DESCRIPTION AND CONSTRUCTION METHOD STATEMENT

FOR DRAINAGE OUTFALL

FORESHORE LICENCE APPLICATION

Project Description

Shannon LNG Ltd proposes to construct and operate a Liquefied Natural Gas (LNG) Regasification Terminal at lands near Ballylongford and Tarbert, Co. Kerry. A number of foreshore leases/licences will be required for the project. This foreshore licence application relates to a proposed drainage outfall pipe from the site into the Shannon Estuary. The drainage outfall is needed to discharge surface water, groundwater, treated foul water and used firewater from the proposed development.

A planning application for the project was submitted to An Bord Pleanála under the Planning and Development (Strategic Infrastructure) Act 2006 on 24 September 2007. The operation of the terminal will require an Integrated Pollution Prevention and Control (IPPC) Licence.

Area of Foreshore relating to the Application

The area of foreshore relating to this application is shown on **Drawings No. FL-001, FL-002, FL-003, FL-004,** and **FL-011**.

Description of Existing Foreshore

The portion of foreshore concerned is a part of the Lower Shannon candidate Special Area of Conservation (cSAC). The existing foreshore is shown in the series of photographs in **Figures 1 to 7.**

The foreshore is generally rocky, comprising bedrock outcrops interspersed with areas of cobbles and gravel as shown in **Figure 1.** The mudstone bedrock in the area is dipping towards the northwest, and the bedrock gets deeper as you move towards the middle of the Shannon Estuary. The outcropping of bedrock becomes less frequent as you move down the shoreline towards the low water mark as shown in **Figure 2. Figure 3** shows a close-up of the ground conditions on the foreshore near the low water mark.

The point at which the outfall pipe crosses into the foreshore is shown in **Figure 5.** The cliff face is made up of glacial till material overlain on bedrock.

Access onto the foreshore will be via an existing access ramp to the shoreline immediately to the west of the proposed outfall pipe route. The existing ramp is shown on **Drawing No. FL-011** and is pictured in **Figure 6**. From this point, access to the site of the proposed outfall pipe will be along the shoreline pictured in **Figure 7**.

Figure 1: Existing foreshore along outfall pipeline route - looking inland

Figure 2: Existing foreshore along outfall pipeline route – looking out to the estuary

Figure 3: Foreshore ground conditions near LWM

Figure 4: Looking West along shoreline from proposed line of outfall pipe

Figure 5: Point at which proposed outfall enters foreshore at HWM

Figure 6: Means of access to foreshore to west of outfall pipe

Figure 7: Looking east along access route

Description of Proposed Outfall Pipe and Reason for the Works

A schematic of the drainage system within the site which will discharge through the proposed drainage outfall pipe is shown in **Drawing No. FL-012.**

Within the proposed terminal development, surface water from paved and impermeable areas and groundwater collected in groundwater drains will be collected by an underground drainage system and discharged where possible to the existing stream/drainage ditches within the site. Otherwise it will discharge to the Shannon Estuary via the proposed drainage outfall pipe that is the subject of this licence application, which will extend across the foreshore to below the low water mark.

Foul water will be generated at five locations on the site: the administration building, guard house, workshop/warehouse building, main control room and jetty gatehouse. All foul water, with the exception of the jetty gatehouse, will be collected by an underground drainage system comprising two pumping stations and will be pumped or fall by gravity to a proprietary waste water treatment plant. The waste water treatment plant will be an activated sludge system which will treat the effluent to the required discharge standard set out by the discharge/IPPC licence. The waste water treatment plant will be sized to cater for a population of 100 people. The treated effluent will be discharged into the same underground drainage system as the surface water, and will be discharged into the Shannon Estuary via the proposed drainage outfall pipe. Due to the very small effluent load expected from the jetty gatehouse, a stand alone package wastewater treatment plant (bio-cycle unit) will cater for the less frequent use of the jetty gatehouse. On an annual basis, the proportion of

treated foul water discharged through the outfall compared to surface water and groundwater discharge is considered to be small.

In the event of a fire, used firewater will be collected and routed via the surface water drainage system and stored temporarily in a firewater retention tank. The need for a retention tank will be determined during the detailed design phase of the project on the basis of a risk assessment and the possibility of contamination of the firewater. Firewater used on the site may contain a non-toxic, biodegradable high expansion foam additive. A location for a firewater retention tank, if required, has been identified within the terminal layout as shown on **Drawing No. FL-012.** The firewater retention tank would retain used firewater until it has been tested for contamination. Contaminated firewater would either be disposed of off-site, or treated to an acceptable standard before being discharged into the Shannon estuary through the proposed drainage outfall pipe. Non-contaminated firewater would be discharged into the estuary following testing. During normal operation, all surface water drainage would be routed through the retention tank before being discharged through the outfall. In this manner, in the event of a fire, automatic shutdown valves could immediately stop the discharge of all surface water drainage and associated used firewater through the outfall to the estuary.

All discharges through the drainage outfall will pass through a Class 1 Hydrocarbon Interceptor before leaving the site. Any bunded areas within the site will have valve-controlled discharge points as part of their connection to the drainage network. Drainage run-off from these areas will be tested for contamination prior to release into the drainage network.

The drainage network for the site has been modelled and the diameter of the outfall pipe across the foreshore has been determined to be 900mm. The outfall pipe will be buried as is crosses the shoreline and will extend approximately 5m beyond the low water mark. **Drawing No. FL-013** shows a detailed section along the line of the outfall pipe as it crosses the foreshore. If deemed necessary at detailed design stage, a check valve may be installed at the end of the outfall pipe to prevent ingress of water from the estuary back into the drainage system. If required a **Tideflex TF-2 Check Valve**, or similar, would be used for this purpose (datasheet attached).

Trenches excavated across the shoreline to install the outfall pipe will be backfilled with concrete and the surface embedded with cobbles and stone excavated from the trench to minimise the visual impact of the trench. Below the low water mark, the trench will remain open, and the sides of the trench will be battered back to avoid creating a pocket for siltation.

Construction Method Statement

The following is an assessment of the means of construction of the proposed outfall pipe at the time of application for a foreshore licence. Before construction commences, a more detailed construction method statement will be prepared and submitted for approval in advance of any works taking place.

Objective

The main objectives of the works are to:

- Excavate a trench across the foreshore to a maximum depth of approximately 2.4m
- Install 900mm diameter concrete drainage pipe in trench and backfill with concrete.
- Reinstate the foreshore and shoreline

Equipment

- 30-tonne excavator or similar for breaking out, and excavating, rock in the outfall pipe trench.
- Dumper truck
- Compressor
- Concreting equipment
- Safety equipment

Methodology

Means of access to the site will be via an existing ramped access onto the shoreline as described above.

All refuelling of equipment and machinery will take place at designated refuelling areas on the adjacent terminal site. No refuelling will take place on the foreshore.

Drawing No. FL-011 shows the proposed area which may be disturbed during the works. Areas of disturbance will be kept to a minimum. Disturbance to the foreshore during construction will arise from movement of personnel and machinery, excavation of a trench across the shoreline, temporary storage of selected excavated material, installation of the outfall pipe, and reinstatement of the foreshore. Surplus material excavated from the trench will be removed from the foreshore and will most likely be incorporated as part of the earthworks on the adjacent terminal development works.

It is proposed to backfill the excavated trench with concrete suitable for underwater use. Concrete would be prepared off-site and transported or pumped onto the foreshore and into the trench. Care will be taken during the transportation of concrete not to spill or dispose of concrete on the foreshore. The surface of the concrete will be embedded with cobbles and stone excavated from the trench in order to minimise the visual impact of the outfall pipe.

Disturbance of the seabed below the low water mark will be small, arising primarily from the excavation of the trench and clearing and levelling of the ground to install the outfall pipe.

The area of cliff face disturbed during construction will be reinstated and protected using rock armour upon completion of the works.

Any marine notices will be applied for to the Shannon Foynes Port Company as required.

All works on the foreshore will be supervised at all times. An Environmental, Health and Safety Officer will visit and inspect the site on a regular basis.

Duration of Works

The works on the tide-affected portion of the foreshore will obviously be influenced by the tide levels, particularly near the low water mark. As the works require the excavation of a trench in bedrock, it is expected that the outfall pipe construction and reinstatement works could take approximately 4-8 weeks to complete, although this is dependent on weather and ground conditions.

Post-Construction Inspection

Following completion of the works, the site will be inspected at regular intervals to ensure that there is no deterioration in the condition of the outfall pipe, reinstatement, or adjacent foreshore.

Statement of the Envisaged Disturbance to the Foreshore

The temporary disturbance to the foreshore during construction is expected to be small, comprising primarily of noise during excavation of the trench for the outfall pipe. The permanent disturbance to the foreshore, essentially that resulting from the excavation of the trench, introduction of an outfall pipe and concrete backfill across the shoreline is also considered to be small. Following completion of the works, it will still be possible to walk along the foreshore, and the reinstatement of the outfall pipe using native cobbles and stone from the foreshore should minimise any visual impact. Additionally, the cliff face will be armoured with rock to prevent erosion and maintain the integrity of the foreshore. With appropriate housekeeping and waste management on the site, there should be a very low risk of pollution or littering during the works. Any arisings from trenching or other works on the site will either be replaced and reinstated or removed from the foreshore.

It is not envisaged that there would be any disturbance to navigation, local boating and sailing amenities as a result of the works. It is not expected that the works would affect the flora and fauna in the estuary, other than as a direct result of disturbance to the shoreline as a result of traffic and excavation of the trench.

The disturbance to the foreshore as a result of the discharge of drainage water through the outfall pipe is also considered to be small. The volume being discharged through the outfall pipe is negligible by comparison to the volume of water flowing through the estuary. Given the nature of the ground conditions at the discharge point, no negative impact due to erosion or deposition of material is expected.

The Environmental Impact Statement prepared for the overall Shannon LNG Terminal project includes an assessment of the impact of the drainage outfall pipe. Particular reference to the outfall pipe can be found in the following sections:

- Section 3.6.9 Drainage

- Section 10.3 Description of the Receiving Environment
- Section 11 Marine and Estuarine Ecology
- Section 14.3.9 Marine Geo-archaeological Survey
- Section 16.9 Drainage
- Section 19 Summary of Impacts and Mitigation Measures

Consultation with Third Parties

As can be seen from the Environmental Impact Statement prepared for the overall Shannon LNG Terminal project and submitted with this application, extensive consultation has been carried out since the project was announced in May 2006. Further consultation with statutory authorities and concerned bodies will be undertaken as the proposed development progresses.

Signed: Eoghan Hynd Date: 28/3/08

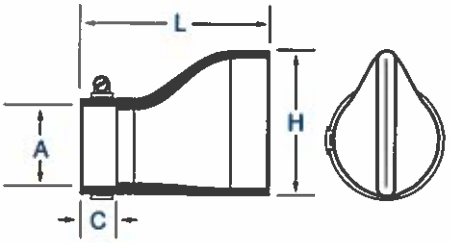
Tideflex® TF-1 Check Valve

- Lightweight, all-elastomer design
- Seals around entrapped solids
- Odour control
- Excellent drainage with low falls
- Minimum bottom clearance required
- Quiet - no slamming
- Ideal for manhole installations
- Self cleaning, low maintenance
- Working underwater or buried in sand
- Long operational life span

Forward Flow
valve opens easily

Backflow
valve seals tightly

MATERIALS:
Body: Neoprene, Buna-N, Hypalon, EPDM, Viton,
Mounting bands / back-up rings: AISI 304.



OPERATION:
The Tideflex® TF-1 Check Valves eliminate potential backflow and are an excellent replacement for ineffective metal flap gate valves. Tideflex valves do not corrode, warp or freeze and are virtually maintenance free. They handle large obstructions without jamming, and there is no flap, gate or door to hang open or jam shut. Due to its nature, the valve collapses around any debris and seals off the backflow.

Tideflex DN450 (18") and larger are constructed with a 180° curved bill, which increases the sealing area and allows the valve to form a tighter seal area around solids. The more flexible curved tip allows even lower headloss.

The flat bottom and offset-bill design of the Tideflex valve allows it to be installed without any modifications to the structure of existing interceptors, manholes and chambers.

To eliminate standing water Tideflex valve offers low cracking pressure that is not affected by rust, corrosion or lack of lubrication.

For example, in tidal areas the duckbill lips collapses tighter and tighter as the tide height increases. The pressure forcing the lips together puts a squeeze effect on any solids build-up. The valve forms around the obstruction until enough runoff flexes the lips open and flushes the material out.

Valves permanently located underwater or buried in sand, silt or mud can still discharge flow.

A [mm]	L [mm]	H [mm]	C [mm]
100	355	305	50
150	355	305	50
200	440	390	50
250	545	480	75
300	660	560	100
400	815	740	130
500	1015	915	205
600	1170	1100	205
750	1405	1400	230
900	1650	1750	255
1050	1510	1800	255
1200	1800	2300	255
1500	2050	2450	330
1800	2440	2920	410

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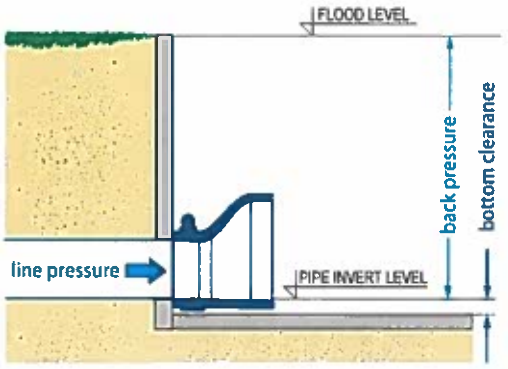


LP - line pressure [m]
BP - back pressure [m]
BC - bottom clearance [mm]

Required bottom clearance for TF-1 Valve.

DN	150	200	300	400	450	500	600	700	800	1000	1200	1400	1600
BC [mm]	15	35	55	60	70	70	75	85	100	125	145	165	230

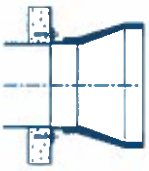
Tideflex® Check Valves - Engineered for Every Drainage System

TF-1 Slip-on / Flat Bottom design - STANDARD.
Enables installation of Tideflex without any modifications to existing structures.

Please specify: OD - pipe outside diameter [mm]
BP - max. back pressure [m]

TF-2 Slip-on / Centered Bill design.
A standard design on inline valves, which requires greater bottom clearance than TF-1
It has been superceeded by TF-1, but still remains available on special demand.

Please specify: OD - pipe outside diameter [mm]
BP - max. back pressure [m]



TF-1 Headwall design.
Supplied with AISI 304 stainless steel mounting plate, which is designed to fit the existing site structure.

Please specify: OPE - opening diameter [mm]
BP - max. back pressure [m]

Series 35-1 Flanged design.
Furnished with an integral elastomer flange and steel back-up rings for installation.
The flange size drilling conforms to DIN 2632 or other standards.

Please specify: flange type and size
BP - max. back pressure [m]

Series 37-G Slip-Inside Pipe design.
The outside diameter of the valve is custom-built to match the inside diameter of the pipe, which is buried or accesible from a manhole.

Please specify: PID - pipe inside diameter [mm]
BP - max. back pressure [m]

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