Corrib Onshore Pipeline

Construction

Brief of Evidence

By Eamon Kelly

1 QUALIFICATIONS, EXPERIENCE AND ROLE IN PROJECT

My name is Eamon Kelly and I am the Senior Onshore Engineer, responsible for the construction of the Corrib Onshore Pipeline.

I am a Chartered Engineer, having qualified from University College Cork (UCC) with a degree in Civil Engineering. I completed a Diploma in Project Management at Dublin University. I also successfully completed a Certified Diploma in Accounting and Finance, accredited by ACCA,. I am a member of Engineers Ireland. I am a former member of Gas Technical Standards Committee, Ireland and I am also an Honorary Life Member of the Pipeline Industries Guild.

My experience includes gas pipeline route selection, site investigation, landowner management, construction supervision and management. I have been involved in Project & Construction Management of various aspects of the following Bord Gáis Éireann transmission/distribution projects since 1985:

1985/86	Including the Cork - Dublin Gas Pipeline. 1986/87 The Clonmel - Waterford Pipeline and associated spurs.
1987/88/89	Dublin - Dundalk Pipeline (NEP2).
1989 - 1990	Santry – East Wall Road. Transmission Pipeline. 1990 - 1991 Dunleer – Virginia / Bailieborough Transmission Pipeline.
1991-2002	Variety of managerial positions, responsible for design, planning, financial assessment and construction management of distribution network and connections
In 2002 – 2004	I was General Manager BGE Northern Ireland. Responsible for design, planning and Contractor appointment for the North West Transmission Pipeline (Carrickfergus-Derry). Responsible for preliminary route selection and appointment of Consultants to Dublin-Belfast gas pipeline.
And in	
2004 – 2006	Distribution Operations Manager. With responsibility for all Republic of Ireland distribution activities, including design, planning, safety, response management and all network construction.

Prior to involvement with Bord Gáis in 1985, I was engaged as a Site Engineer on sewerage/water projects in Tallaght, Naas, Clondalkin, Drogheda and Clonmel. I was also engaged as Site Engineer on construction of a tailings dam in Navan, a major sand embankment reservoir in Drogheda, a sea

outfall pipeline and Resident Engineer on a variety of bridges and associated roads including the East Link Toll Bridge. I have extensive site and construction experience on a variety of infrastructure projects but particularly on pipeline projects.

2 SCOPE OF EVIDENCE

My Brief of Evidence is in two parts. In Part 1 - , I will outline the proposed construction methods to be used along the pipeline route from the landfall location at Glengad to the termination of the onshore pipeline at Bellanaboy Bridge Gas Terminal. The proposed construction methods have been developed in consultation with various environmental specialists, each of whom will outline their evidence later in separate statements to the Oral Hearing. This approach ensured that methods were developed that would avoid or minimise environmental impact.

I will also outline the proposed method of installing and testing the pipeline, the likely construction programme and the construction supervision team, to be engaged in managing the construction.

Part 2 will outline the CAO Application.

3 PROPOSED CONSTRUCTION METHODS

I will first describe general pipeline construction methods that will be used on the land sections of the proposed route. I will then discuss in more detail the proposed methods for the various sections of the pipeline route, which I have divided into 7 distinct sections, as follows: (**Slide 1**)

1. Glengad
2. Lower Crossing of Sruwaddacon Bay
3. Rossport Landfall to Rossport Commonage
4. Rossport Commonage
5. Upper Crossing of Sruwaddacon Bay
6. South of Sruwaddacon Bay
7. Forested area to Bellanaboy Terminal

The proposed construction methods for each of the 7 sections are summarised in Table 1, which is provided as an Appendix to this Statement. Table 1 also outlines where these construction methods are discussed in the EIS and the relevant application drawings.

The planned Offshore Pipeline reaches landfall at Glengad at chainage 83.40 indicating that the length of the overall pipeline to this point is 83.40km. Therefore, the distances measured along the length of the onshore pipeline (i.e. chainages), which are used to identify specific locations commence at 83.40

It should be noted that the following description of the proposed construction methods are provided in Chapter 5 of the EIS. Furthermore, it should be noted that some specific measures to minimise or prevent impact on sensitive habitats or areas of archaeological potential for example are described separately in the evidence to be presented later in this Oral Hearing. Method Statements will be prepared and agreed with NPWS and other relevant authorities for all proposed construction works in designated conservation sites.

Spread Technique

In general pipeline construction projects on land are completed using an “open cut” method.. The spread technique is a standard open cut method for constructing land based pipelines and is widely used across the industry in Ireland and throughout the world. All construction work and associated

activities are carried out within a fenced area that follows the length of the pipeline route. This is the "pipeline construction spread" area.

The "pipeline construction spread" area varies in width along the route of the pipeline, but is generally 40m wide. It should be noted that the "pipeline construction spread" is always contained within the "temporary working area" as identified on the application drawings. In certain locations the "temporary working width" may be wider than the pipeline construction spread and I will explain these areas as I describe the proposed construction method in each section of the pipeline. Generally, open cut pipeline construction is undertaken in a sequence of distinct activities as follows:

- Firstly the pipeline centerline is marked out using wooden pegs.
- The pipeline construction spread will be secured using a linked palisade fence (approximately 3m high). Arrangements will be put in place to retain an adequate access across the working width for landowners and their livestock as necessary. Topsoil stripping of the temporary working area (including installation of drainage facilities where necessary) will then take place (**Slide 2**).
- Topsoil will be set to one side of the temporary working area and used for reinstatement once the pipeline has been installed and tested. Archaeologists will be present on site to monitor topsoil stripping activities.
- A temporary stone access track with a typical 300mm depth of stone will be constructed within the working area to facilitate movement of pipelaying equipment and vehicles associated with the construction of the pipeline.
- Pipes will then be delivered to the temporary working area and laid out in a process known as pipe stringing (**Slide 3**). Pipe lengths are positioned parallel to the trench line, on wooden skids.
- Pipe bending using a special hydraulic bending machine, will be carried out on site where changes in elevation or direction occur along the route, in compliance with I.S. 328. Factory manufactured bends are used where major alignment alterations occur.
- Following pipe stringing and bending, pipe welding can commence (**Slide 4 and Slide 5**). The pipe lengths, positioned on timber skids, are carefully aligned and welded into continuous strings of predetermined length. The welding process is carried out by approved, qualified and experienced welders using approved welding procedures (as outlined in Section 4.5.2.2 of the EIS). All completed welds are subject to robust non-destructive radiography or ultrasonic testing in accordance with I.S 328.. Welded joints will be cleaned and wrapped with an approved protective coating. The entire pipe coating, including coated welded joints, will then be tested for defects.
- The pipeline trench is excavated adjacent to the stone access track. Subsoil removed during this stage will be kept separate from topsoil. All stockpiled material (topsoil and subsoil) will be contained within the pipeline construction spread. The depth of the trench may vary but will allow a minimum reinstated cover of 1.2m over the top of the pipeline generally and a minimum of 1.6m below watercourses, roads and field boundaries, ditches/dykes (see Section 4.3.1 of the EIS). An archaeologist will also be present on site to monitor trench excavation works. .
- A suitable bedding material is placed in the trench. A screening device is often used to improve the quality of local backfill by removing larger stones. If suitable bedding material is unavailable it may be necessary to import bedding material such as sand or pea gravel. This material will be delivered directly to site as it is required.
- The prepared pipeline sections (including the outfall pipeline and services umbilicals) are lowered (ditched) into the trench using side boom crawler tractors (see Figure 5.4 in the EIS) (**Slide 6**).
- Suitable pipeline surround material is placed at the sides and over the pipeline. The trench is then backfilled, using previously excavated material, and compacted in layers. Pipeline marker tape will be placed above the pipeline during the backfill process to warn of pipeline location should future excavation works occur within the wayleave.
- The completed pipeline is hydrostatically tested prior to commissioning and reinstatement. I will outline the hydrostatic testing procedures separately later in my evidence.
- On completion of testing, land reinstatement can commence (**Slide 7 and Slide 8**). The temporary stone road is removed, all land drains reinstated, subsoil is ripped to undo any

compaction, surface stones are removed and the subsoil levelled and graded. Topsoil from the adjacent stockpile is spread over the temporary working area, and the area is re-seeded or allowed to revegetate naturally, as appropriate (as outlined in Section 5.4.11 of the EIS).

- Following successful reinstatement, temporary fencing will be removed and marker posts will be installed at reinstated field boundaries, roads, tracks, rivers and streams. Dished marker posts will be erected at intersection points, where the route changes direction . The dished marker posts assist post construction, aerial surveying.

- A surface water management plan will be implemented. The plan will outline mitigation measures to allow for the proper sedimentation and filtration of water from construction areas before water is discharged to the existing water courses. The plan will include measures such as interceptor drains and silt fences in accordance with established practices.

- Monitoring before, during and after construction of surface water will be undertaken to ensure minimum disturbance of water quality by the construction activities. During the construction phase, the monitoring programme will include daily checks, weekly inspections and monthly audits to ensure compliance with the Surface Water Management Plan. This will be carried out in consultation with the National Parks and Wildlife Service and the North Western Regional Fisheries Board.

Stone Road Method

The Stone Road method was selected in preference to either a 'floating road' or a 'bog mat road' as it provides a more stable construction surface through areas of peat. The stone road approach also allows for retention of turves for subsequent reinstatement use. The stone road method incorporates most elements of the "Spread Technique" but also includes the following steps;

- Removal of upper layer of peat in sections (referred to as turves) (**Slide 9**). In some areas, for example heavily cutover areas, removal of the upper peat layers as turves may not be possible. However, where the peatland is intact, turves, typically 2.0 x 1.0 x 0.5m deep will be removed and stored within the working area. Great care will be taken during the turving process to ensure that turves are not damaged and are reinstated properly. Excavation of lower layers of peat will be conducted under the full time supervision of a geotechnical engineer. The lower layers will be excavated in sections to approximately 0.5m above firm ground. When each section is excavated, it will be backfilled with stone to a level approximately 0.6m below the natural surface level of the bog. In this way, the stone road will be installed progressively and safely within the peatland.
- Surplus excavated peat will be removed for disposal to the Srahmore Peat Deposition Sites. Further details on the Srahmore Peat Depositing Operation will be provided later in the Hearing.
- Low permeability peat plugs traversing the full width of the stone road, will be incorporated within the stone road during the construction phase prior to installation of the gas pipeline. The low permeability peat plugs will effectively divide the stone road into 50m sections. Peat plugs may be placed at closer intervals depending on site conditions. The peat plugs therefore form a series of barriers to the flow of sub-surface water and ensure that the potential for hydrological impacts is minimised. A separate statement on the potential impacts of construction on the hydrology of the bog will be presented later in the Oral Hearing.
- Once the stone road has been installed, a stable working platform and transport corridor will have been established within the temporary working area (**Slide 10**). The stone road will be approximately 9m wide, at the top surface level.
- Installation of the pipeline system will thereafter be similar to the spread technique including pipe stringing, welding, trench excavation and backfilling. The pipeline will be buried within the stone road at a level where the minimum depth of cover to the reinstated surface of the peatland will be 1.2m.

- After the pipeline has been installed within the stone road, a regulation layer of stockpiled peat will be placed on top of the stone road. Stockpiled turves will in turn be placed above this layer to complete reinstatement in line with original ground level. Once areas have been reinstated, no heavy construction traffic will be permitted along the pipeline route.

Micro-Tunnelling

A trenchless construction method known as micro-tunnelling, incorporating either direct pipe or pipe jacking methods will be used to construct the lower and upper Sruwaddacon Bay Crossings. Trenchless construction is generally undertaken in a sequence of activities as follows:

- A continuous steel pipe length, circa 1.8m in diameter or a similar concrete pipe, is used to form an outer sleeve pipe for the trenchless crossing.
- The sleeve pipe is installed using a Tunnel Boring Machine (TBM) (**Slide 11**) micro-tunnelling method. The TBM is connected to the front end of the sleeving pipe and pushed forward into the ground from the launch pit. When the sleeving pipe is pushed forward, the TBM also moves forward, rotates, cuts into the surface and progressively excavates a tunnel ahead of itself. In this way, the sleeving pipe can be gradually inserted behind the TBM. The TBM and sleeving pipe will be advanced continuously guided by a steering mechanism from the launch pit until the TBM reaches the reception pit. A specialised bentonite lubricant will be extruded at the TBM and at regular intervals along the entire length of the sleeve pipe. The bentonite lubricant reduces frictional forces and assists in the process of pushing the sleeve pipe into position. It should be noted that the bentonite extrusion process is not highly pressurised but operates at low pressure under hydrostatic pressure with pump back up from the bentonite plant at the launch pit, thereby maintaining a coating of bentonite on the surface of the sleeve pipe. The low pressure extrusion process, greatly reduces the possibility of bentonite breakout.
- Testing and inspection of completed sleeving pipe to ensure that the gas pipeline bundle can be successfully inserted.
- Stringing and assembly of pipeline bundle (comprising gas pipeline, outfall pipeline, umbilical services and a spare duct). See Figure 4.2, Chapter 4 of EIS.
- Testing of pipeline bundle including pre-testing of gas pipeline before the pipeline bundle is installed within the sleeving pipe.
- Installation of pipeline bundle within sleeving pipe. Rollers will be fitted to the pipeline bundle to allow it to travel through the sleeving pipe without unnecessary friction. The assembled pipeline bundle will be gradually inserted within the sleeving pipe. Winches and / or hydraulic power will be used to move the assembled pipeline bundle into place.
- Grouting of sleeving pipe using a cement / bentonite grout. A cement grout will be used to fill any void spaces within the sleeving pipe after the pipeline bundle is inserted. The purpose of the grout is to permanently support the pipeline bundle once it is in its final position.
- "Tying in" of trenchless crossing with land based sections of onshore pipeline. The trenchless crossings will be executed as discrete elements of the construction works. Once the pipeline bundle is in place within the sleeving pipe, it must be connected to the rest of the gas pipeline. Tying in is the term normally used to describe this operation.
- Reinstatement and demobilisation of site compounds. After the works have been completed, the areas used will be returned to their original condition. This will involve removal of all equipment from the site and any temporary civil structures. The surrounding ground will be levelled and graded as required.

On the basis of the available geophysical and geotechnical information that has been gathered in and around Sruwaddacon Bay, and design work that has been carried out on both crossings, I am satisfied that micro-tunnelling techniques can be successfully used for both crossings. The micro tunnelling techniques have several operational features which assist the tunnelling operation should obstacles be encountered. The sleeve pipe at approximately 1.8m diameter, facilitates man entry and the compression chamber adjacent to the TBM allows manual access from within the sleeve pipe to change the cutting discs and teeth at the TBM. Likewise the man entry and TBM access, allows a survey to be undertaken of the obstruction. It is also possible to rotate the TBM clockwise or

anticlockwise. It should also be noted that intermediate jacking stations in the sleeve pipe, combined with a telescopic jack behind the TBM, allows flexibility in the thrusting process but more particularly allows direct thrust to be applied to be TBM face. However, should extreme difficulties arise e.g. due to unforeseen ground conditions, the fallback measure for both trenchless crossings is to construct an intervention pit within Sruwaddacon Bay. An intervention pit would measure approximately 10m x 12m. Detailed aspects of all proposed contingency measures are described in the EIS, Appendix S.

Compounds

A total of 9 construction compounds are required along the route of the pipeline. The compounds vary in size, see Table 2. The areas within the compounds will be stripped of topsoil or peat and will be temporarily surfaced using stone. The topsoil or peat will be reused at final reinstatement stage.

The compounds will typically be used to store plant, equipment and materials. The compounds will also be used to provide welfare facilities, site office accommodation and storage. At compounds adjacent to trenchless crossings, the compounds will contain either launching areas or reception areas associated with the trenchless crossings.

Table 2 Summary of Compounds

Compound Number	Starting at Chainage Point	Dimensions	Purpose
SC 1	83.50	75m x 60m	• Material, plant and equipment storage • Welfare Facilities • Site Accommodation • LVI Construction Plant
SC 2	83.76	150m x 50m	See Text – Section 3.2
SC 3	84.51	150m x 50m	See Text – Section 3.2
SC 4	85.72	80m x 50m	• Material, plant and equipment storage • Welfare Facilities • Site Accommodation
SC 5	87.39	150m x 120m	• Material, plant and equipment storage • Welfare Facilities • Site Accommodation
SC 6	88.40	150m x 50m	See Text – Section 3.5
SC 7	89.54	150m x 50m	See Text – Section 3.5
SC 8	90.70	80m x 50m	• Material, plant and equipment storage • Welfare Facilities • Site Accommodation
SC 9	-	125m x 80m	• Material, plant and equipment storage • Welfare Facilities • Site Accommodation

3.1 SECTION 1 – GLENGAD - CHAINAGE 83.40 – 83.91

I will now address the 7 identified sections in terms of pipeline construction methodology, commencing with Section 1.

SLIDE 12

This section of the onshore pipeline extends from the landfall at Glengad to SC2 at the western end of the proposed Lower Crossing of Sruwaddacon Bay. I will address the Lower Crossing of Sruwaddacon Bay later in my Brief of Evidence.

The area in Glengad where it is proposed to construct the onshore pipeline is relatively flat, improved agricultural grassland / wet grassland / marsh.

The method of construction to be used for general pipelaying activities in Glengad will be the open cut spread technique, as outlined above.

The temporary working area in the vicinity of Glengad varies in width from approximately 65m to approximately 128m at its widest point. This temporary working area is required to facilitate the various works that will take place in this area during construction. The construction spread will be contained within the temporary working area and will accommodate LVI construction, tie-in with Offshore Pipeline, trenchless works including stringing the pipeline bundle and constructing of the land based sections of the onshore pipeline. I will describe these elements of the project later in my Brief of Evidence.

A site compound (SC1) is proposed in the vicinity of chainage point 83.50 as per Table 2

It is proposed that access to the temporary working area at Glengad, including the LVI will be provided via an existing access road, which is located off the northern side of the L1202 coast road.

3.2 SECTION 2 – LOWER CROSSING OF SRUWADDACON BAY - CHAINAGE 83.91 – 84.51

SLIDE 13

The Lower Crossing extends from launch pit L1 at SC2/Launch area/Ch 83.91) to reception pit L2 (at SC3/Reception Area Ch 84.51). Between these two points, construction will take place below the bed of Sruwaddacon Bay. This section of the works will be constructed using a micro-tunnelling technique method as described earlier. The surface based elements of the trenchless construction operation are described as follows:

Site compound SC2 will be used as the launch area for the trenchless operation, and will measure approx. 150m x 50m. It will include:

- Launch pit for pipe thruster equipment (L1)
- A working lane for mobile construction plant approximately 20m wide (to be temporarily surfaced using stone)
- Hard standing areas for cabins and equipment (power packs, mobile crane etc.)
- Bentonite processing plant
- Storage areas
- Stringing / assembly area for sections of pipeline / sleeving pipe.

Site compound SC3 will be used as the reception area and will measure 150m x 50m. It will include:

- Reception pit (L2)
- Limited hard standing areas
- Cabin for staff and storage
- Power pack and winch (to pull the gas pipeline into place within the sleeving pipe)
- Plant and materials

Pipeline stringing area (Glengad): The area west of launch pit L1 will be used as an area to string out and assemble a continuous length of pipeline approximately 600m in length. The stringing area will be extended beyond the construction compound into the pipeline spread. The stringing area will be approximately 40m wide.

A final decision on whether to launch from compound SC2 or from compound SC3 will depend on the appointed trenchless contractor. There is no real difference in these approaches from a construction management or environmental point of view. Therefore compounds SC2 and SC3 may be used either as launch areas or as reception areas (depending on which direction it is decided to install the pipeline). Currently it is anticipated that SC2 (western end) will be used as the launch area.

The pipeline stringing area will be similar to the pipeline spread with the addition of fixed rollers upon which the assembled pipeline will be placed. The rollers will allow the pipeline to be pulled into position. Some stone or bog mat surfacing may be used in these areas also to facilitate access by construction traffic. Rollers will be constructed from steel and will be fixed to temporary concrete bases placed at regular intervals.

A temporary shore access has also been included in the development proposal to allow access to the foreshore if there is a need for such access, during the construction of the Upper or Lower Crossings. This will only be used in the unlikely event that there is a need for a surface intervention during the trenchless construction works.

3.3 SECTION 3 – ROSSPORT LANDFALL TO ROSSPORT COMMONAGE - CHAINAGE 84.51 – 85.99

SLIDE 14

This section of the pipeline route lies within an area of agricultural grassland. This area includes the trenchless construction site compound SC3 which I have already described above. The topography of the area is gently sloping down to Sruwaddacon Bay. The pipeline route in this section follows the coastline until chainage point 85.60, at which point it turns north east in the direction of Rossport Commonage. The spread technique as described earlier will be used for this section of the pipeline route.

Generally the construction spread area will be 40m wide, but wider temporary working areas will be required in the following areas:

- In the vicinity of site compound (SC3), the temporary working area is approximately 174m wide to cater for construction of the trenchless crossing.
- The southern side of the L52453-25 (designated Road Crossing 1 (RDX1)) at chainage 85.81: to facilitate site compound SC4 and additional space requirements for construction of the road crossing at RDX1.
- The northern side of RDX1 (L52453-25) extending to the boundary of Rossport Commonage ranges between 50m and 60m wide, primarily to accommodate construction of the road crossing at RDX1 and to provide workspace at the western edge of the commonage.

A site compound (SC4) is proposed in this section on the southern side of RDX1 at approximate chainage point 85.80.

Access to the temporary working area will be provided via RDX1 from the public road network and a temporary access track located at chainage 85.00. Access tracks to the temporary working area will be temporarily surfaced using stone (topsoil will be removed and stock-piled to one side).

This section of the onshore pipeline will also include the construction of a road crossing at RDX1. I will discuss separately the construction of road and track crossings later in my evidence.

3.4 SECTION 4 - ROSSPORT COMMONAGE - CHAINAGE 85.99 – 88.52

SLIDE 15

This section of the pipeline lies mainly within peatland and includes 2 track crossings (TRX1 at chainage 86.40 and TRX2 at chainage 86.84) and two road crossings (RDX2 (L52453-0) at chainage 87.55 and RDX3 (L52453-25) at chainage 88.35). The area includes a range of peatland habitats from heavily cutover blanket bog to intact blanket bog. A section of the commonage (chainages 87.55 – 88.35) lies within the Glenamoy Bog Complex (cSAC), which contains intact, eroding and cutover blanket bog.

The potential temporary working area proposed throughout Rossport Commonage is generally 60m wide. However, the pipeline construction spread will be typically 40m wide. The additional width proposed is to allow greater flexibility within the bog to avoid or reduce impact on heretofore undiscovered archaeology. Therefore, the proposed wider temporary working area of 60m is a means of mitigation (should it be needed). The pipeline construction spread i.e. the area directly impacted by the works, will be typically 40m wide within Rossport Commonage.

The proposed construction method for this area is the 'stone road' method as described earlier. In the event that localised water ponding occurs on the stone road, the stone road level may be temporarily raised. All open surface drains intercepted by the stone road will be culverted with a suitable pipe crossing the stone road. The culvert pipe will be extended into the open drain on both sides of the stone road. Peat plugs will be formed around the culvert ends to minimize the egress of water from the stone road.

In cutover areas that are not within the designated conservation sites, the excavated top layer of peat will be stockpiled within the temporary working area. This applies to much of the Rossport Commonage area from chainage 85.99 to 87.54 and from chainage 88.35 to 88.55.

Areas of intact bog occur within the undesignated sections of Rossport Commonage at chainages 86.60 – 86.68 and 87.12 – 87.35. Surplus material excavated from these areas will be removed for disposal to the Srahmore Peat Deposition site. Similarly within the designated section of Rossport Commonage (chainage 87.54 – 88.35), surplus material will be hauled to the Srahmore Peat Deposition Site. Further details of the Srahmore Peat Deposition Operation will be provided later in the Hearing.

Site compound (SC5) is proposed in this section on the western side of RDX2 at chainage point 87.39. A site compound on the eastern side of road crossing RDX2 is no longer included in the application.

Site compound (SC6) will be established as part of the trenchless construction works. I will describe this later in my Brief of Evidence with the Upper Crossing of Sruwaddacon Bay (Section 5).

Access to the temporary working area within Rossport Commonage will be provided via RDX1, RDX2 and RDX3 from the local road network.

3.5 SECTION 5 - UPPER CROSSING OF SRUWADDACON BAY - CHAINAGE 88.52 – 89.55

SLIDE 16

The Upper Crossing extends from chainage point 88.52 to chainage point 89.55. This is the distance measured from launch pit L3 to reception pit L4. Between these two points, construction will take place below the bay surface.

The surface based elements of the trenchless construction operation are described as follows:

- Launch area L4: Site compound for trenchless construction equipment (SC7) incorporating Launch Pit L4. The full size of the launch area (including stringing area is approximately 150m x 50m)
- Pipeline stringing area (Aghoos): The area south of access pit L4 will be used as an area to string out and assemble a continuous length of pipeline. The stringing area may be extended beyond the construction compound. The stringing area will be approximately 100m wide. The maximum length of the stringing area will be approximately 350m (restricted in length by the public road to the south 1202).
- The temporary working area varies in width from 231m to 350m to accommodate a possible foreshore jetty, turving and stockpiling areas.
- Reception Area: site compound (SC6) incorporating reception pit (L3). This area will measure approximately 150m x 50m.
- The temporary working area in the vicinity of SC6, is 138m wide to allow for turving and stockpiling areas.

The typical layout of a trenchless launch area and reception area are the same as I have described for the Lower Crossing.

A final decision on whether to launch from compound SC6 or from compound SC7 will depend on the appointed trenchless contractor. As previously outlined for the lower crossing, there is no real difference in these approaches from a construction management or environmental point of view. Therefore compounds SC6 and SC7 may be used either as launch areas or as reception areas (depending on which direction it is decided to install the pipeline). Currently it is anticipated that SC7 (southern end) will be used as the launch area.

The pipeline stringing areas will be similar to those I described for the Lower Crossing of Sruwaddacon Bay. If pipeline stringing is necessary on the northern side of Sruwaddacon Bay on the Upper Crossing, this will be carried out within the trenchless compound SC6 and potentially can be accommodated between the bay and L52453-0 (RDX3). Pipeline stringing will not take place across the L52453-0 (RDX3).

Access to the trenchless works will be from RDX3 on the northern side and via the L1202 in Aghoos, on the southern side.

3.6 SECTION 6 – SECTION SOUTH OF SRUWADDACON BAY - CHAINAGE 89.55 – 90.39

SLIDE 17

In order to best explain the proposed construction methods in Section 6, I have divided it into four areas which I will describe.

The temporary working area proposed in these areas is generally 60m wide. This is as for areas within Rossport Commonage, where a wider temporary working area is specified as a means of mitigation (should it be needed). The pipeline construction spread i.e. the area directly impacted by the works, will be typically 40m wide on Section 6 of the proposed pipeline route. In some areas on this section, the temporary working area is wider than 60m. I will explain these widths with each area as they arise.

Access to this section of the works will be via the public road to the south (L1202). Access will also be gained using the adjacent temporary working areas.

3.6.1 Chainage 89.55 – 90.06

The proposed construction method along this section is the stone road method for peatland construction incorporating the spread technique, as I have described earlier, with a 60m temporary working area.

This area contains site compound SC7 and a pipe stringing area which will be used during the construction of the Upper Crossing of Sruwaddacon Bay and which I have already described under Section 5 above.

3.6.2 Chainages 90.06 – 90.11 Leenamore River Estuary

The topography from chainage 90.00 to 90.20 is more steeply sloping than adjacent areas as this area forms a small valley through which the Leenamore River flows to Sruwaddacon Bay. The temporary working area in this section is 85m wide to accommodate the river crossing construction.

The river crossing will be constructed using open cut methods, which are established methods for such crossings. The pipeline route crosses the Leenamore River at a point on the foreshore where the river meets Sruwaddacon Bay. The estuary is approximately 40m wide at this point. The estuary is a tidal area. Specific measures for the protection of salt marsh, which will be put in place during construction of this crossing, will be outlined in evidence to be provided later in the Oral Hearing.

This crossing will involve the following steps:

- Stringing and welding of section of pipeline for the complete 40m crossing on an adjacent section of the temporary working area.
- Addition of bypass flume pipes to contain the flow of the Leenamore River to Sruwaddacon Bay during the construction works. Flume pipes stay in place while a trench is excavated for the pipeline. In effect, the flume pipe provides a bridge / 'aquaduct' for the flowing water on its way downstream and controls the flow of water. It also allows access across the stream, similar to a standard culvert.
- Removal of sections of salt marsh as turves and placing these temporarily at similar locations on the foreshore nearby. The upper layer of the foreshore (approximately 300mm) will also be moved temporarily to one side to reduce impact on living organisms therein.
- Installation of running track on the crossing using bog mats (weighted if necessary).
- Consideration will be given to the installation of sand bags on the seaward side of the crossing. Using information on local tides and by scheduling the works around neap tides, the risk from tidal flooding can be minimized.
- Excavation of trench within foreshore.
- Excavated material will be stockpiled on the foreshore adjacent to the excavated trench.

- Dewatering of the open trench (if necessary e.g. following heavy rainfall or exceptionally high tide) will be carried out.
- Installation of assembled pipeline section as one piece using a team of side-boom crawler tractors. Consideration will be given during construction to the use of a small diameter sleeve pipe to accommodate laying services, outfall pipeline and umbilicals. The installed section of pipeline will have a minimum depth of cover beneath the watercourse of 1.6m. The pipeline will have a bedding surround, as previously outlined.
- Backfilling of installed pipeline using selected material, placing precast concrete slabs 0.5m over the pipeline.
- Removal of any temporary works (e.g. flume pipes and temporary trench supports) and reinstatement of the river estuary.

It is anticipated that once the contractor is fully mobilised, works to construct the stream crossings will take less than 1 week to complete.

3.6.3 Chainages 90.11 – 90.20

This section of the pipeline route is through wet grassland. In this area, the spread technique will be used for construction.

3.6.4 Chainages 90.20 – 90.39

This section of the pipeline consists of eroding / intact blanket bog which is not designated as a conservation site. The area is gently sloping / flat. The proposed construction method for this area is the stone road method.

3.7 SECTION 7 – FORESTED AREA TO BELLANABOY GAS TERMINAL - CHAINAGES 90.39 – 92.56

SLIDE 18

This section of the pipeline consists of coniferous forestry that was planted in an area of blanket peat. Sections of forestry (approximately 2.5ha) will be felled from this section prior to installation of the stone road. The proposed construction method for this area is the stone road method as previously outlined.

The temporary working area proposed for this section is approximately 60m wide. However, the pipeline construction spread will be 40m wide, as previously outlined.

A site compound (SC8) is proposed in this section close to RDX4 (L1202-116) at chainage point 90.70.

Access to this section of the works will be via the public road (L1202-116) at RDX4 (chainage 91.00), adjacent to RDX4 at site compound SC8 (chainage 90.70) and via the temporary working area on adjacent sections of the pipeline route.

A site compound (SC9) is proposed within the Bellanaboy Gas Terminal site.

3.8 LANDFALL VALVE INSTALLATION (LVI) - CHAINAGE 83.44 - 83.49

SLIDE 19

The location of the LVI extends from chainages 83.44 to 83.49. This includes the 'dished' area which contains the main compound. An access track (approximately 3.5m wide) also extends from the LVI to the public road (L1202-45).

The LVI will be located in an area of agriculturally improved grassland that is within the Glenamoy Bog Complex (cSAC). The works will generally be carried out according to the following sequence:

- Establish secure temporary working area as part of the overall pipeline works.
- Strip topsoil and stockpile nearby for reuse during reinstatement.
- Excavation of main LVI area to below base of valves. Material from this area will be removed from the site.
- Setting out and levelling of foundation for pipeline and valves. The prefabricated mechanical sections of the LVI will be placed on timber skids (or partially complete bases) to facilitate final fabrication.
- Installation of prefabricated sections of LVI. The inline valve section of the LVI pipework will be welded to the offshore pipeline and onshore pipeline. The bypass lines and bypass isolation valves will also be welded in place. The pressure limiting valves will be connected with bolted flanged joints.
- Once the mechanical elements of the LVI and gas pipeline are in place, permanent supports / bases will then be completed.
- Installation of drainage.
- Backfilling of LVI to finished ground level.
- Installation of instrumentation and controls including instrument cabin.
- Placement of stored topsoil on inclined areas around LVI.
- Completion of miscellaneous civil details including access road and track, actuator covers, painting and finishes.
- Installation of permanent compound fencing.

Site compound SC1 will be used to support the LVI construction works.

3.9 ROAD/TRACK CROSSINGS

SLIDE 20

All road and track crossings will be constructed using the same open cut method. There will be 4 road crossings and 2 track crossings. Additional room is required for the temporary working area at road crossings to manage excavated material and sections of pipe that will be laid under the road.

The sequence for road and track crossings will be as follows:

- Road / track crossing to be surveyed for existing services (buried or overhead) and drains.
- Preparation of section of pipeline for installation under the road. A single or double pipe length will be sufficient for crossing all roads and tracks.
- Preparation of concrete slabs for installation above pipeline within road crossing. These slabs will be manufactured off-site and transported to the crossing point.
- Excavation of trench within road / track for installation of pipeline. The width of the excavation will be wider at the top and become narrower towards the bottom. In practice, the excavation may be benched i.e. the sides will be stepped. The excavation is likely to be approximately 3 -

4m wide at the surface and approximately 2.15m wide at its base. The excavation may be over 3m deep depending on the depth of road / track and side drains. Trench supports will be used as necessary.

- The pipeline sections (including outfall pipeline, services and umbilicals) will be laid with a minimum depth of cover of 1.6m beneath watercourses i.e. open drains next to road / track crossings, and 1.6m minimum below road surfaces as agreed with Mayo County Council. Consideration will be given during construction to the use of a small diameter sleeve pipe to accommodate laying services, outfall pipeline and umbilicals.
- Backfilling of the trench will be carried out using selected back-fill compacted in layers.
- Reinforced concrete slabs will be installed 500mm above the installed pipeline. These will be laid across the pipeline within the road/track.
- Consideration will be given to the use of steel plates and constructing the road crossing in two halves to permit traffic movement on a stop-go system, in agreement with Mayo Co. Co.
- Once the trench has been backfilled, the road surface will be reinstated in accordance with specifications of Mayo County Council.

Public traffic will be managed in accordance with a traffic management plan as outlined in Appendix E of the EIS for the duration of the works in each area.

3.10 STREAM CROSSINGS

Apart from the Leenamore River (discussed above) there will be 2 additional stream crossings at chainage 90.88 and 91.50. Both of these stream crossings will be constructed using open cut methods similar to that described for the Leenamore River Crossing. The sequence for the stream crossings will be as follows:

- Stringing and welding of section of pipeline for the complete crossing on an adjacent section of the temporary working area (either side of the stream depending on contractor working arrangements).
- Addition of bypass flume pipes to manage the flow in the stream during the construction works.
- Addition of temporary running track across the stream. This may be constructed using sand bags covered with stone/bogmats. The flume pipe will be incorporated in the temporary running track.
- Excavation of trench from either side of the stream (beneath flume pipe). Excavated material will be stockpiled within the temporary working area away from the stream crossing. Adequate means of settlement and filtration will be provided.
- Installation of assembled pipeline section as one piece using a team of side-boom crawler tractors. The installed section of pipeline will have a minimum depth of cover beneath the water course bed of 1.6m.
- Installation of pre cast concrete slab (impact protection) 500mm above the installed pipeline.
- Backfilling of installed pipeline using approved material.
- Removal of any temporary works and reinstatement of the stream bed/banks.

It is anticipated that works to construct the stream crossings will take approximately 1-2 days to complete.

3.11 CATHODIC PROTECTION SYSTEM

A cathodic protection system is proposed for the protection of the pipeline. Details of the proposed pipeline protection system will be addressed later in the Hearing. Construction will be completed in compliance with the design intent.

3.12 HYDROSTATIC TESTING

On completion of pipeline construction and following the successful completion of tie in welds, the pipeline will be subject to a hydrostatic pressure testing operation. The pipeline shall be cleaned internally using a series of PIGs.

The pipeline will be filled with water and pressure tested to 504 bar, as outlined in the EIS Appendix Q9. The approved testing procedure shall entail pressurising the water in the pipeline for set time periods and recording the associated pressure readings, in accordance with I.S. 328. On successful completion of the testing operation, the water used shall be tested to ensure lack of contaminants prior to disposal. It is envisaged that the clear test water will be discharged to sea, subject to approval of relevant statutory authorities.

3.13 CONSTRUCTION MANAGMENT

All construction activities will be closely supervised and managed. The Onshore Pipeline Construction Manager will be responsible for all on site construction management. The Construction Manager will ensure that the pipeline is constructed in accordance with relevant plans and specifications. The Construction Manager will be supported by a dedicated project team consisting of Pipeline Engineers and Inspectors, Health and Safety Officers, Environmental Officers, Liaison Officers and other key project personnel (see Table below).

Table 3 Project Team – Indicative Roles and Responsibilities

Position	Role
Construction Manager	The Construction Manager will oversee the entire construction of the pipeline and will ensure that all works are undertaken in accordance with Contract Documents, the design intent, Environmental Impact Statement, Environmental Management Plan and detailed method statements agreed with the relevant authorities. The Construction Manager will be responsible for the Health and Safety Plan.
Pipeline Engineers	Pipeline Engineers will be responsible for construction activities in the field.
Mechanical Engineer	Mechanical Engineers will be responsible for all mechanical works on site.
Pipeline Inspectors	Pipeline Inspectors will supervise construction according to design and engineering aspects and specifications, including welding, x-ray and pipeline testing, coating inspection, field records and quality control.
Health and Safety Officer	The Health and Safety Officer will monitor construction activities and ensure the works are carried out in a safe manner in compliance with all relevant health and safety legislation, standards and project documentation. The Health and Safety Officer will support the Construction Manager on all aspects of public safety and road safety during construction.
Environmental Officer	The Environmental Officer will supervise the works from an environmental perspective and ensure the works are carried out in compliance with the EIS, EMP and appropriately authorised environmental method statements. The Environmental Officer will also ensure construction personnel are appropriately inducted and aware of environmental issues prior to commencing work.

Environmental Specialists	Environmental Specialists such as the Project Ecologist and Project Archaeologist will provide support to the Environmental Officer and advise on all relevant ecological and archaeological features.
Community Liaison Officers	Community Liaison Officers will communicate with the local community before, during and after the construction process.
Agricultural Liaison Officers	Agricultural Liaison Officers will communicate with landowners on agricultural issues before during and after the construction process.
Geotechnical Engineer	The Geotechnical Engineer will supervise and monitor civil works in peatland areas.
Field Surveyors	Field Surveyors will conduct topographical surveys before and after pipe laying. 'As Laid' records will be prepared and used for ongoing monitoring of the pipeline.
Transport Manager	The Transport Manager will manage all transport activities in accordance with the agreed Traffic Management Plan.
Quantity Surveyors	Quantity Surveyors will prepare detailed quantity analysis for construction design and record purposes.
Administration Staff	Back up support, reporting, liaison and financial administration.

A number of key documents will be used to support the management role of the project, namely;

- **Project Execution Plan** – A Project Execution Plan will be developed prior to the construction phase of the project. This document will address the execution strategy for all aspects of the work from mobilisation to demobilisation. The Project Execution Plan will outline procedures for aspects such as HSE management, risk management, project organisation, specific roles and responsibilities, detailed programming and associated method statements, quality assurance and controls, Contract management, stakeholder management and security.

- **Environmental Management Plan** - An EMP will also be prepared for the construction phase of the project outlining the environmental management of the works. This document will be used as guidance for the Environmental Officer to ensure that construction is carried out in compliance with all relevant environmental regulations and standards and that all potential environmental impacts associated with the development are identified and mitigated. The EIS will form the basis of many environmental procedures contained in the EMP.

  The EMP will detail procedures for environmental reporting and communications, training and awareness, supervision, inspection, monitoring and auditing, environmental approval, consents and authorisations including NPWS, NWRFB and Mayo County Council. The EMP will include specific systems to deal with environmental issues such as waste management, pollution control and protection of habitats and species.

- **Construction Health and Safety Plan -** A Construction Health & Safety Plan will be prepared prior to construction. This document will ensure that all construction activities are carried out in a safe manner in accordance with approved procedures. It will include Contractors Health & Safety Policy Statements and Method Statements, general and specific hazard identification and risk assessments, details of site restrictions, emergency response plan, welfare facilities, company safety rules, safety inspections & audits, safety file, general principles of prevention, preliminary health and safety plan, arrangements to monitor compliance with safe working procedures and arrangements to ensure all employees have the appropriate safety training.

3.14 PROGRAMME

It is envisaged that construction activities can be completed in approximately 12 months, given favourable conditions. Commencement of construction activities is subject to statutory process. Accordingly it is not possible to definitively state a commencement date. It is anticipated that construction will largely take place in 2010. The phasing of construction will be finalised when timing for commencement is confirmed.

Normal working hours will be between the hours of 7.00am to 7.00pm Monday to Friday and 7.00am to 4.00pm on Saturdays. Sunday working will be avoided but may be necessary on some occasions. If working outside of normal hours is required, discussions will be held with Mayo County Council before operations begin and adequate notice will be given to the local community. For Trenchless works, 24 hour working, 7 days per week will be required during the tunnelling process.

3.15 CONCLUSION

In summary, my Statement covered the onshore pipeline construction and outlined the following:

- The Spread Technique to be used on all sections, with the exception of trenchless crossings, roads and streams
- The Stone Road method to be used in all peatland areas. It will provide an area where vehicular traffic can operate and the pipeline will be installed within the Stone Road.
- Micro-tunnelling techniques proposed for both crossings of Sruwaddacon Bay
- The proposed pipeline testing operation.

By industry standards, a 9.2km pipeline is a short pipeline it has been examined in great detail. Indeed, the level of detailed planning, covering all aspects of the pipeline, including construction activity, is well above industry norm. All aspects of the project have been carefully examined and mitigation measures developed, as appropriate.

The proposed level of construction supervision, as outlined, covers all aspects of the pipeline construction. The proposed supervision team includes Engineers, Environmental Specialists, Health & Safety Officers, Agricultural Liaison Officers and Archaeologists. The level of construction supervision is totally in line with construction requirements and exceeds supervision levels witnessed on similar projects.

Construction phasing is uncertain at present, as it is dependent on statutory process. The phasing of construction might delay completion of the project but it does not in any way impact on the constructability of the pipeline.

The Sruwaddacon Bay crossings have been extensively researched and the proposed micro-tunnelling techniques have been successfully used on many European projects. The construction of an intervention pit is unlikely, but a sensible provision should unforeseen ground conditions arise. It should be noted, however, that extensive site investigations have been completed on both crossing routes. The site investigation programme has reinforced the view that an intervention pit will not be required on either crossing.

The stone road construction method in peatland areas provides a stable working area which facilitates transportation of pipe and machinery. The stone road approach assists in the welding process by providing a hard standing working area. Pipe ditching and backfill operations are also less onerous using the stone road method. Ultimately the stone road assists construction and provides enhanced long term pipeline protection. Extensive construction operations in peatlands have been successfully and safely undertaken in the nearby Terminal Site to the satisfaction of the relevant statutory bodies.

The experience gained on the Terminal Site, by our proposed contractor and construction team members, will be used during the pipeline construction in the peatland areas.

I am satisfied that the Corrib Onshore Gas Pipeline can be constructed using the methodologies, as outlined in my Brief of Evidence and as outlined in the EIS.

Inspector, I would now like to move to the second part of my Evidence: The CAO Application

CAO Application

As part of the current application the applicant is seeking legal rights, through the CAO process, for all lands as shaded green, in the MASTER MAP.

The areas shown in green on the MASTER MAP represents the “temporary working area” as shown on the Construction Plan DG0102. The extent of the “temporary working area” is indicated by a dashed yellow line on DG0102. The “temporary working area” is the area within which the “pipeline construction spread” is positioned. It is considered prudent to allow greater pipeline corridor flexibility within peatlands to avoid or reduce impact on heretofore undiscovered archaeology.

A permanent wayleave, shown in red on the CAO application MASTER MAP, is required for post construction access. Access to the pipeline may be required for monitoring purposes, walk over surveys, remedial works and potential maintenance works. Permanent wayleave access is a standard requirement for pipeline projects. The permanent wayleave is typically 14m wide, however, in areas of peatland where the stone road method is used, a 20m wide permanent wayleave is required to accommodate the permanent stone road and to allow future access, as previously described.

Section 1 – Glengad - Chainage 83.40 – 83.91

The land requirement along this section in Glengad varies in width from approximately 65m to approximately 128m at its widest point. This temporary working area is required to facilitate the various works that will take place in this area during construction. These works will include LVI construction, tie-in with the Offshore Pipeline, trenchless works including stringing the pipeline bundle and construction of the land based sections of the onshore pipeline. A site compound (SC1) is proposed in the vicinity of the LVI and will measure approximately 50m x 80m. A site compound (SC2) is proposed in the vicinity of the launch pit (L1) and will measure approximately 150m x 50m.

Section 2 – Lower Crossing of Sruwaddacon Bay - Chainage 83.91 – 84.51

The land requirement from L1 to the foreshore in Glengad at chainage 84.05 is 65m wide. From the foreshore in Rossport at chainage 84.47 to L2 the land requirement is approximately 110m wide.

Section 3 – Rossport Landfall to Rossport Commonage - Chainage 84.51 – 85.99

The land requirement along this section is generally 40m wide, but increases to approximately 174m wide in the vicinity of site compound SC3 to cater for the construction of the trenchless crossing. A site compound (SC4) is proposed adjacent to L52453-25 on the southern side of the road. This compound will measure approximately 80m x 50m. To facilitate the construction of the road crossing (RDX1) it is proposed to widen the temporary working area from 40m to 60m on both the northern and southern sides of L52453-25. The land requirement on the northern side of RDX1 (L52453-25) extending to the boundary of Rossport Commonage ranges between 50m and 60m wide, primarily to accommodate construction of the road crossing at RDX1 and to provide workspace at the western edge of the commonage.

At chainage 85.00 there is an access track that connects the pipeline construction spread with the L52453-25. This access road extends through the pipeline construction spread. The land requirement for this access track is 6m wide from the L52453-25 to the foreshore.

Section 4 - Rossport Commonage - Chainage 85.99 – 88.52

The land requirement proposed throughout Rossport Commonage is generally 60m wide. However, the pipeline construction spread will be typically 40m wide. The additional width proposed is to allow greater flexibility within the bog to avoid or reduce impact on heretofore undiscovered archaeology. Therefore, the proposed wider temporary working area of 60m is a means of mitigation (should it be needed). The pipeline construction spread i.e. the area directly impacted by the works, will be typically 40m wide within Rossport Commonage.

There are two track crossings at chainages 86.40 and 86.85 where the temporary working area increases to approximately 70m to accommodate the construction of the track crossings. Site compound SC5 is proposed on the western side of road crossing RDX2 and will measure approximately 120m x 150m. The temporary working area on the western and eastern sides of RDX2 is approximately 80m wide to accommodate construction of the road crossing. The temporary working area on the northern side of RDX3 is also wider at approximately 80m to accommodate construction of the road crossing. Site compound SC6 is proposed on the southern side of road crossing RDX3 and will measure 150m x 50m. The land requirement on the southern side of RDX3 is approximately 138m wide to allow for stockpiling and turving.

Section 5 - Upper Crossing of Sruwaddacon Bay - Chainage 88.52 – 89.55

The land requirement along this section is approximately 138m wide from chainage 88.52 to the foreshore at chainage 88.60 and ranges from 231m to 350m wide from the foreshore at 89.50 to launch pit L4 at chainage 89.55.

Section 6 – Section south of Sruwaddacon Bay - Chainage 89.55 – 90.39

The land requirement proposed along this section is generally 60m wide. This is as for areas within Rossport Commonage, where a wider temporary working area is specified as a means of mitigation (should it be needed). The pipeline construction spread i.e. the area directly impacted by the works, will be typically 40m wide on this section of the proposed pipeline route.

In the vicinity of site compound SC7 the land requirement is wider and varies in width from 231m to 350m to accommodate a possible foreshore jetty, turving and stockpiling area. Site compound SC7 measures approximately 150m x 50m and will be used as the launch area for the trenchless crossing. The area south of access pit L4 will be used as an area to string out and assemble a continuous length of pipeline. The stringing area may be extended beyond the construction compound. The stringing area will be approximately 100m wide. The maximum length of the stringing area will be approximately 350m (restricted in length by the public road to the south 1202). The land requirement in the vicinity of the Leenamore River is 85m wide to accommodate the construction of the river crossing.

Section 7 – Forested Area to Bellanaboy Gas Terminal – Chainage 90.39 – 92.56

The land requirement along this section is generally 60m wide. A site compound (SC8) is proposed at chainage 90.70. This compound measures approximately 80m x 50m. The land requirement for this compound is approximately 60m wide and extends from the pipeline construction spread to the L1202-116. The area either side of road crossing RDX4 is approximately 80m wide to facilitate the construction of the road crossing.

Inspector , that completes my brief of evidence.

Appendix A: Summary of Proposed Construction Methods

Table 1: Proposed Construction Methods along the Pipeline Route.

Location / Chainage	Proposed Construction Method	Description in EIS
83.40 – 83.91 (Section 1 - Glengad) 83.44 – 83.49 Landfall Valve Installation	Spread technique Spread technique and general civil and mechanical construction.	Section 5.4 Dg0604
83.91 – 84.51 (Section 2 – Lower Crossing of Sruwaddacon Bay) 83.70 – 83.83 Pipeline stringing area 83.76 – 83.91 Trenchless construction compound SC2 and access pit L1. 84.51 + approximately 150m Trenchless construction compound SC3 and access pit L2 Trenchless construction compound + approximately 550m Pipeline stringing area	Micro-tunnelling using Direct Pipe Method or pipe jacking method. Area to be prepared for fixed pipeline rollers Area to be prepared for trenchless construction equipment (launch / reception site) Area to be prepared for trenchless construction equipment (launch / reception site) Area to be prepared for fixed pipeline rollers	Section 5.5.2 EIS Supplementary Report, Section 5.5.2 and Appendix R3. Dg0401 Dg0402 Dg0403
84.51 – 85.99 (Section 3 – Rossport Landfall to Rossport Commonage)	Spread technique	Section 5.4 Dg0604
85.99 – 88.52 (Section 4 - Rossport Commonage)	Stone road method. Turving where possible	Section 5.5.1 EIS Supplementary Report, Section 5.5.1 Dg0601
88.52 – 89.55 (Section 5 - Upper Crossing of Sruwaddacon Bay 88.40 – 88.55 Trenchless construction compound SC6 and access pit L3. 89.54 - 89.69 Trenchless construction compound SC7 and access pit L4. 89.69 + approximately 250m Pipeline stringing area	Micro-tunnelling using Direct Pipe Method. Reception area for upper crossing. Area to be prepared for trenchless construction equipment. Area to be prepared for fixed pipeline rollers	Section 5.5.2 EIS Supplementary Report, Section 5.5.2 and Appendix R3. Dg0401 Dg0402 Dg0403

89.49 – 90.06 (Section 6 – Section south of Sruwaddacon Bay)	Stone road method with turving	Section 5.5.1 Dg0601
90.06 – 90.20 (Section 6 – Section south of Sruwaddacon Bay)	Open cut with salt marsh turving. Spread technique	Section 5.4 Dg0604
90.20 – 90.39 (Section 6 – Section south of Sruwaddacon Bay)	Stone road method with turving where possible	Section 5.5.1 Dg0601
90.39 – 92.56 (Section 7 – Forested area to Gas Terminal)	Stone road method.	Section 5.5.1 EIS Supplementary Report, Section 5.5.1 Dg0601