will be undertaken by appropriately sized excavator – typically 20 or 25 tonnes for larger structures, and 13 tonnes for smaller structures. Excavations will be benched or battered, and if required temporary stairs will be provided for safe access into excavations. To prevent degradation, formation levels will not be left exposed in inclement weather. Blinding concrete will be placed as the excavation progresses over several days, or a protective surcharge will be left for final trim
- Blinding will be placed using a machine bucket, or crane and skip, or by concrete pump
- If required, a sheet piled ground support system or other similar trench support system, or ‘trench box’, will be used to reduce the extent of excavation or provide support to provide safe space to work for operatives
- Excavations will be de-watered by mechanical means, i.e. a submersible pump, and will discharge to a suitable treatment system or retention pond before out falling to existing watercourses
- The excavation support will be lifted into position by a suitable sized excavator or crane, with installation by a suitable attachment for an excavator or from specialist installation equipment.

Steel Fixing

- Where possible steel reinforcement cages will be prefabricated at ground level and lifted into position by a suitably sized excavator or crane
- Where fixed in situ, reinforcement will be lifted onto the blinding in bundles and then distributed by operatives tying the reinforcement cage together
- Reinforcement will be fixed progressively across the blinding, using tying wire and hand tools. Strips of rubber matting will be placed to provide safe access to reduce trip hazard on reinforcement mats
- Protection will be provided to starter bars and any projecting steel.

Shuttering and Preparation for Pour

- Prior to erection, shuttering panels (which will be assembled into the formwork, into which the concrete will be placed) will be inspected to ensure they are clean and free from damage. Shutter oil, used to prevent the concrete sticking to the shuttering, will be applied by brush, roller or spraying
- The panels will be placed using mechanical lift assistance. Kickers and bolt hanging jigs etc. will be completed in timber and plywood
- Cast-in bolts and ducts will be installed during shutter installation
- Prior to placement of concrete, the shuttering will be checked, and debris will be blown out or removed by hand.

Placement, Compaction, Finishing and Curing of Concrete

- Concrete will be placed by crane and skip, or by concrete pump, working progressively across the pour in layers, to ensure the working front is kept "live"
- Concrete will be compacted using portable vibrating poker
- Unformed surfaces will be tamped off to the required level, before being floated to the required finish. Some slabs may require a power float finish
- The finished concrete will be covered to aid curing, typically with polythene covers or sprayed with curing membranes. Protection from rain or cold may be required in inclement weather
- The covers and protection will remain in place until the concrete has cured and the temperature of the concrete has reduced to a suitable level.

Striking Formwork, Finishing Works

- The sequence for striking (removing) formwork will be planned, and temporary propping for stability will be provided if required
- Formwork will be stuck when the concrete is sufficiently cured and has gained sufficient strength
- On striking formwork, defects and tie holes will be made good, and any rubbing up/finishing will be carried out
- Surface treatments (if any) to surfaces will be applied
- The space between the excavation and the cured concrete will be backfilled as soon as possible.

##### *9.5.4.5 Steel Superstructure Erection, Wall Cladding, Roof Installation, Gutters and Rainwater Pipes*

The superstructure of the substation buildings will be a structural steel frame. The structural steel will be erected once the foundations have been completed. The walls and roof metal cladding will be fixed, making the buildings weather-tight, when the structural steel frame is complete.

Structural Steel Erection

- Suitably sized plant and equipment will be used to erect the steel frame
- The structural steel will be fabricated in suitable fabrication facility, with all required fire and corrosion coatings applied and cured before delivery to site for assembly
- The sequence of operations will be carefully planned, ensuring that the structures are built progressively to maintain access, and temporary bracing may be required to ensure stability
- Large span roof trusses will be assembled at ground level in two parts, which will be connected by an "air splice" to avoid tandem lifts.

Wall Cladding and Roof installation

- Equipment to be used will include mobile cranes, mobile elevated work platform access, scissor lifts, scaffold and tower access, fall arrest netting
- The sequence of operations will be carefully planned to ensure the installation is progressed safely and efficiently.

Floor Screeds and Finishes

- Floor screeds and finishes will comprise a pumped floor screed and specialist concrete floor paints.

Internal Walls and Partitions

- Once the building envelope is water-tight, internal walls will be constructed using a metal stud partition system
- Plywood pattresses will be installed where items are to be fixed to the walls
- Appropriate fire rating for walls and ceilings will be achieved by use of cement board, cement blocks and/or concrete
- All walls will be painted
- First and second fix joinery will be installed
- Electrical equipment and instrumentation will be installed
- A specialist subcontractor will install fire stopping and will be certified in accordance with specifications
- Rooms will be fitted with required fixtures and fittings.

#### *9.5.4.6 Electrical Equipment Fit Out*

Once external foundations are constructed or buildings are weather-tight, the electrical equipment fit out for the substations will be undertaken. The electrical fit out includes the following:

- Delivery and installation of all high voltage equipment, communication mast and lightning arrestor masts
- Wiring and cabling of all high voltage equipment and protection and control cabinets
- Commissioning of all newly installed equipment.

#### *9.5.4.7 Drainage, Wastewater and Potable Water*

Below ground drainage will be installed prior to construction of the substation building superstructure/roof drainage. Final connection will be made when down pipes are installed to ensure accurate positioning.

Road gullies, filter drains and associated connections will be installed during road construction, prior to trimming sub-base, and surfacing. Gullies will be finished once the binder course has been installed. Ground support will be by trench sheets/trench boxes/manhole boxes. Excavation will be by excavator, sized to suit the drainage being carried out. An excavator will be used to place pipes.

The proposed attenuation basin – which will be approximately 70m in length and 15m in width - will be formed by excavating material by mechanical means, to a depth of approximately 2-3 metres. The base of the excavation will be formed and proof-rolled, a HDPE liner and protective geotextile will be included in the pond. The precast concrete inlet and outlet headwalls and associated pipework will be constructed prior to landscaping the pond. The roadside swales will be formed in a similar manner to the attenuation basin, albeit on a smaller scale.

Foul sewers will also be installed and the foul wastewater holding tanks will be constructed. Potable water mains will be laid and a new connection to the public mains will be made.

Details of the drainage, wastewater and potable water are provided on the planning drawings in Appendix 7.1 (Drawing Reference 281240-ARP-ONS-GF-DR-CD-1200 and 1201).

#### *9.5.4.8 Site Finishes and Surfacing*

When construction works are substantially complete and the risk of damage to surfaces from construction traffic is reduced, the permanent surfacing of the access tracks, road surfacing will be completed for the permanent access tracks and permanent site signage will be erected and unpaved areas within the grid facility will be surfaced with single sized crushed limestone.

Road Surfacing

- Top surface of the bituminous binder layer will be thoroughly cleaned, and tack coat will be applied to the binder layer, prior to placing the surface course by the surfacing contractor
- Surface course material will be delivered by lorry, placed using asphalt paving plant and then be compacted by roller.

Lining and Signage

- Road markings will be applied as soon as possible after the surface course has been placed
- Permanent Road Signage will be installed, fixed either to fences or buildings, or mounted on galvanised steel poles, which are embedded in a concrete mass footing in the ground.

Substation Surfacing (non-paved areas)

- A minimum 150mm layer of 50mm single sized crushed limestone will be placed in non-paved areas
- The stone shall be separated from the existing subsoil by a geotextile membrane and will be compacted in layers following placement.

### 9.5.5 Onshore Cable Route

The onshore cable route commences from the Bremore substation within the grid facility and connects to the 220kV substation at Belcamp. The onshore cable route between these two substations will comprise two (2) 220kV High Voltage Alternating Current (HVAC) cable circuits, laid underground, as described in Chapter 7: Description of the Proposed Development – Onshore,  with associated fibre optic communication and earth cables.

While the programming of works along the overall cable route may vary (i.e. sections of cable laying may be concurrent in different locations or sequential – see Section 9.3.3), the overall sequence of works, for each section, will generally follow the methodology below.

#### *9.5.5.1 Enabling Works and Site Clearance*

Enabling works and site clearance activities as outlined in Section 9.5.2 will be undertaken as required.

At discrete locations along the cable route, minor works, such as tree/hedgerow removal to accommodate the construction of access points and haul roads off the public road, or in off-line sections where cables are laid through field boundaries, will be required.

In these locations, subject to agreement with the landowner, the existing fencing, hedgerows and/or walls will be removed as required for construction and reinstated to the extent possible, on completion of the works, with appropriate materials. The extent of the removal and reinstatement will be minimised as much as possible.

Where the perimeter of the proposed development boundary runs along field boundaries, temporary and permanent access tracks will not be sited within 3m from the edge of the hedgerow vegetation and no other construction works or activities will be sited within 5m of the hedgerow vegetation.

As outlined in Section 9.3, vegetation removal will be conducted outside of the breeding bird season unless ecological surveys identify that no nesting birds are present (see Volume 4, Chapter 23: Biodiversity for further details). Temporary working areas will be fenced to prevent trespass to protect the public and livestock. The fencing will remain in place for the duration of the works and until reinstatement of the land to its original condition has been completed.

Prior to any excavation works, the location of underground utilities will be confirmed, through further engagement with utility providers, review of utility records and by hand held CAT scanning, as required.

#### *9.5.5.2 Site Access*

Where excavations cross existing farm tracks or roadways, obstruction will be minimised, and arrangements will be made for the safe passage of persons, farm machinery and livestock across the working width, as required by the landowner. All permanent farm tracks and roadways will be restored to their original condition, following completion of construction.

#### *9.5.5.3 Site Drainage Measures*

Land drains, open drains, drainage pipework or watercourses, affected by the works, will be maintained until completion of the works, and restored to their original condition. Where required, drainage will be temporarily diverted or over pumping, with appropriate water treatment as required, will be employed.

#### *9.5.5.4 Existing Utilities*

Cognisance has been given, in the development of the design, to avoid conflicts with existing utilities (e.g. water mains, surface water network, telecommunications), to the extent possible. Where any utilities are affected by the works (through crossings or localised relocations), these will be reinstated as soon as is feasible to reduce the disruption to the existing utility, or an alternative supply provided on a temporary basis until the permanent supply can be reinstated. Where access to drinking troughs for animals is disrupted by the works, an alternative supply will be provided for the duration of the works.

#### *9.5.5.5 Open Cut Trenching Methodology*

For much of the cable route, open cut trenching will be used to install the cables. The methodology for open cut trenching is detailed below, for works within the public road (majority of the cable route) and for off-line sections.

<u>Cable route construction within the public road</u>

As described in the Onshore Description Chapter Section 7.5, where possible, the cable has been routed along the public road, in accordance with Eirgrid requirements. Where this is the case, the cable route will be divided into a series of rolling short sections of works areas. Along most of the cable route, the cables will be installed using open cut trenching techniques. It is anticipated that the open cut trench construction works (to install the cable ducts) will typically follow the following sequence:

- A section of route (road) approximately 200 metres long will be fenced-off
- The road over this section will then be excavated to the required depth (typically 1.4m) and the ducts installed

- Where possible the material excavated from the trench will be re-used within the trench, e.g. sub-base and capping layers. Where possible, the excavated material to be reused will be stored adjacent to the trench, while the trench is open. Unsuitable material will be stored separately or disposed of. Once the trench has been backfilled, any surplus or unsuitable material will be removed by truck, in a planned operation, in which the truck will be summoned to collect a load and will depart immediately, once fully loaded
- The cable trench will then be backfilled with duct surround material to Eirgrid Specifications and selected backfill to TII Specifications each day, along with the placement of warning tapes or boards as protective measures
- The road surface (road base and wearing course) will be reinstated (the surface reinstatement will extend beyond the width of the trench to finish at the centreline of the road in line with local authority requirements)
- The ducts will be cleaned of any debris and water by a series of brushes and rubber discs, usually pulled through as a 'train'.

Typical plant used for the cable route trenching in the public road will be:

- Road saw(s)
- Excavator, with hydraulic breaker to break the road course
- 4-axle lorry, for removing excavated material
- Small dumper(s), to take the excavated material to the 4-axle lorry, if it is not possible to locate the lorry adjacent to the trench, and to deliver trench backfill materials; and
- 4-axle grab loader lorry, for removing excavated material from dumpers.

Details of duct installation, cable installation and cable jointing are provided in Section 9.5.5.7, Section 9.5.5.9 and Section 9.5.5.10 below. Typical details of the onshore cable route, including cable trenches are shown on the planning drawings 281240-ARP-ONS-XX-DR-PL-3000 to 3012, in Appendix 7.1.

Given the nature of these works, the local road network and other factors such as access requirements, locations of joint bays and the construction schedule, there will be a requirement for either temporary lane, or full road, closures to undertake the cable route construction works along the public road. These partial (lane) or full road closures will be sequenced to minimise the impact on the local road network and residents. Details of the required partial (single lane) and full road closures are included in Volume 4, Chapter 24: Traffic and Transportation Chapter. Further detail on traffic management is included in Section 9.6.

The rolling short sections of partial (single lane) or full road closures will be fenced off and temporary traffic management installed, in accordance with Chapter 8 of the Traffic Signs Manual. Once the temporary traffic management has been established the excavation work will commence; the road will be excavated, ducts installed, and the duct excavation back filled with bedding material on a daily basis (i.e. no open trench excavations overnight, where practicable). In accordance with the Construction Traffic Management Plan the road surface will be reinstated on the duct excavation and the temporary traffic management modified accordingly (i.e. the rolling section of lane or road closures will reopened to traffic). The rolling sections of lane or full lane closures will be coordinated with the construction of the joint bays. The construction of the joint bays will take longer than duct installation.

At various locations along the public road, it will be necessary to cross existing utilities and services. Details of proposed crossing methodologies are provided in Section 9.5.5.11 below. In addition, it will be necessary to cross other key constraints such as watercourse crossings, where alternative construction methodologies may be required. This includes the use of both in-line and off-line alternatives, as well as both open cut and HDD types of crossing as described below in Section 9.5.5.11.

Off-road Cable Sections

As detailed in the Onshore Description Chapter Section 7.5, there are a number of locations along the cable route where the cables will be laid through private lands. Depending on the location of the off-road cable construction, an appropriate construction working width has been agreed with the relevant landowners. This will typically be approximately 18m – but may be up to 30m in places - to give sufficient space for the excavation of the trench, storage of topsoil and subsoil arisings, temporary haul roads for the movement of the excavation equipment, and general installation vehicles for the delivery of materials such as ducting, protective covers and bedding.

A schematic showing the arrangement of the construction activities, within the working width, for the off-road sections which traverse private lands is presented in Image 9.3.

Where the onshore cable route passes through hedgerows, drainage channels, or similar, the width will be narrowed to approximately 11m, as indicated below.

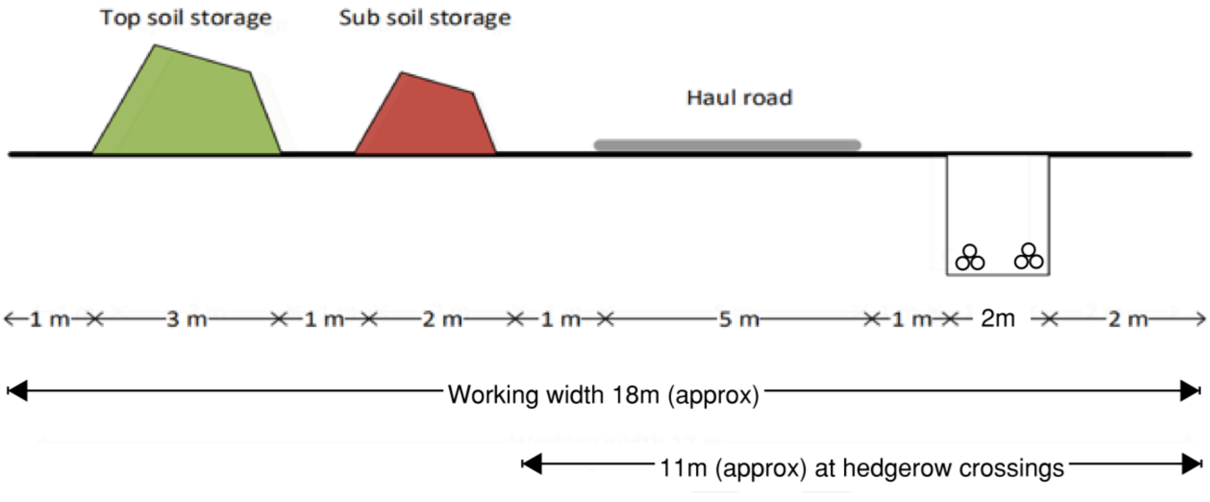


**Image 9.3 Working Corridor for Cables in Private Lands**

The construction methodology, where open cut trenching is used off-road, will generally follow that set out in Section 9.5.5.5 above.

Where off-road sections are required for watercourse or other crossings, alternative construction technologies (HDD) may be utilised, as detailed below.

### *9.5.5.6 Horizontal Directional Drilling (HDD)*

Where required, for crossings of key constraints along the onshore cable route, duct installation will be undertaken by HDD either within the road corridor (in-line HDD) or in private lands adjacent to the road (off-line HDD). The more significant HDD operations (landfall, railway crossing [refer to Section 9.5.3] and the M1 crossing) are described in this chapter, for all other HDD crossings, the typical methodology is as described below.

The HDD will consist of a minimum of two (2) bores drilled underground to the required depth, with suitable spacing between them. These HDDs will be constructed using a mini or midi sized HDD rig similar to those shown in Image 9.4. The HDD bores will vary in length from 50m to 150m and will be at a sufficient depth to pass below existing buried services, riverbed or bridge/culvert foundations but above hard ground / solid geology. The length of the HDD's will be confirmed prior to construction and may include pressure relief pits to manage the risk of ground heave.


**Image 9.4 mini or midi HDD rig**

The HDD will typically use a jetting assembly and a walkover tracking system to monitor the bore position during the pilot hole. The tracking system will have a remote, or “drill to” tracking feature to allow the bore to be tracked under inaccessible locations or busy roads.

Following completion of the pilot hole the pilot bit and sonde are removed and the first reamer is attached to be pulled back through to enlarge the bore. A number of reaming passes may be required to achieve the final bore diameter. Fluid pumping rates for mini or midi HDD rigs are much less than for maxi HDD rigs, typically 150-350 litre per minute (lpm).

The duct will have been prepared in advance of the final ream. Short lengths of small diameter duct can be supplied in rolls, otherwise 6m or 12m lengths of duct will have been welded into a string and internally de-beaded at the exit location.

When the reaming phases are completed, a cleaning run will be undertaken with a reamer of larger diameter than the duct to ensure the bore is clear. The reamer will then be pushed back to the exit point and attached to the duct with a swivel and shackle, the swivel to ensure that the duct does not rotate with the reamer and drill rods. The operator then pulls the duct into the bore by progressively pulling back each rod, removing it from the rig and then connecting to the next rod. The duct is normally left attached to the rig overnight to allow recovery of any elastic strain in the duct.

A bentonite fluid is typically used for drilling, but its viscosity is normally lower than that used for major HDD crossings and landfalls. A weaker fluid mix is used because linework tends to incorporate the cut ground in the drilling fluid as a sediment rich slurry, rather than carry the cuttings from the bore for recycling. The HDD equipment for line work does not normally include fluid recycling equipment unless the HDD is expected to be in rock. Any excess fluid created during the drilling and duct insertion will be cleaned up and removed from site for disposal.

Typical equipment for these HDD's are:

- A tracked mobile mini or midi HDD rig with one person operator's cabin, onboard mixing system and automatic rod changing system
- Drilling fluid mixing and storage system
- A tractor and bowser, and possibly a flatbed trailer; and
- A light truck/van with equipment and spares.

Typically, the mini or midi HDD rig is loaded onto a flatbed truck or low loader to be transported to and from site and between HDD locations.

#### *9.5.5.7 Duct Installation*

Ducts will typically be delivered to working areas in c. 9m sections. Where the route changes direction, care will be taken to ensure that local over-bending of the ducts will not occur at the connections. Alternatively, pre-formed bends will be used at tighter changes in direction. Pre-formed bends will be avoided, as much as possible, as they increase the pulling force on cables during installation and so reduce the length of a cable that can be installed.

Due to the way push-fit ducts are connected, with a considerable length of interference (i.e. the 'male' part is inserted at approximately 300mm to ensure adequate sealing of the duct joints), the ducts will be installed in a continuous process. Trying to insert ducts in gaps in the route, at road crossings for example, requires a considerable length of duct to be lifted in order to provide the spare length to accommodate the interference, and there is a risk of disturbing good duct connections at either side of the gap.

For this reason, it is essential that the whole of each cable section, between joint bays, will be available and accessible before duct installation commences, and that one crew works from one end to the other. Multiple crews working on the same section of ducting between joint bays is not practicable and will not be carried out.

The push-fit joints are designed to present minimum interference to the cable when pulled in one direction through the joint, from the 'male' end of one duct into the 'female' part of the next duct. Therefore, the installation of the cables will be planned before the ducts are installed, to ensure that the orientation suits the proposed pulls.

Cables can be pulled in the opposite direction, but additional scuffing of the cable over-sheath, and increased pulling tensions, could occur.

A nylon rope will be left in each section of duct to enable cleaning equipment to be pulled into the duct. The ducts will then be sealed.

#### *9.5.5.8 Joint Bays*

Joint bays are required at intervals along the onshore cable route. The following methodology will be used to construct the joint bays:

- A large excavation will be dug at the joint bay locations, typically 2.15m (min) deep by 2.5m wide by 8m long, the depth of the excavation will depend on underlying ground conditions
- The base of the excavation will be trimmed and prepared for installation of the jointing bay, including a layer of concrete blinding
- Where required, de-watering pumps will be used to remove ground water from the excavation to existing watercourses with appropriate water treatment
- The precast concrete units will be assembled and fixed in place within the excavation
- Openings in the precast concrete units will be coordinated with the cable ducts and all openings sealed with non-shrink material
- In some scenarios, reinforced in-situ concrete will be required in lieu of precast concrete units

- The ancillary precast boxes (link, communications and earthing) will be installed
- The excavation will be back filled with suitable material in advance of the cables being pulled through
- Cable pulling locations will be identified, in both directions, at each joint bay.

The layout and location of the joint bays will be carefully considered to optimise the construction and reduce the impact on the local environs during construction.

#### *9.5.5.9 Cable Installation*

The following methodology will be used in installing a cable, or pulling into a duct:

- Cable drums will be transported from the cable contractor compounds to the joint bays on low loader vehicles
- If space constraints mean that the low loader vehicles cannot directly access a joint bay, the cable drums will be transferred to drum stands
- The cable pulling will be undertaken using the pulling equipment located on a hardstand area adjacent to the joint bay
- A suitable length of spare cable will be coiled at either end to undertake the joining process
- A temporary shelter will be placed over the joint bay to provide a safe and clean environment for an engineer to work in while connecting the two cable ends. This shelter could be a modified shipping container
- The cable will be jointed, refer to the next activity description
- The temporary shelter will be removed when the cable jointing is completed
- The joint bay will be backfilled with clean sand, with red cable marker tape above the cables
- A precast reinforced concrete slab will be placed over the top of the joint bay before yellow cable markers are installed as part of the remaining backfilling and final reinstatement
- The cable will be tested and commissioned.

#### *9.5.5.10 Cable Jointing*

The joints will be made at a joint box after two lengths of circuit have been winched into position in the duct.

The following methodology will be used in installing a joint bay along the onshore cable route:

- The area of the joint bay will be excavated down to a suitable bearing stratum, with the sides of the excavation either battered or shored
- If necessary, ground water will be pumped out and discharged downslope via suitable surface water management means
- The reinforced concrete base slab will be constructed, followed by the reinforced concrete walls. Alternatively, precast U-channel sections may be used and lifted into place using appropriately sized excavator or crane
- The required number and orientation of duct penetrations will be formed in the walls
- The perimeter of the excavation will be backfilled as much as possible once duct penetrations are sealed with a non-shrinking material, or fully if the cable trench is already installed on either side
- Ancillary items including the link box and communications chamber will be installed adjacent to the joint bay
- The pull-in locations on either side of the joint bay will be prepared to support the cable pulling equipment and the cable drum.

The joint bay may be constructed in advance of the cable trench on either side.

#### *9.5.5.11 Crossings*

The cable route will cross existing services, utilities, roads, bridges and watercourses along the proposed cable route. Depending on the nature of the crossing and the constraint, different construction methodologies will be adopted to undertake the crossing, with several options being considered. The final methodology will be confirmed prior to construction, but in general, will comprise either open cut trenching (similar methodology to that described in Section 9.5.5.5 above) or via horizontal directional drilling (HDD), as described in Section 9.5.5.6 above.

Utility/Service Crossings

Given the nature of the proposed development and the fact that most of the cable route is within the public road, there will be a requirement to cross existing utilities and services, such as electrical services, watermains, foul and surface water sewers and telecommunications ducts in particular locations. Record (as built) details of utilities have been reviewed and GPR surveys have been undertaken in some locations and consultation with key utility providers has been undertaken to determine the location and extent of utility crossings needed.

Depending on the type, size, nature and depth of cover to these utilities and services, a number of construction methodologies will be employed. This includes crossing underneath the utility/service (if sufficient cover is not available), crossing over the utility/service (if the utility/service is at an appropriate depth to allow this), local diversion of the utility/service, or if required HDD. All of these crossings will be confirmed and the methodologies agreed in advance with the utility/service provider.

Where the crossing is achieved by use of an open cut trench below the utility/service, this will be undertaken by hand digging. Protective timbers will be strapped around the pipeline/duct as it is exposed, such that the timber will provide support and protection to the short length of exposed pipelines. The trench will be deeper than a standard cable trench to allow the ducts to be installed under the utility/service. The protective/supporting timbers will be removed as the cable trench is backfilled carefully by hand.

Road Crossings

Where the onshore cable route crosses roads (as opposed to running along them), the trench detail will remain as per the standard open cut trench methodology, however the backfill material may be changed to mass concrete. At locations where a road crossing is required, a temporary traffic management plan will be produced and agreed with the road authority in advance.

M1 Crossing

The cable route will cross under the M1 motorway by HDD. A smaller HDD-rig than that proposed for the landfall HDD will be used for the M1 motorway crossing. The exact equipment to be used will be subject to the contractor's available equipment and the detailed design. However, the scale and characteristics of the construction works described below are considered to represent precautionary assumptions for the purposes of assessment.

The HDD for the M1 will be approximately 180m long with an anticipated maximum depth of approximately 10m under the motorway carriageway and is shown on Drawing 281240-ARP-ONS-CR-DR-PL-1136 in Appendix 7.1 of Volume 8. The M1 HDD schematic is also shown in Image 9.5.

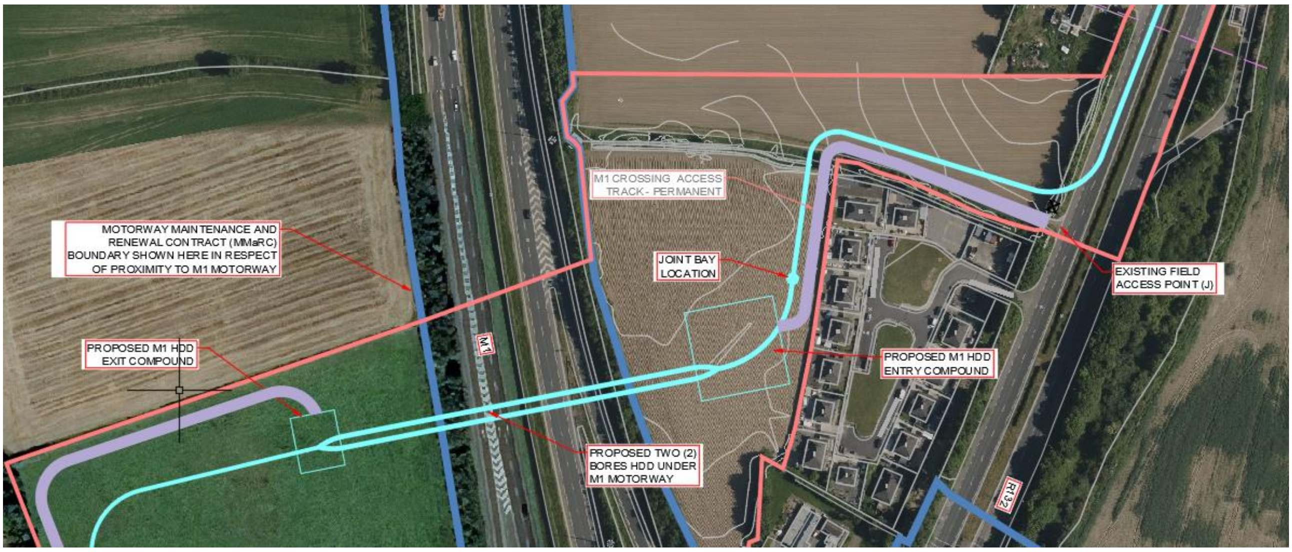


**Image 9.5 M1 HDD Crossing (not to scale)**

The typical space required for the smaller HDD rig entry set up is up to 40m x 40m, providing room for the drilling rig, bentonite pumping plant and drill sections.

The typical space requirement for the exit compound is similar to the entry compound and provides space for the construction of the HDD drill reception pit, storage of the HDD pipe and welding equipment during the pipe fabrication process including the plant and welfare facilities.

Drilling mud and water management in relation to the M1 crossing will be similar to that described for the landfall HDD.

Ongoing consultation with the asset owner, Transport Infrastructure Ireland (TII) is underway to finalise design details prior to works commencing.

The operation of the smaller HDD rigs will be similar to that described above for the landfall. The smaller HDD rig will utilise a comparatively smaller volume of drilling fluid which will be in a self-contained small mobile vessel. The smaller HDD rig will also have smaller ancillary equipment on a small footprint with setup significantly quicker than the static equipment used by a larger HDD rig.

Crossing of East-West Interconnector (EWIC)

The cable route crosses the existing East West Inter-Connector, on an off-line section from the R129, near watercourse crossing, WX11. The interconnector in this location is at a depth of approximately 10 m, so the cable ducts can be laid above the interconnector using standard trench details. Consultation with Eirgrid has been undertaken and final details will be agreed prior to construction.

Crossing of Gas Pipelines

As detailed in the Onshore Description Chapter Section 7.5, the proposed cable route will cross Gas Networks Ireland (GNI) medium and high pressure pipelines along the route, including three crossings of large diameter (750 mm and 900 mm) high pressure pipelines/gas interconnectors, in the following locations:

- Crossing of 900 mm diameter pipeline, approximately 350m south of Knock Cross along the R132 (Townland of Knock)
- Crossing of 900 mm diameter pipeline, approximately 590m south of Five Roads Junction along the R132 (Townland of Jordanstown); and
- Crossing of 750 mm diameter pipeline, approximately 300m south of junction of R132 / L1155 (Townland of Ballough).

The locations of the pipeline crossings are shown on the planning drawings, 281240-ARP-ONS-CR-DR-PL-1101 to 281240-ARP-ONS-CR-DR-PL-1164 which are included in Appendix 7.1.

The gas pipelines are at depths of approximately 2 – 3m (depth to top of pipe) and will likely be crossed by open cut trench. All crossings will be undertaken in accordance with the requirements of GNI.

The general construction methodology will be undertaken as follows, with the agreement of GNI:

- Before any work is carried out in the vicinity of existing transmission pipelines or distribution strategic mains, GNI will, with 3 working days notice, mark/peg out the transmission pipeline route. Following that, the developer will confirm the position and depth of the pipeline before work commences
- A GNI Inspector will be in attendance for the duration of the excavation of any trial holes necessary to confirm the position of the pipe. Co-ordination with GNI will be undertaken regarding their specific safety procedures and crossing methodology requirements
- If Aurora fibre optic cables are present at any of the crossings, then a representative of Aurora may also need to be present
- The final duct crossing section (open cut trench) will be confirmed to ensure a minimum of 0.6m clearance above the gas pipeline or as agreed with GNI
- Trench excavation near gas pipeline: Transition from mechanical excavation to hand tools or hydro vac to minimize the risk of damaging the gas pipeline
- Duct installation in trench to be carried out as per relevant construction specification
- Backfilling and compaction of trench to be carried out as per relevant construction specification
- Carry out inspection and approval of completed works.

All works will be undertaken in accordance with the GNI Code of Practice for Working in the Vicinity of Transmission Pipelines (2021).

<u>Crossing of Aviation Fuel Pipeline</u>

A planning consent (An Bord Pleanála reference PL29N.245738) has been granted for an aviation fuel pipeline between Dublin Port and Dublin Airport and construction has commenced to install this pipeline. The route of the pipeline follows the R139 at Belcamp and the cable route will need to cross this pipeline (if it is installed ahead of construction of the cable) to cross into the existing Belcamp substation. Consultation has been undertaken with the developer of this pipeline and standard service/utility crossing methodologies (crossing under the pipeline) can be used, ensuring a separation of 300 mm in the vertical and horizontal from the aviation fuel pipeline trench. Final details will be confirmed with the developer prior to construction.

<u>Watercourse Crossings</u>

In terms of watercourse crossings, 24 watercourses will be crossed at 25 locations along the onshore cable route. Each of these watercourses will be crossed using one of a number of construction methodologies (five in total) with the final methodology at each location being determined prior to construction. This EIAR has considered all methodologies to ensure a robust assessment.

Where required, watercourse crossings will be designed and agreed in consultation with the Office of Public Works (OPW) prior to commencement of construction, and in accordance with Section 50 of the Arterial Drainage Act 1945, as amended.

There are two main *types* of crossing:

- Open cut trench crossing
- Horizontal directional drilling (HDD) trenchless crossing.

These types of crossing will either be in-line (within the roadway) or off-line (in private lands). With these two types of crossing, there are a number of different *methodologies* considered. The HDD methodology for both types of crossing, will follow that described in section 9.5.5.6 above.

The general principles for each of the different open cut trench crossing methodologies are described below:

- *Crossing over existing bridge / culvert via open cut*: Where sufficient depth is available above the bridge or culvert of the watercourse, open cut trenching will be used to lay the cables over the bridge/culvert. On occasion, reduced depth of cover, or in isolated, suitable locations, minor localised reprofiling of the road surface to achieve the required cover, may be considered for a shallow trench across a bridge or culvert structure in accordance with Eirgrid requirements
- *Crossing under existing culvert via open cu*t: Where it is an option, given the size and structure of the culvert, and where sufficient depth of cover is not available above the culvert, a modified open cut trenching will be used to allow the crossing to be made under the existing culvert
- *Off-line open cut crossing of watercourse:* two methodologies are considered as detailed below.
  - *With over-pump methodology:* If a temporary bunding and over-pumping methodology is adopted, soil filled sandbags will be used to create a seal and bund on both the upstream and downstream sides of the watercourse crossing. Appropriately sized pumps will then be located adjacent to the watercourse crossing, the intake pipe will be positioned upstream of the upstream bund and the discharge pipe downstream of the downstream bund, with appropriate water treatment provided in between, as required. The bunds, pump and treatment will be inspected daily. Water levels in the watercourse will be monitored to prevent flooding upstream of the bunds, back up pumps may be required.
  - *With culvert/flume pipe methodology:* In this method, the water flow will be diverted into a culvert or flume pipe to the side of the watercourse. The culvert/flume pipe watercourse crossing will be prepared by stripping the topsoil from the banks and areas adjacent to the river at the crossing point and storing it separately within the working area, at a safe distance away from the watercourse; and

    The excavated bank material and a selection of vegetation will be stored for replacement or reinstatement of the watercourse, after the cable ducts have been laid. A flume pipe bridge will be installed to one side of the watercourse channel. The culvert/flume pipe will be long enough to extend below the haul road to allow safe passage of plant and materials along the cable route. A suitably sized culvert/flume pipe will be installed at the crossing point. The invert of the culvert/flume pipe will be typically 100mm below the existing watercourse invert, to replicate natural free flow through the channel. The culvert/flume pipe will extend on the upstream and downstream sides of the crossing point for a suitable distance. The culvert/flume pipe will then be bedded and packed or surrounded with soil filled sandbags to create a seal or dam across the watercourse, to prevent scouring and to divert the water flow into the flume pipe. The flume pipe will take all the flow to the downstream side of the crossing point and the ducts will be installed beneath the dry watercourse channel.

    Once the flume pipe or dam/bund and over-pump method has been installed and sandbags are securely in place, the construction of the cable trench can proceed by excavating through the bed of the watercourse. The excavated stream bed material will be stored within the working width separately from the bank material. Trench supports may be used to facilitate safe excavation and dewatering of the excavation area will be carried out if required. Prefabricated cable duct sections will then be installed in the trench and checked to ensure that a minimum cover, typically 1.6m below the top of the watercourse bed and the top of the cable ducts. Thicker walled ducts may be used. In some circumstances the ducts may be further protected by installing at a greater depth. The ducts will be surrounded with concrete and galvanised steel plates with red marker strip fixed to the top of the concrete. Final reinstatement will use the stored river-bed materials with reinforcement mesh included along with yellow marker warning tape.

    The banks of the temporary watercourse crossings will be reformed to their original profile in accordance with National Parks and Wildlife Service (NPWS), Inland Fisheries Ireland (IFI) and the landowners’ requirements. The excavated bed materials which had been removed for construction, and stored separately, will be reinstated to the original profile.

    The temporary flume pipe, packing and sand-bags will be removed once the watercourse profile-has been reinstated, ensuring the correct sequencing of substrate reinstatement.

Final bank reinstatement may require further measures to stabilise the banks and prevent erosion. Geotextiles may be used in conjunction with seeding of an appropriate grass mix.

The management of stockpiles of material in the vicinity of a watercourse will comply with the requirements specified in the Onshore CEMP (refer to Appendix 9.1 of Volume 8).

Table 9.6 below details the watercourse crossings associated with the onshore cable route. It also notes the likely crossing types considered, although it is noted that the final type and methodology of crossing will be determined prior to construction.

**Table 9.6 Watercourse crossings proposed methodologies.**

| Watercourse crossing Ref No. | Watercourse Name | Crossing Options |
|---|---|---|
| Wx01 | Bremore Stream | In-line Open Cut Trench |
| Wx02 | Bracken River | In-line Open Cut Trench<br>In-line HDD |
| Wx03 | Knock Stream | In-road Open Cut Trench<br>In-line HDD |
| Wx04 | Balrothery Stream | In-line Open Cut Trench<br>In-line HDD |
| Wx05 | Balrickard Stream | In-line Open Cut Trench<br>In-line HDD |
| Wx06 | Rowans Big Stream | In-line Open Cut Trench<br>In-line HDD |
| Wx07 | Rowans Little Stream | In-line Open Cut Trench<br>In-line HDD |
| Wx08 | Courtlough Stream | In-line Open Cut Trench<br>In-line HDD |
| Wx09 | Oberstown Stream | In-line HDD<br>In-line Open Cut Trench |
| Wx10 | Aldrumman Stream | In-line HDD<br>In-line Open Cut Trench<br>Off-line Open Cut Trench |
| Wx11 | Ballough Stream | Off-line HDD |
| Wx12 | Deanestown Stream | In-line HDD<br>Off-line HDD |
| Wx13 | Ballyboghil Stream | In-line HDD<br>Off-line HDD<br>Off-line Open Cut Trench |
| Wx14 | Turvey Stream | In-line Open Cut Trench<br>In-line HDD |
| Wx15 | Staffordstown Stream | In-line Open Cut Trench<br>In-line HDD |
| Wx16 | Broadmeadow River | In-line Open Cut Trench<br>In-line HDD |
| Wx17 | Ward River | In-line Open Cut Trench<br>In-line HDD |
| Wx18 | Seapoint Stream | In-line Open Cut Trench<br>In-line HDD |
| Wx19 | Greenfields Stream | In-line Open Cut Trench<br>In-line HDD |

| Watercourse crossing Ref No. | Watercourse Name | Crossing Options |
|---|---|---|
| Wx20 | Gaybrook Stream | In-line Open Cut Trench<br>In-line HDD<br>Off-line Open Cut Trench |
| Wx21 | Hazelbrook Stream | In-line Open Cut Trench<br>In-line HDD |
| Wx22 | Sluice Stream | In-line Open Cut Trench<br>Off-line Open Cut Trench<br>Off-line HDD |
| Wx23A | Cuckoo Stream | In-line Open Cut Trench<br>In-line HDD |
| Wx23B | Cuckoo Stream | In-line Open Cut Trench<br>In-line HDD |
| Wx23C | Cuckoo Stream | In-line Open Cut Trench<br>In-line HDD |
| Wx24A | Mayne River | In-line Open Cut Trench<br>In-line HDD |
| Wx24B | Mayne River | In-line Open Cut Trench<br>In-line HDD |
| Wx24C | Mayne River | In-line HDD<br>In-road Open Cut Trench |
| Wx25 | Mayne River | Open Cut Trench (within Belcamp Substation site), either within access road (in-line) or off-line. |

It should be noted that there are also numerous minor field drainage channels along the cable route, in off-line sections, which will be crossed using similar standard open cut trenching methodologies as detailed above (off-line open cut crossing).

## 9.6 Construction Traffic Management

As outlined in Section 9.5.5.5, to lay the cables in the public road, partial (single lane) and in some instances, full road closures will be required. Appropriate diversions will be put in place to minimise traffic disruption during the works. An assessment of likely required road closures during the onshore cable route construction is provided in Volume 4, Chapter 24: Traffic and Transportation.

Measures relating to construction traffic management are set out in Construction Traffic Management Plan (included in the Onshore CEMP (Appendix 9.1 Volume 8) and in Volume 4, Chapter 24: Traffic and Transportation. The Construction Traffic Management Plan will be updated at detailed design stage by the contractor to include the final details, locations, anticipated durations, and sequences of lane and road closures. All excavation works in the public realm will be in accordance with '*Guidelines for Managing Openings in Public Roads*' issued by the Department of Transport, Tourism and Sport.

## 9.7 Commissioning Activities

Commissioning of all electrical equipment will be required to confirm the operational readiness of the equipment and to demonstrate the equipment meets the functional and operational specifications.

### 9.7.1 Landfall site

The offshore and onshore export cables at the landfall site will be commissioned in accordance with the relevant industry standards and specifications. Equipment for this may be required to be transported via a low loader vehicle due to the size of the testing equipment. The test equipment will be stored securely in the landfall HDD compound during testing.

### 9.7.2 Grid Facility

The grid facility, and the compensation and Bremore substations therein, will be commissioned in accordance with the relevant industry standards and specifications.

Commissioning of the substations will involve the following activities:

- Pre-commissioning
- Sub-system testing
- HV energisation; and
- Performance testing.

Both substation compounds will include 220kV GIS switchgear, control and protection panels, LV distribution equipment, batteries, and UPS supplies. All elements will be commissioned separately and in accordance with the respective industry standard and specification.

The compensation 220kV substation will be pre-commissioned by the Developer. The final steps of commissioning including HV energisation will be undertaken between the Developer and ESB Networks, in their role as Transmission Asset Owner, and in coordination with EirGrid as Transmission System Operator.

### 9.7.3 Onshore Cable Route

The onshore cables will be commissioned in accordance with the relevant industry standards and specifications.

Testing will be completed at each joint bay, as they are constructed.

### 9.7.4 Connection to Belcamp Substation

High voltage and partial discharge testing will be required at the existing Belcamp facility, where the cable connects to the existing transmission network. Equipment for this may be required to be transported via a low loader vehicle due to the size of the testing equipment.

## 9.8 Site Management

### 9.8.1 Employment

The onshore aspects of the proposed development are anticipated to provide employment to approximately 250 people during the construction phase.

### 9.8.2 Working Hours

The timing of construction activities, core working hours and the rate of progress of construction works are a balance between efficiency of construction and minimising nuisance and significant effects.

The normal construction working hours for the onshore proposed development works will be 7am – 7pm: Monday to Saturday. These hours correspond to the current construction programme.

All construction works will be carried out during normal working hours with the following specific exceptions:

- HDD works at the landfall HDD contractor compound and the railway HDD contractor compound, both of which will require 24-hour working

- HDD works at the following watercourse crossings, which may require 24-hour working: watercourse crossings 5, 6, 7, 9, 10, 16, 17 and 18.

Nearby sensitive receptors including residential receptors and sensitive non-residential receptors such as schools will be notified of any activities involving 24-hour a day working hours.

The removal of waste material off site by road and regular deliveries to site will, where appropriate, be generally confined to outside of peak traffic hours (further detail can be found in the Construction Traffic Management Plan included as part of the Onshore CEMP (Appendix 9.1, Volume 8).

It may be necessary, due, for example, to weather constraints, specialist subcontractor availability or the nature of the activity, to undertake certain other activities outside of the normal construction working hours. Any other construction outside of the normal construction working hours will be agreed in advance with Fingal County Council and Dublin City Council. The scheduling of such works will have regard to nearby sensitive receptors, who will be notified in advance.

### 9.8.3 Hoarding and Fencing

A site boundary in the form of temporary hoarding will be established around each of the temporary contractor compounds with hoarding or fencing used around each of the working areas. These will be established before any significant construction activity commences, as these construction sites can be an unsafe environment for those that have not received the proper training and are unfamiliar with construction operations.

For the temporary contractor compounds (HDD, grid facility, and cable contractor compounds), the hoarding will generally be a minimum 2m high in order to provide a secure boundary to prevent unauthorised access and delineate the works. The site hoarding will also perform an important function in relation to minimising nuisance and effects including:

- Noise emissions (by providing screening)
- Visual impact (by screening the working areas, plant and equipment); and
- Dust minimisation (by providing a buffer).

The hoarding/fencing will be typical of that used at most construction sites. Mounting posts will be erected by using a mini-digger and the posts will be set in concrete.

Other working areas and site access routes will typically use a mix of fencing and other appropriate safety barriers, as these types can be more readily re-configured and re-used between working areas as the construction activities progress.

### 9.8.4 Services and Site Lighting

Temporary site services will be installed in parallel with the rearrangement and diversion of existing utilities, where relevant. Eco-Cabins will be used to promote the most efficient use of resources for the temporary construction facilities for the onshore elements of the proposed development.

#### *Electricity*

The working areas will be powered by existing mains supplies, however where mains supply is not available, power will be provided via a diesel generator. Typically, one 20,000 litre tanker for the delivery of diesel to the site compounds will be required each week, suitable bunded storage facilities will be provided.

#### *Drinking Water*

Potable water will be supplied from Uisce Éireann mains where available. If not, potable water will be either transported via tanker to site or via large, recyclable bottles. Typically, one delivery each week will be required for the provision of potable water.

***Grey Water***
Grey water for non-drinking purposes (construction and toilets) will be sourced via rainfall collection or transported via tanker to site.

***Wastewater***
Wastewater will be collected and stored on site in holding tanks, which will be emptied on a regular basis (typically bi-weekly) by licensed Contractors and disposed of appropriately.

***Lighting***
Site lighting will typically be provided by tower mounted temporary portable construction floodlights that will be cowled and angled downwards to minimise spillage to surrounding properties.

***Wheel wash***
Where a wheel wash is installed, this will be located on impermeable surface, and water will be passed through a silt buster or other appropriate surface water management mechanism.

Alternatively, a “dry” wheel wash will be used, which relies on mechanical vibration of the vehicle wheels and chassis to loosen and remove mud and debris.

### 9.8.5 Deliveries to Site
Deliveries of materials will be planned and programmed to ensure that the materials are delivered only as they are required at the working areas, in accordance with the Construction Traffic Management Plan, refer to Volume 4, Chapter 24: Traffic and Transportation. Storage of material will primarily be at the grid facility contractor compound or at the temporary cable contractor compound, depending on the type of material and intended location of end use.

Works requiring multiple vehicle deliveries, such as concrete pours, will be planned to ensure there will be no queuing on the public roadways around the working areas, in accordance with the Construction Traffic Management Plan. Abnormal loads and deliveries will, where appropriate, be limited to outside of peak traffic hours, in accordance with the Construction Traffic Management Plan.

### 9.8.6 Security
Security for the works will be provided by a combination of:

- Secured work areas with fencing, with gate man and barrier controlling access to the fenced areas, at the grid facility site
- Roving security patrol outside normal working hours; and
- CCTV.

### 9.8.7 Handling Materials
The construction works will require the use of typical material handling equipment, such as forklifts, teleporter, or mobile cranes. The material handling equipment will be required for the loading, unloading, storing, and distribution of building materials on site such as concrete pipes, formwork for concrete, reinforcement, precast concrete, steelwork, façade, plant, and general building materials. Again, the use of material handling equipment may be adopted to assist in the installation of the converter station, the converter station building façade and mechanical plant. Heavy machinery transport on the road network to and from working areas will be restricted to outside of peak hours.

Assessments have been carried out to confirm that these activities are feasible. Larger cranes may be required for some of the larger equipment or where access is limited and additional reach is required.

### 9.8.8 Community Liaison During Construction
The Onshore CEMP (refer to Appendix 9.1 - Volume 8) sets out the steps which will be taken in relation to community and stakeholder liaison.

A Construction Waste Management Plan (CWMP) has been prepared and is included in the Onshore CEMP (refer to Appendix 9.1 - Volume 8). The Contractor will further develop this CWMP, prior to construction.

The CWMP addresses:

- Waste Manager
- Waste Types; and
- Tracking and documentation procedures for waste sent off site.

## 9.9 Materials Management

The focus in terms of materials management is on sustainable, circular principles, as detailed in Chapter 21: Land and Soils and Chapter 31: Resource and Waste Management. The approach to materials management for the construction phase of the proposed development is provided below.

### 9.9.1 Excavated Materials

Excavated material as part of the construction works will generally consist of:

- Topsoil
- Existing road build up (i.e. asphalt layers)
- Sub-surface materials (i.e. material beneath topsoil or road) which will vary across the site and will typically comprise:
  - Subsoil
  - Glacial till; and
  - Sub-base/capping (crushed stone).

The quantities of materials anticipated to be excavated during the construction of the proposed development are set out in Table 9.7 below.

**Table 9.7 Excavated material quantities**

| Excavated material | Landfall | | | Grid Facility | | | Onshore Cable Route | | |
|---|---|---|---|---|---|---|---|---|---|
| | Excavated Volume (m3) | Re-used (m3) | Exported Volume (m3) | Excavated Volume (m3) | Re-used (m3) | Exported Volume (m3) | Excavated Volume (m3) | Re-used (m3) | Exported Volume (m3) |
| Topsoil | 6,100 | 3,900 | 2,200 | 15,900 | 4,700 | 11,200 | 17,500 | 13,800 | 3,700 |
| Sub-soil | 1,600 | 700 | 900 | 31,500 | 800 | 30,700 | 4,900 | 2,200 | 2,700 |
| Surface course (asphalt) | 0 | 0 | 0 | 0 | 0 | 0 | 1,700 | 1,200 | 500 |
| Base/Binder course (asphalt) | 0 | 0 | 0 | 0 | 0 | 0 | 6,700 | 4,700 | 2,000 |
| Sub-Base (crushed stone) | 0 | 0 | 0 | 0 | 0 | 0 | 8,300 | 5,900 | 2,400 |
| Capping (crushed stone) | 0 | 0 | 0 | 0 | 0 | 0 | 12,500 | 0 | 12,500 |
| Road sub-grade | 0 | 0 | 0 | 0 | 0 | 0 | 30,100 | 0 | 30,100 |
| HDD bore material | 3,800 | 0 | 3,800 | 0 | 0 | 0 | 8,800 | 0 | 8,800 |

Excavated material, where it can be shown to fulfil the requirements of the project Earthworks Specification, will be reused within the site. Any excavated contaminated material will be removed and disposed of or recovered at a suitably licensed or permitted site in accordance with the current Irish waste management legislation.

Excavated materials will be handled in line with the measures set out in the construction resource and waste management plan which are included in the Onshore CEMP (refer to Volume 8, Appendix 9.1). Transport of material to and from the works areas will be managed in accordance with the construction traffic management measures outlined Chapter 24: Traffic and Transportation and included in the Construction Traffic Management Plan in the Onshore CEMP (refer to Appendix 9.1 - Volume 8), to ensure that there will be no queuing of trucks on public roadways around the works areas.

### 9.9.2 Construction Materials Requirements

The proposed onshore elements of the proposed development will have a requirement for materials imported to the works areas. Breakdowns of the volumes of the materials required are presented in Table 9.8.

**Table 9.8 Construction Materials**

| Construction Material | Units | Landfall | Grid Facility | Onshore Cable Route |
|---|---|---|---|---|
| Surface course (asphalt) | $m^3$ | 0 | 300 | 500 |
| Base/Binder course (asphalt) | $m^3$ | 0 | 1,200 | 2,000 |
| Sub-Base (crushed stone) | $m^3$ | 0 | 6,200 | 2,400 |
| Capping (crushed stone) | $m^3$ | 3,300 | 8,100 | 18,100 |
| Cement Bound Granular Material (CBGM) | $m^3$ | 900 | 1,000 | 26,600 |
| Water (for HDD) | $m^3$ | 11,400 | 0 | 26,400 |
| Bentonite (for HDD) | kg | 565,200 | 0 | 131,8800 |
| Concrete for HDD anchor block (per HDD compound) | $m^3$ | 108 | 0 | 1,188 |
| Concrete (for substation foundation/slabs) | $m^3$ | 0 | 2,000 | 0 |
| Steel reinforcement (for substation foundations/slabs) | tonnes | 0 | 150 | 0 |
| Structural steel (for substation foundations/slabs) | tonnes | 0 | 300 | 0 |
| Steel cladding (for substation buildings walls/roofs) | $m^2$ | 0 | 10,500 | 0 |
| HDPE ducting | m | 15,400 | 9,600 | 292,000 |
| Power cables (subsea export cable) | m | 2,000 | 0 | 0 |
| Power cables (onshore export cables) | m | 7,800 | 7,200 | 0 |
| Power cables (onshore cable route) | m | 0 | 0 | 214,800 |
| Earthing cable | m | 4,600 | 2,400 | 71,600 |
| Fibre Optic cable | m | 4,600 | 2,400 | 71,600 |
| Concrete (for joint bays, link boxes, comms chambers) | $m^3$ | 400 | 200 | 8,400 |
| Temporary access tracks/contractor compound bases | $m^2$ | 7,900 | 10,000 | 29,400 |

## 9.10 Safety Management

### 9.10.1 Health and Safety

The requirements of the Safety, Health and Welfare at Work Act 2005, as amended , the Safety, Health and Welfare at Work (Construction) Regulations, 2013 , as amended, (the ‘Safety, Health and Welfare Regulations’) and other relevant Irish and EU safety legislation will be complied with at all times during the construction works for the proposed development.

As required by the Safety, Health and Welfare Regulations, a Health and Safety Plan has been formulated which addresses health and safety issues from the design stages through to completion of the construction and maintenance phases. This plan will be reviewed and updated as required, as the development progresses.

In accordance with the Safety, Health and Welfare Regulations, a 'Project Supervisor Design Process' has been appointed and a 'Project Supervisor Construction Stage' will be appointed for the construction works.

The Project Supervisor Construction Stage will assemble the Safety File as the project progresses on site.

The contractor will be required to ensure all Health and Safety, Fire Safety and security requirements are met.

All construction staff and operatives will be inducted into the security, health and safety and logistic requirements on site prior to commencing work.

All contractors will be required to progress their works with reasonable skill, care, and diligence and to proactively manage the works in a manner most likely to ensure the safety, health and welfare of those carrying out construction works, all other persons in the vicinity of the working areas and interacting stakeholders.

Contractors will also have to ensure that, as a minimum, all aspects of their works and project facilities comply with legislation, good industry practice and all necessary consents.

Prior to commencement of site work, the appointed contractor(s) will produce detailed construction method statements, work programmes and risk assessments. These method statements will detail how the contractor plans to implement the design. They will also take into account site investigations, third party requirements, and the mitigation measures outlined in the various sections of the EIAR and CEMP (refer to Appendix 9.1 - Volume 8).

The method statements produced by the contractor(s) will be agreed with the Developer, who will ensure the method statement has taken account of any mitigations or actions identified within this EIAR, including compliance with the Onshore CEMP.

## 9.11 Environmental Management

Every effort will be made to ensure that any significant environmental effects will be avoided, prevented or reduced during the construction phase of the proposed development. The Onshore CEMP (refer to Appendix 9.1 - Volume 8) will be further developed by the appointed contractors prior to construction commencing.

The Onshore CEMP comprises all the construction mitigation measures proposed in the EIAR. The contractor will include any additional measures imposed as a condition of any planning approval. Implementation of the Onshore CEMP will ensure disruption and nuisance will be kept to a minimum.

The Onshore CEMP has regard to the guidance contained in the handbook published by Construction Industry Research and Information Association (CIRIA) in the UK; Environmental Good Practice on Site Guide, 4th Edition (CIRIA, 2015).

The Onshore CEMP is in accordance with relevant legislation and guidance and will be effective for the duration of the construction works. The Onshore CEMP will be a live document during the construction phase and will be updated/added to as construction progresses.

### 9.11.1 General Measures

Steps will be taken to reduce the probability of an incident occurring and to also reduce the magnitude of any incident by a combination of good site environmental management procedures, including additional precautions when operating machinery close to watercourses, soil management, staff training, contingency equipment, and emergency plans. Key measures identified to reduce the risk of pollution, erosion and sedimentation of waterways are provided in the Onshore CEMP (Appendix 9.1 – Volume 8).

### 9.11.2 Landfall site

For the HDD at the landfall, any ground water or rainwater that collects in the HDD drilling pit will be pumped away. Then it will be discharged onto the adjacent land, not directly into a waterway, and through a filter medium. This will avoid the build-up of silt, as some granular material will, inevitably, be pumped out with the water from the trench.

Any bentonite (or similar HDD drilling head lubrication material) will be handled and removed by the drilling Contractor. The volume of bentonite (or similar material) will be determined by the ground conditions encountered and length of HDD. Further details on mitigation are provided in the Onshore CEMP (Appendix 9.1 – Volume 8) and in the relevant EIA chapters.

### 9.11.3 Grid Facility

Steps will be taken to reduce the probability of an incident occurring and to also reduce the magnitude of any incident from a combination of good site environmental management procedures, including additional precautions when operating machinery close to watercourses, soil management, staff training, contingency equipment and emergency plans.

In addition to the measures described above:

- Dust generation and dermal exposure during site construction works, until the made ground is capped, will be controlled by appropriate dust control measures e.g., water sprays and suitable personal protective equipment
- Where the asphalt layer is being removed, this will occur in phases and the asphalt will be replaced with granular fill as soon as possible to prevent the generation of windblown dust
- All made ground excavated in the course of installing underground services, which is not suitable for reuse on site, or surplus to requirements, will be stockpiled, tested and classified for recovery or disposal. Refer to Volume 5, Chapter 31: Resource and Waste Management for further information.

Further details on mitigation are provided in the Onshore CEMP (Appendix 9.1 – Volume 8).

### 9.11.4 Onshore Cable Route

The cables will be installed in ducts, so the only section of trench that will be open is that which is being excavated and in which ducts are being installed.

Excavated cable trenches will be backfilled as the works progress, as soon as installation is complete, and any cement bound surround material has cured sufficiently.

Any groundwater or rainwater that collects in a trench will be pumped to locations agreed with the landowners and local authorities. Typically, this will be onto adjacent land, not directly into waterways, and through a filter medium, to avoid the build-up of silt, as some granular material will, inevitably, be pumped out with the water. The pump flowrates will match that of the water into the trench, as it must be kept generally free of water. A single pump with a 75mm hose will usually be adequate to deal with rainwater running into a trench. A similar arrangement will apply at joint bays, where a sump will be cast into the concrete base for a pump.

Further details on mitigation are provided in the Onshore CEMP (Appendix 9.1 – Volume 8).

The Onshore CEMP also includes a number of specific management plans, as outlined below.

### 9.11.5 Traffic Management Plan

A Construction Traffic Management Plan (CTMP) has been prepared and is included in the Onshore CEMP (refer to Appendix 9.1 - Volume 8). The Contractor will update and develop the CTMP prior to construction and this will be agreed with Dublin City Council and Fingal County Council.

The CTMP will minimise the disruption to the public and the road users in the vicinity of the working areas during the construction phase of the works. The plan will include all suitable temporary signage, barriers and hoarding as necessary.

Volume 4, Chapter 24: Traffic and Transportation provides more information on the issues addressed in the plan.

### 9.11.6 Resource and Waste Management Plan

A Resource and Waste Management Plan (RWMP) has been prepared and is included in the Onshore CEMP (Appendix 9.1 – Volume 8). This Plan sets out how resources and waste will be managed throughout the project, in accordance with relevant legislation and best practice. The Contractor will update the RWMP prior to construction.

### 9.11.7 Environmental Incident and Emergency Response Plan

An Environmental Incident and Emergency Response Plan is included in the Onshore CEMP, which will cover all foreseeable risks during the construction stage, including fire, flood, collapse and accidental spills and releases of hazardous substances. The plan will be further developed by the Contractor, prior to construction commencing.

In further developing the plan, the Contractor will be required to liaise with the emergency response services. Further information on the emergency response plan is presented in the Onshore CEMP, provided in Appendix 9.1 – Volume 8.

Appropriate site personnel will be trained as first aiders and fire marshals.

## 9.12 Reinstatement & Landscaping

#### *9.12.1.1 Landfall site*

Following completion of the HDD and jointing activities, all cabling and jointing infrastructure will be below ground. The only visible structures at the landfall will be two small manhole covers for each cable and small cable marker posts, which will indicate the location of the underground cables. There will also be a permanent access track of approximately 5m to allow access to the TJBs.

#### *9.12.1.2 Grid Facility*

Following completion of the compensation substation and Bremore substation works at the grid facility site, the landscaping infrastructure and planting will be constructed and established in accordance with the details provided in the Onshore Description Chapter and on the landscape drawing 281240-MCR-ONS-GF-DR-YE-1010 in Appendix 7.1. Where opportunities exist to establish elements of landscaping or planting early in the construction programme, these will be taken.

#### *9.12.1.3 Onshore Cable Route*

The cable corridor will be fully reinstated following the completion of works along the cable route.

Farmland will be reinstated to its original condition. Prior to the replacement of topsoil, the subsoil will be ripped to below the depth of compaction, if possible, and levelled, and any roots, stones, shale and rock will be removed. Topsoil will be replaced, and additional topsoil provided, if required. Grassland will be reseeded, in consultation with the landowner.

On completion of the works all temporary buildings, fences, roadways, surplus materials debris and materials not naturally belonging on the land will be removed. Some access tracks will be retained for ongoing maintenance and emergency access purposes, in the specific locations detailed on the planning drawings accompanying this planning application.

Where loss of hedgerows occurs, the hedgerow will be replanted where possible. To protect the cable and to provide future access to the cable corridor, there will be restrictions on the replanting of hedgerows directly over the cable trenches. At Blakes Cross, for the off-line section of cable at watercourse crossing (Wx11), there is a specific landscaping plan which will also be implemented, as detailed in the Onshore Description Chapter and on the landscaping plan, 281240-MCR-ONS-GF-DR-YE-1011 in Appendix 7.1.

Along route sections where the onshore cable route is located within public roads, the removal of any trees or vegetation alongside the road will be avoided as much as practicable. Where habitat cannot be reinstated, biodiversity enhancement planting will be provided to ensure that there is no net-loss of habitat as a result of the proposed development. Further detail on this is provided in Volume 4, Chapter 23: Biodiversity.

On completion of the construction works and energisation of the project, the permanent wayleave will be 8m wide in third party lands. Future access to the joint bays in third party lands for annual inspection will be maintained via the construction of approximately 5m wide permanent access tracks to each joint bay location.

## 9.13 Decommissioning Activities

Once the proposed development has reached the end of its operational life it is anticipated it will be decommissioned or repowered. However, the infrastructure from the grid facility to the existing Belcamp substation will be under the ownership of ESB Networks and operated by EirGrid, forming part of the Transmission System and therefore will not be decommissioned.

The compensation substation at the Grid Facility will be decommissioned when the proposed development ceases operation: however, the Bremore substation will not as it will form part of the wider transmission network owned by EirGrid.

When it becomes appropriate to decommission the proposed development, all above ground structures (i.e. access track, marker posts, link) between the TJBs at the landfall and the grid facility will be removed, and the sites will be returned to their previous state. It is not proposed to remove any planting. The cabling will be removed but below ground ducting will remain in place.

Decommissioning plant and machinery required will be similar to that required for the construction phase of the proposed development however the workforce required will be smaller and the duration of the works will be shorter. The environmental management measures specified in the Onshore CEMP (refer to Appendix 9.1 - Volume 8), which are relevant to the decommissioning activities, will be implemented and will reflect the relevant legislation and guidance available at the time of decommissioning.

Items / equipment which are decommissioned will be removed for appropriate management, based on the waste regulations at the time of decommissioning.

## 9.14 References

Department of Transport (2021) Traffic Signs Manual

Department of Transport, Tourism and Sport, Government of Ireland (2017) Guidelines for Managing Openings in Public Roads

Eirgrid Functional Specifications: https://www.eirgrid.ie/grid/transmission-policies-and-standards

Eirgrid (2024) Eirgrid Grid Code Version 13: https://cms.eirgrid.ie/sites/default/files/publications/Grid-Code-Version-13_0.pdf

GNI Code of Practice for Working in the Vicinity of Transmission Pipelines, May 2021

Government of Ireland (1945) Arterial Drainage Act 1945