Tidal Lagoon Swansea Bay

Town & Country Planning Act 1990 (as amended)

275kV Cable Route - Planning Application

Construction Method Statement

November 2016

Version history

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Table of Contents

1 Introduction

1.1 The development

1.1.1 This Construction Methodology Statement (CMS) has been prepared by Tidal Lagoon Swansea Bay (TLSB) in support of the application under the Town and Country Planning Act 1990 (TCPA) which will seek planning permission for the 275 kV cable route (the 275 kV Project) associated with the development of Tidal Lagoon Swansea Bay. This CMS will set out how a contractor will deliver the scope of works to install the 275kV cable and associated fiber optic cable from the TLSB power house structure to the Baglan Bay National Grid substation, a distance of approximately 10km. This includes the options for duct installations, cable installation and environmental considerations, particularly in Crymlyn Burrows Site of Special Scientific Interest (SSSI)

1.2 Linkages with other plans

1.2.1 This CMS is one of a suite of documents that will be provided to the relevant local planning authorities in support of the application under the TCPA for the 275kV Project. Table 1.1 below outlines the linkages between this CMS and additional TCPA materials.

1.3 Site management

1.3.1 Details related to agreement of the site management and traffic are found within the 275kV Project Construction Environmental Management Plan (CEMP).

Table 1.1 275Kv CMS linkages with other TCPA materials

Name	Linkage
Site Location Plan	Details the location of the 275kV Project
Design and Access Statement	Outlines the design principles and gives a written description of the planning application for the 275kV Project
Construction Environmental Management Plan	Defines the measures required to mitigate the construction of the 275kV Project so as to protect the environment
Ground Contamination Report	Provides details of the desktop study results of the 275kV route
275kV Non-Technical Summary	Non-technical summary of the 275kV Cable Route Environmental Statement Addendum
275kV Cable Route Environmental Statement Addendum	Provides details of the likely environmental impacts that are specific to the 275kV cable route alone
275kV Cable Route Drawings	Outlines the 275kV cable route

2 Site Survey

2.1 Geophysical and Intrusive Surveys

2.1.1 Geophysical surveys will be carried out where considered necessary along the whole cable route to locate and identify current and historic services as well as buried structures/obstructions. Geophysical techniques will vary depending on ground conditions and location. Alongside these works intrusive investigations to identify unknown services will also be carried out.

2.1.2 These intrusive works will be undertaken alongside the ground contamination works and this will allow TLSB to develop a fully coordinated 2D/3D suite of information that will highlight any potential risks associated with the cable route. This detailed information gathering exercise will better inform the contractor and mitigate risks associated with potential unknowns.

2.1.3 In addition to the above, there is a requirement for an archaeological watching brief for the works in SSSI, this is detailed in the archaeology section within the 275kV CEMP for the 275kV Project. The Geophysical survey will allow this commitment to be reviewed and also to ascertain whether the use of a plough (section 4.3) is suitable for installation.

2.2 Unexploded Ordinance (UXO)

2.2.1 An Explosive Ordnance Threat Assessment was carried out by BACTEC International in the areas from Swansea Docks (section 2) to Baglan Burrows (section 6), see Appendix B. All works will comply with the latest information that is available.

3 Environment

3.1 Contamination

3.1.1 Details regarding the ground contamination reporting and best practice can be found in the 275kV Project CEMP. Below is an overview of the strategy for managing the potential contaminated ground along the proposed cable route.

3.1.2 Further to a desktop study into the ground conditions on site (Ground Conditions Desk Study Report dated 19th April 2016),it is expected that the 275kV cable route has a significant risk from contamination, in particular around the dock and adjacent to former industrial processes such as the BP Transit Site and Baglan Chemical works. It has been recommended by the authors of the report that intrusive ground investigation be carried out in order to more fully assess the ground conditions beneath the site and to provide greater certainty with respect to the potential geo-environmental risks. From these investigative works, options appraisal and remediation strategy documents will be developed for agreement with the relevant planning authorities and consultees. In accordance with CL:AIRE Code of Practice, a Materials Management Plan (MMP) will be produced which will set out how the strategy will be implemented. The MMP also sets out how excavation arisings and construction materials will be handled and stored. This will be used by all land based contractors to govern how they manage arisings from the 275kV Project.

3.1.3 Depending on the type and level of contamination found, the primary objective will be to retain spoil on site. When the spoil is excavated it will be inspected and tested in line with the 257kV Project MMP. If excavated material is classed as suitable clean Engineering material it will be reused within the trench reinstatement above the warning marker tile placed over the cable system, and compacted until the easement and trench are reinstated. Finishes will be reinstated to match existing. Should the arisings from Crymlyn Burrows prove to be inert then, if agreed with Natural Resources wales (NRW), it may be possible to spread arisings from Crymlyn Burrows SSSI to remain on the site, either on the cable easement or at an agreed location.

3.1.4 Clean inert material (either site won/treated or imported) will be used to provide a minimum of 600mm clean capping depth, due to the depth of the trench and the potential for future maintenance works it is not intended to place any contaminated material back into the trench

3.1.5 Further details regarding the 275kV ground contamination strategy can be found in the Ground Contamination Report Ref:TLSB-TLP-C122-XXX-TND-0001 which forms part of the suite of documents applicable to the 275kV TCPA.

3.2 Presence of Reptiles

For information regarding the management of reptiles in relation to the installation of the 275kV cable please refer to the 275kV Project CEMP.

3.3 Invasive Non-native Species

3.3.1 For information regarding the management of invasive non-native species in relation to the installation of the 275kV cable please refer to the 275kV Project CEMP.

4 Construction Methodology

4.1 General Installation of Ducting -Trenching Method

4.1.1 All works will be carried out in accordance with the New Roads and Street Works Act (NRSWA) where applicable, maintaining segregation from the general public with the correct barriers and signage for the location.

4.1.2 Where installation occurs adjacent to Fabian Way, the cable will be sited within the highway verge. Under no circumstances will the 275kV cable be installed beneath the existing highway.

4.1.3 The ducting from the western landfall of the lagoon to Baglan Bay (excluding the drilling site) will take approximately 20 weeks for the entire route, with up to 7 weeks ducting within the SSSI.

4.1.4 Typical Plant required consists of excavators, rollers & compaction equipment, dump trucks, equipment associated with the moving and jointing of the ducts and trench boxes.

4.1.5 Typical materials required are ducting, cement bound sand/protective bedding, granular pipe bedding, marker tape and protective tiles, clean backfill materials and matching finishes.

4.1.6 Construction for the duct installation would entail the creation of up to a maximum 10m wide working area. Where possible, the 10m working corridor will be reduced in areas such as Crymlyn Burrows SSSI where sensitive ecological receptors are present to minimise impacts during construction.

4.1.7 The cable will be either installed in 6m long uPVC ducts or in a longer coil. Due to the restrictions that exist along the line of the cable route, including services/assets of other utility providers and the SSSI, it is proposed that temporary trench boxes are installed prior to the ducts. This involves the process of opening the trench to a nominal depth of between 0.5m and 1m (depending on the ground conditions), installing the trench box into the trench and then using a 'dig and push' technique. This is where the trench is excavated from within the trench box and then the trench box is pushed down. This ensures that the sides of the trench are supported and provides a safe working area within the trench for operatives. The use of trench boxes reduces the requirement for excavations and batters and there is no need to undertake sheet piling to ensure that the walls of the trench are safe. The use of trench boxes would be reviewed and designed based on the ground conditions, depth and length of excavation. This information will be made available to the relevant local planning authorities and NRW after the ground investigation works are carried out prior to installation of the cable.

4.1.8 Topsoil to be stored separately from subsoil and preferably within the easement for ease of re-instatement

4.1.9 A typical arrangement of the installation is depicted below in Figure 2:

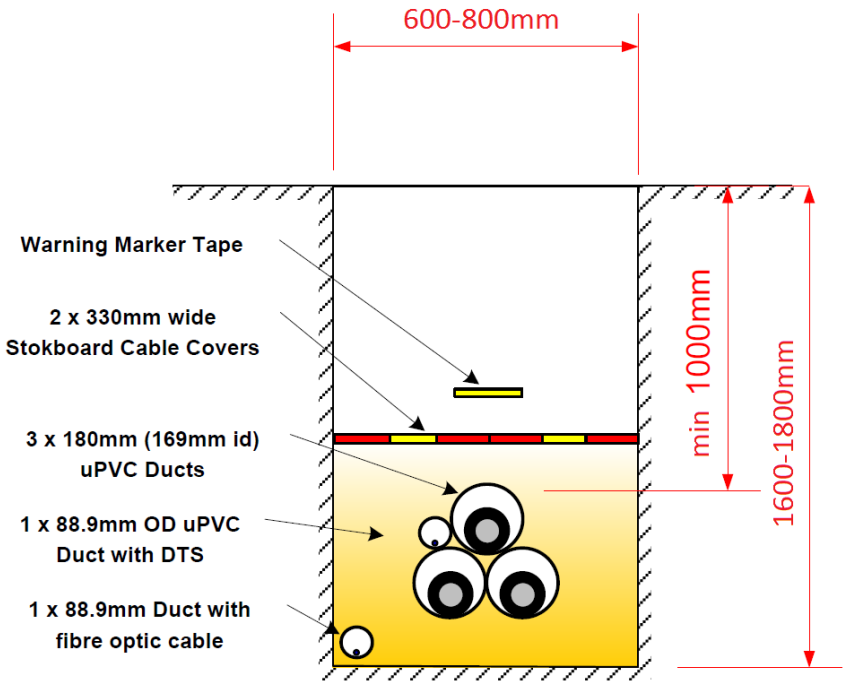

Figure 1 typical cross section detail for 275kV cable installation

4.2 Trenching Method through Crymlyn Burrows SSSI

4.2.1 As Crymlyn Burrows SSSI is designated for its sand dunes, salt marsh habitats, plants and invertebrates particular care will be taken when working in this area

4.2.2 The maximum 10m wide working corridor will be reduced where possible in Crymlyn Burrows SSSI to reduce impacts on sensitive ecological receptors.

4.2.3 It is envisaged that the cable will be installed under the tarmac existing track as shown in Figure 3. If this happened then the tarmac would be removed to the sites material handling area and new tarmac laid on completion of the trenching works.

4.2.4 The following measures will need to be adhered to when working within the SSSI:

- Protection of the vegetation from tracking of vehicles e.g. through sand covered semi permeable membrane (Terram or similar) or mats which reduce vegetation damage;

- Topsoil to be stored separately from subsoil and preferably within the easement for ease of re-instatement;
- Minimising the storage of topsoil/subsoil and reinstating as the works progress;
- No storage of excess spoil or laydown areas to be within the SSSI;
- Works will if possible be programmed for Autumn/Winter to reduce long term impacts on vegetation.
- Re-instatement of both the cable trench and working corridor through the spreading of subsoil, followed by topsoil and allowing the vegetation to naturally recolonize;
- Trench width to be kept to a minimum where possible in the SSSI to keep impacts on SSSI to a minimum;
- In addition to the general best practice measures set out above, a site survey will be undertaken along the proposed route through the SSSI during the summer prior to installation to identify any species-rich areas of dune grassland that may be affected by the cable route – this will inform potential areas where the 10m easement may be reduced.

4.2.5 A detailed plan setting out how these areas are to be protected, or, if not possible, translocated will be submitted to NRW and NPTCBC prior to commencement of the cable route construction. This plan will include the following aspects:

- The identification of a suitable storage/receptor site for any translocated turves;
- Methods of translocation of turves and/or details of seed collection from species rich areas and distribution when works have finished;
- A programme for when translocation/ seed collection, storage and re-instatement will occur;
- Protection from damage of any reinstated turves/areas of species-rich grassland;
- Methods of any weed control or further action should the translocation be unsuccessful;
- Surveillance of the cable route once works have been completed to ensure no long term adverse effects on the SSSI, reported to NRW and NPTCBC annually for five years post installation. This will be undertaken by the Lagoon warden who will be employed by TLSB to monitor elements of the wider project consented under the Development Consent Order, and any relevant associated TCPAs.

4.2.6 The ducts will be installed across the length of the SSSI and then the cable installed into the duct from joint bay locations. These locations will be at approximately 1000m-1500m intervals therefore potentially three in the SSSI.

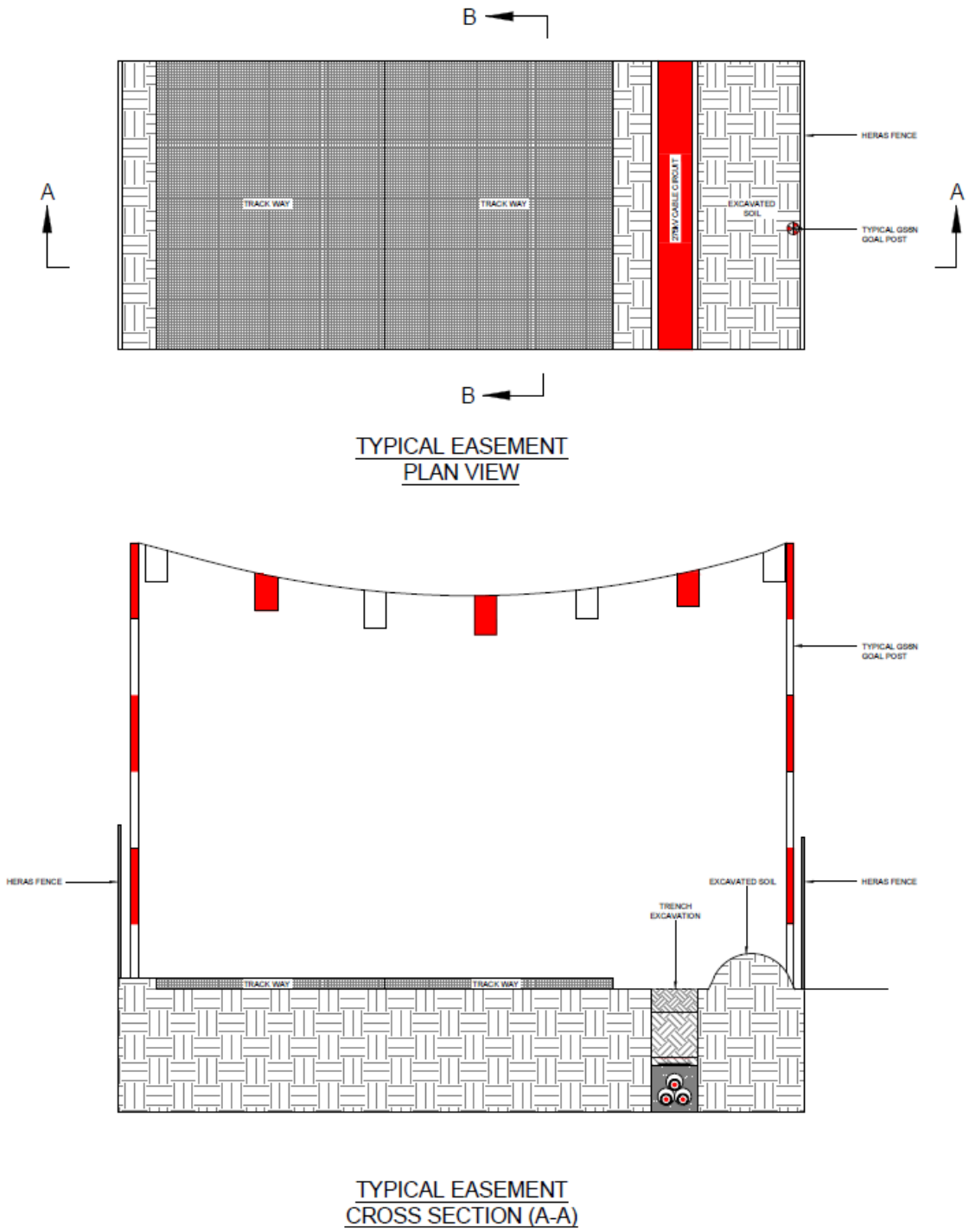

Figure 2 Typical cross section of trenching through SSSI

4.2.7 The vegetation would be allowed to re-instate upon completion of the works.

4.3 Alternative method for Work in Crymlyn Burrows SSSI (plough)

4.3.1 An alternative method of installation of the ducts across the SSSI is through the use of a cable plough. With only a narrow cut into the ground, there is little disturbance and no significant structural changes to soil properties or topography. The almost automatic closure process ensures rapid recovery of land to its original and natural state. Added to this, as it cuts, installs and back-fills - all in one operation - the cable plough's method eliminates any risk of trench-collapse and associated health and safety concerns, see Figure 4 below. It is only possible for this method to be used in Crymlyn Burrows SSSI as the route has not been developed previously and therefore the presence of existing services and infrastructure are minimal. A GPR survey will be conducted in line with the further GIS studies prior to the installation of the cable. The use of the plough is also dependent upon the need for a watching brief, see 2.1.2. Where services are present, the trenching method above would be adopted locally.

4.3.2 Construction for duct installation would entail the creation 10m wide working area over the SSSI cable run. As stated previously, this maximum 10m wide working width will be reduced in the SSSI where possible.

4.3.3 The cable would be installed either under or adjacent to the existing tarmac track and further to the west potentially along the existing track in the SSSI that runs parallel to Fabian Way, but south of the drainage ditch

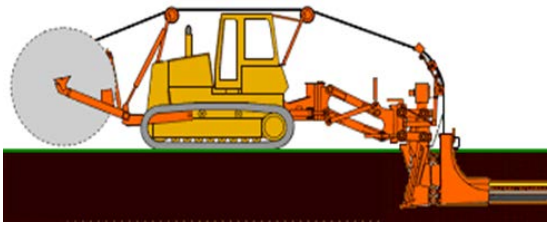

Figure 3 Above - Duct being installed by Plough method, Right – cross section of plough

4.3.4 Figure 4 demonstrates the installation by means of the plough method. Although only a single duct is shown it would be preferable to install the ducting in a single trefoil configuration to minimise the work carried out on the SSSI.

4.3.5 The installation of ground protection measures will be explored for use whilst operating the Cable Plough. This may involve sand covered Terram or mats which reduce vegetation damage whilst maintaining traction during duct installation.

Alternative methods could involve the use of mats similar to that illustrated in Figure 5.

Figure 4 Potential protective measures

4.3.6 It should be noted that works within the SSSI will be kept to a minimum and there will be no unplanned works within the SSSI without prior approval from the relevant local planning authority and NRW.

4.4 Horizontal Directional Drilling (HDD)

4.4.1 To cross the River Neath the technique of Horizontal Directional Drilling (HDD) has been selected to install the 275kV ducting and cables. This technique consists of a launch pit and reception pit. The launch pit is where the drilling starts. The reception pit is where the drilling comes to the surface on the opposite side of the river. The launch pit will be at the Baglan Bay side of the river with the reception pit on Crymlyn Burrows SSSI. Figure 6 shows a typical launch pit.

4.4.2 The drilling is anticipated to be through loose to dense sands overlaying weak to moderately weak mudstones and siltstones of the Coal Measures. This will be confirmed by future ground investigations.

4.4.3 A minimum area of approximately 40m x 40m of good grounding is required at the launch pit to position the equipment and conduct drilling operations. This will be on the Baglan Bay side of the river to minimise the disruption on the SSSI. At the reception pit on the SSSI, an area of approximately 15 m x 15 m of good grounding is required to enable safe hole-opening.

Figure 5 Typical launch pit complete with aluminium track.

4.4.4 The construction procedure for HDD has three phases. Firstly, a pilot hole is drilled from the launch pit until it reaches the reception pit. This pilot hole is guided and follows a pre-determined profile. The second phase of construction is the hole-opening stage whereby the pilot hole is enlarged to approximately 460mm diameter, so as to be large enough for the ducts to be pulled into place and the third stage is the duct pullback itself.

4.4.5 Prior to and during drilling operations, mixing of the drilling fluid is required at the launch pit. The drilling fluid consists of water and bentonite which produces an inert liquid that both reduces friction and cools as it is pumped to the cutting head of the drill.

4.4.6 During the drilling, the drill fluid and cuttings are collected and passed through a mud recycling plant at the launch pit. This separates the mud and cuttings, with the cuttings falling into a shallow bunded 'cuttings- pit' in front of the recycling unit and the drill fluid returning to the bentonite mixing tank to be re-used. This reduces water usage, drill fluid usage and landfill volumes, thus reducing the environmental impact considerably.

4.4.7 The cuttings will be removed from site for storage in accordance with the 275kV MMP. Should the arisings need to be transported off site they will be removed to an appropriately licensed landfill site. Waste transfer tickets are retained on site for each load removed.

4.4.8 At the reception pit, a tanker will collect any mixing fluid that collects during the drilling or pull back operation. This fluid will be reused where possible, or collected and transported to a licensed waste disposal site (as outlined in the Construction Method Statement provided with this application (TLSB, November 2016)).

4.4.9 The ducts to be installed within the bore will be high density polyethylene (HDPE) and in 6m or 12m lengths which will require welding and stringing out at the reception pit location on the SSSI. They will be welded in advance and it is

anticipated that these will be in two separate strings per cable, each approximately 400m long.

4.4.10 Where the cable route crosses the two roads to the north of the new Swansea Bay University Campus (SBUC), HDD will be implemented here to minimise disruption to the campus.

4.5 Installation of 275kV Cables and Jointing

4.5.1 Plant required for the installation of the cables are cable carrier, spindle, Hiab lorry, generator, and cable winch.

4.5.2 The materials required are approximately 10km of 275kV cable, fiber optic cable, distributed temperature sensing (DTS) cable, stokboard cable covers, warning marker tape and jointing materials.

4.5.3 Locations for cable pits will be confirmed once the installation technique is finalised but these are expected to be between 1000m and 1500m apart. This would mean a total of 8-10 along the route (excluding the western sea wall) and 2-3 jointing pits within Crymlyn Burrows SSSI. Typical jointing pit details can be seen in Figure 7.

4.5.4 All cables and jointing will be installed during dayshift and will be installed after all ducts are laid throughout the route by two jointing teams. This is envisaged to take 14 weeks for the entire route, and depending on the final route approximately up to 14 weeks will be within the SSSI.

4.5.5 Cable drums to be delivered to site via HIAB lorry and will be loaded onto cable drum stands. Cables will be installed from the drum to the required position. Cables will be installed with the use of a 10tonne winch equipped with a dynameter, the maximum permitted cable pulling tension will be set on the winch prior to installation and a printout will be provided for each section showing exact length and maximum force applied. Once all cables have been installed they will be cut from the cable drum and cable ends will be sealed to prevent water ingress prior to jointing.

4.5.6 While installing the cable through the SSSI, ground protection similar to that used during the duct installation will be used where vehicles need to access works off the existing track or storage of cable drums needs to occur. Any trafficking will be with a 10m working corridor.

4.5.7 A typical joint bay design can be seen below in Figure 7 with a typical width of 4.1m

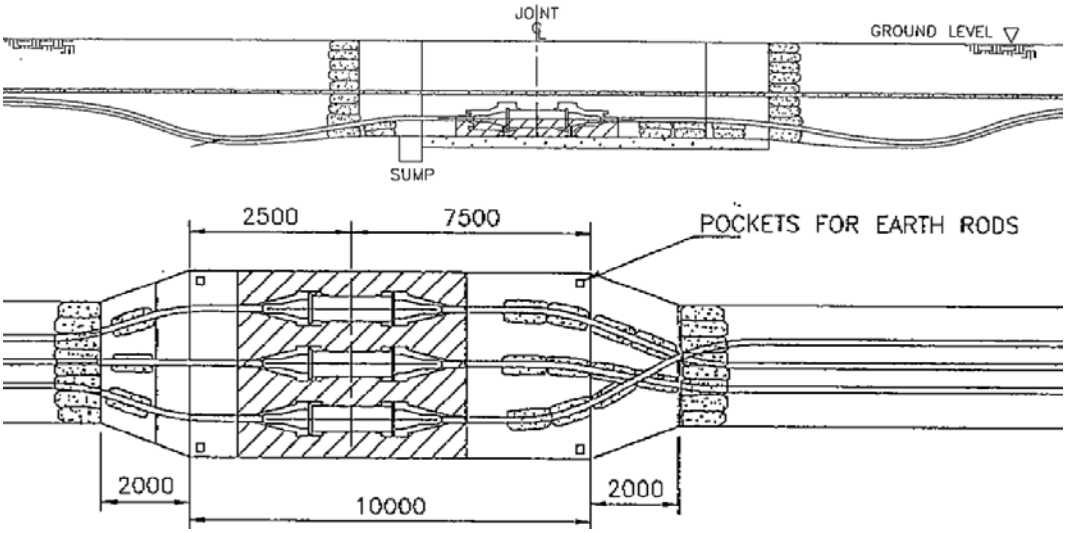

Figure 6 Typical jointing bay configuration

4.5.8 All Jointing will be undertaken in accordance with manufacturers jointing instructions.

4.6 Ground reinstatement protocol within the SSSI

4.6.1 During the installation of the 275kV cable in Crymlyn Burrows SSSI, a ground reinstatement protocol will be adopted.

Ground reinstatement beneath the existing track

4.6.2 Installation of the 275kV cable will be undertaken beneath the existing access track which runs from the amazon roundabout, south east towards the River Neath. Installation below the existing tarmac track will reduce impacts on the surrounding SSSI.

4.6.3 Where the trenching of the cable cuts through the existing tarmac track, this area will be reinstated in accordance with local authority highway standards. In locations where the 10m working width corridor also impacts upon the surrounding area, the ground will be reinstated on a like for like basis should this area extend beyond the tarmac track.

Ground reinstatement in the wider SSSI

4.6.4 In areas where the 275kV cable runs through the Crymlyn Burrows SSSI, and is not located beneath the existing tarmac access track, the ground reinstatement protocol will be adopted.

4.6.5 Where installation of the 275kV cable adopting the proposed trenching or plough method (as stated above) is undertaken, the immediate area will be reinstated with a minimum of 150mm of topsoil. This will enable the area to be reinstated on a like for like basis.

4.6.6 Post installation of the cable, the 10m working corridor (in places potentially reduced due to sensitive ecological receptors) will also be fully reinstated. This area will be protected by temporary stock proof fencing. The period for which this temporary fencing will be in place will be agreed with the local planning authority ecologists and NRW. Public access into the SSSI will be maintained at all times. For more information on the fencing of the cable route, please see the 275kV Project CEMP.

4.6.7 A planting and seeding regime for the maximum 10m wide working corridor within the SSSI will be developed in consultation with the local planning authority and NRW, should this be required.

4.6.8 The above measures will also be adopted for the reception in relation to the HDD beneath the River Neath.

5 Appendix A – Cable Route

6 Appendix B - BACTEC Explosive Ordnance Threat Assessment