Appendix A26

An Bord Pleanála

# Inspector's Report ABP302556-18

| | |
|---|---|
| **Development** | Proposed Waste Water Treatment Plant, Interceptor Sewers and Associated Works. |
| **Location** | Ferrybank and Tinahask Lower, Arklow. |
| **Planning Authority** | Wicklow County Council. |
| **Planning Authority Reg. Ref.** | Not Applicable |
| **Applicant(s)** | Irish Water. |
| **Type of Application** | Application under the provisions of S37 of the Planning and Development Act and Compulsory Purchase of Lands under the Housing Act 1966. |
| **Planning Authority Decision** | Not Applicable. |

| | |
|---|---|
| **Observers to the Strategic Infrastructure Application** | Development Applications Unit<br>Transport Infrastructure Ireland<br>Health Service Executive<br>Inland Fisheries Ireland<br>Geological Survey of Ireland<br>Sophia Meeres<br>Arklow Marine Services<br>Peter Byrne<br>Ferrybank and Seaview Residents<br>Patrick and Patricia Ivory<br>Elizabeth Kenny and Nicola Kenny<br>Arklow Ferrybank Developments Ltd<br>Arklow Marina Village Owners Management Company Ltd. |
| **Objectors to the CPO** | Aldi Stores Ireland (subsequently withdrawn)<br>Peir Leonard & Roger Prestage<br>Christine McElheron<br>Arklow Marina Village Owners Management Company (subsequently withdrawn)<br>Arklow Ferrybank Developments Ltd.<br>Ailish Byrne |
| **Date of Site Inspection** | 28th November 2018 & 21st January 2019 |
| **Inspector** | Paul Caprani. |

9.5.2. Significant concerns are raised in relation to noise and vibration impacts arising from construction activities, and in particular the construction of the interceptor sewers along the Riverside Walk and the North and South Quays of Arklow Town. Concerns are also expressed in relation to traffic impacts, and in particular, traffic diversions resulting from the temporary closure of public thoroughfares during the course of the construction activities.

9.5.3. The proposed new interceptor pipeline has been developed on a 50-year design horizon and have been designed to prevent 'out of sewer flooding' in accordance with standard requirements. The depth of the pipeline varies significantly along the alignment to ensure that all connection points with the existing overflow pipes are intercepted. The depths also seek to ensure that the pipeline passes under existing utilities such as gas, telecoms and electricity. Finally, the depths of pipes are predicated on conveying flows by gravity to the wastewater treatment plant which eliminates any requirement for pumping stations along the river. Pumping stations attract significant energy requirements and can in themselves be a potential source of noise and odour generation. Two methods of construction are proposed along the alignment of the interceptor sewer. The more westerly section of the interceptor sewer south of the river i.e. between the Alps and Arklow Bridge and the South Quay area to the immediate east of Arklow Bridge are to be constructed by open cut trenches in which the pipework will be installed. In general pipeline depths along this section of the interceptor sewer will range between 2 and 4 metres. Site investigations also indicate that existing ground conditions are most suited for completing the work by open cut trench technique.

The method of construction for the interceptor sewer at the eastern end of the South Quay and the North Quay will be undertaken by tunnelling pipeline depths along these sections of the interceptor sewer range from 5 to 14 metres. Evidence provided by Mr. Aidan McCarthy on behalf of Irish Water at the oral hearing stated that it is considered good engineering practice to avoid pipeline installation by open cut trenches for excavations in excess of 4 to 5 metres.

9.5.4. An array of concerns was raised by observers with regard to the proposed methods of construction involved in the provision of the interceptor sewer and these are summarised and assessed below:

2020

# Greater Dublin Drainage

## Appendix 6

## Outline Construction Methodology relating to the Proposed Outfall Pipeline Route (Marine Section)

## February 2020

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# Outfall Pipeline Route (Marine Section)

## 1.1 Outfall Pipeline Route (Marine Section) Construction

The preferred option for the construction of the outfall pipeline (marine based) is a combination of micro-tunnelling and sub-sea pipe laying (dredging) techniques. The micro-tunnelled section will commence at the west side of the Baldoyle Estuary and the tunnel section will progress beneath Baldoyle Estuary and terminate seaward of the Baldoyle Bay SAC/SPA below the low water level mark, a distance of approximately 2,000m in total.

The sub-sea pipe section will involve the excavation of a trench from the tunnel termination point to the outfall location (c. 4.0km), the trench will be 5m deep trapezoidal trench – 5.0m wide at base. Excavated material will be temporarily stored on the sea bed within the working corridor and parallel to the pipeline trench.

The sub-sea pipeline, a LLLD (Long Length Large Diameter) Polyethylene (PE) pipe of 2.0m diameter, will be installed by "float and sink" method.

### 1.1.1 Microtunnelled Section

Micro-tunnelling techniques will be used from the open fields immediately west of the R106 Coast Road to approximately 600m offshore terminating below the low tide level.

The micro tunnel section is 2m internal diameter, constructed at depths ranging between 15m and 20m below ground level using a micro-tunnelling machine, with pipe sections installed as the tunnelling machine progresses.

The tunnel section will require temporary construction compounds onshore, in the open field immediately west of the R106 Coast Road and in the grassed area adjacent to the public car park off the Golf Links Road, immediately north of Portmarnock Golf Club. At these compounds, the launch/reception shafts would be constructed, tunnelling equipment would be located and the tunnel materials would be stored temporarily. Waste material from the tunnel would be removed and disposed of in accordance with waste management legislation. Preliminary analysis estimates that the micro-tunnelling would progress at a rate of approximately 60m per week and that the tunnelling would take in the region of 12 months including for site mobilisation. An outline programme for these works is provided in Figure 2.

**Outline Construction Methodology relating to the Proposed Outfall Pipeline Route (Marine Section)**

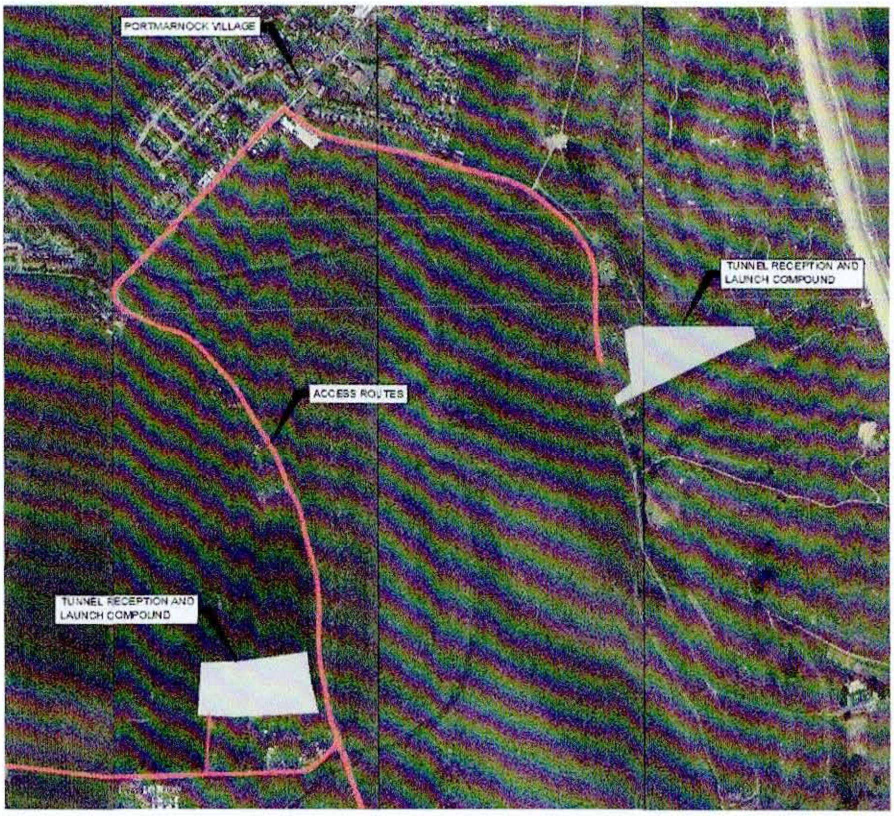



**Figure 1: Tunnel Compound Locations**

The micro-tunnelling compound area will require an area of approximate dimension 200m x 100m and will contain the following plant and facilities:

- Office area including car parking;
- Launch/ Reception Shaft with Jacking Station;
- Tunnelling equipment including;
    - Tunnel Boring Machine (TBM)
    - o Control Unit
    - o Hydraulic pump units
    - o Generators
    - o Bentonite mixing plant
    - o Water separation plant
- □ Storage area for jacking pipes, fuel, bentonite, topsoil, surface water;
    - Crane; and
    - Excavator.

A typical arrangement for the micro-tunnelling compounds is illustrated in Figures 3 and 4.

Micro tunnelling would operate on a continuous 24 hour/ 7-day basis. The construction of the microtunnelled section of the outfall pipeline (marine section) is estimated to take 15 months.

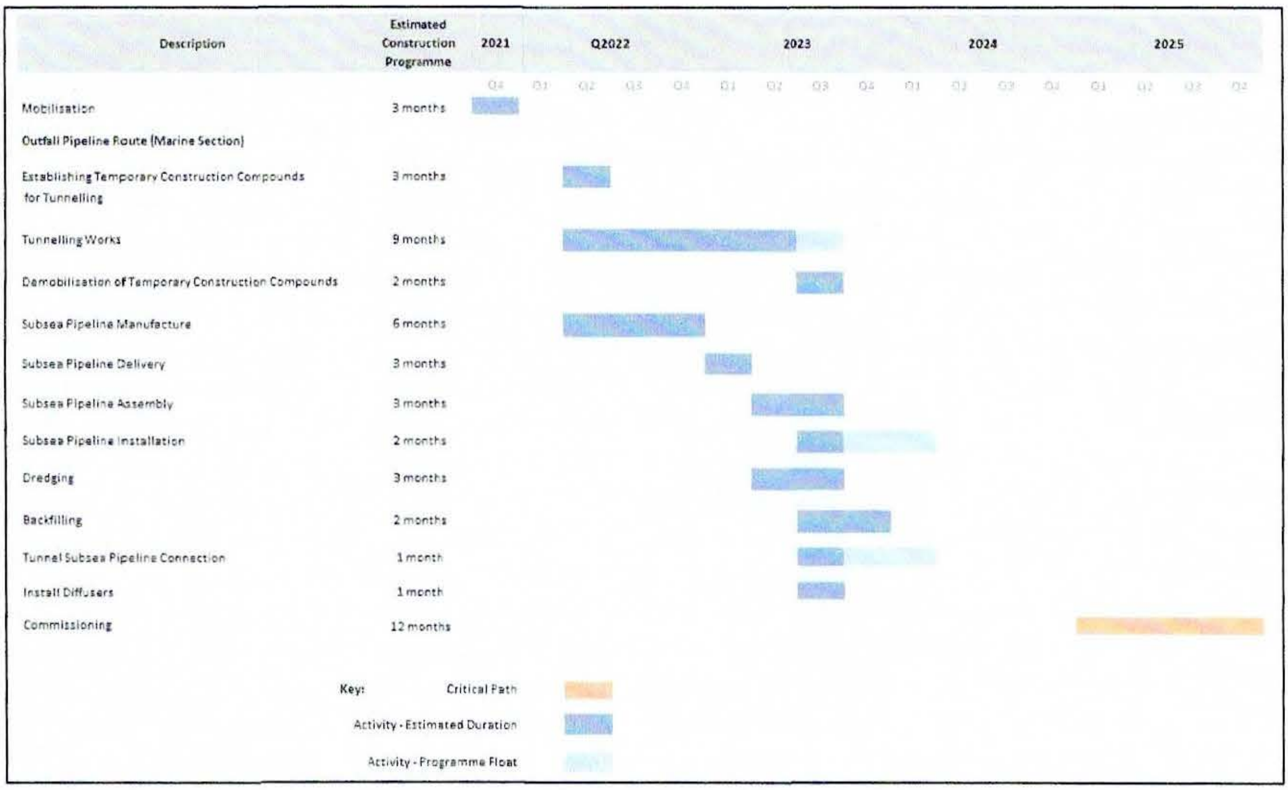



**Figure 2: Outline Construction Programme–Marine Based Pipelines (Part of Overall Programme)**

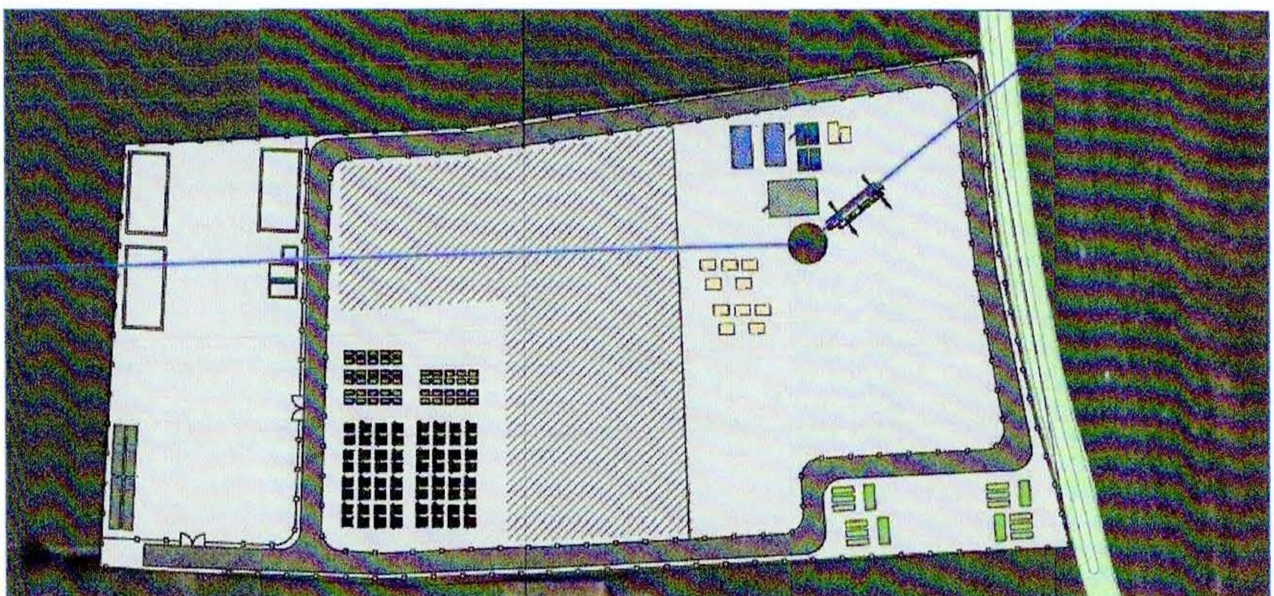


**Figure 3: Baldoyle Tunnel Compound Arrangement**

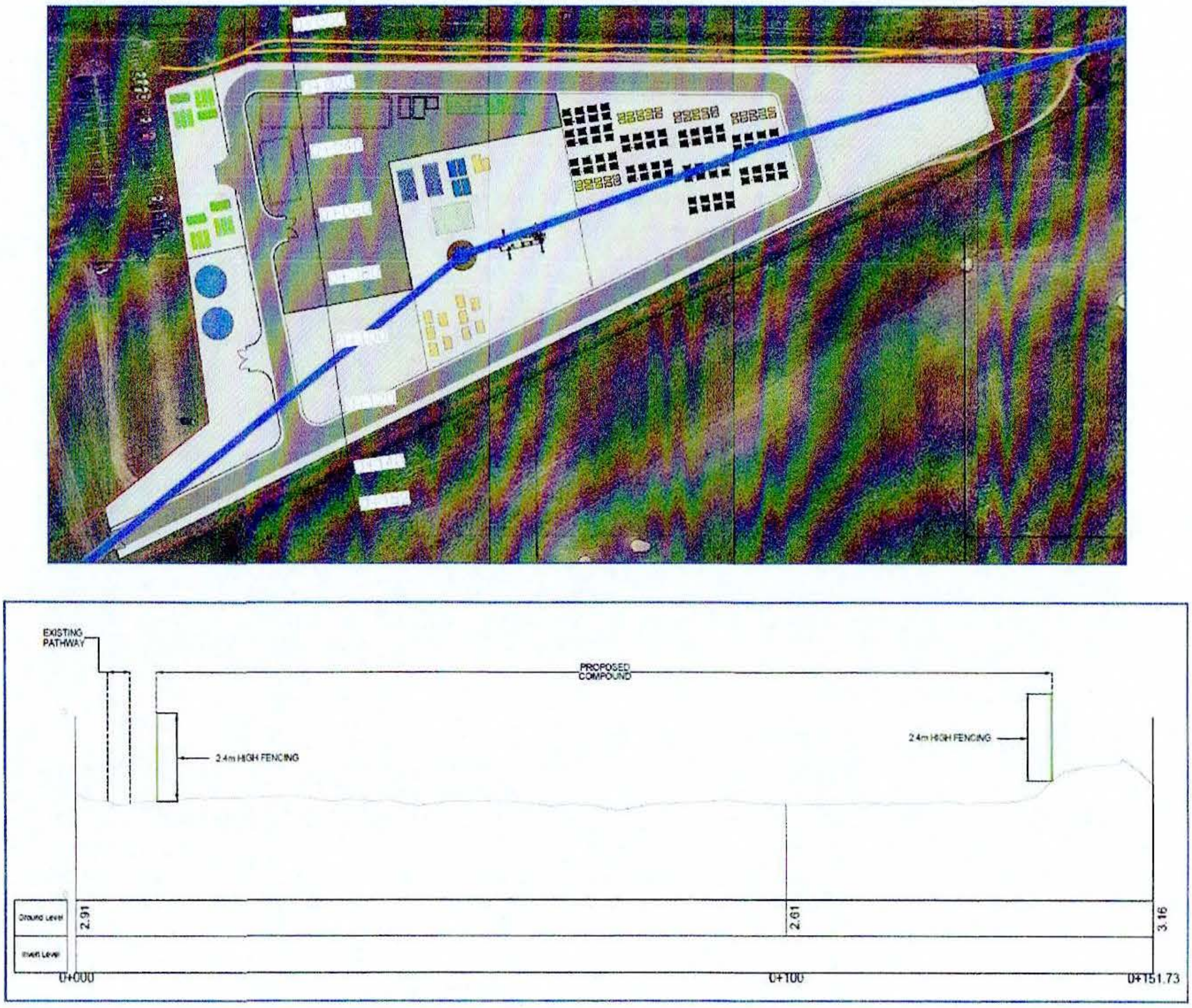



**Figure 4: Portmarnock Tunnel Compound Arrangement**

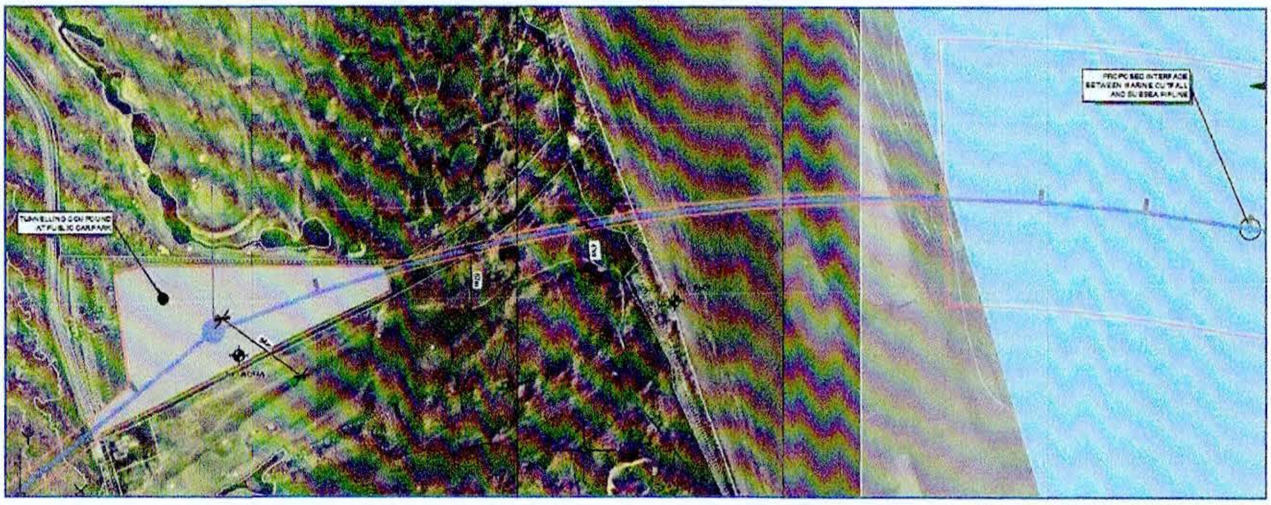


**Figure 5: Micro Tunnel Alignment (extract from Drawing 32102902-2113)**

The micro-tunnelling process is briefly described hereunder;

- Set up site -compound fencing,
- Topsoil stripping, importing of granular material to protect working area.
- Excavate and prepare Launch/ Reception shaft (10m diameter minimum)
- Set up control container and other auxiliary equipment beside launch/reception shaft
- Setup jacking frame and hydraulic jacks
- Lower micro-tunnelling machine into launch/reception shaft and set up
- Set up laser guidance system
- Setup slurry lines and hydraulic hoses on the micro-tunnelling machine
- Commence Jacking
    - Main jack pushes the micro-tunnelling machine forward
    - When back of tunnel machine reaches face of drive, disconnect slurry lines and hydraulic hoses from jacked section, jacks are retracted.
    - Lower new pipe segment behind the tunnel machine and reconnect slurry lines and hydraulic hoses
    - The Jacks are re engaged to the pipe, jack new pipe segment and excavate and
    - remove spoil
- Repeat until receiving shaft is reached.

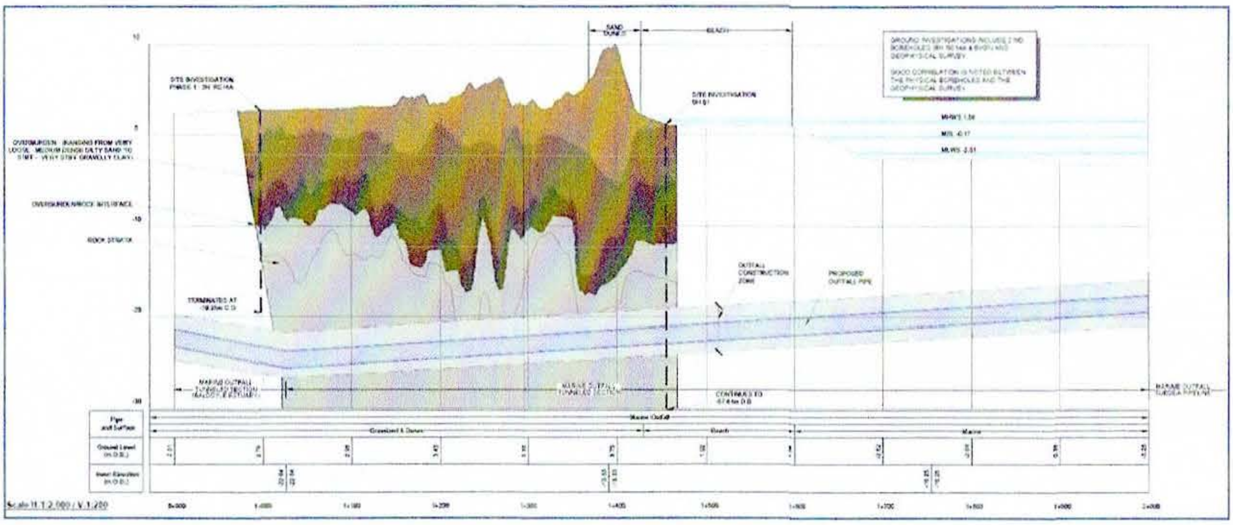


Figure 6: Micro Tunnel Profile (extract from Drawing 32102902-2113)

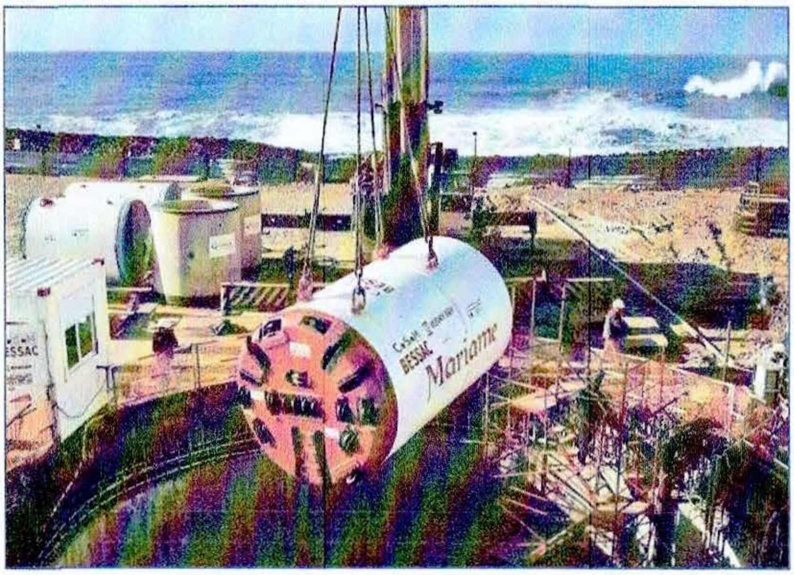


Figure 7: Micro-Tunnelling Machine lowered into Tunnel Shaft

Figure 8: Micro-Tunnelling Machine Launch Shaft

Figure 9: TBM Reception Shaft

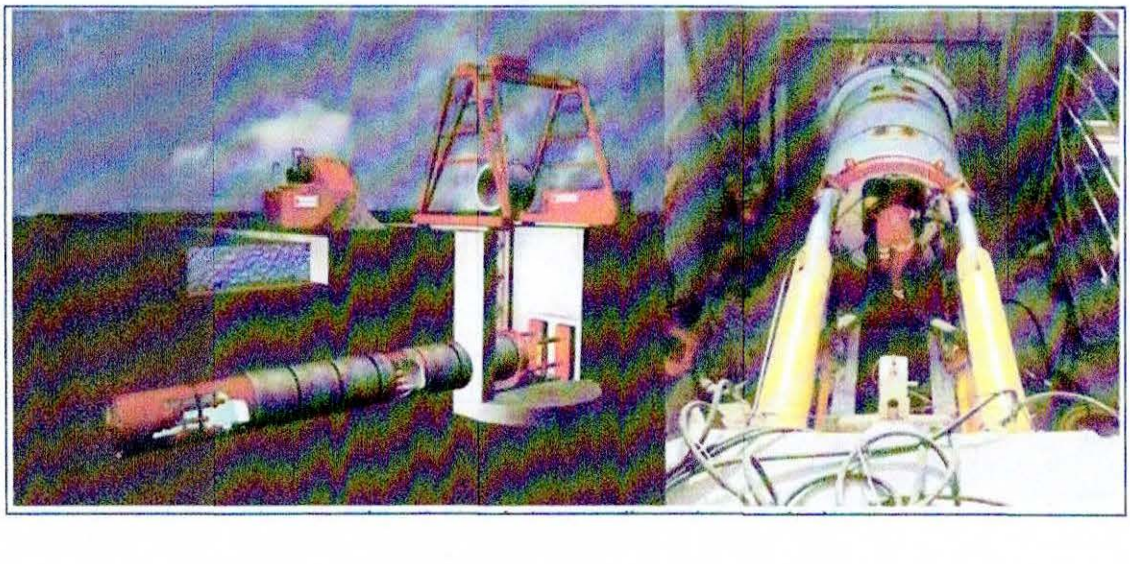


Figure 10: Tunnel Schematic & Micro-Tunnelling Machine commencing

It is possible that the micro-tunnelling machine will be recovered via a 10m cofferdam structure as illustrated in Figure 11. The cofferdam structure will be constructed from a jack up platform using an interlocking sheet piling methodology. The interlocking sheet piles will be driven from the jack up platform to create the cofferdam structure using vibratory hammers, impact hammers or using a hydraulic method of installation. All access to the works will be from the seaward side. Once constructed the cofferdam will be emptied of water. The micro-tunnelling machine will be driven into the cofferdam structure and recovered from there using a crane mounted on the jack-up platform.

Alternatively, the micro-tunnelling machine could be recovered in a 'wet' recovery procedure via a pre-excavated trench filled with granular material (excavated from elsewhere along the pipeline trench) without the necessity to construct a cofferdam. In this procedure, the micro-tunnelling machine is driven into the granular material in the trench. The granular material is then carefully excavated from around the micro-tunnelling machine which is then recovered using a crane mounted on a jack-up platform.

**Figure 11: Construction of Cofferdam**

## 1.2 Subsea Pipeline

### 1.2.1 Sequence of Activities for Pipeline Installation

The installation methodology for flexible PE pipes in long lengths is typically;

**Step 1** Dredging of trench (parallel operation to pipe assembly)

**Step 2** Pipe assembly into long strings, including addition of concrete ballast. (length of string will be dependent on contractor's methodology, typically in range of 1.3 – 2.5km (parallel operation to dredging of trench)

**Step 3** Towing the assembled pipe string (s) to the outfall site.

**Step 4** Installing the pipe string into the dredged trench using the 'float' and sink' method

### 1.2.2 Step 1 – Dredging of Trench

The sub-sea pipe section will involve the excavation of a trench within a 250m wide working corridor from the tunnel termination point to the outfall location (c4.0km). A summary of the construction methodology for the sub-sea pipeline is provided hereunder;

- Dredge from tunnel interface to outfall location

Sediment Plume not assessed at interface

- Trapezoidal trench -5m deep, 5.0m wide at base

Deeper than this at interface? (1m ? + rising

- Dredged material disposed to a barge, deposited and stockpiled parallel to the pipeline trench within the 250m corridor and
- Sub Sea Pipeline: LLLD (Long Length Large Diameter) PE pipe 2.0m diameter installed by "float and sink" method.
- The excavated material will be returned to trench once the pipe is in place, with a minimum cover to the installed pipe of 2m.
- The main equipment required is;

| Marine Equipment |
| --- |
| Backhoe dredger |
| Trailer suction hopper dredger |
| Multicat support vehicle |
| Hopper barge |
| Tugs |
| Floating pontoons |
| Cranes/excavators |

A backhoe dredger (BHD) or trailer suction hopper dredger (TSHD) could be used for the construction of the trench from the tunnel reception pit seawards. It is likely a combination of both pieces of plant would be used with the BHD used in shallower waters and TSHD in the deeper section (water > 20m deep).

The release of spoil material by a hopper barge will be controlled and will only take place every 7 hours.


**Figure 12: Typical Sub-Sea Pipeline Equipment – Backhoe Dredger**

Figure 13: Typical Sub-Sea Pipeline Equipment – Trailer Suction Hopper Dredger

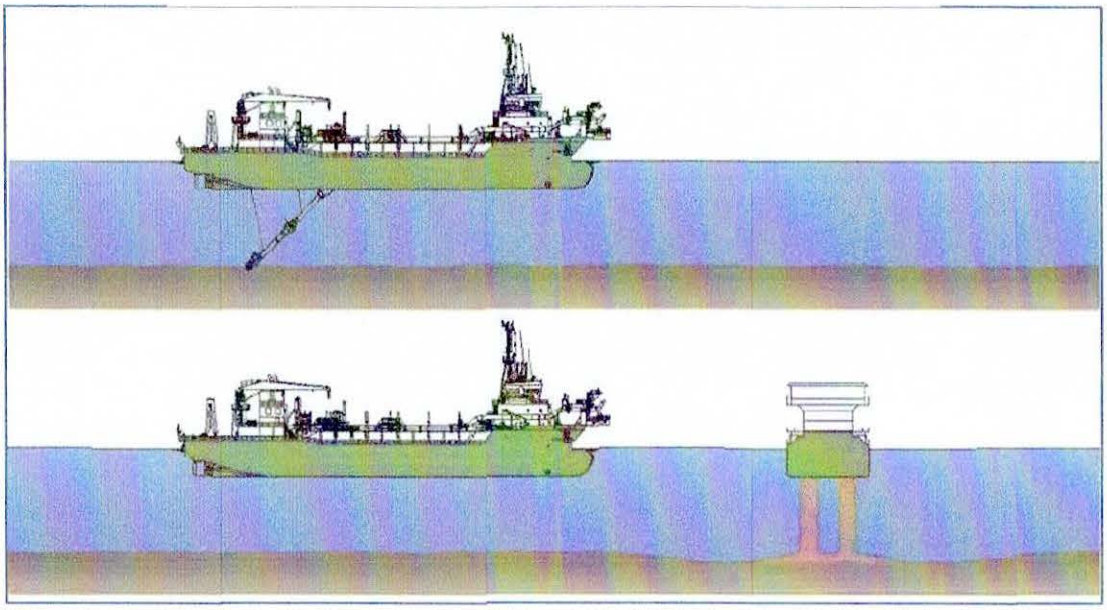


Figure 14: Typical Sub-Sea Trench Construction with TSHD

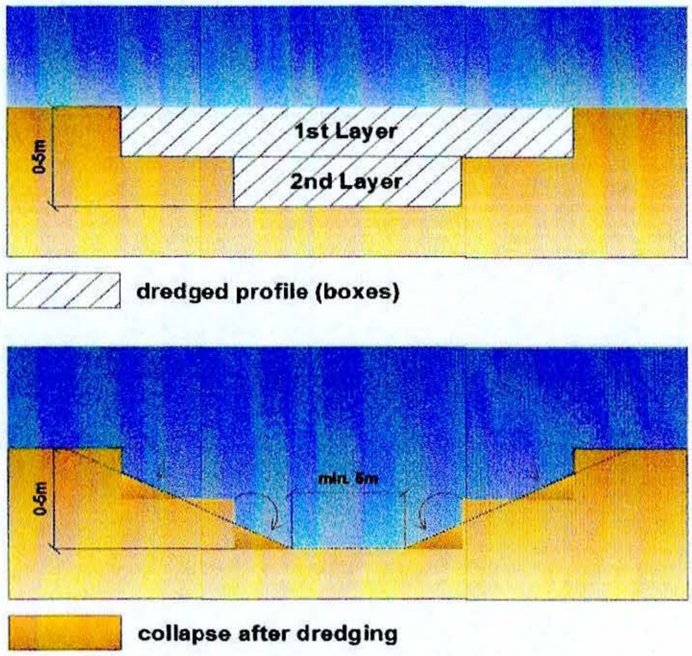



Figure 15: Trailer Suction Hopper Dredger Excavation Sequence

### 1.2.3 Step 2 – Pipe Assembly

LLLD (Long Length Large Diameter) PE pipes are towed by sea to the pipe assembly area from manufacture. The pipes are towed in maximum lengths of 650m with up to ten of these pipe lengths being towed at a single time, refer Figure 16.

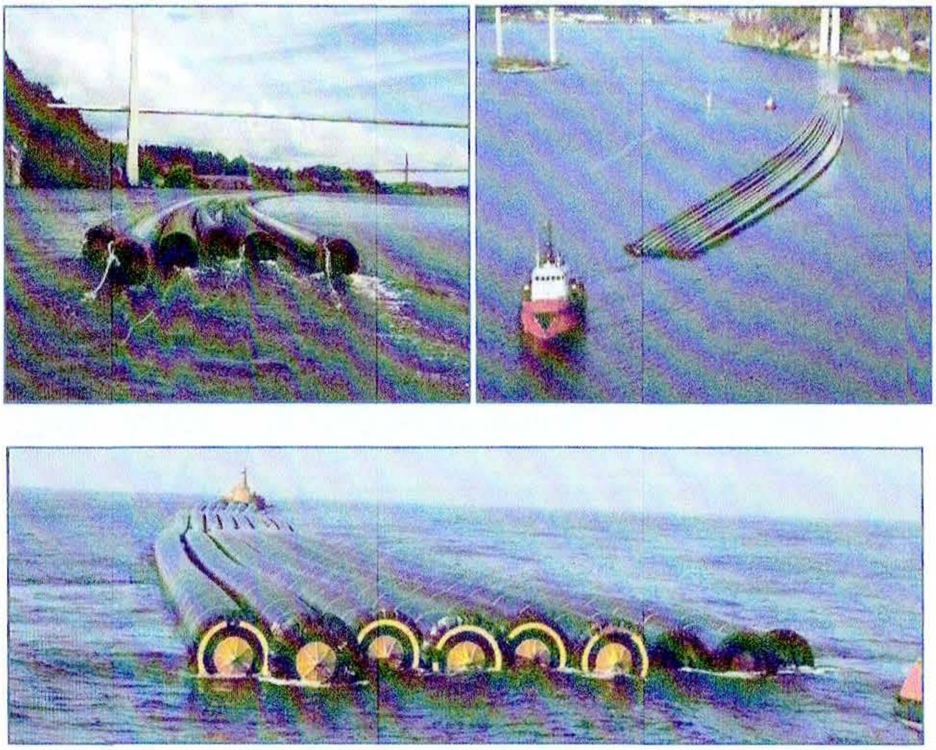


**Figure 16: Transport of Long Lengths of Pipe to Site – copyright PipeLife Norge AS**

The pipes are then assembled into string lengths defined by the Contractor with the use of mechanical joints or flanged connections as per Figure 17.

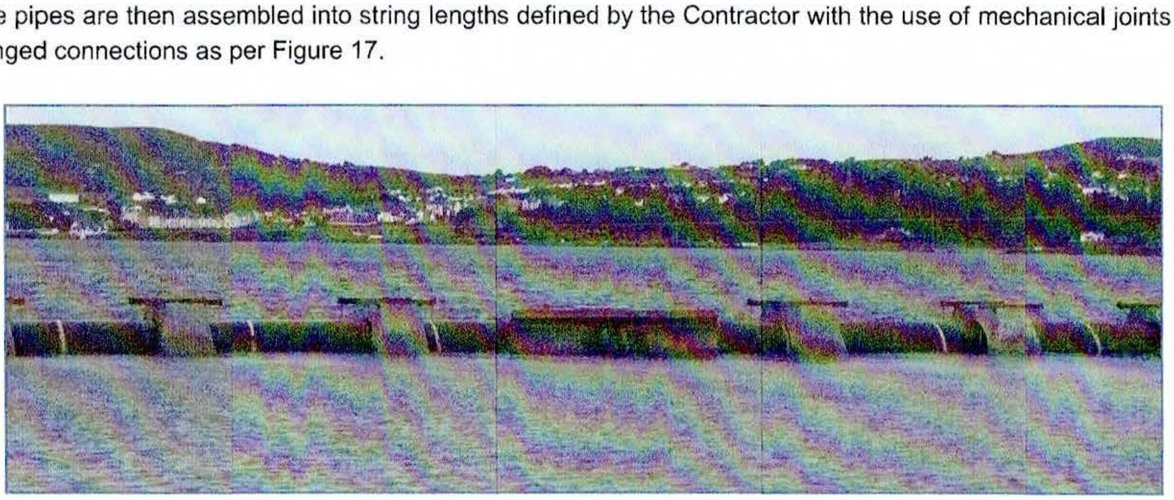


**Figure 17: Connection of Long Pipe Strings**

Both ends of the LLLD pipes are blanked off at both ends of the pipeline string allowing the pipe to stay slightly pressurised to aid floating. Concrete weight collars are then dropped on and secured in place. There are a number of alternative designs for concrete weight collars, such as rectangular, circular or starred ballast blocks or alternatively continuous concrete collars. The actual type used will be dependent on contractor's design, pipeline parameters and contractor's installation methodology.

Pipe assembly can take place alongside a quay wall at a Port or in sheltered waters. In a Port mobile cranes, operating on the quay walls would lift the concrete collars into place. Collars would be delivered by road to the port (Figure 18).

**Figure 18: Typical Ballasting and Pipe Assembly Location off Quay wall**

In sheltered water, a floating jack up platform supported by floating vessels would be used. Collars would be delivered on a daily basis by ship to assembly location (Figure 19).

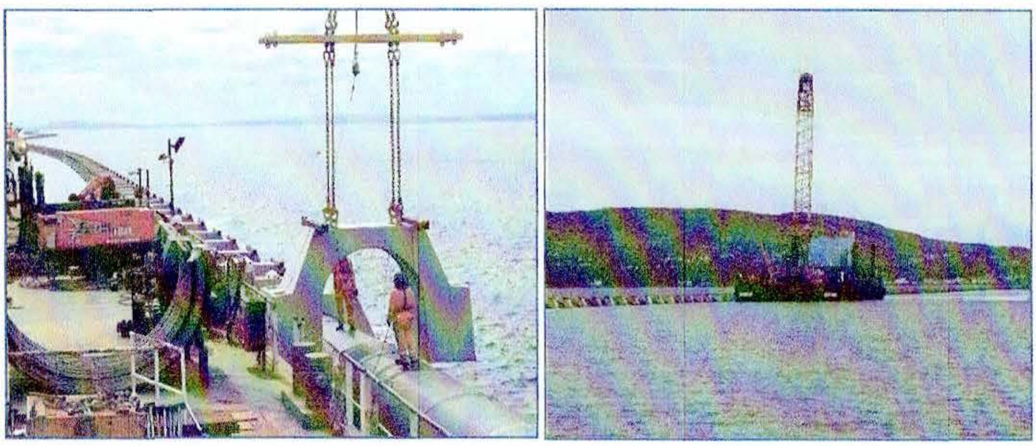


**Figure 19: Concrete Ballast and pipe assembly being installed on floating pipe in sheltered water**

Possible locations for the pipe assembly areas are Dublin Port and/or adjacent to the marine pipeline corridor.

### 1.2.4 Step 3 – Towing

The pipe strings and associated concrete weight collars are towed using tugs to the outfall pipeline site and placed over the dredged trench.

### 1.2.5 Step 4 – Float and Sink Method

The proposed methodology is to install the sub-sea pipeline section by the float and sink method. The pipe string is slowly filled with water from one end and then gradually lowered into the trench via a S curve (Figure 20 and 21). When multiple strings are in place, the connection between strings can be made by a number of methods;

- Making a mechanical connection underwater with the use of divers
- Making a mechanical connection on the surface between strings as the pipe is being sunk

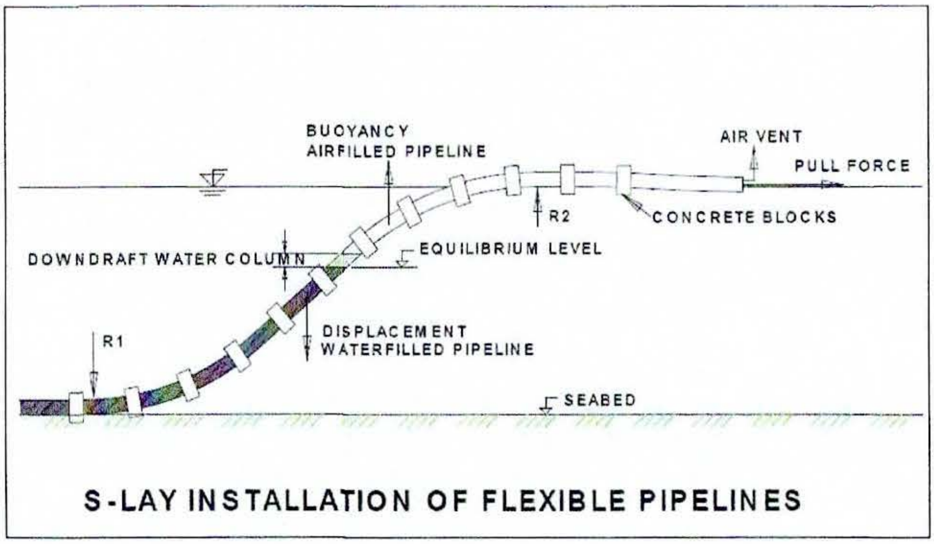



**Figure 20: Step 4 - Principle of installation of flexible PE pipes in long lengths**

**Figure 21: Step 4 - Submersion by water filling/air evacuation - copyright PipeLife Norge AS**

## 1.3 Tunnel/ Subsea Pipeline Interface

The tunnelled section will terminate approximately 600m offshore and this will be the interface point between the two sections of the marine outfall, i.e. the tunnelled section and the section constructed by subsea pipe construction techniques.

The Tunnel Boring Machine (TBM) will terminate into a temporary structure (cofferdam or in a pre-excavated trench filled with granular material) which will facilitate the retrieval of the TBM. After installing the bulkheads, removal of the TBM can be undertaken. The cofferdam is then removed. The dredged trench is then completed and the pipe installed as close as possible to the tunnel section. At this stage, the connection is made. The connection can be made by a number of methods;

- Inserting the HDPE spool piece sufficiently into the tunnel and sealing the annulus between the tunnel and the HDPE marine outfall pipe to form a water tight seal.
- Making a mechanical connection between the tunnel and the outfall pipeline, using flanges or similar (Figure 22).

**Figure 22: Subsea flanged connection between sections by divers**

## 1.4 Marine Diffuser

The diffuser allows the effluent to be released from the pipeline to mix with (or diffuse into) the surrounding sea water. The diffuser section is normally located along the final or end section of the pipeline.

The diffuser section consists of one or more vertical riser pipes (Figure 23) which are attached to the main pipeline after it is lowered into the trench. The actual diffuser valves (Tideflex duckbill valves or similar – refer Figure 24) are then attached to the riser pipes.

The main pipeline will be supplied with pre-installed flanged openings (capped) for the diffusers. Once the pipe is lowered into the trench divers will remove the flanged caps and attach the riser pipes via bolted connections. The trench is then backfilled. Divers will then attach the diffuser valves (Figure 25), again using bolted connections, to the end of the riser pipes which are protruding above the reinstated sea bed. Protective covers – precast concrete or steel (Figure 26) are then placed over the diffuser valves.

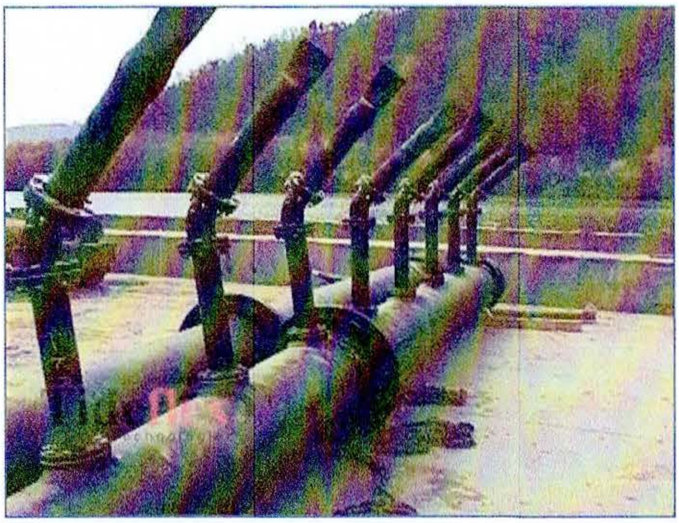


Figure 23: Marine Riser – Multi Port

Figure 24: Marine Riser Valves

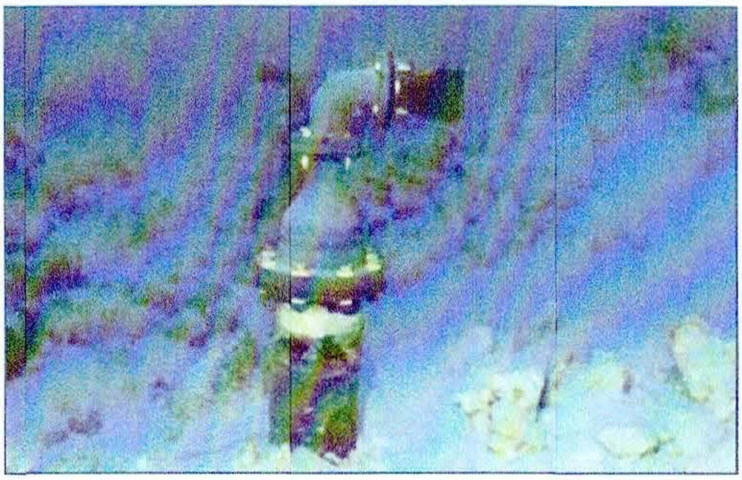


**Figure 25: Marine Riser above Seabed**

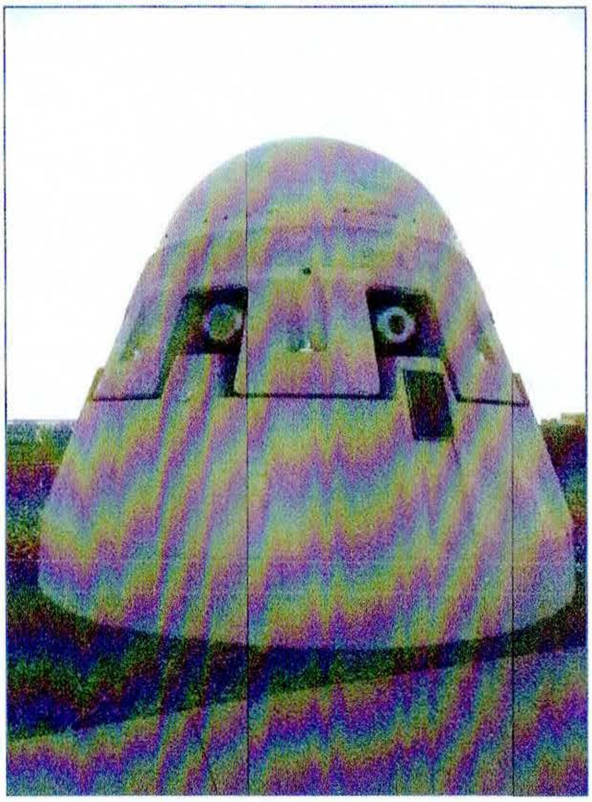
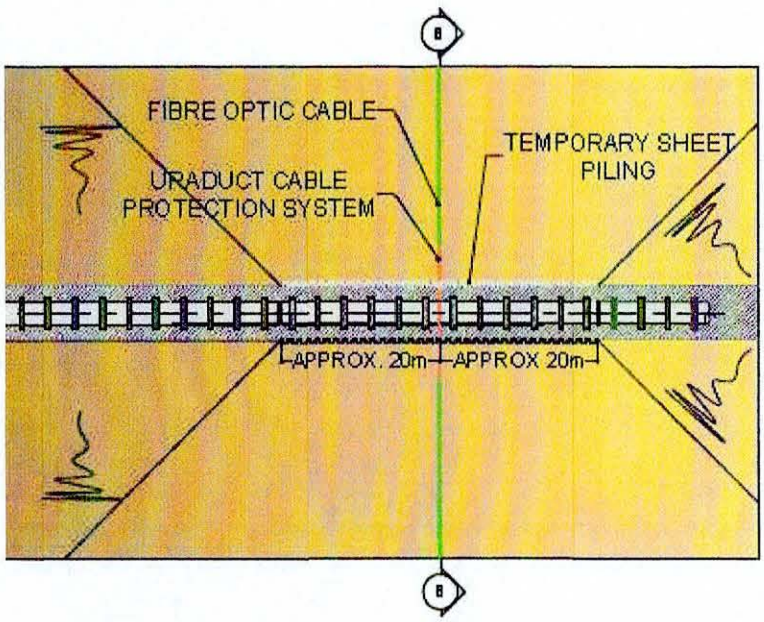


**Figure 26: Typical Precast Concrete Protection for Outfall Riser**

## 1.5 Subsea Fibre Optic Cable

A sub-sea fibre optic cable crosses the route of the outfall pipeline at approx. ch 4,500m. This cable has to be protected in-situ while the dredging and pipelaying operations progress. The method of protecting this cable using interlocking sheet piles and installing the outfall pipeline under it is outlined hereunder.

Interlocking sheet piles will be installed either side of the fibre optic cable to support the sides of pipeline trench. This will enable the width of trench to be kept to a minimum and allow the cable to be supported during the installation of the outfall pipe.




Plume
Not assessed.

Figure 27: Fibre Optic Cable Crossing

Once supported, the cable can be shielded with a suitable conduit to provide additional protection. This will allow the contractor to carefully excavate below the supported cable. Following excavation of a suitable trench, an appropriate length of PE pipeline can be pulled in to the trench beneath the cable. This short length of PE pipeline is then connected to the overall outfall, by means of subsea connections, in a similar manner to that described above.

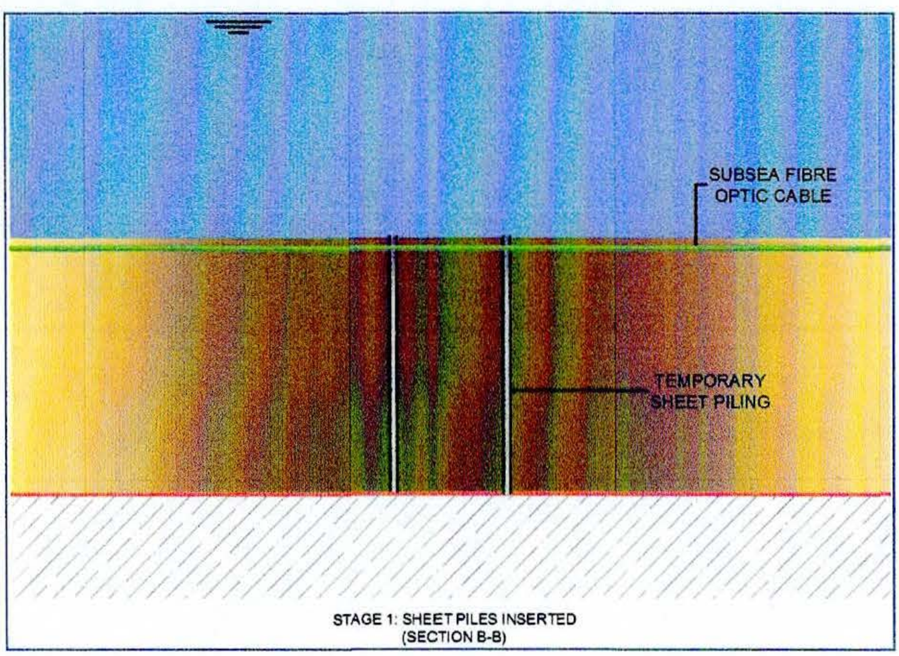



Figure 28: Fibre Optic Cable Crossing – Stage 1 – Install Sheet Piles

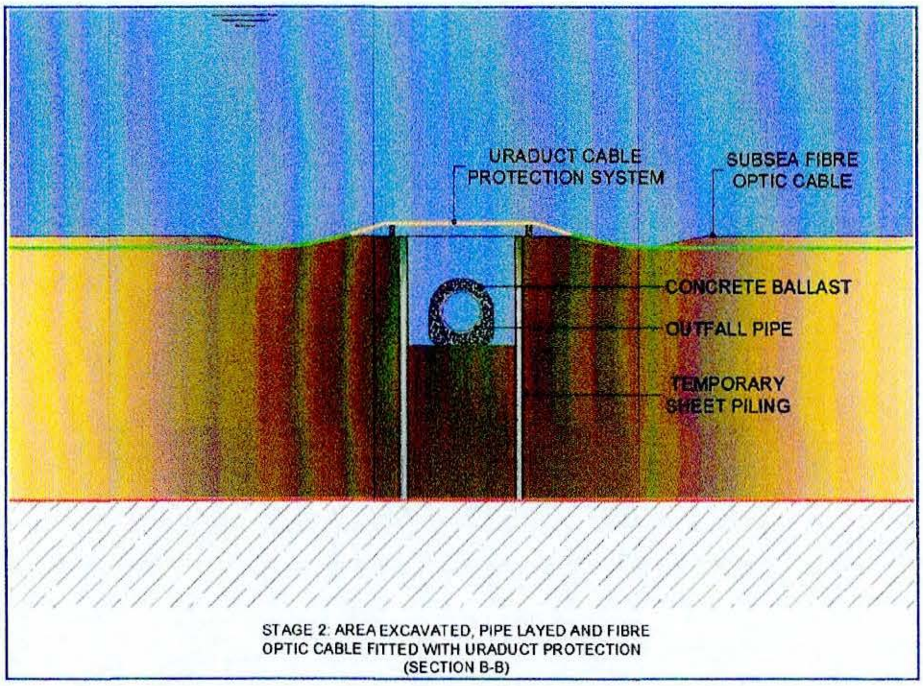



**Figure 29: Fibre Optic Cable Crossing – Stage 2– Install Outfall Section**

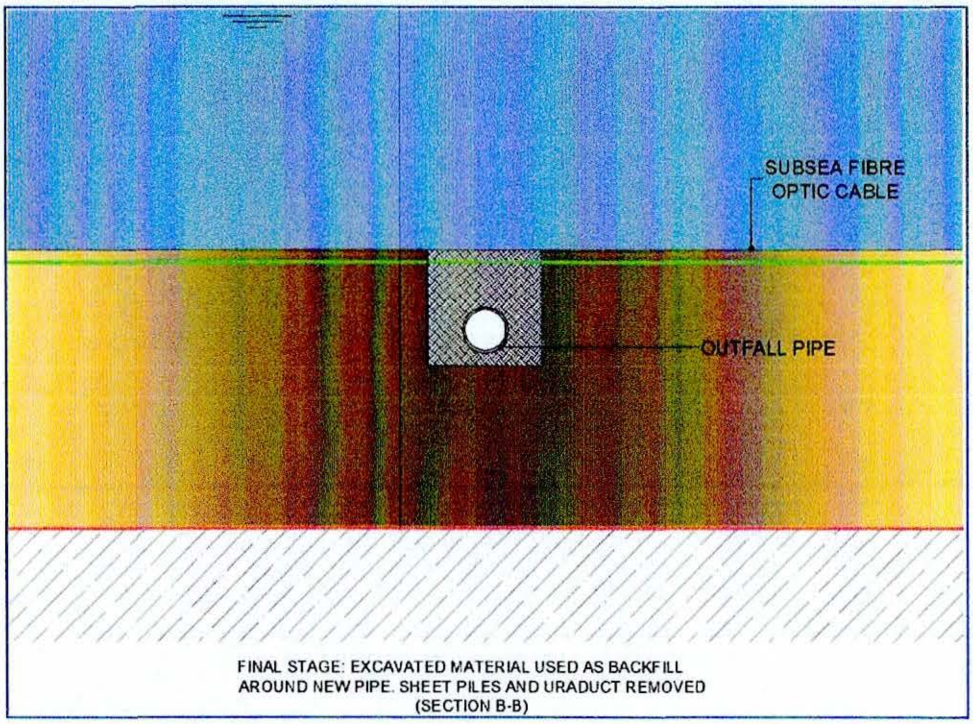



**Figure 30: Fibre Optic Cable Crossing – Stage 3 – Backfill Trench**