operational phase. A traffic [illegible] of the proposed operational phase traffic on the local access road to Pebble Beach. The entrance to the local access road is approximately 340m south-east of the Dockyard main entrance. A traffic count was undertaken at the local access road beside the railway bridge (Irish Rail ref. OBC 433) in 2016. The expected traffic generated by the operation phase of the pumping station is 495 two-way trips per year, averaging 1.4 vehicles per day. This represents a traffic increase of just over 1% to the area and is considered negligible. Road safety will not be significantly impacted by the vehicle trips generated by the proposed pump station and the interaction of road users at the railway overbridge does not pose a significant safety risk.

Rushbrooke Hotel Pumping Station:
Due to changes in the network design, a number of residents who had expected to connect to the gravity sewer along the R624 road, expressed dissatisfaction that this would no longer be the case. A solution is proposed that provides a local rider gravity sewer to collect local flows and deliver them to a new pumping station at *Rushbrooke Hotel*. This work will include the decommissioning of the existing bio-cycle system serving the hotel.

Carrigaloe Pumping Station:
A minor rearrangement at the Carrigaloe site is required as this pumping station will no longer serve the entirety of the catchment.

d. Estuary Crossing:

The original development proposed a crossing in the vicinity of the Cross River Ferry sailing point, near Carrigaloe and pumping directly across the River Lee, to the Glenbrook shore. This would have required conveying flows 1.7km north from Cobh to the crossing point. Also, four key elements of the original PR proposals would have been complex to construct and would have disrupted local communities:

1. Cobh-Cork Rail Crossing
2. Construction on the R624
3. Construction of crossing from Carrigaloe to Glenbrook
4. Construction on the R610.

A comprehensive review of the crossing proposal was undertaken as part of the detailed design process. The estuary crossing approved by the Board allowed flexibility to either use open-cut techniques or tunnelling technology. An assessment of the current available feasible technologies for constructing the estuary crossing and a detailed site selection using multi-criteria analysis techniques were carried out and informs this application. This review identified possible technical improvements to reduce the impact of the proposed works by taking advantage of advances in construction technology. For instance, the distance which can be achieved using a horizontal directional drilling technique has significantly increased.

The optimum solution for the crossing technology was deemed to be Horizontal Directional Drilling (HDD), and the preferred location for the pumping station was assessed to be in the Cork Dockyard at Rushbrooke. The PR had considered the Cork Dockyard as a potential crossing site but did not proceed with this site due to concerns over manmade underground obstructions. These risks were considered in the site selection process, and detailed site investigations and engineering assessment have concluded that it is feasible to construct a drill crossing from this location to Glen Road, Monkstown. Further information on this selection process can be found in the Report on Site Selection of Transfer Infrastructure from Cobh to Monkstown, which is included as an appendix to the Routing Report.

The review of the design has considered new technical options to reduce the impact of the proposed works from those considered in the EIS and provide a less disruptive solution. Horizontal Directional Drilling provides a methodology that immediately mitigates environmental risk by removing the majority of environmental impacts typically seen with open trenching/dredging works. Compared to tunnelling, using a Tunnel Boring Machine (TBM), HDD technology minimises excavations - greatly reducing the amount of material removed from the site. This is further dealt with in the Environmental Assessment Review Table.

HDD operates from discrete working areas at each end of the crossing where containment and other environmental responsive procedures can be properly established, monitored and maintained. The EIS states the following[2]:

> *Should the tunnelling option be used rather than the open cut technique for the marine crossing, the impacts on the marine ecology will be significantly reduced as there will be no interface between the tunnelling environment and the marine environment other than minimal vibrations. These would not be considered to have a significant impact on the marine ecology.*

The HDD will exit at a green area off Glen Road (L2474) and an interception manhole will be constructed at Marine Villas which will require a temporary relocation of the existing bus stop. A temporary road closure of Glen Road (L2474) will be required to allow pipe stringing for the HDD as discussed in the Routing Report, Estuary Crossing Feasibility Report and Environmental Assessment Review table (see attached documentation). The pipelines will be procured in long extruded lengths (up to 850m) to minimise the number of butt-fusion welded joints required so as to minimise the road closure period. Local access will be facilitated through diversion routes during the road closure period.

[2] Volume II Section 3.2.4 of

e. *Conclusion:*

As noted in the Routing Report, the proposed alterations to the approved scheme are designed to reduce the impact to the local community and the environment. Where possible the design has been adapted to take advantage of new technologies which allow rationalisation of the scheme, such as the advances in horizontal directional drilling, which no longer requires prolonged road closures and rail disruption. As noted earlier, the majority of the changes proposed are as a result of compliance with the conditions of the planning approval, as well as undertakings and mitigation measures set out in the EIS.

3. Planning Policy

a. *Planning Policy pertaining in 2008:*

The Inspector's Report considered the project with respect to planning policy prevailing at the time of the Planning Application. In 2008 the main Planning Policy documents that informed the Inspector's Assessment and which were specifically identified within the Inspector's Report were:

At a National Level:
Requirements of the Urban Wastewater Directive
The provisions of the Water Framework Directive

At a Local Level:
Cork County Development Plan 2003-2009.
Cork Area Strategic Plan.
County Cork Sludge Management Plan.

The Inspector recommended approval of the proposal stating the following[3]:

> *'I recommend approval by An Bord Pleanála, subject to the conditions outlined below, of the construction of a wastewater treatment plant at Shanbally, Ringaskiddy Co Cork and the construction of four major pumping stations at West Beach (Cobh), Carrigaloe, Monkstown and Raffeen together with the modification of Church Road (Carrigaline) pumping station to result in an overall catchment network of 20 small and 5 large pumping stations and a single outfall off Ringaskiddy which is already in operation.*
>
> ***Reasons and Considerations***
> *Having regard to the following:*
> *1. The Cork County Development Plan 2003*
> *2. Cork Area Strategic Plan*

[3] Page 23 of the Inspector's Report

e. ***Estuary Crossing Feasibility Report:***

An Estuary Crossing Feasibility Report by Boregis Ltd is included. It was informed by the geological advice of Dr. Ivor MacCarthy, who thoroughly evaluated the geology along the proposed estuary crossing. His evaluation includes an assessment of recent site investigations along the proposed estuary crossing route. Prior to becoming a Consultant Geologist, Dr. MacCarthy was a senior lecturer in the Department of Geology at University College Cork for over twenty years. He is an expert in the geology of the Cork Harbour and has several publications of relevance to the estuary crossing. Dr. MacCarthy's evaluation, including his curriculum vitae, has been included as an appendix in the Estuary Crossing Feasibility Report.

The report states that as part of the scheme two pumped pipelines are required to transfer wastewater from Cobh to Monkstown across the estuary of the River Lee. Trenching of the crossing is less desirable on environmental grounds due to the potential impact on the marine and foreshore environments.

Of the potential trenchless methods, only Horizontal Directional Drilling (HDD) and conventional tunnelling are considered technically viable for the alignment under consideration. Of these, HDD is considered the most economical and technically viable. HDD is suitable for this site due to its layout, sub-surface conditions and diameter, and length requirements. HDD also minimises the requirements for soil disposal and material import. The recommendations of the Estuary Crossing Feasibility Report, along with the mitigation measures of the Estuary Crossing Natura Impact Statement, will be fully considered and implemented by the appointed Contractor, and as a result it is considered that the crossing, using HDD, is technically feasible and manageable in terms of environmental considerations, safety, constructability and financial risk.

f. Detailed Noise Impact Assessment of Horizontal Directional Drilling

A Detailed Noise Assessment of the proposed Horizontal Directional Drilling works associated with the estuary crossing was undertaken by AWN Consulting Limited.

Following the completion of a baseline survey, appropriate noise and vibration limits were established using best practice construction noise and vibration guidance documents. Additionally, the limits outlined in the EIS were reviewed and incorporated into the proposed limits.

Using this compiled data, and taking into account the proximity of the drilling works to the nearest noise sensitive receptors, a predictive noise model was developed. The report finds that the unmitigated drilling works would give rise to noise levels in excess of the adopted limits for evening and night-time.

AWN Consulting Ltd, in their assessment, set out a detailed programme of mitigation to reduce the level of noise generation from the proposed works. The effectiveness of the proposed mitigation measures has been assessed using best practice standards and methods. It was found that with the proposed mitigation the levels of noise will be reduced significantly and would permit the proposed works to operate during the evening and night-time period within the appropriate limits

The Contractor will be contractually required to implement the above measures or suitably equivalent measures.

5. Consultation

The approval by An Bord Pleanála, included as condition No. 2:

> *"A Local Liaison Committee shall be established by Cork County Council* (now Irish Water) *at the detailed design stage to act as a forum for disseminating information on planning and construction work in relation to the Waste Water Treatment Plant and the major pumping stations. The Committee shall be representative of the Local Authority* (now Irish Water), *their consultants and Contractors when appointed, and one representative of residents from the immediate vicinity of each of the major pumping stations and of the Waste Water Treatment Plant. The results of all odour monitoring shall be made available to this committee.*
>
> ***Reason:** To provide a consultative forum for local residents likely to be affected by construction activities and by potential noise and odour emissions from the development."*

Irish Water welcomed this opportunity to provide a consultative forum for local residents. Recognising the importance of involving the community and informing local residents about the Cork Lower Harbour Main Drainage Project, the project team continue to take steps to ensure that the local community are kept up-to-date with what is happening on this project, and have an opportunity to have their views, concerns and issues heard and taken into account during detailed design, construction and operation of the infrastructure.

A local liaison committee engaged with residents throughout 2015 and 2016. In addition, a dedicated Community Relations Manager has been appointed for this project, and a full suite of information materials has been created and distributed. Extensive public engagement, over and above the statutory consultation required, has progressed - including open evenings, information events and letter drops. A dedicated project website has been established and is updated on a regular basis.

There is an awareness among the community of the project and, where reasonable, the issues that have been raised have been addressed during design and construction. Irish Water will continue to liaise with the community at all stages of this project.

6. Compulsory Purchase Order (CPO)

To facilitate construction and operation of the Cork Lower Harbour Main Drainage Project Irish Water must acquire land for the pumping stations. In addition, where the pipeline route diverges from the public road, permanent wayleaves will be required to lay the new/upgraded pipelines and ancillary

infrastructure and operate and maintain them into the future. Permanent rights of way are required to access a number of the pumping stations and temporary working areas and temporary construction rights will also be required during the construction period.

Attempts have been made to acquire the required lands, wayleaves, any necessary rights of way, temporary working areas and temporary construction rights wayleaves and rights by agreement. However, it has not been possible to secure agreement from all affected Landowners. Consequently, under Section 76 of and the Third Schedule to the Housing Act, 1966, as extended by Section 10 of the Local Government (No. 2) Act, 1960, to be published in accordance with Article 4 (a) of the Third Schedule to the Housing Act, 1966 as amended by the Planning and Development Acts, The Water Services Acts 2007 to 2013 (and, in particular, Section 7 of the Water Services (No. 2) Act, 2013 and Part 2 and Sections 31 & 32 and Part 7 and Section 93 of the Water Services Act, 2007' the Planning and Developments Acts, 2000 to 2014 (and, in particular, Part xiv, Sections 213 and 217 of the Planning and Development Act, 2000 and Section 184(2) of the Local Government Act, 2001, Section 10 of the Local Government (No.2) Act, 1960 (as inserted by Section 86 of The Housing Act, 1966 and as amended by Section 6 and the Second Schedule of the Roads Act, 1993 and by Section 222 of the Planning and Development Act, 2000) the Housing Act, 1966 (and in particular Part V, Sections 76 and 78 and the Third Schedule), the Land Clauses Acts and the Acquisition Of Land (Assessment Of Compensation) Act, 1919, Irish Water has made a Compulsory Purchase Order under the relevant legislation.

The Irish Water Compulsory Purchase (Cork Lower Harbour Main Drainage Project) Order, 2015 in respect of the Carrigaline, Ringaskiddy, Coolmore, Passage West, Glenbrook and Monkstown networks accompanied the first request for alterations, under Section 146B made to the Board in June 2015 and was subsequently confirmed by Irish Water on 12th October 2015, no objections having been received by An Bord Pleanála.

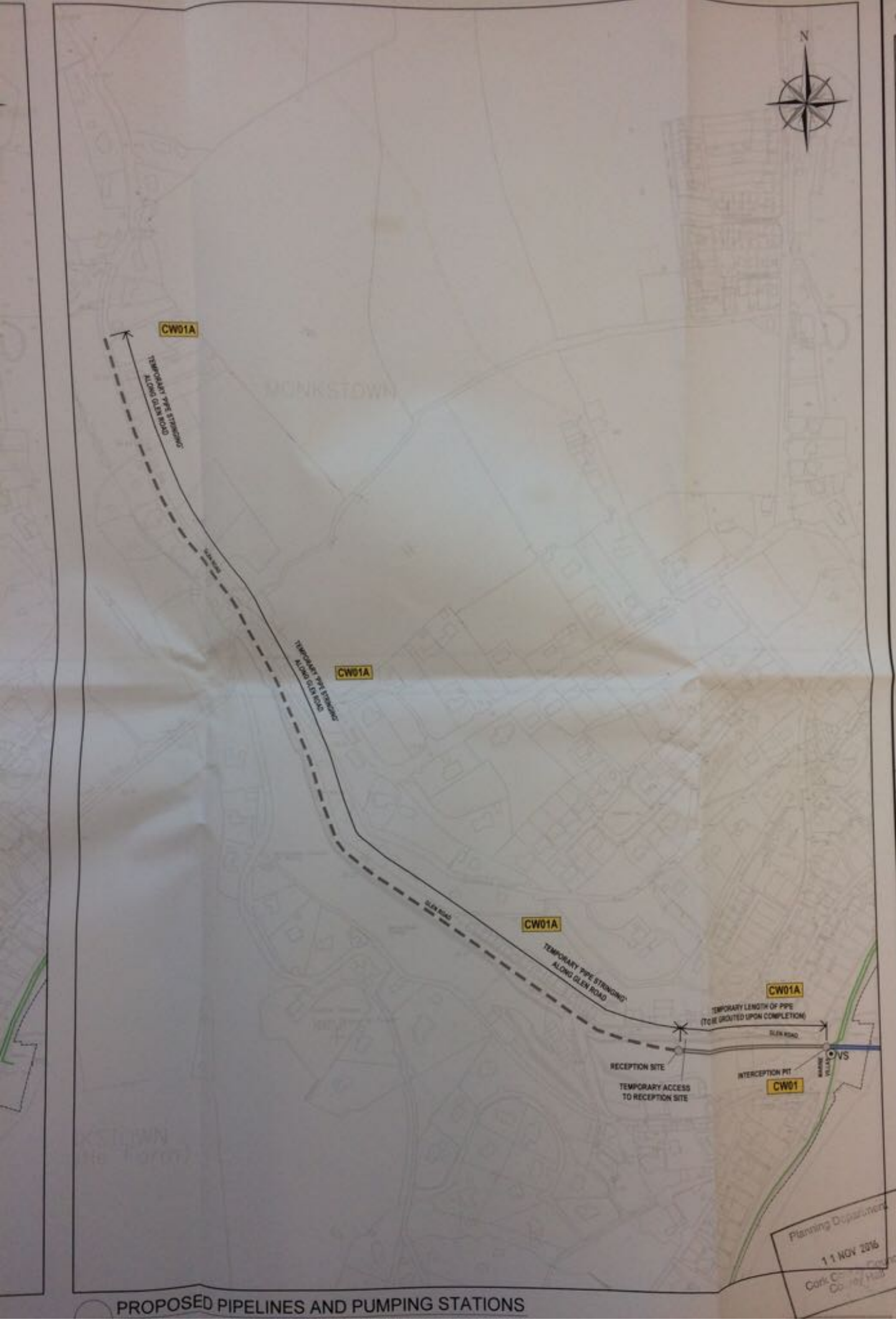
The Irish Water Compulsory Purchase (Cork Lower Harbour Main Drainage Project) Order, 2016 in respect of the Cobh network and estuary crossing accompanies this application, for confirmation.

7. Conclusion

This second application for an alteration to the previously approved permission (Reg. Ref. YA0005) is made to the Board under section 146B of the Planning and Development Act.

The alterations requested to the terms of the development are:

1. Changes in the location of 1 No. major pumping station (Carrigaloe to the Dockyard).
2. Changes to the location of the estuary pipeline crossing.
3. Relocation of the West Beach pumping station to the Old Town Hall.
4. Changes to the number and the location of minor pumping stations
    a. Addition of 1 No. minor new pumping station at Rushbrooke Hotel



PROPOSED PIPELINES AND PUMPING STATIONS

1. ALL LEVELS IN METRES

QUICK KEY PLAN

LEGEND

PUMPING STATION LOCAT

FOUL SEWERS Ø225mm to

FOUL SEWERS Ø475mm to

STORM SEWERS Ø225mm

STORM SEWERS Ø475mm

RISING MAINS Ø75mm to Ø

RISING MAINS Ø475mm to

PIPELINES IN FORESHORE

PIPELINES / PUMPING STA
(APPROVED UNDER ABP

HIGH WATER MARK

S.P.A. (SPECIAL PROTECT

ARCHAEOLOGICAL BUFFE

VENT STACK

REFER TO ENVIRONMEN

* CW - REFERS TO COB
CC - REFERS TO COB
CE - REFERS TO COB
CM - REFERS TO COOL

REV | DATE

NI
O'

CLIENT

CLIENT

UISC
WAT

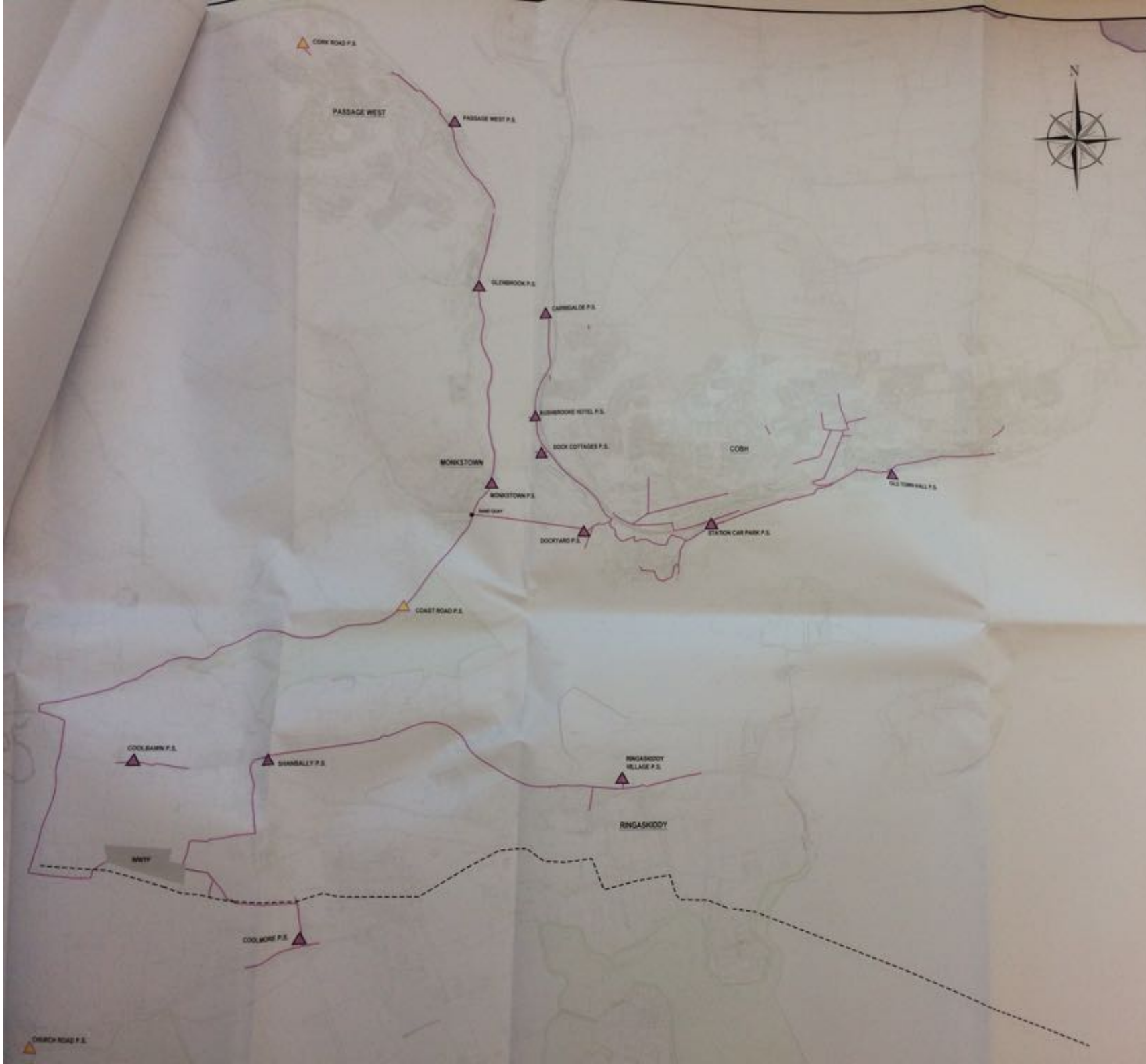
PROJECT

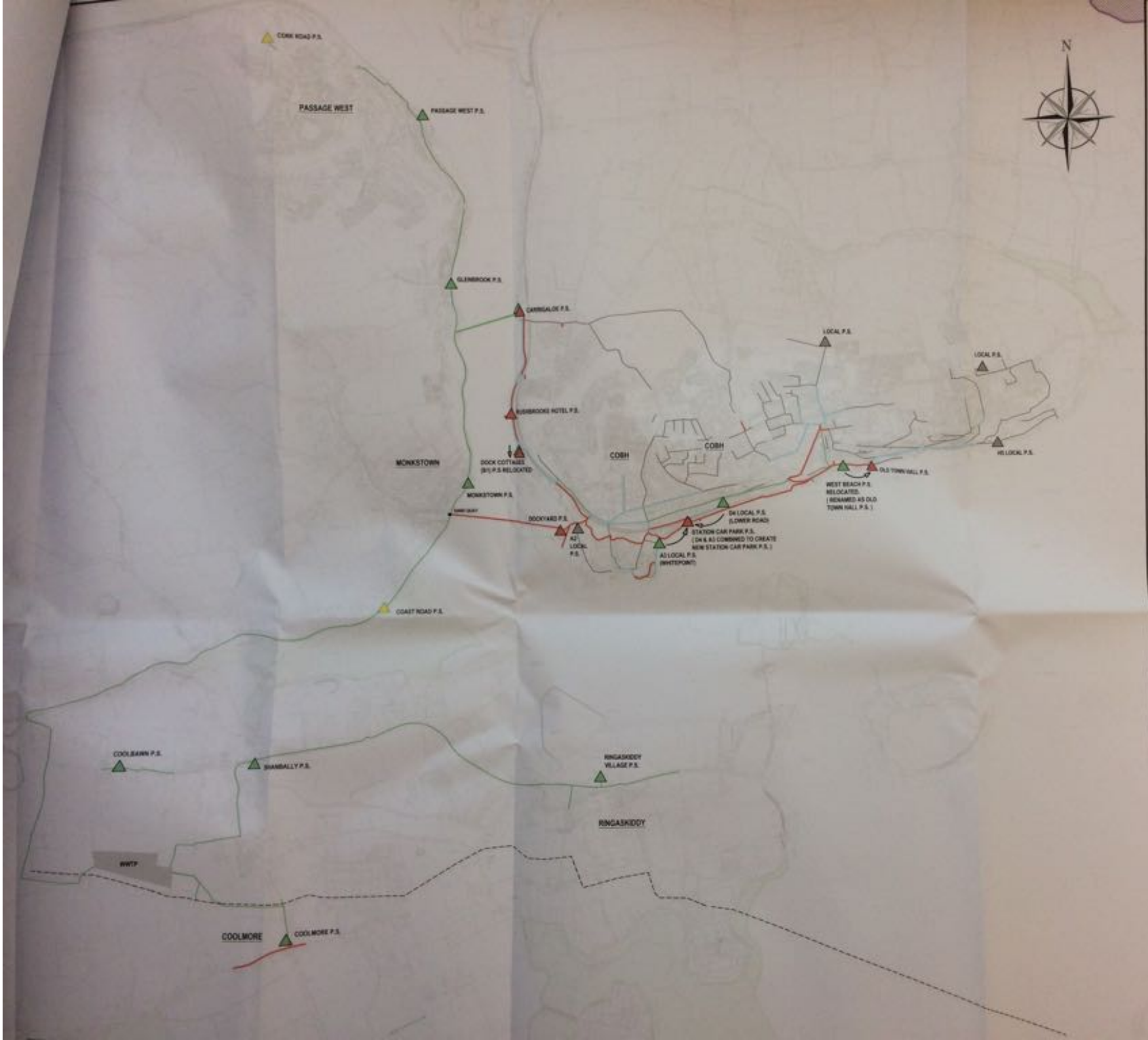
CO
MAI

TITLE

P

SCALES @ A1
1:2500
(1:5000 @ A3


CORK ROAD P.S.
PASSAGE WEST
PASSAGE WEST P.S.
GLENBROOK P.S.
CARRIGALOE P.S.
BUSHBROOKE HOTEL P.S.
DOCK COTTAGES P.S.
MONKSTOWN
MONKSTOWN P.S.
DOCKYARD P.S.
COBH
OLD TOWN HALL P.S.
STATION CAR PARK P.S.
COAST ROAD P.S.
COOLBAWN P.S.
SHANBALLY P.S.
RINGASKIDDY VILLAGE P.S.
RINGASKIDDY
WWTP
COOLMORE P.S.
CHURCH ROAD P.S.
N
NOTES
LEGEND
PIPELINE ROUTES
RAISED MANHOLES
PUMPING STATION
EXISTING PUMPING STATION UPGRADE
ATTENUATION TANK
WASTEWATER TREATMENT PLANT
EXISTING I.D.A. OUTFALL
CORK HARBOUR S.P.A.
CORK HARBOUR S.A.C.
REV
DATE
DESCRIPTION
PLANNING
COPYRIGHT RESERVED - THIS DRAWING IS NOT TO BE USED FO
PURPOSE OTHER THAN THAT FOR WHICH IT HAS BEEN ISSUED
NICHOLAS O'DWYER LTD. NOR IS IT TO BE COPIED OR REPRODUC
IN ANY MANNER WITHOUT WRITTEN CONSENT.
NICHOLAS O'DWYER
Unit E4, Nutgrove Office Park
Nutgrove Avenue, Dublin 14
+353 1 296 9000
+353 1 296 9001
dublin@nodwyer.com
www.nodwyer.com
CLIENT
Cork County Council
Comhairle Chontae Chorcaí
County Hall,
Cork, Co. Cork.
Tel: (021) 4276891 Fax: (021) 4276321
CLIENT
IRISH WATER
Colvill House,
24-26 Talbot Street,
Dublin 1.
Tel: 1890 278 278 Web: www.water.ie
PROJECT


CORK ROAD P.S.
PASSAGE WEST
PASSAGE WEST P.S.
GLENBROOK P.S.
CARRIGALOE P.S.
RUSHBROOKE HOTEL P.S.
DOCK COTTAGES (S1) P.S. RELOCATED
MONKSTOWN
MONKSTOWN P.S.
COBH
COBH
LOCAL P.S.
LOCAL P.S.
HS LOCAL P.S.
OLD TOWN WALL P.S.
WEST BEACH P.S. RELOCATED. (RENAMED AS OLD TOWN WALL P.S.)
DOCKYARD P.S.
A2 LOCAL P.S.
D4 LOCAL P.S. (LOWER ROAD)
STATION CAR PARK P.S. (D4 & A3 COMBINED TO CREATE NEW STATION CAR PARK P.S.)
A3 LOCAL P.S. (WHITEPOINT)
COAST ROAD P.S.
COOLBAWN P.S.
SHANBALLY P.S.
RINGASKIDDY VILLAGE P.S.
RINGASKIDDY
WWTP
COOLMORE
COOLMORE P.S.
N
LEGEND
ABP REF. YA0005 & ABP REF. YM0001
PIPELINE ROUTES
RAISED MANHOLES
PUMPING STATION
EXISTING PUMPING STATION UPGRADE
ATTENUATION TANK
WASTEWATER TREATMENT PLANT
MINOR CHANGES TO ABP REF. YA0005
PIPELINE ROUTES
EXISTING PUMPING STATION UPGRADE
PIPELINE ROUTES (REMOVED FROM SCOPE)
PUMPING STATION (REMOVED FROM SCOPE)
1405
PIPELINE ROUTES (ALTERATIONS TO ABP REF. YA0005 & ABP REF. YM0001)
PUMPING STATION
EXISTING LO.A. OUTFALL
CORK HARBOUR S.P.A.
CORK HARBOUR S.A.C.
REV
DATE
DESCRIPTION
PLANNING
COPYRIGHT RESERVED - THIS DRAWING IS NOT TO BE USED
PURPOSE OTHER THAN THAT FOR WHICH IT HAS BEEN ISS
NICHOLAS O'DWYER LTD. NOR IS IT TO BE COPIED OR REPRO
IN ANY MANNER WITHOUT WRITTEN CONSENT.
NICHOLAS O'DWYER
CLIENT
Cork County Council
Comhairle Chontae Chorcaí
CLIENT
IRISH WATER

Natura Impact Statement

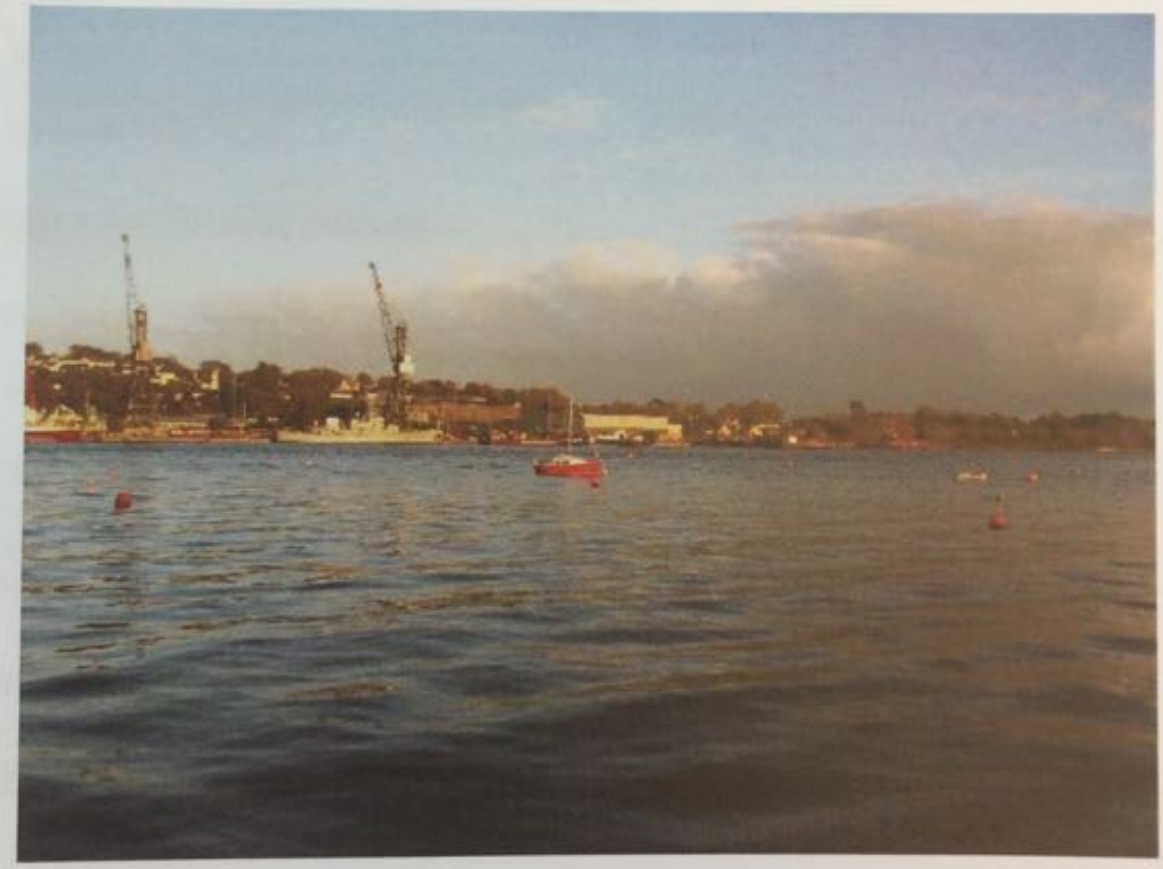
Appropriate Assessment

of

Cork Lower Harbour Main Drainage Project

Estuary Crossing by Horizontal Directional Drilling

Prepared by: Moore Group – Environmental Services



On behalf of Irish Water

April 2016

1. Introduction

1.1. General Introduction

This Natura Impact Statement (NIS) contains information required for the Competent Authority, to carry out an Appropriate Assessment (AA) process on the proposed crossing of the River Lee estuary by means of Horizontal Directional Drilling (HDD) as part of the Cork Lower Harbour Main Drainage Project.

The estuary crossing will take place between the site of a proposed Pumping Station in the southeast corner of Cork Dockyard and a site adjacent to Glen Road (approximately 150 m from the R610) at Monkstown. The potential impacts on the Great Island Channel SAC (Site Code 001058) and Cork Harbour SPA (Site Code 004030) are considered in this assessment. Both sites form part of the Natura 2000 network of sites of highest biodiversity importance for rare and threatened habitats and species across the EU.

This report has been prepared by Moore Group – Environmental Services on behalf of Irish Water and assesses the potential for the proposed development to impact on sites of European-scale ecological importance. It is necessary that the Project has regard to Article 6 of the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) (referred to as the Habitats Directive). This is transposed into Irish Law by the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477) (referred to as the Habitats Regulations).

The NIS was compiled by Ger O'Donohoe (B.Sc. Applied Aquatic Sciences (GMIT, 1993) & M.Sc. Environmental Sciences (TCD, 1999)) who has over 20 years' experience in environmental assessment and has completed numerous Appropriate Assessment Screening Reports and Natura Impact Statements in terrestrial and aquatic habitats. Engineering and technical data was supplied by Nicholas O'Dwyer Ltd., Consultant Engineers for the project.

1.2. Legislative Background - The Habitats and Birds Directives

The Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) is the main legislative instrument for the protection and conservation of biodiversity in the EU. Under the Directive member States are obliged to designate Special Areas of Conservation (SACs) which contain habitats or species considered important for protection and conservation in a European Union context.

This NIS is a documentary record of the AA process on the effects of the implementation of the proposed crossing of the River Lee estuary by means of horizontal directional drilling (HDD) as part of the Cork Lower Harbour Main Drainage Project.

1.3. Methodology

The Commission's methodological guidance (EC, 2002) promotes a four-stage process to complete the AA, and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

Stages 1-2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of Article 6(3) or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

Stage 1 Screening: This stage examines in the first place whether the plan or project is not directly connected with or necessary to the management of the site and if not, the likely effects of a project either alone or in combination with other projects upon a Natura 2000 site and considers whether it can be objectively concluded that these effects will not be significant.

Stage 2 Appropriate Assessment: In this stage, the impact of the project is considered on the integrity of the Natura 2000 site with respect to the conservation objectives of the site and to its structure and function.

Stage 3 Assessment of Alternative Solutions: This stage examines alternative ways of implementing the project that, where possible, avoid any adverse impacts on the integrity of the Natura 2000 site.

Stage 4 Assessment where no alternative solutions exist and where adverse impacts remain: Where imperative reasons of overriding public interest (IROPI) exist, an assessment to consider whether compensatory measures will or will not effectively offset the damage to the sites will be necessary.

In order to ensure that the Project complies fully with the requirements of Article 6 of the Habitats Directive and all relevant Irish transposing legislation, Moore Group on behalf of the Consenting Authority completed a screening report on the Project to see if Stage 2 AA is required. The output of the Screening Stage is recorded in Section 2 below.

2. Stage 1 – Screening for Appropriate Assessment

Screening determines whether Appropriate Assessment is necessary by examining:

1) Whether a plan or project can be excluded from AA requirements because it is directly connected with or necessary to the management of the site, and;

2) The potential effects of a project or plan, either alone or in combination with other projects or plans, on a Natura 2000 site in view of its conservation objectives, and considering whether these effects will be significant.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA).

2.1. Description of the Project

It was a condition of granting planning permission that all mitigation measures as set out in the 2008 EIS for the Cork LHMD Project are implemented in full. Hence, the environmental protection measures as outlined in the EIS now form part of the overall Cork LHMD Project. The Estuary crossing is an integral part of the overall Cork LHMD Project and therefore this Appropriate Assessment takes on board all planning conditions and environmental protection measures outlined in the EIS and 2009 planning approval. These EIS measures have been reviewed in the context of Appropriate Assessment to ensure they will prevent any impact to the Qualifying Interests and Special Conservation Interests of the SAC and SPA.

The project includes the crossing of the estuary by means of Horizontal Directional Drilling (HDD) as part of the Cork Lower Harbour Main Drainage Project (see Figures 1 & 2). From the outset it should be noted that there will be no works proposed within any Natura 2000 site as part of this Project.

The 2008 EIS stated that:
"Should the tunneling option be used rather than the open cut technique for the marine crossing, the impacts on the marine ecology will be significantly reduced as there will be no interface between the tunneling environment and the marine environment other than minimal vibrations. These would not be considered to have a significant impact on the marine ecology".

It is proposed to Horizontal Directional Drill from the launch site in Cork Dockyard, under the estuary and emerge above ground at a reception site (temporary exit point) located in the amenity area off Glen Road in Monkstown (see Figure 2).

The pipe string will be attached to the drill head and then be pulled back through the drill bore.

Once the pipe has been installed, an interception manhole (permanent exit point), approximately 15m deep, will then be constructed at the location shown in and Figure 3 to intercept the pipeline.

From the interception manhole, a gravity sewer pipeline will be laid as far as the proposed Monkstown PS (shown in Figure 3) where it will be connected to the proposed Monkstown Rising Main. Flows will then be pumped via the proposed Monkstown Rising Main to the new WWTP at Shanbally for treatment.

A location plan of the estuary crossing and further crossing details are shown on Figures 4 and 5, respectively. The duration of the estuary crossing project is expected to be approximately 6 months.

A general HDD methodology is given in Section 2.1.1 of this report.

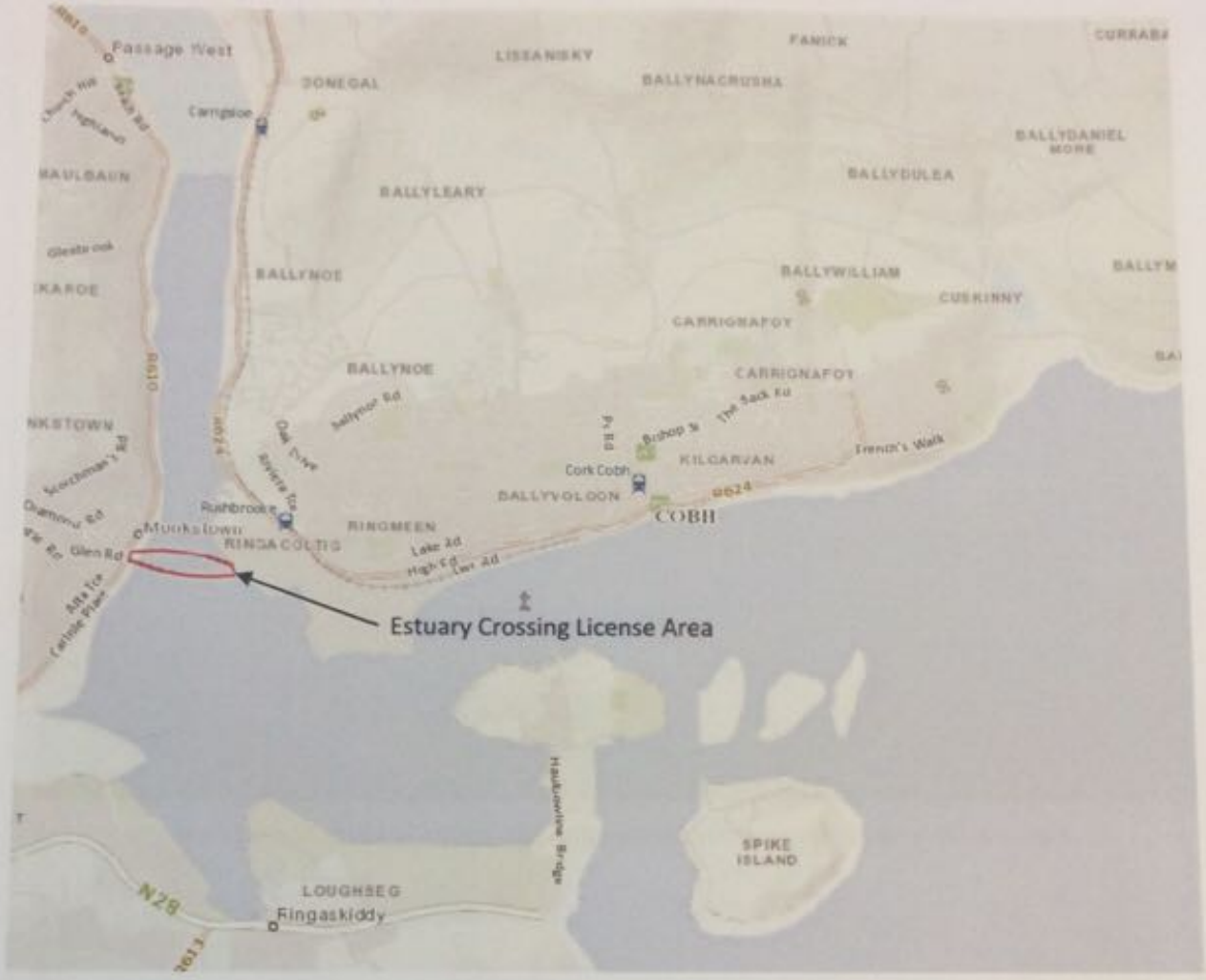


Figure 1. Showing the estuary crossing license area in Lower Cork Harbour (©GeoHive).

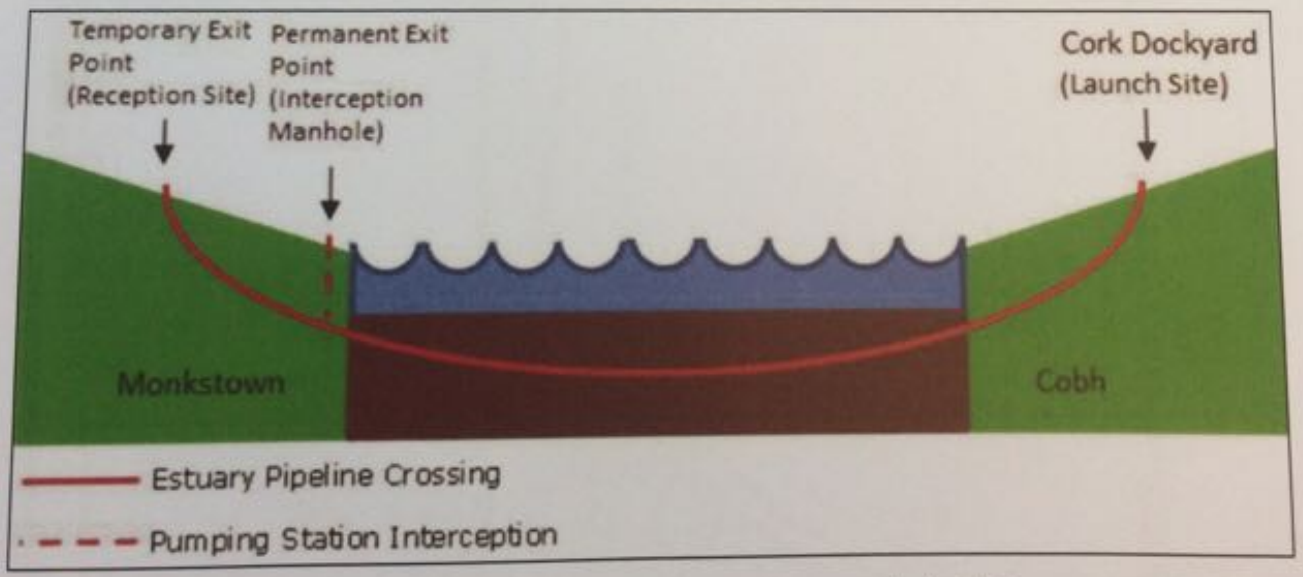


Figure 2. Schematic of the proposed estuary crossing by HDD.

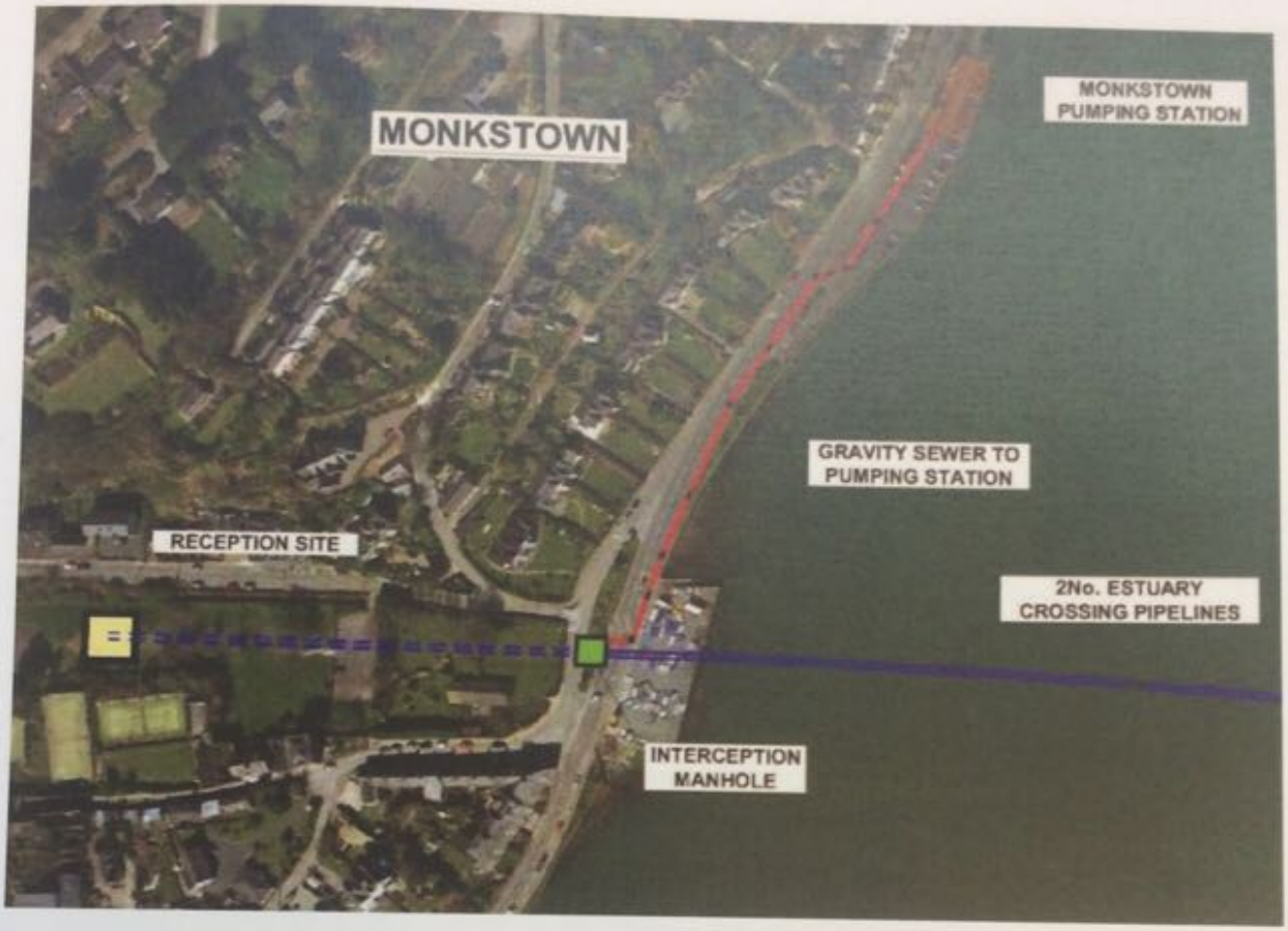


Figure 3. Overview of the proposed reception/interception detail at Monkstown.

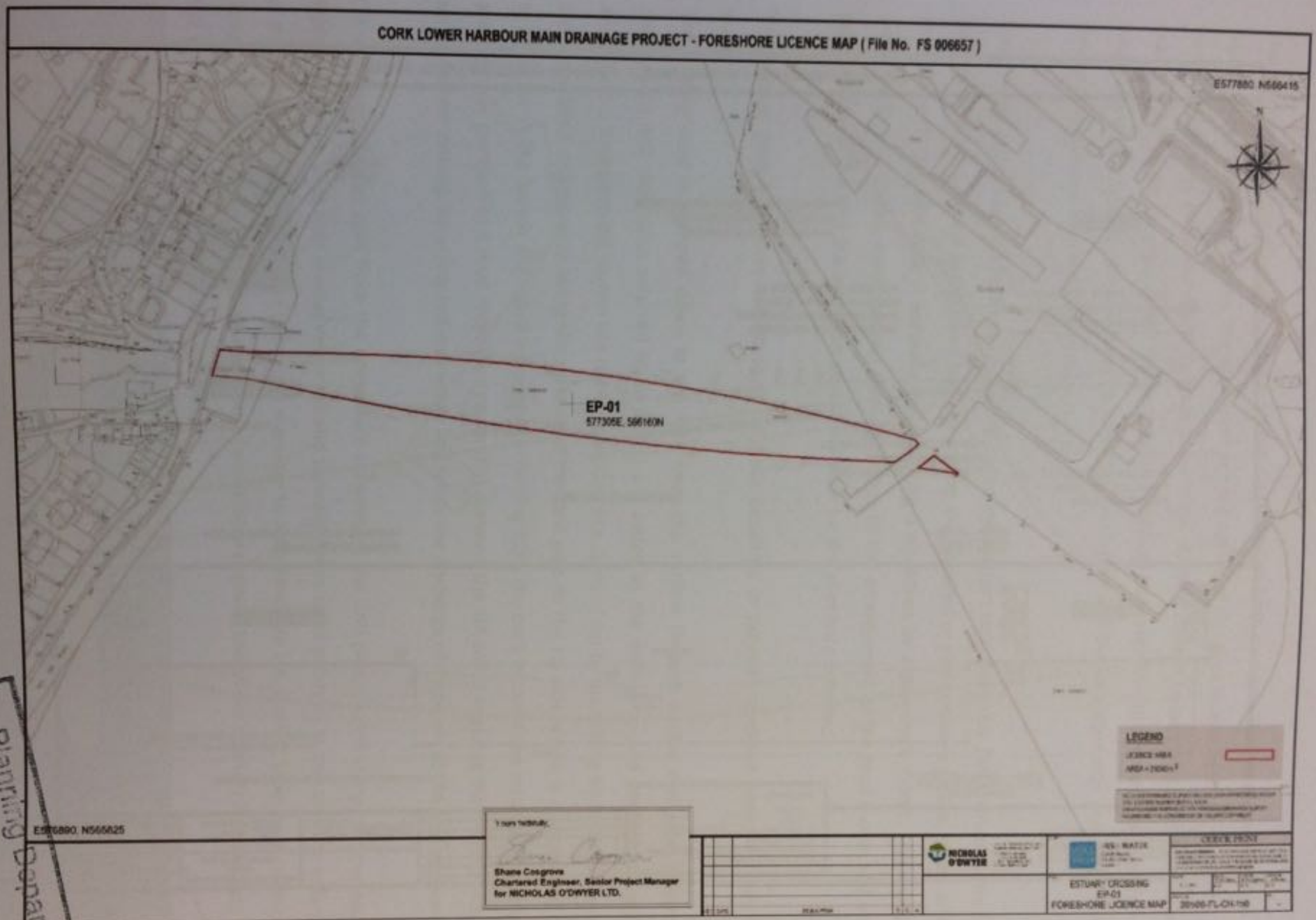


Figure 4. Location plan of estuary crossing

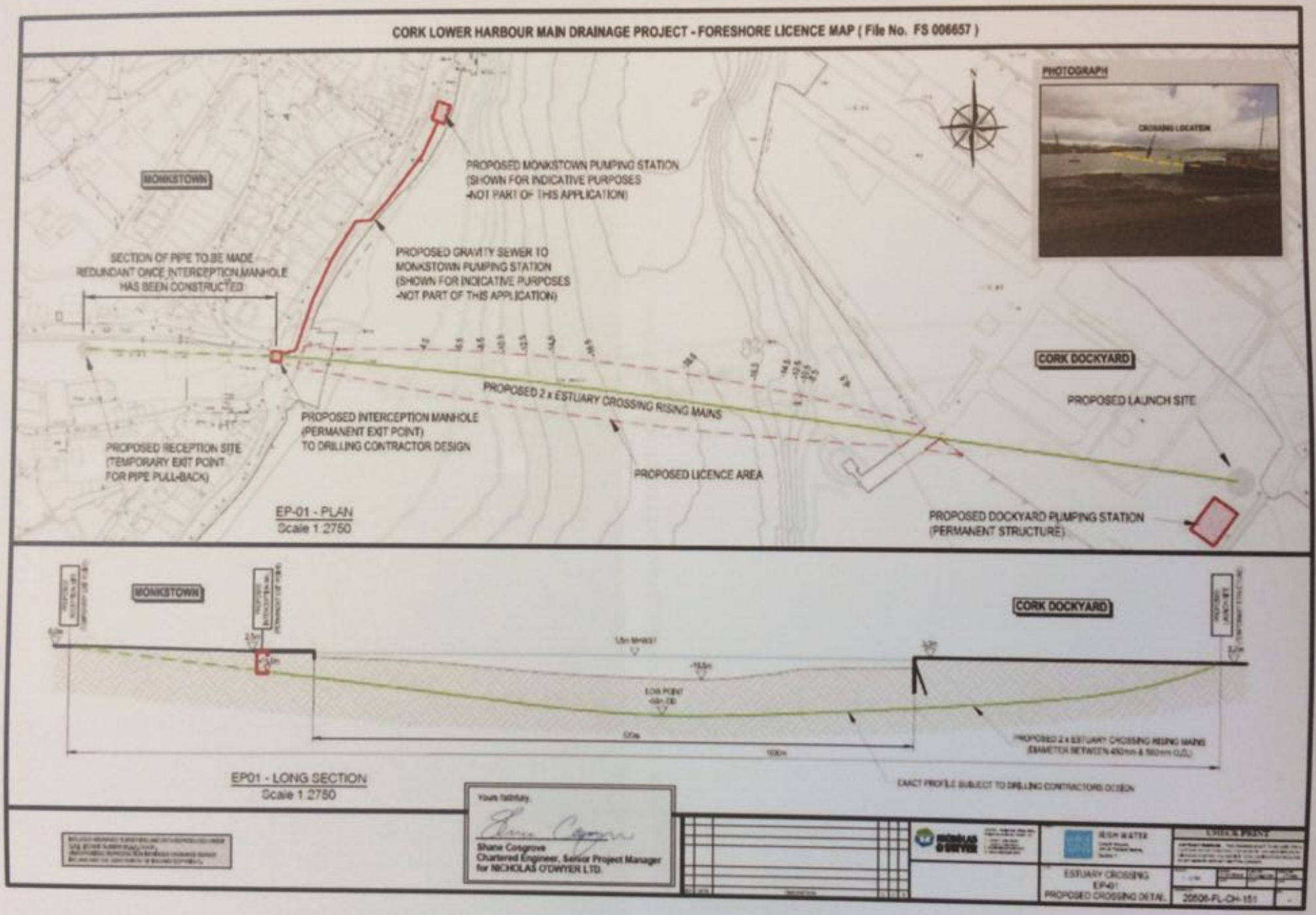


Figure 5. Proposed estuary crossing detail

2.1.1. Horizontal Directional Drilling Methodology

The HDD process commences by using a drilling rig to drill or bore a small diameter pilot hole from the launch site to the reception site. The alignment or bore profile of this pilot hole in both the horizontal and vertical is planned beforehand and consists of an initial slanting section followed by a vertical curve to take the drill to the required depth. It then typically continues horizontally until towards the reception site when the drill is typically steered back up towards the surface and the reception site. Horizontal curves can be incorporated in addition to vertical curve(s).

Down Hole equipment at the front of the drill called the Bottom Hole Assembly (BHA) enables the pilot hole to be advanced and at the same time steered to the required or planned bore profile. When drilling through rock the pilot hole is normally created using a bit driven by a downhole motor. This motor is powered by the drilling mud pumped through it. Due to the arrangement of the mud motor and other components of the BHA the minimum steerable radius for the pilot bore is limited.

The drilling mud is typically a mixture of naturally occurring or polymer modified bentonite clay and water.

The drilling mud is pumped down to the BHA from the surface through hollow drill pipe. Individual sections of drill pipe (also referred to as joints) are added at the drilling rig and pushed forward to advance the BHA from the launch site to the reception site. Ground cut by the drilling bit is carried back in the circulating drilling mud along the outside of the drill pipe to the rig side where it is deposited in a shallow pit at the launch site. Spoil laden mud emerging from the bore is called the returns. The returns are typically pumped to a mud recycling system that removes the cut solids enabling the cleaned mud to be reused for drilling. Recycling reduces waste and limits the discharge of materials to the environment.

On completion of the pilot bore the bored hole contains all the drill pipe, or drill string, surrounded by drilling mud. The pilot hole is relatively small and typically needs to be enlarged in one or more enlarging or pre-reaming phases until large enough in diameter to accommodate the product pipe. Back reaming is undertaken by drawing and rotating a new BHA consisting of reaming tools/hole openers inserted into the drill string at the reception side (see Figure 6).

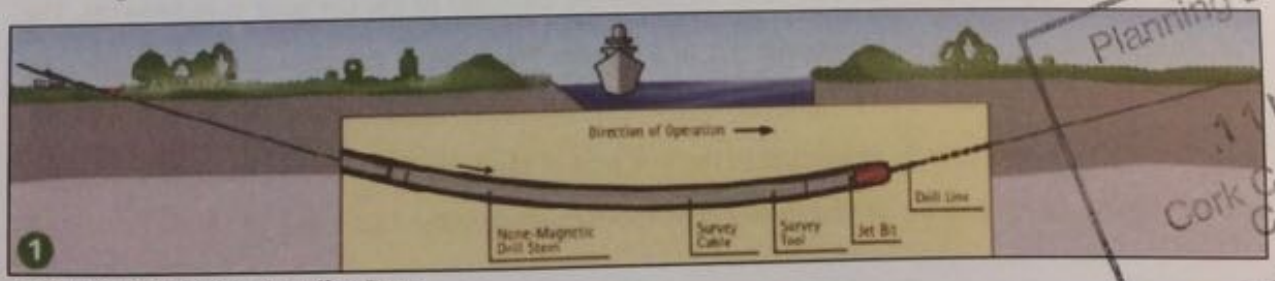


Figure 6. HDD Stage 1 – Pilot Bore

During the reaming phases drilling mud continues to be pumped from the drilling rig down the drill string to the reaming/hole opening BHA where it exits through jets in the tools. As with the pilot bore the ground that is cut during reaming becomes mixed with the drilling mud and is transferred to the surface through the circulation of the drilling mud in the open bore. Typically, returns from back reaming operations would occur to the reception side (Monkstown) of the crossing. This solids laden mud must be cleaned and returned to the launch site to be reused (see Figure 7).

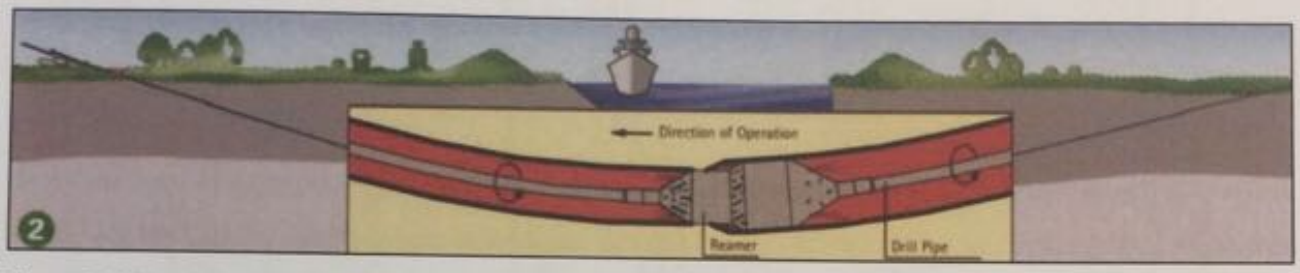


Figure 7. HDD Stage 2 – Reaming

At every step of the process the cut bore is maintained open by the presence of the drilling mud. The mud is specially formulated and mixed to provide properties that both maintain the mud within the cut bore and also support the bore against collapse.

Because the drilling mud is pumped down the drill string under pressure there is always pressure within the bore during pilot-hole drilling or reaming. If the passageway for circulating mud is impeded, or if an easier path for the mud to escape presents itself, drilling mud can escape from the bore and will often migrate to the surface to become inadvertent returns (i.e. returns emitting from somewhere other than the end of the bore).

Inadvertent returns may present environmental problems in the vicinity of the escape or compromise the ability to keep the ground laden drilling mud flowing properly to one end of the bore or the other. The risk of inadvertent returns is reduced by drilling through the most competent horizon and avoiding areas of loose or soft strata. The risk has been mitigated for this project by applying knowledge gained from site investigation and geophysical surveys to the pipeline design. The pipeline has accordingly been designed such that sufficient depth within the bedrock is maintained.

Reaming, or hole-opening in rock formations, increases the diameter of the cut bore in increments. The final diameter reamed is typically between 1.2 to 1.5 times the external diameter of the product pipe. Hole-openers would be deployed for pre-reaming in the rock strata anticipated of the estuary crossing. The product pipe would then be connected to the drill pipe at the reception site (Monkstown) and pulled back through the bore using the drilling rig in a continuous operation (see Figure 8).

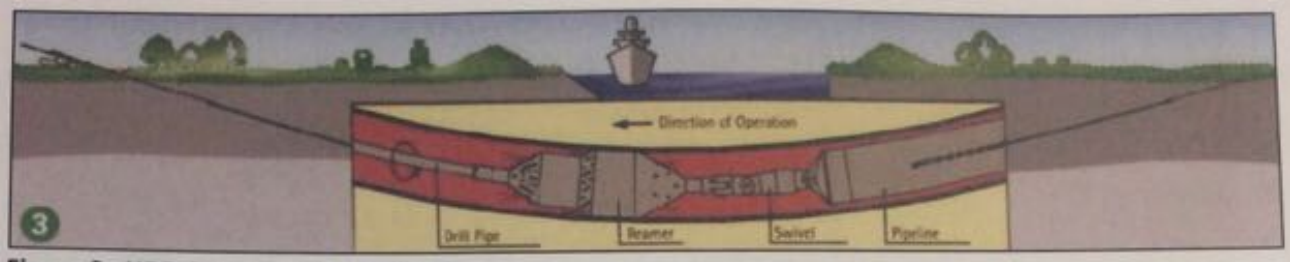


Figure 8. HDD Stage 3 – Pipe Pullback

The size of operation required for the HDD crossing requires that considerable space be afforded to the drilling contractor for their operations. The principal space requirement on the reception side is that required for stringing-out the product pipelines prior to pull back into the prepared bore. Jointing of pipe sections into a single string prior to installation is advisable for the directional drilling process to avoid time delays and increased installation loads. A linear space is traditionally required running roughly in-line with the pipeline route and beyond the reception site for the equivalent of the length of the bore. This enables the contractor to fabricate the full length of pipe required from shorter sections welded together on site.

2.2. Description of Natura Sites Potentially Affected

In accordance with the Department of Environment, Heritage and Local Government guidance (DoEHLG, 2010), an initial distance of 15 km from the Project extents was selected for consideration of European sites. Given the coastal nature of the proposed works, the zone of influence can be reduced to include the European sites with marine hydrological connectivity to the works areas. The two European sites considered in this assessment are the Cork Harbour SPA (Site Code 004030) and the Great Island Channel SAC (Site Code 001058). The location of the proposed crossing is presented in relation to the relevant European sites in Figure 9 below.

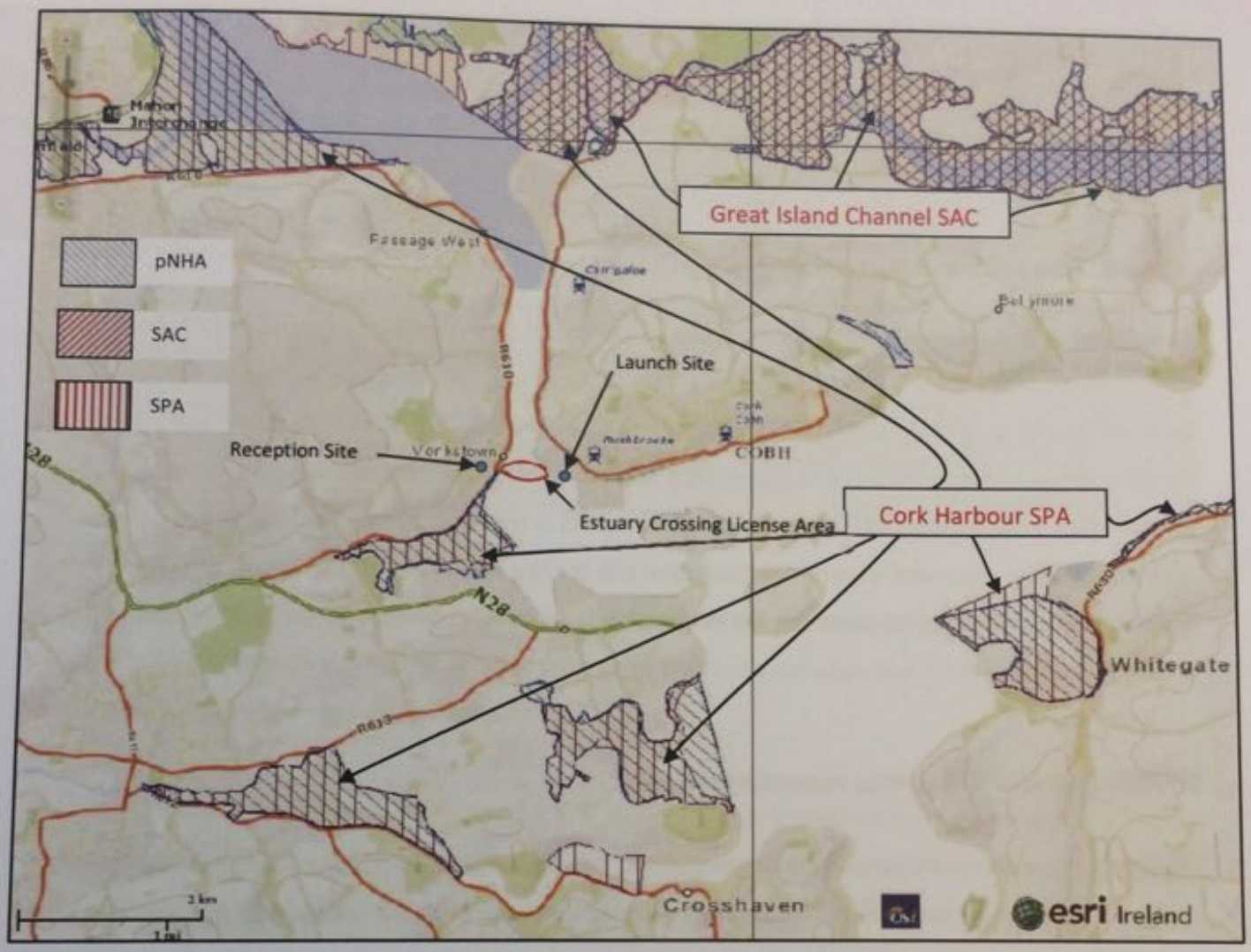


Figure 9. Estuary Crossing works area in relation to the Cork Harbour European Sites.

Details of the Qualifying Interests of the Great Island Channel European site are listed in Table 1 and Cork Harbour SPA in Table 2 below. Site Synopses for all sites are available on the NPWS metadata site. Spatial boundary data on the Natura 2000 network was extracted from the NPWS website on 4th February 2016.

Table 1. Qualifying Interests of the Great Island Channel SAC [001058]*

Site Code	Site Name	Qualifying Habitats	Qualifying Species
001058	Great Island Channel SAC	Mudflats and sandflats not covered by seawater at low tide [1140] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	

2.5. Assessment of Likely Significant Effects

This section uses the information collected on the sensitivity of each European site and describes any likely significant effects of implementation of the Project.

There will be no works within any Natura 2000 site. Therefore, there will be no direct impact or habitat fragmentation from this project. Having established no direct impacts or habitat fragmentation, the assessment concentrates on potential indirect impacts on the Cork Harbour SPA and the Great Island Channel SPA.

Disturbance to waders and waterfowl in winter

Based on the surveys undertaken in November and December 2015 by Cork Ecology (see Appendix A), the numbers of waders and waterfowl occurring within the proposed area of works are low, compared to other areas within Cork Harbour. There are no regular high tide roost sites regularly counted as part of I-WeBS surveys within the proposed area of works, indicating that this area does not offer suitable high tide roost sites (Crowe, 2005 & NPWS, 2014 (SPA Conservation Objectives Supporting Document). The nearest areas that are covered by I-WeBS surveys, and therefore are likely to support larger numbers of waders and waterfowl are Monkstown Creek and the Ringaskiddy area, to the south of the works area. There is potential for negative impacts on waders and waterfowl arising from construction operations. Although the proposed area of works is not within the Cork Harbour SPA, birds feeding within this area in winter months are likely to be part of the qualifying populations of the adjacent Cork Harbour SPA and Monkstown Creek pNHA. Excavation works may deter birds from feeding in the affected areas due to physical intrusion and elevated noise levels, however, birds of the area are currently accustomed to a degree of elevated noise due to day to day activity at the Cork Dockyard, traffic on roads bordering the estuary/river and also to regular disturbance by the Passage West to Cobh ferry and other shipping. The extent of construction areas adjacent to the SPA/pNHA is relatively limited and the degree of disturbance will be reduced as far as possible using appropriate noise mitigation measures (*e.g.* screening such as containers, housing of equipment). It is anticipated that the placement of a pipeline across the estuary will not change the ecology of the wider environment in this area, as this area is currently subjected to variable conditions and daily disturbance by the ferry.

Disturbance to breeding species

The 2009 Cork LHMDP EIS referred to a Birdwatch Ireland submission regarding Peregrine falcons nesting at a quarry to the west of the works area in 2002 (Cork County Council 2008). Although this species is listed under Annex 1 of the EU Birds Directive, it is currently Green-listed (considered to be of lowest conservation priority) by Birdwatch Ireland in their summary of Birds of Conservation Concern in Ireland

(Colhoun & Cummins 2013). These birds have quite large territories and may use parts of the works area or areas adjacent to the works area for foraging. However, no potential nest sites or important areas for this species would be affected by any aspect of the proposed estuary crossing.

Breeding Common Terns are a species of Special Conservation Interest (SCI) within the Cork Harbour Special Protection Area (SPA) (Site Code: 004030). Common Terns have a tendency to move breeding locations between seasons, however, in recent years they have nested on the Martello Tower at Marino Point and the Ringaskiddy Deepwater Port mooring dolphins within Cork Harbour. In 2012 the total population of Common Terns which nested within the wider Cork Harbour was between 85 and 95 pairs (RPS 2014).

The area of water off Black Point, Cobh, to the south-east of the proposed area of works has been highlighted as a favoured foraging area for breeding common terns in summer months, as is the entrance to Monkstown Creek (RPS 2014).

There would be no impact from the proposed works at the estuary crossing site between Cork Dockyard and Marine Villas, Monkstown in terms of the areas having been identified as potential foraging areas for common terns. A recent environmental statement for the redevelopment of existing port facilities at Ringaskiddy, Cork Harbour stated that *"Based on observations in 2011, 2012, and 2013, common tern foraging activity within Cork Harbour is widespread"* (RPS 2014). Based on this, it is likely that if the proposed works did temporarily disturb foraging common terns in the immediate vicinity of operations, there would be alternative foraging areas available. The Ringaskiddy EIS also found that *"the common tern colony is highly tolerant of the existing level of noise disturbance arising from the activities within the operational port"* (RPS 2014).

Water Quality Impacts from Drilling Activities

Potential impacts from contaminated surface water runoff is unlikely given the sufficient space available at the Cork Dockyard launch site which is comprised of artificial surfaces. The reception site at Glen Road, Monkstown is also an artificial habitat presently comprising amenity facilities including a basketball court, grassland and playground. Potential impacts from surface water runoff will be avoided through the employment of best practice construction measures which will specifically include bunding of the works areas to trap excess surface water if this occurs. There is a stream flowing from Monkstown to the sea at Sand Quay along the northern boundary of this amenity area. No surface water runoff will be allowed to enter this stream.

A worst case scenario could possibly occur whereby the proposed works would result in a significant detrimental change in the water quality of the Cork Harbour either alone or in combination with other projects or plans as a result of indirect pollution sources such as inadvertent drill returns containing bentonite clay, drilling fluid disposal and oil and fuel spillages from rig operation. The most significant risk in this instance would be from Bentonite clay accidental spillage/escape during the Horizontal Directional Drilling (HDD) procedure, which is toxic to fish and other species at high concentrations.

Water quality impacts have the potential to negatively impact on the waterbird populations and their wetland habitats. This is turn will impact the conservation status and integrity of the Cork Harbour SPA and the Great Island Channel SAC.

HDD provides a methodology that immediately mitigates environmental risk by removing the majority of environmental interfaces typically seen with open trenching works. While the methodology of HDD is designed to minimise environmental impacts in comparison to other construction methods, there remains a number of specific environmental concerns peculiar to the process which need to be evaluated and mitigated as part of the design and construction of any project. These include:

- Oils and fuel spillages

The risk of oil spillages comes primarily from ruptured hydraulic hoses associated with the drilling rig operation. Therefore, there is the potential for oil spillages from drilling rig operation to impact upon the water quality of the harbour.

- Inadvertent drilling fluid returns

Inadvertent drilling fluid returns are defined as those returns which occur somewhere other than the launch and reception sites at either end of the drilled bore. Typically, drilling fluids are only released at the launch and reception sites of a HDD installation although inadvertent returns can potentially occur as a result of poor conditions within the drilled bore. Inadvertent returns are a concern because bentonite based drilling fluids are used in significant quantities during the HDD process and these can have a negative impact on the environment, especially the aquatic and marine environment. Based on this, there is the potential for Inadvertent drilling fluid returns to impact upon the water quality of the harbour.

- Drilling fluid disposal

Bentonite based drilling fluid is mixed with water on site to gain full hydration. It is then stored in a tank or tanks (typically shipping container size) ready for use during drilling. Drilling mud containing cuttings retrieved from the bore are collected at the launch and reception sites and pumped or transferred to a

mechanical mud separation plant, normally located close to the drilling rig or adjacent to the reception site (or both). Without the appropriate management of drilling fluid disposal, there is a risk of bentonite based drilling fluid being released to the environment which can have a negative impact, especially on the aquatic and marine environment. Based on this, there is the potential drilling fluid to impact upon the water quality of the harbour.

2.6. Assessment of Potential Cumulative Effects

Cumulative impacts or effects are changes in the environment that result from numerous human-induced, small-scale alterations. Cumulative impacts can be thought of as occurring through two main pathways: first, through persistent additions or losses of the same materials or resource, and second, through the compounding effects as a result of the coming together of two or more effects.

As part of the Screening for an Appropriate Assessment, in addition to the proposed works, other relevant projects and plans in the region must also be considered at this stage. This step aims to identify at this early stage any possible significant in-combination or cumulative effects/impacts of the proposed development with other such plans and projects on the Natura 2000 sites.

Cobh Town Development Plan 2013

The Cobh Town Development Plan 2013 covers most of the coastal area in which the proposed works are to be carried out. The Plan provides the planning policy and zoning objectives for Cobh. The Natura Impact Report associated with the Plan was reviewed, which took into consideration the development also provided for in the Cork City Development Plan 2009-2015.

Policy INF-01 of the plan seeks to encourage the implementation of the Cork Lower Harbour Main Drainage Project and it requires the provision of appropriate and sustainable waste water infrastructure for new developments in the town in advance of the commencement of any new discharges from these. The policy precludes any increase in discharge of untreated wastewater to the harbour. On this basis, it is considered that the plan will not cause any increase in discharge of untreated wastewater to the harbour, and therefore is unlikely to contribute to negative impacts on water quality in the harbour.

The Cork County Development Plan in complying with the requirements of the Habitats Directive requires that all Projects and Plans, that could affect the European sites in Cork Harbour, would be initially screened for Appropriate Assessment and if requiring Stage 2 AA, that appropriate employable mitigation

measures would be put in place to avoid, reduce or ameliorate negative impacts. In this way any in-combination impacts with Plans or Projects for the areas of Monkstown and Cobh would be avoided.
Any new applications for the project areas will be assessed on a case by case basis by Cork County Council which will determine the requirement for AA as per the requirements of Article 6(3) of the Habitats Directive.

Port of Cork Maintenance Dredging

Port of Cork submitted an application to the EPA in February 2014 for a maintenance dredging programme. That application was accompanied by a NIS which was reviewed as part of this analysis. The dredging campaign extends from the City Quays and Tivoli Docks in Cork City, out to Roche's Point. Coastal hydrodynamic modelling was undertaken as part of that assessment to help determine the spread of the dredge plume. The NIS concluded that all of the potential impacts identified will be avoided, and that the proposed maintenance dredging would not have a significant negative impact on either European Site being considered here.

Monkstown Marina

Proposals for a new marina at Monkstown were submitted for planning permission and that application included a NIS. The marina comprises car-parking, retail, office and landscaping, with a requirement to dredge part of the seabed in the shallower parts of the marina and in a band paralleling the shore to enable safe access by craft during all states of the tide. The NIS concluded that the marina at Monkstown will not result in the loss of any feeding areas or roosting sites for wintering waterfowl or waders and consequently no impact on the qualifying interests for Cork Harbour SPA.

Ringaskiddy Port Redevelopment

The Ringaskiddy Port Redevelopment project consists of a new 314 m Container Berth 1/ Multipurpose Berth that will be capable of accommodating vessels carrying a range of different cargoes including containers, freight and general cargoes, an additional 200 m Container Berth 2, surfacing of existing port lands to provide operational areas, dredging of the seabed to a level of -13.0 m Chart Datum (CD), demolition of existing link-span, installation of link-span comprising a floating pontoon and access bridge, installation of container handling cranes and terminal transport equipment, maintenance building, administrative buildings and entrance kiosks, ancillary car parking, lighting and fencing. In addition, a new 182 m extension to the existing Deepwater Berth (DWB) which will comprise a filled quay structure extending no further seaward than the edge of the existing DWB, dredging works to varying levels to facilitate navigational access to the new facilities and construction of a new public pier, slipway and boarding platform at Paddy's Point Amenity Area.

The EIS was accompanied by a NIS which determined that with the employment of mitigation measures that the proposal will not result in direct, indirect or cumulative impacts which would have the potential to adversely affect the qualifying interests / special conservation interests of the Natura 2000 sites within the study area with regard to the range, population densities or conservation status of the habitats and species for which these sites are designated (i.e. conservation objectives).

Cork Lower Harbour Main Drainage Project – Outfall Upgrade and Repair Works

All elements of the Cork Lower Harbour Man Drainage Project have been screened for Appropriate Assessment. No works will be taking place within the Cork Harbour SPA or the Great Island Channel SAC. It was a condition of granting planning permission for the Project in 2009 that all environmental protection measures as set out in the 2008 EIS for the Cork LHMD Project are implemented in full. Hence, the environmental measures as outlined in the EIS now form part of the overall Cork LHMD Project and therefore are an integral part of all protect components. These measures have been reviewed in the context of Appropriate Assessment to ensure they will prevent any impact to the Qualifying Interests and Special Conservation Interests of the SAC and SPA, and additional best-practice construction measures have been included as necessary. The contractor will be contractually required to implement these measures in full. The sequence of works for all elements of the Project has not yet been determined however with the implementation of the environmental protection measures of the EIS no in combination effects/impacts are predicted.

Summary of In-combination Effects

The plans and projects listed in this section are not considered likely to act in combination with the proposed estuary crossing pipeline to give rise to negative effects that have the potential to affect the conservation objectives of the European Sites considered here, including their structure and function.

2.7. Screening Conclusion

The Screening Assessment was completed in compliance with the relevant European Commission and National guidelines. The potential impacts during the construction and operation of the associated activities with the Cork Lower Harbour Main Drainage Project Estuary Crossing have been considered in the context of the European Sites potentially affected, their Qualifying Interests and conservation objectives. From the findings of the Screening exercise, it is concluded that:

- the proposed project is not directly connected with or necessary to the management of any European site;

- The risk of oil/fuel spillages are a concern due to the potential for ruptured hydraulic hoses associated with the drilling rig operation. This has the potential to cause negative impacts on the waterbird populations and the wetland habitats of the Cork Harbour SPA and Great Channel Island SAC.
- Inadvertent returns are a concern because bentonite based drilling fluids are used in significant quantities during the HDD process. Should this occur these returns have the potential to have a negative impact on the waterbird populations of the harbour and their wetland habitats.
- Without the appropriate project specific management of drilling fluid disposal, there is also a risk of bentonite based drilling fluids being released to the environment which can have a negative impact on the waterbird populations of the harbour and their wetland habitats

Therefore, adopting the precautionary approach, in line with current guidance, detailed mitigation measures to avoid inadvertent drilling returns are required and a Stage 2 Appropriate Assessment of the proposal is required for the estuary crossing.

3. Stage 2 –Appropriate Assessment

Cork Harbour SPA (Site Code 004030) and the Great Channel Island SAC (Site Code 001058) have been brought forward for Stage 2 Appropriate Assessment.

Water quality impacts from bentonite based drilling fluids, inadvertent returns and the potential for ruptured hydraulic hoses associated with the drilling rig operation and subsequent oil/fuel spillages during the Horizontal Directional Drilling (HDD) procedure have the potential to negatively impact on the waterbird populations and their wetland habitats. This in turn has the potential to impact the conservation status and integrity of the Cork Harbour SPA and Great Channel Island SAC.

3.1. Description of Natura 2000 Site

Cork Harbour SPA

Cork Harbour is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas, Owenboy and Owenacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, the Douglas River Estuary, inner Lough Mahon, Monkstown Creek, Lough Beg, the Owenboy River Estuary, Whitegate Bay and the Rostellan and Poulnabibe inlets. Cork Harbour is adjacent to a major urban centre and a major industrial centre.

3.2. Habitat Assessment

The pipeline crossing will be wholly contained within the bedrock below the marine environment. The pipeline will carry flows from the Cork Dockyard site in Cobh to the temporary exit point in Monkstown. Flows will be intercepted at the Marine Villas, Monkstown (the permanent exit point) and directed to the Monkstown pumping station.

The predominant foreshore habitat types are: Shingle and gravel shores (LS1), Intertidal Mud shore (LS4) and Estuaries (MW4). Other habitats include the hardstand areas of Cork Dock Yard and amenity areas at Monkstown.

Buildings and artificial surfaces (BL3)

This habitat refers to the hardstand areas of Cork Dockyard and its component buildings and warehouses. The dockyard site is essentially comprised of an area of disturbed ground (ED2 Spoil and bare ground). There is a berm of earth to the east of the site which is colonised by Buddleia *Buddleia davidii* and Gorse *Ulex europaeus* Scrub. The shore can be accessed from local roads leading to the beach area, see Photo 1.

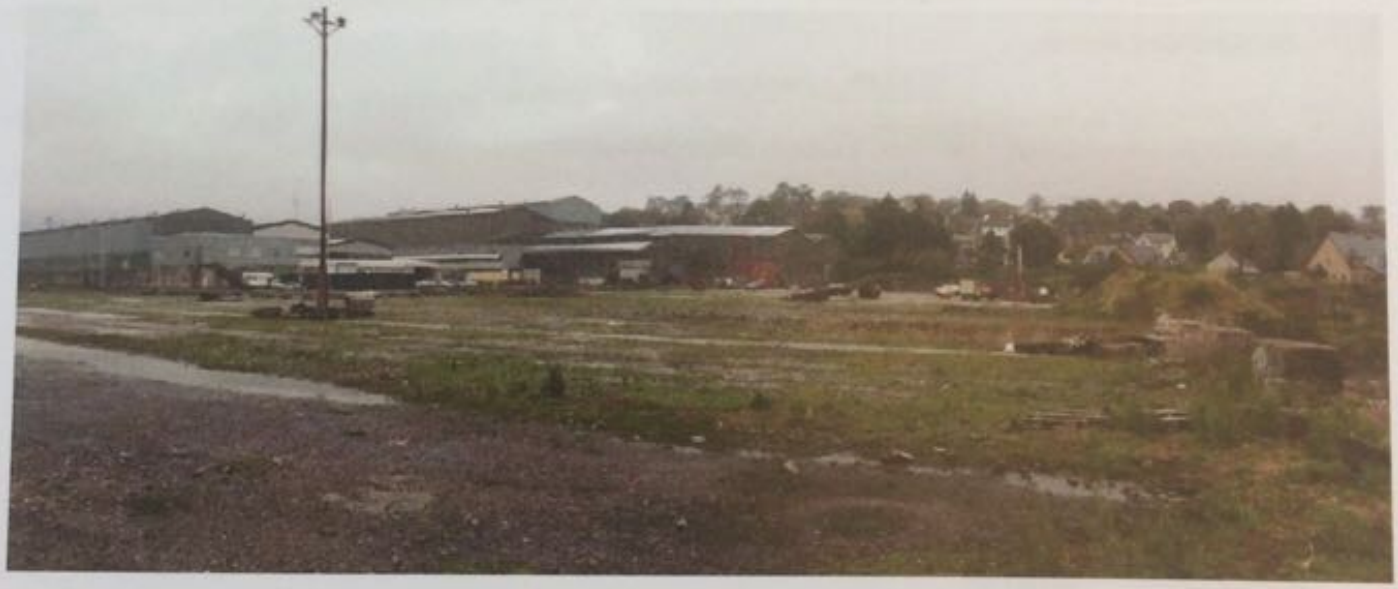


Photo 1. Showing the artificial habitat at Cork Dockyard.

Amenity grassland (GA2)

The reception site for the HDD process will be located in the amenity area on Glen Road, Monkstown. The proposed access to the working area will be via a temporary access bridge across the stream which runs along the north boundary of the site. The reception site is located in an area of amenity grassland between the playground and hard basketball court, see Photo 2. The presence of Japanese Knotweed has

been recorded outside the amenity area on the verge of the main road has been identified to the consulting engineers and will be avoided by construction traffic.

All works will be contained in the reception site and construction management will be employed to prevent runoff to the adjacent stream.

Photo 2. Showing the non-zoned amenity area and reception site at Glen Road, Monkstown.

Sea walls, piers and jetties (CC1)

This habitat refers to the periphery of the dockyard structure from which the estuary crossing pipeline will be constructed.

Estuaries (MW4) and Sea inlets and Bays (MW2)

Cork Harbour and the River Lee channel at Passage West/Monkstown is a continuum between the above habitats. The Owenboy and Monkstown Creeks are estuaries. These habitats are located nearby the existing Church Road and the proposed Raffeen pumping stations. The salinity of these areas is variable due to riverine inputs and tidal currents. This habitat type corresponds loosely with the ED Annex I Habitats 'Estuaries' (1130) and 'Large shallow inlets and bays' (1160) and is of international importance.

3.2.1. Birds

The most important bird species are those overwintering species for which the Cork Harbour SPA is designated. These species are listed in Table 2, Section 2.2 of this NIS. A review of the Cork Harbour site synopsis includes the following information:

> *The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Shelduck, Wigeon, Teal, Pintail, Shoveler, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Blacktailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Black-headed Gull, Common Gull, Lesser Black-backed Gull and Common Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.*
>
> *Of particular note is that the site supports internationally important populations of Black-tailed Godwit and Redshank.*

Ornithological surveys undertaken for this project have shown that for three days of surveys over a tidal cycle (2 low to high and 1 high to low) in November (two days) and December (1 day) 2015. Based on the surveys undertaken in November and December 2015, numbers of waders and waterfowl occurring within the proposed area of works are low, compared to other areas within Cork Harbour. There are no regular high tide roost sites regularly counted as part of I-WeBS surveys within the proposed area of works, indicating that this area does not offer suitable high tide roost sites. The nearest areas that are covered by I-WeBS surveys, and therefore are likely to support larger numbers of waders and waterfowl are Monkstown Creek and the Ringaskiddy area, to the south of the works area.

The 2009 Cork LHMDP EIS referred to a Birdwatch Ireland submission regarding Peregrine falcons nesting at a quarry to the west of the works area in 2002 (Cork County Council 2008). Although this species is listed under Annex 1 of the EU Birds Directive, it is currently Green-listed (considered to be of lowest conservation priority) by Birdwatch Ireland in their summary of Birds of Conservation Concern in Ireland (Colhoun & Cummins 2013). These birds have quite large territories and may use parts of the works area or areas adjacent to the works area for foraging. However, no potential nest sites or important areas for this species would be affected by any aspect of the proposed estuary crossing.

Breeding Common Terns are a species of Special Conservation Interest (SCI) within the Cork Harbour Special Protection Area (SPA) (Site Code: 004030). Common Terns have a tendency to move breeding locations between seasons, however, in recent years they have nested on the Martello Tower at Marino Point and the Ringaskiddy Deepwater Port mooring dolphins within Cork Harbour. In 2012 the total population of Common Terns which nested within the wider Cork Harbour was between 85 and 95 pairs (RPS 2014).

The area of water off Black Point, Cobh, to the south-east of the proposed area of works has been highlighted as a favoured foraging area for breeding common terns in summer months, as is the entrance to Monkstown Creek (RPS 2014).

Full details of the winter bird surveys are provided in Appendix A.

3.3. Impacts of the Project

Disturbance Impacts

As outlined in the Appropriate Assessment Screenings impacts from disturbance to waders and waterfowl in winter and breeding species are not likely from this project (see Section 2.5). Based on the Ornithological surveys undertaken in November and December 2015, numbers of waders and waterfowl occurring within the proposed area of works are low, compared to other areas within Cork Harbour. There are no regular high tide roost sites regularly counted as part of I-WeBS surveys within the proposed area of works, indicating that this area does not offer suitable high tide roost sites. There is no evidence that the site is important for feeding waders at low tide. It has been concluded that there is no likelihood of significant levels of disturbance to roosting or feeding waders of the Cork Harbour SPA (*ex-situ* species) or other water-birds in the vicinity of the proposed operations.

The works locations are not located in areas where Common tern nest or roost (Ringaskiddy Mooring Dolphins) and there would be no impact on this species from noise or disturbance given the distance of removal from the proposed works area. Similarly, the potential future habitat improvement locations at Monkstown Creek or areas identified as potential foraging areas will not be affected by the proposed works. This statement is based on the "*Winter Bird Surveys and Impact Assessment*" undertaken for the Estuary Crossing which is provided in Appendix A.

Water Quality Impacts

A worst case scenario could possibly occur whereby the proposed works would result in a significant detrimental change in the water quality of the Cork Harbour either alone or in combination with other

projects or plans as a result of indirect pollution from such anthropogenic sources as inadvertent drill returns containing bentonite clay, drilling fluid disposal and oil and fuel spillages. The most significant risk in this instance would be from Bentonite clay accidental spillage/escape during the Horizontal Directional Drilling (HDD) procedure, which is toxic to fish and other species (e.g. birds) at high concentrations.

Water quality impacts have the potential to negatively impact on the waterbird populations and their wetland habitats. This is turn will impact the conservation status and integrity of the Cork Harbour SPA and the Great Island Channel SAC.

HDD provides a methodology that immediately mitigates environmental risk by removing the majority of environmental interfaces typically seen with open trenching works. While the methodology of HDD is designed to minimise environmental impacts, when compared with other construction methods, there remains a number of specific environmental concerns peculiar to the process which need to be evaluated and mitigated as part of the design and construction of any project. These include:

- **Oils and fuel spillages**

The risk of oil spillages comes primarily from ruptured hydraulic hoses associated with the drilling rig operation. Small quantities of oils and greases are also used as part of the drilling process, especially for lubricating drilling components. There is the potential for oil spillages from drilling rig operation to impact upon the water quality of the harbour if project specific mitigation measures are not implemented. This therefore has the potential to have a detrimental indirect impacts on the qualifying species and habitats of the Cork Harbour SPA and the qualifying habitats of the Great Island Channel SAC. Project specific mitigation is required for this project to ensure this risk is negated/minimised.

- **Inadvertent drilling fluid returns**

Inadvertent drilling fluid returns are defined as those returns which occur somewhere other than launch and reception sites at either end of the drilled bore. Typically, drilling fluids are only released at the launch and reception sites of a HDD installation although inadvertent returns can potentially occur as a result of poor conditions within the drilled bore. This may be as a result of:

a. Poor drilling methods,

b. Poor drilling mud formulation,

c. Issues with the stability of the bore in heavy granular soils or significantly fractured strata,

d. Insufficient bore depth (insufficient overburden).

These can all lead to normal returns to either end of the bore path being restricted or lost entirely and hence an increase in pressure of the drilling fluid in the bore. If normal returns are not regained it may result in drilling mud being released outside the bore, such as to the surface or the ground, nearby underground infrastructure spaces, the bed of water courses, or marine environments.

Inadvertent returns are a concern because bentonite based drilling fluids are used in significant quantities during the HDD process and these can have a negative impact on the environment, especially the aquatic and marine environment. Depending upon the particulate dispersion level of the drilling fluid constituents (turbidity), especially bentonite clay, a reduction in the oxygen levels within the water can occur. If the particulate density is high it may lead to the suffocation of aquatic and marine life, especially in slow moving aquatic environments where the particulates have time to settle before full dispersion. To a much lesser extent the risk from inadvertent drilling mud returns may apply to invertebrate life and other fauna and flora at the surface where they occur on land in areas of vegetated ground cover. Based on this, there is the potential for Inadvertent drilling fluid returns to impact upon the water quality of the harbour if project specific mitigation measures are not implemented. This has the potential to have a detrimental indirect impacts on the qualifying species and habitats of the Cork Harbour SPA and the qualifying habitats of the Great Island Channel SAC. Project specific mitigation is required for this project to ensure this risk is negated/minimised.

- **Drilling fluid disposal**

Bentonite based drilling fluid is mixed with water on site to gain full hydration. It is then stored in a tank or tanks (typically shipping container size) ready for use during drilling. Drilling mud containing cuttings retrieved from the bore are collected at the launch and reception sites and pumped or transferred to a mechanical mud separation plant, normally located close to the drilling rig or adjacent to the reception site (or both). Drilling mud remains in a closed circuit, either being stored within the holding tank, in use within the bore/drill pipe or being processed by the separation plant. Losses of drilling fluid from the surface set-up are negligible and do not normally have any environmental concerns provided normal site containment measures and protections are in place. However, should bentonite based drilling fluid be released to the environment a negative impact, especially on the aquatic and marine environment has the potential to occur. This has the potential therefore to have a detrimental indirect impacts on the qualifying species and habitats of the Cork Harbour SPA and the qualifying habitats of the Great Island Channel SAC. Project specific mitigation is required for this project to ensure this risk is negated/minimised.

3.4. In-Combination Effects

Cumulative impacts or effects are changes in the environment that result from numerous human-induced, small-scale alterations. Cumulative impacts can be thought of as occurring through two main pathways; first, through persistent additions or losses of the same materials or resource and second, through the compounding effects as a result of the coming together of two or more effects in combination.

As part of this assessment, in addition to the proposed works, other relevant projects and plans in the region must also be considered at this stage. This step aims to identify at this early stage any possible significant in-combination or cumulative effects/impacts of the proposed development with other such plans and projects on Natura 2000 sites.

As stated in the AA Screening Section of this Report the plans and projects listed in Section 2.5 are not considered likely to act in combination with the proposed Cork Lower Harbour Main Drainage Project Estuary Crossing to give rise to negative effects that have the potential to affect the conservation objectives of the European Sites considered here, including their structure and function.

3.5. Mitigation Measures

It was a condition of granting planning permission that all mitigation measures as set out in the 2008 EIS for the Cork LHMD Project are implemented in full. Hence, the environmental measures as outlined in the EIS now form part of the overall Cork LHMD Project.

Below we outline the general mitigation relating to this Project, followed by project specific mitigation required to minimise/negate the potential impacts identified in Section 3.3 of this report. Cognisance of the IFI (2016) *Guidelines for the Protection of Fisheries During Construction Works in and Adjacent to Waters*, specifically the measures relating to trenchless crossing measures (*i.e.* Section 11.3), was taken in developing the general protection measures below.

General mitigation measures:

- The importance of the protection of the water quality in Cork Harbour and associated habitats as outlined in Sections 2.2 and 2.3 of this report will be included and highlighted in the Construction Environmental Management Plan (CEMP) which will be developed by the appointed Contractor in consultation with an appropriately qualified ecologist.

- A suitably qualified Ecologist will be employed on site by the appointed Contractor to supervise construction works associated with the Estuary Crossing and ensure all mitigation measures and standard design measures are implemented in full.
- All method statements prepared by the Contractor associated with the works will be submitted to the NPWS and IFI prior to the commencement of any works.
- Environmental checklists will be prepared for each stage of Estuary works. Responsibility for completion of these checklists will be assigned to individual members of the Contractor's staff.
- All environmental monitoring and checklists will be recorded and added to the CEMP on a daily basis.
- The location for drill rig positioning and pipeline pull areas will be chosen or engineered such that the fall is away from the waters in question, thereby facilitating installation of pollution containment and control facilities.
- Where drilling fluids are being returned for cleaning and re-use or recirculation through a temporary fluid return line, pneumatic leak testing shall be carried out to confirm the integrity of the return line.
- Spent drilling fluids including separated drill materials shall be contained in secure bunded areas for off-site disposal at a licensed disposal facility.
- All mitigation/control measures will be inspected daily by designated Contractor staff and maintenance and repairs carried out immediately.
- Emergency response plans will be prepared and implemented should contamination of the marine environment occur.
- Prior to construction, a schedule and method of construction works will be submitted to other relevant stakeholders, particularly the Port Authority and Cross River Ferries Ltd.
- Fuels, lubricants and hydraulic fluids for equipment used on the construction sites will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best practice.
- Fuelling and lubrication of equipment will not be carried out within 10 m of water courses.
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the site and disposed of at a suitable licenced facility.
- No discharges will be permitted to the watercourse at Glen Road in Monkstown or to Cork Harbour.
- A silt curtain will be erected along the length of the stream from the reception site to the playground to prevent surface water runoff to the stream.

Oils and fuel spillages:

- All equipment shall be in good working order and will provide equipment and materials for any clean-up required.
- Static placed equipment will have drip trays below engines, fuelling points and tanks and the main hydraulic pumps associated with the drilling rig and other major components.
- Fuel spillage will be mitigated by ensuring all fuel oils are delivered to site and dispensed with appropriate equipment and processes. Spill kits and hydrocarbon mats will be maintained at works areas for emergency use.
- Small quantities of oils and greases are also used as part of the drilling process, especially for lubricating drilling components. Good site housekeeping is required to mitigate unnecessary wastage of these materials to the environment.
- Operations will be undertaken in cognisance of the existing Port of Cork Oil Spill Contingency Plan.

Drilling fluid management and disposal:

- The method of drilling mud disposal will be in accordance with all local and national environmental requirements. Mud disposal management may in part be achieved on site using a mixture or flocculating chemicals, fine filtering and centrifuges. This will involve setting up treatment ponds adjacent to the launch and reception sites.
- Alternatively, the material may be taken off site by a tanker for processing at an approved liquid waste facility elsewhere.
- Once treatment of the drilling mud has been completed the mud will be disposed of at a licensed waste facility.

Inadvertent drilling fluid returns – Design Measures:

- Typically, HDD construction is performed from a launch site at surface level and the drill head gradually lowers to achieve the required depth. There is typically a greater risk of inadvertent returns at shallower depths due to insufficient overburden and bore instability.
- The design for this pipeline has mitigated against the above risk as construction will commence from a launch site in Cork Dockyard and will be over 20m deep upon reaching the estuary which will ensure that there is sufficient overburden from the outset of the drill. The depth of the proposed pipeline increases across the estuary, thus ensuring that there is sufficient overburden throughout the estuary crossing.
- The vertical alignment of the pipeline across the estuary has been chosen such that it is deep within the bedrock. This will ensure that the drill bore is routed through competent bedrock and

this should avoid issues with the stability of the bore. Existing borehole records have informed the routing of the pipeline.

- As the level of the pipe gradually rises on the reception side of the crossing, there will be a slightly increased risk of inadvertent returns. This stage of the crossing will therefore be monitored with particular vigilance as per the construction mitigation measures below.
- Contractors have been subjected to a thorough PQQ process in order to ensure that they have the necessary experience and expertise to carry out works of this nature and complexity.

Construction Mitigation Measures to Prevent the Occurrence of Inadvertent Returns

The following measures will be put in place to mitigate against the occurrence of inadvertent returns during the construction of the estuary crossing pipeline:

- Bentonite use will be monitored constantly by the Contractor from the tunnelling control area at so that any sudden drop in pumping pressure which could signify a bentonite breakout will result in an immediate cessation of bentonite pumping.
- Furthermore, the pressure of bentonite pumping will be constantly monitored and lowered if necessary to mitigate against a bentonite breakout.
- Appropriate drilling mud formulation and management for the conditions and appropriate drilling practices will be adhered to by the Contractor at all times.
- A loss in the volume of drilling mud returns at the launch site would also be an indication of drilling mud escaping the drill bore. The mud system operator will constantly monitor both the actual drilling fluid volume and the volume of mud returns.
- Where the driller reports poor or lost circulation of the drilling fluid there will be an increased possibility of inadvertent returns until full circulation is regained. Observation and monitoring of the environment will be especially vigilant during any such periods.
- Such issues can often be resolved by adjustment of the drilling mud formulation and by lowering the drilling pressure.
- Where this is not possible, special measures to halt leakage from the drill will involve sealing the leakage path or paths with a special lost circulation material.
- In extreme cases the drill path might need to be modified, the section of bore hole sealed up (grouted) and re-drilled, or the section cased.
- The section of the bore between the reception site and interception manhole will be cased in advance of the works to avoid the risk of inadvertent returns through this shallower section of pipeline as it begins to rise toward the surface.

- For releases at shallow elevations, the HDD contractor will install silt barriers. Removal by vacuum truck may be attempted if deemed appropriate. The location of the discharge will be sealed off and the drilling operation.
- Where the drilling designer considers the risk of inadvertent returns at the beginning or end of the bore to be unavoidably likely the risk to the environment this shallow section of the bore will be cased.
- The environment will be continuously monitored by the drilling Contractor and containment measures will be ready should a release occur.

Contingency Plan

Should an accidental spillage occur the EPA, IFI and the NPWS will be contacted immediately. Appropriate containment and clean-up plans will be implemented accordingly. The design and construction mitigation measures outlined above should ensure that inadvertent returns do not occur on the launch side of the estuary or across the estuary itself. There is however a slightly increased risk of inadvertent returns near the proposed reception site as the level of the pipeline is raised towards the surface. The following contingency measures will be implemented in the event of an inadvertent release of drilling fluid:

- Circulation pressure will be reduced immediately and the drill will be assessed as to whether the fracture can be sealed. This can often be achieved by thickening the drilling fluid and sealing the location of the fluid discharge.
- In the event that the fracture cannot be sealed, a berm will be constructed around the release area to contain the release.
- If the amount of inadvertent returns is too large to contain fully by this method, sumps will be excavated within the contained area in order to pump the fluid away for processing as it accumulates.
- Where there is risk of the fluids released discharging to adjacent water bodies, silt fences will be installed as a preventative measure.
- Once the fluid release has been contained and removed, the release area will be returned to its original condition.

The contractor will be contractually required to implement all the measures detailed above in full. This will ensure that significant effects on the protected habitats and species of the Cork Harbour SPA and the Great Island Channel SAC will not occur or will be significantly minimised.

3.6. Residual Impacts

Residual impacts are those that occur after mitigation measures have taken effect. If the general and project specific measures that are listed above are employed during the proposed works, then there will be no residual impacts on the habitats or species in Cork Harbour.

There will be no significant impact on the Cork Harbour SPA and the Great Island Channel SAC and a Natura Impact Statement can be completed on this basis.

4. Natura Impact Statement & Conclusion

This NIS has reviewed the impacts arising from the proposed Project and found, following a Stage 1 Screening Assessment, that without the implementation of mitigation measures, significant effects could impact upon the integrity of the Cork Harbour SPA and Great Island Channel SAC.

These impacts have been outlined in detail in Stage 2 of this NIS along with proposed avoidance mitigation.

Given the determination of no residual impacts after the predicted impacts have been mitigated, it is considered that the implementation of the proposed project will not result in significant effects to the conservation objectives or integrity of the Cork Harbour SPA and Great Island Channel SAC, either individually or in combination with other plans or projects.