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Project	**Natura Impact Statement (NIS) Whitegate-Aghada Sewerage Scheme (UTAS Cork Bundle)**		
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1 Introduction

DixonBrosnan Environmental Consultants have prepared a Natura Impact Statement (NIS) on behalf of Irish Water for the proposed Whitegate-Aghada Sewerage Scheme, County Cork. This report is included in the planning application for the proposed scheme (proposed UTAS development). As part of the proposed scheme, Irish Water proposes to provide new wastewater treatment infrastructure for Whitegate and Aghada and to remove a number of untreated wastewater discharges. The proposed development consists of a new wastewater treatment plant with a marine outfall, three proposed new wastewater pumping stations with interconnecting pipework and the upgrading of part of the existing sewer network.

This Natura Impact Statement (NIS) has been prepared in accordance with the provisions of Part XAB of the Planning and Development Act, 2000 (as amended) and in accordance with the requirements of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive), the Planning and Development Acts, 2000-2016 and the European Communities (Birds and Natural Habitats) Regulations, 2011-2015 (the Birds and Habitats Regulations).

It considers the implications of the proposed development on its own and in combination with other plans or projects, for Natura 2000 sites in view of the conservation objectives of those sites. It includes a scientific examination of evidence and data to identify and assess the implications of the proposed development for any European sites in view of the conservation objectives of those sites. It considers whether the proposed development, by itself and in combination with other plans or projects, would adversely affect the integrity of European sites. In reaching a conclusion in this regard, consideration is given to any mitigation measures necessary to avoid or reduce any potential negative impacts.

The purpose of this NIS is to provide an examination, analysis and evaluation of the potential construction and operational impact of the proposed UTAS development on European sites and to present findings and conclusions with respect to the proposed development in light of the best scientific knowledge in the field. This NIS will inform and assist the competent authority, Cork County Council, in carrying out its Appropriate Assessment as to whether or not the proposed UTAS development will adversely affect the integrity of European sites, either alone or in combination with other plans and projects, taking into account their conservation objectives.

The information in this NIS forms part of and should be read in conjunction with the planning application documentation being submitted to Cork County Council in connection with the proposed development. It is noted that this report will be also be utilised in support of a Wastewater Discharge Licence Application under the European Union (Waste Water Discharge) Regulations 2007 to 2020.

2 Regulatory Context and the Appropriate Assessment Procedure

2.1 Regulatory context

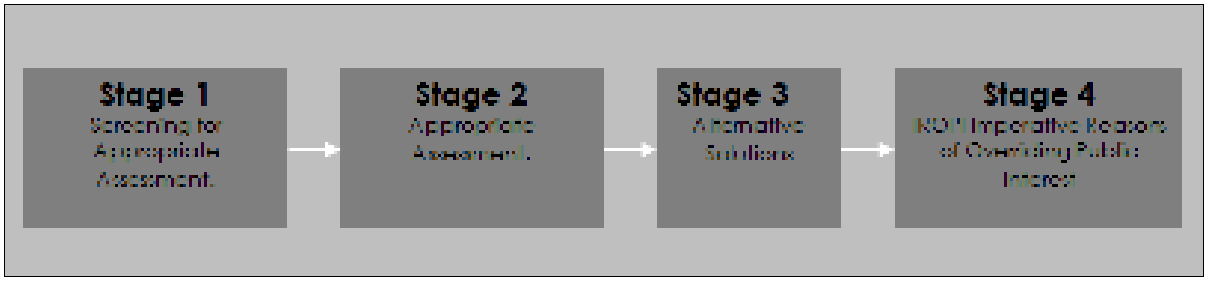
Article 6(3) of *Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora* (as amended) (hereafter 'the Habitats Directive') requires that, any plan or project not directly connected with or necessary to the management of a designated site, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.

The possibility of there being a significant effect on a designated or "European" site has generated the need for an appropriate assessment to be carried out by the competent authority for the purposes of Article 6(3). A Stage Two Appropriate Assessment is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site. The first (Screening) Stage for appropriate assessment operates merely to determine whether a (Stage Two) Appropriate Assessment must be undertaken on the implications of the plan or project for the conservation objectives of relevant European sites.

DixonBrosnan Environmental Consultants prepared a report for AA Screening on the proposed development on behalf of Irish Water in 2020 (Refer to **Appendix A**). The conclusions of that report were that significant effects on Cork Harbour SPA (04030) could not be ruled out and that a Stage Two AA was required.

2.2 Appropriate Assessment Procedure

The assessment requirements of Article 6(3) and 6(4) establish a stage-by-stage approach. This assessment follows the stages outlined in the 2001 European Commission publications "*Assessment of plans and projects significantly affecting Natura 2000 sites: methodological guidance on the provisions of Articles 6(3) and 6(4) of the Habitats Directive 92/43/EEC*" (2001) and "*Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (Draft) Office for Official Publications of the European Communities, Luxembourg (EC, 2015)*";



The stages are as follows:

<u>Stage One</u>: Screening — the process which identifies any appreciable impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant, in the absence of mitigation;

Stage Two: Appropriate assessment — the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts;

Stage Three: Assessment of alternative solutions: The process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site.

Stage Four: Assessment where no alternative solutions exist and where adverse impacts remain — an assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed (it is important to note that this guidance does not deal with the assessment of imperative reasons of overriding public interest).

Documentation/guidelines of relevance to this NIS include the following:

- European Commission, 2001. *Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC.* Office for Official Publications of the European Communities, Brussels (EC, 2001);
- European Commission, 2000a. *Communication from the Commission on the Precautionary Principle.*, Office for Official Publications of the European Communities, Luxembourg (EC, 2000a);
- *Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (Draft)* Office for Official Publications of the European Communities, Luxembourg (EC, 2018);
- *Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2000)*
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission; (EC, 2007);
- *Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities*. Department of the Environment, Heritage and Local Government, Dublin (DEHLG, 2010a);
- Department of Environment Heritage and Local Government Circular NPW 1/10 and PSSP 2/10 on Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities (DEHLG, 2010b);
- *Interpretation Manual of European Union Habitats. Version EUR 28*. European Commission (EC, 2013).

3 Methodology

3.1 Study Area and Scope of Appraisal

European sites are only at risk from significant effects where a source-pathway-receptor link exists between a proposed development and a Natura 2000 site(s). This can take the form of a direct impact (e.g. where the proposed development and/or associated construction works are located within the boundary of the Natura 2000 site(s) or an indirect impact where impacts outside of the Natura 2000 site(s) affect ecological receptors within (e.g. impacts to water quality which can affect riparian habitats at a distance from the impact source).

Considering the Natura 2000 sites present in the region, their Qualifying Interests (QIs) and conservation objectives, and any potential impact pathways that could link those sites to the proposed development area, all Natura 2000 sites potentially within the Zone of Influence (ZoI) of the proposed development were assessed.

Thus, any appreciable direct, indirect or cumulative impacts which could arise from the proposed development in relation to the designated sites within this zone were considered. A report for AA Screening conducted by DixonBrosnan Environmental Consultants (**Appendix A**) in 2020 concluded that:

"After an initial review of all Natura 2000 sites within 15 km of the proposed development site, it was considered that "no pathway" exists by which the proposed development could impact upon on the following Natura 2000 site:

- *Ballycotton Bay SPA (Site Code 004022)*

*The following Natura 2000 site has been screened out as no potential for impacts exist as outlined in **Table 5**.*

- *Great Island SAC (Site Code 001058)*

There is no potential for the proposed development to impact on these Natura 2000 sites and therefore they can be screened out for Stage 2 Appropriate Assessment.

*However, a number of SCI's for the Cork Harbour SPA have been screened in for further assessment as significant effects cannot be ruled in the absence of mitigation (refer to **Table 4** for more details). This Natura 2000 site and its relevant QIs are listed below:*

- *Cork Harbour SPA (Site Code 004030): Little Grebe (Tachybaptus ruficollis) [A004], Great Crested Grebe (Podiceps cristatus) [A005], Cormorant (Phalacrocorax carbo) [A017], Grey Heron (Ardea cinerea) [A028], Shelduck (Tadorna tadorna) [A048], Wigeon (Anas penelope) [A050], Teal (Anas crecca) [A052], Pintail (Anas acuta) [A054], Shoveler (Anas clypeata) [A056], Red-breasted Merganser (Mergus serrator) [A069], Oystercatcher (Haematopus ostralegus) [A130], Golden Plover (Pluvialis apricaria) [A140], , rey Plover (Pluvialis squatarola) [A141], Lapwing (Vanellus vanellus) [A142], Dunlin (Calidris alpina) [A149], Black-tailed Godwit (Limosa limosa) [A156], Bar-tailed Godwit (Limosa lapponica) [A157], Curlew (Numenius arquata) [A160], Redshank (Tringa totanus) [A162], Black-headed Gull (Chroicocephalus ridibundus) [A179], Common Gull (Larus canus) [A182], Lesser Black-backed Gull*

(Larus fuscus) [A183], Common Tern (Sterna hirundo) [A193] and Wetland and Waterbirds [A999]

Therefore, in line with a precautionary approach, a Stage 2 Appropriate Assessment of the proposed development is considered necessary in respect of these SCI's for the Cork Harbour SPA."

These conclusions are supported by the water quality impact assessment, which was carried out by Arup Consulting Engineers (see *Irish Water Cork UTAS Whitegate Aghada Far Field Modelling* (Arup 2020)). This report, which describes the water quality model for Cork Harbour, determined the following:

It can be seen that the mixing zone is limited to the immediate vicinity of the outfall and that the Whitebay shoreline maintains excellent water quality.

and

The results of our model results show that the 95%ile concentrations of both E. Coli and Intestinal Enterococci are significantly reduced in the outer area of Cork Harbour with the proposed scheme in place. The results also show that the 50%ile concentrations of Dissolved Inorganic Nitrogen, Molybdate Reactive Phosphorus, Total Ammonia and Unionised Ammonia are reduced in the outer harbour area.

The results also indicate that the 95%ile concentrations of both E. Coli and Intestinal Enterococci, as well as the 50%ile concentrations of the other modelled nutrients, are increased in the vicinity of the proposed outfall location. The increases however do not lead to the Environmental Quality Standards at any of the designated Environmental Protection Agency Surface Water Regulation monitoring points to be exceeded outside the immediate mixing zone.

The proposed scheme does not cause any of the Environmental Quality Standard thresholds in Cork Harbour to be exceeded and the discharges from the proposed Wastewater Treatment Plant for Whitegate are in full compliance with the relevant European Union water regulations.

Therefore, with the exception of Cork Harbour SPA, there are no potential pathways for impacts on any other Natura 2000 sites as a result of the proposed outfall. Full details of this report are included in **Appendix F**.

3.2 Desktop Study

A desktop review facilitates the identification of the baseline ecological conditions and key ecological issues relating to Natura 2000 sites and facilitates an evaluation assessment of potential in-combination impacts. Sources of information used for this NIS include reports prepared for the Aghada/Whitegate area as well as information from statutory and non-statutory bodies. The sources of information and relevant documentation utilised are as follows:

- National Parks & Wildlife Service (NPWS) - www.npws.ie including qualifying interests and conservation objectives for Natura 2000 sites.

- Cork Harbour Special Protection Area (Site Code 4030) Conservation Objectives Supporting Document version 1 (National Parks & Wildlife Service November 2014)
- Environmental Protection Agency (EPA) – www.epa.ie
- National Biodiversity Data Centre – www.biodiversityireland.ie
- Information on the status of EU protected habitats in Ireland (National Parks & Wildlife Service, 2013a & 2013b)
- BirdWatch Ireland - http://www.birdwatchireland.ie/
- Report for Screening for Appropriate Assessment on behalf of Arup Untreated Agglomerations Study (UTAS) Cork Bundle, Whitegate-Aghada (DixonBrosnan 2020) (**Appendix A**)

3.3 Author of NIS

This NIS was prepared by Carl Dixon MSc. (Ecological Monitoring) and Ian McDermott MSc. (Ecological Monitoring). Both have considerable experience in ecological assessment and the preparation of Natura Impact Statements for a range of large and small-scale developments.

4 Description of the project

4.1 Overview

The villages of Whitegate and Aghada, Co. Cork, have been identified by the EPA as a Priority Area where untreated wastewater is being discharged into the environment. In addition, the villages are identified as part of Irish Water's Untreated Agglomeration Study (UTAS) schemes. As part of the Whitegate -Aghada Sewerage Scheme - UTAS Cork Bundle, Irish Water proposes to provide new wastewater treatment infrastructure for the two villages and to remove a number of untreated wastewater discharges. The proposed development consists of a new wastewater treatment plant with a marine outfall, three proposed new wastewater pumping stations with interconnecting pipework and the upgrading of part of the existing sewer network.

With regard to this NIS, the study location has been defined by the existing and potential future wastewater collection network of the Whitegate-Aghada agglomeration. The Whitegate-Aghada agglomeration consists of four settlements: Whitegate, Upper Aghada, Lower Aghada and Rostellan. Whitegate, Lower Aghada and Rostellan are all located along the east coast of Cork Harbour and are accessed by the R630. Upper Aghada is located on elevated ground to the northeast of Whitegate and south of Lower Aghada. The town nearest to the study area is Midleton, approximately 14 km northeast from the village of Whitegate.

The National Secondary Route R630 runs from Whitegate through Aghada and Rostellan to Midleton. The villages function as service centres for the surrounding hinterland, and there are numerous commercial, institutional and community facilities present. The area is quite heavily industrialised with the Conoco Philips Oil Refinery and the Bord Gais Eireann Power Plant located in Whitegate, and an ESB electricity generating station located in Lower Aghada.

Upper Aghada is located on elevated ground to the northeast of Whitegate and south of Lower Aghada.

There are currently no wastewater treatment facilities in place to serve this agglomeration. Currently these settlements are served by three independent collection systems that discharge untreated sewage to Cork Harbour. There are currently four coastal discharge outfalls (SW001, SW002, SW003 and SW005) and one groundwater discharge (GW004) (Ardnabourkey) within the Whitegate-Aghada agglomeration (Refer to **Figure 1** below).

In order to ensure compliance with the Urban Wastewater Treatment Directive (91/271/EEC), the provision of a number of new wastewater treatment services has been proposed by Irish Water. These services will also be required to provide for sufficient wastewater treatment capacity to cater for the expected future population growth in Whitegate and Aghada. The *East Cork Municipal District Local Area Plan (LAP) 2017* (Cork County Council 2017) identifies Whitegate and Aghada as key villages within the municipality as well as being a Specialist Employment Centre. The LAP document states that *"the existing sewerage scheme is a combined sewerage scheme that currently discharges to the lower harbour at a number of locations though primarily at Long Point"* and that *"provision of a new foul sewer system and a new waste water treatment plant is required prior to any further development taking place in Whitegate and Aghada."*

The Whitegate-Aghada agglomeration is subject to marginal seasonal population fluctuations, with a relatively small number of the properties utilised as summer dwellings. The agglomeration is part of the electoral division of Midleton and is located in the Cork County Council functional area.

Figure 1: Existing Discharge outfalls

4.2 Existing Situation

Rostellan

Rostellan is the smallest settlement within the agglomeration. The existing collection sewer accommodates the majority of the settlement and discharges untreated wastewater to Cork Harbour at a secondary discharge location SW002- Rostellan. The Radharc na Mara housing estate in Rostellan is served by a private package plant that discharges effluent into the public sewer. The treatment site consists of treatment chambers (below ground) and two control kiosks. The plant is privately maintained. Treated effluent is discharged into the Rostellan public sewer at the junction of Radharc na Mara and the R630.

Lower Aghada

Lower Aghada is a small village located on the R630 between Rostellan and Whitegate. The existing collection sewer in the village only accommodates a small number of residential properties. The flows from this collection sewer are treated by a package treatment plant before being discharged to Cork Harbour at secondary discharge location SW003- Lower Aghada. There is an inlet pumping station and a final effluent pumping station which serve the Lower Aghada private package treatment plant.

Lower Aghada Private Package Plant is a TITAN package plant and is located on a site adjacent to the Lower Aghada Harbour. The package plant is located underground and secured with lockable covers. The package treatment plant site includes a stone control building. The package plant serves a small portion of the Lower Aghada village (approximately 30%). The remainder of the village is believed to be served by septic tanks. Effluent from the package plant is pumped into Cork Harbour via a short outfall.

Whitegate

The village of Whitegate is the largest settlement in the agglomeration. Whitegate is served by a gravity collection network that terminates at a Cork County Council terminal waste water pumping station (WwPS) on the shore of Whitegate Bay. There is a smaller Cork County Council WwPS that serves a number of houses along Whitegate Bay shore. This pumping station (PS) forwards flow into the gravity network.

Untreated sewage is pumped from the terminal WwPS to the primary discharge location SW001 - Whitegate, located in Cork Harbour.

There is one public septic tank in Whitegate. This tank serves the Ardnabourkey Housing Estate. Effluent from this septic tank is discharged into a percolation area at the secondary discharge location GW004 – Ardnabourkey.

Upper Aghada

Upper Aghada is a small village located on elevated land south of Lower Aghada. The sewage network which serves Upper Aghada is connected to the Whitegate sewerage network. All sewage generated from Upper Aghada is conveyed, by gravity, to the Whitegate network.

There is one Cork County Council network pumping station (Cork County Council No. 1) and one Cork County Council terminal pumping station (Cork County Council No. 2) within the sub agglomeration. Both are located along the Whitegate Bay shoreline and both have emergency

overflows which discharge into the Bay. There are no package treatment plants in the sub-agglomeration grouping.

Effluent Outfall

There are currently four coastal discharge outfalls (SW001 – 3, and SW005) and one groundwater discharge (GW004) within the Whitegate-Aghada agglomeration.

Rostellan SW002 outfall is noted as a 'Secondary' discharge location on the Wastewater Discharge Licence. The outfall is located approximately 15m offshore from a green area and is adjacent to the bridge in the village.

Lower Aghada SW003 outfall is noted as a 'Secondary' discharge location on the Wastewater Discharge Licence. The outfall is located approximately 88m from the shoreline to the rear of the Lower Aghada Package Plant and is adjacent to Lower Aghada Pier. Effluent is discharged via a final effluent pumping station.

Whitegate SW001 outfall is noted as the 'Primary' discharge location on the Wastewater Discharge Licence and is the discharge point for the Cork County Council No 2 WwPS. The rising main from the pumping station is located along the R630 and then along the access road to the Aghada Power Plant. The discharge location is approximately 80m from the shore at the end of the embankment.

Ardnabourkey GW004 is noted as a 'Secondary' discharge location on the Wastewater Discharge Licence. Effluent discharge is into a percolation area in an agricultural field opposite the Ardnabourkey housing estate. The effluent monitoring location is not identified in the WwDL. No problems with the percolation area have been identified.

CSO (SW005) spills into the adjacent culvert that discharges to the foreshore of Whitegate Bay.

4.3 Proposed Development

The location of the proposed development is indicated in Drawing Nos. IW-10015229-00-02-000 to IW-10015229-00-02-004 in **Appendix E.**

The proposed development comprises the construction and operation of a number of new wastewater treatment services in the Whitegate-Aghada agglomeration. As part of the proposed works a three-stage approach was developed in order to identify the preferred treatment and outfall option(s) which include the following main elements:

Rostellan	• Underground wastewater pump station at Thomas Kent Memorial Park, including am underground stormwater storage tank (approx. volume 53m^3). • 1,417m long, 110mm diameter rising main to convey Rostellan Formula 'A' flows to the Lower Aghada network.
Lower Aghada	• Underground wastewater pump station in Lower Aghada, located west of the pier, including an underground stormwater storage tank (approx. 141m^3).

	• 656m long, 160mm diameter rising main to convey Lower Aghada and Rostellan Formula 'A' flows to the Upper Aghada Network
Whitegate	• Underground wastewater pump station at the Square in Whitegate village, including an underground stormwater storage tank (approx. 240m^3) • 1,765m, 315mm diameter long rising main to convey Rostellan, Lower Aghada, Upper Aghada and Whitegate Formula 'A' flows to the WwTP Site.
WWTP	• New wastewater treatment plant which will provide primary treatment
Outfall	• 880m terrestrial gravity sewer sized to convey Formula 'A' to the outfall launch point. • 295m gravity sea outfall sewer (from high water mark) to convey treated effluent to the proposed discharge point in White Bay.

4.3.1 Construction – General

It is expected that construction will commence in Q2 2021, subject to planning approval. The total duration of all construction works is expected to be 16 months. However, some elements of the works, such as the construction of the individual pumping stations and the laying of the rising mains, will be completed in a considerably shorter duration than others, such as the construction of the WWTP. Construction locations are illustrated in **Drawing Nos. IW-10015229-00-02-000 to IW-10015229-00-02-004 in Appendix E**. The main elements to be constructed as part of the proposed development include three separate pumping stations, rising mains connections, gravity mains connections, gravity sewer connections, the WWTP and the effluent outfall pipeline. An overview of the construction works required for these elements is presented below.

Pumping Stations

Three separate pumping stations will be constructed as part of the proposed development. These will be located at Rostellan, Lower Aghada and Whitegate. Each pumping station will be located entirely below ground except for their control kiosks, 7.6m high vent stack, paved areas and perimeter fencing to be erected above ground (Lower Aghada).

The pumping stations will consist of a shaft which will be installed as a concrete caisson, while the control kiosks above ground will be constructed from Glass Reinforced Plastic (GRP). Typical open cut excavation methodology will be used. All excavated material generated from the development of the pumping stations will be removed from site.

Dewatering and over pumping are likely to be required at the pumping station works areas close to Cork Harbour such as the Rostellan Pumping Station. However, the level of dewatering and over pumping required will be minimal and will therefore have a limited impact on the groundwater resource and on receiving waters (Refer also to the mitigation measures proposed in **Section 9** below). No groundwater wells or springs are located within the proposed development area or in its immediate vicinity.

During construction of the proposed Rostellan Pumping Station located in the Thomas Kent Memorial Park, it is proposed that the existing sculpture, commemorative plaque, flag pole, outdoor tables and seats, information sign at the entrance and the bollard and chain fencing be removed and stored safely off-site. They will be placed back in their approximate current position on the completion of construction works. Topsoil will be reinstated, and grass planted, to ensure that the finished Memorial Park would be similar to the existing Park.

It is possible that some root damage to the existing Sycamore tree located in the memorial park may arise during the construction works. It is intended to retain the tree if at all possible. An arboriculturist will assess the condition of the tree during and following the completion of site works. The arboriculturist may specify a crown reduction to minimise the risk of wind blow or in worst case scenario may specify removal. It is proposed that three Alder (*Alder glutinosa*) will be planted within the memorial park to ensure that tree cover is maintained.

The existing pumping station at Whitegate village will be decommissioned prior to the commencement of the construction works at this location.

Rising Mains and Gravity Mains Connections and Gravity Sewer Connections

Rising main connections of various lengths will be laid between each of the 3 no. pumping stations and the existing gravity network. Gravity main connections of various lengths will be required in some areas to convey flows. These connections will be laid below existing ground levels and, in most locations, within existing roads. Excavations will be open cut with excavated material generally used for backfill. Any surplus material generated will be removed from site, to a suitably licensed/permitted facility.

Gravity sewer connections of various lengths will be required to divert flows to the new pumping stations and to the effluent outfall launch point. Excavated material generated during the construction of these connections will be returned to the trenches.

WWTP

The elements involved in the construction of the proposed WWTP will include the following:

- Inlet works – required earthworks, formwork and concrete, incoming and outgoing pipework and associated chambers, inlet channel, inlet screen, screenings handling unit, bypass channel with screen and associated control, testing and commissioning equipment.
- Primary settlement and stormwater holding tank – required earthworks, formwork and concrete, incoming and outgoing pipework and associated chambers, pyramidal prefabricated primary settlement tanks, circular stormwater tank, desludging valves and pipework and associated control, testing and commissioning equipment
- Sea outfall – required earthworks, formwork and concrete, pipework and diffuser(s).
- Sludge handling – Picket Fence Thickener. Required earthworks, formwork and concrete, incoming and outgoing pipework, associated chambers and associated testing and commissioning equipment.
- Miscellaneous – land purchase (agricultural), site clearance, road to site, road within site, green paladin fencing, control kiosks, welfare facilities, manholes, watermain to site, watermain within site and water supply break tank.

Effluent Outfall Pipeline

The WWTP at Whitegate will include an outfall pipeline to White Bay which will discharge treated effluent from the proposed WWTP site. The outfall will consist of a terrestrial section and a marine section. The terrestrial section will be constructed along a public road, through agricultural fields and along White Bay beach. The marine section will extend approximately 295m beyond the high-water mark and approximately 190m beyond the low water mark into White Bay.

Following the construction of the outfall pipeline, its endpoint will be fitted with a diffuser, while the seabed around the pipeline will be protected with a woven Gabion mattress.

Overview

A permanent marine outfall is proposed to discharge the treated effluent from the proposed WwTP in Ballytigeen TD to White Bay. The proposed outfall will extend approximately 295m beyond the high-water mark and approx. 190m beyond the low water mark discharging in a water depth range of between 4.3m and 8m during a typical spring tide. The outfall has been designed as a 315mm diameter HDPE pipe terminating at an 80mm diameter diffuser port. A 40m wide pipe corridor (i.e. 20m either side of the outfall) is included in the consent application, to allow flexibility for construction activities required within this corridor.

It is envisaged that the terrestrial section of the outfall will be constructed via open cut excavation. The access road to White bay beach and the beach itself is currently used by the public. Whilst every effort will be made to maintain public access to the beach, it would be necessary to temporarily close the beach at White Bay to facilitate the safe construction of the outfall. It is envisaged that closure would be required for a full summer season

There are several methods by which the marine section of the sea outfall can be constructed, and the contractor's methodology will ultimately depend on their available plant and equipment as well as their previous experience with laying marine outfalls. The contractor is responsible for determining which method is most appropriate. The likely methods to construct the sea outfall are presented in the following sections, based on current practice and site constraints/characteristics. These are:

- Horizontal directional drilling method;
- Flood and float method; and
- Bottom-pull method.

Construction of the outfall will include works from both the land and sea. It is expected that several vessels may be required during the construction of the outfall and that diving support is likely to be required at times. The outfall area is calculated to be 1.16 Hectares. Refer to **Figure 2**.

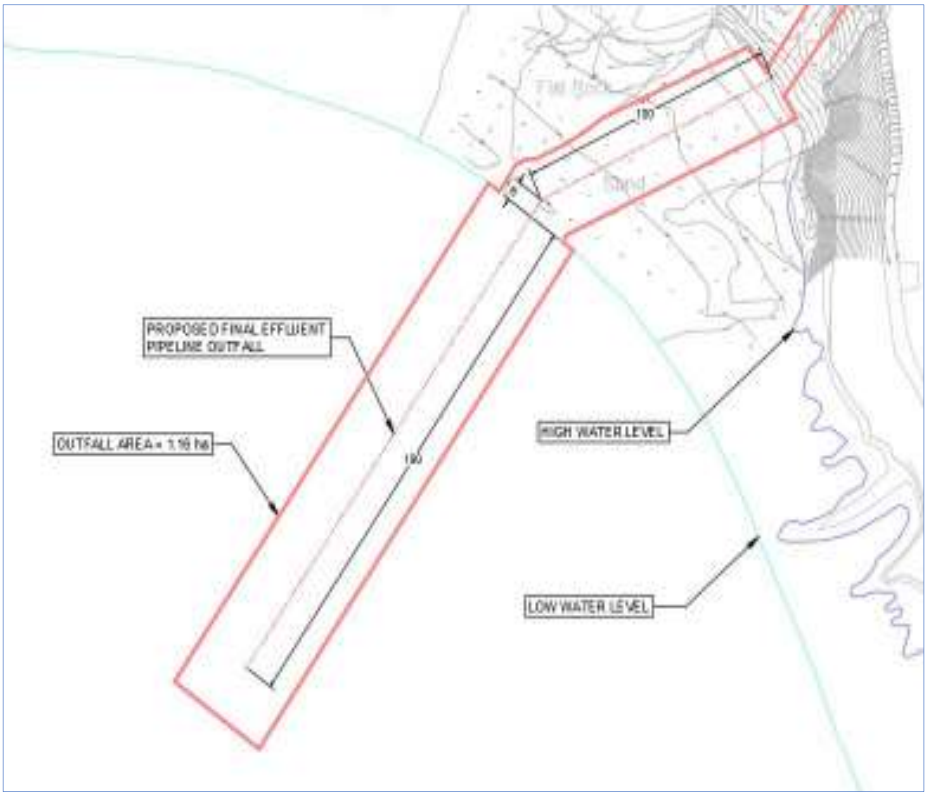


Figure 2: Proposed Marine Outfall

Horizontal Directional Drilling Method

Construction of the outfall using the horizontal directional drilling method would comprise three phases: pilot boring, pre-reaming and pipe positioning, each of which are illustrated in **Figure 3**.

It is assumed that the HDD process would occur from a drilling rig located close to the beach (as this is the reasonable worst case for the purpose of the assessment).

It is noted that this method would not involve any change in the seabed geometry during construction or operation (as the pipeline would be installed using trenchless techniques) and therefore there is no need to install scour protection along the route of the outfall.

It should be noted that the contractor may locate the rig on a suitable barge or jack-up platform (i.e. on the seaward end of the outfall). In this case, pilot boring would be undertaken from the seaward end of the outfall towards the landward end and thus geotechnical risks associated with exiting the seabed would be avoided. This would avoid loose sand material at the exit point and improve support to the hole at the seaward end of the outfall (as the hole can be supported with casing from the platform). The reaming and pull-back stages would be undertaken from the landward side of the outfall.

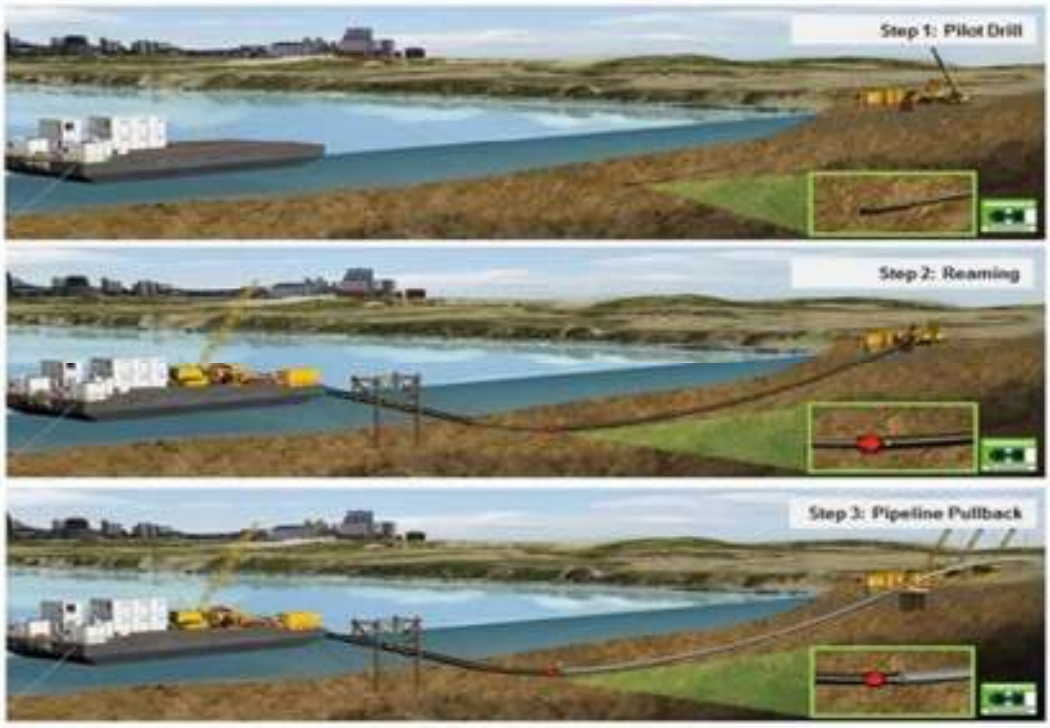


Figure 3: Typical HDD process for a sea outfall (Source: Stevens[1])

Float and Flood Method

The use of the float and flood method would require the formation of trenches and the placement of suitable material to support and protect the sea outfall once it is in position. Refer to **Figure 4** for an overview of the float and float method.

Trenching

Prior to the pipeline installation, the trench (in which the outfall pipe is to be laid) would be excavated along the route of the outfall. The seabed material would be removed to achieve the required depth and slope of the trench (which would be set out as part of the detailed design).

This trenching would be carried out through the use of barges that would be either anchored to the sea bed or jacked up using steel piles. The dredging equipment that would be used would depend on the contractor, but it is envisaged that either backhoe dredgers or grab dredgers would be used. It is anticipated that the excavated material would be left to the side of the trench, with some material being re-used as filter material in the trench, when the pipe has been laid and the rest naturally dispersing locally within the water column.

Bedding Layer

Once the seabed material has been removed and the trench has been formed, the bedding stone would be placed along the bottom of the trench to form the bedding layer.

[1] Stevens (2015) Trenchless solutions for sewer networks and sea outfalls. Available from: https://www.imesa.org.za/wp-content/uploads/2015/11/Paper-10-Trenchless-solutions-for-wewer-networks-and-sea-outfalls-Frank-Stevens.pdf [Accessed 30 October 2019]

At this stage, it is anticipated that the bedding layer would be imported material brought to the site from local quarries on trucks or by sea. The laying of the bedding layer along the bottom of the trench is likely to be carried out through the use of barges, however the exact procedure would be confirmed by the contractor.

Laying the Outfall Pipeline

The float and flood method, also known to as the 'S-Bend method' would involve floating and towing the entire outfall pipeline into position on the surface of the sea and the subsequent lowering down of the pipe into the trench as illustrated in **Figure 4**.

Sections of the outfall pipe would be assembled on land and readied for moving to the water. The pipe and diffuser would be sealed temporarily while full of air, which provides the buoyancy necessary to float.

The pipeline would then be floated into the water using barges, which would tow and manoeuvre the outfall into position. The lowering operation would be achieved by replacing the air with water, which causes the outfall to sink into position. The rate of submergence would be controlled by the rate of air release. Additional weight would be added where required (e.g. by using concrete ballast collars) in order to provide the negative buoyancy needed to sink the pipeline and place it in the bottom of the trench.

Backfilling the Trench

Once the outfall pipe is laid in place, backfill material would be placed in the trench to protect and stabilise the outfall pipeline. First, a filter layer would be installed to surround the outfall pipe, followed by a rock armour layer to provide protection on the sea bed.

The exact procedure and depths of these backfill layers would depend on the equipment available from the contractor along with programme and cost considerations, however it is anticipated that this would be undertaken from the barges.

Diffuser Assembly

Once the sea outfall pipe has been laid, the diffuser would be assembled at the seaward end of the outfall. The diffuser would be prefabricated on land and placed on the seabed by barge as one complete unit. The exact procedure and depths of backfill required would depend on the equipment available from the contractor along with programme and cost considerations, however it is anticipated that this would be undertaken from the barges.

Scour Protection

To ensure against potential long-term effect from scour on the seabed, suitable protection of the pipeline is required. A concrete mattress layer up to approximately 300mm thickness is proposed and would be finished at existing bed level so as to avoid any scour problems once operational.

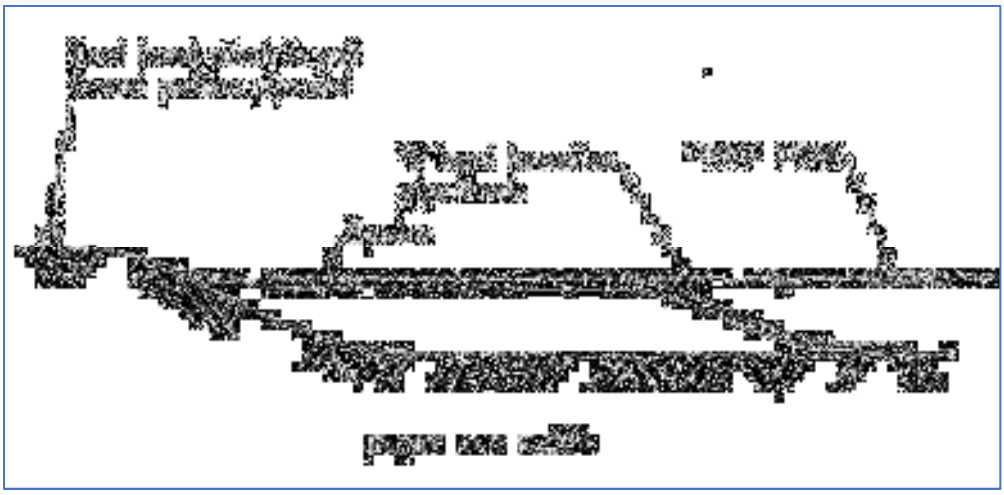


Figure 4: Float and Flood method of installing the outfalls (Source: WRC[2])

Bottom Pull Method

The use of the bottom-pull method would, in a similar manner to the flood and float method, require the formation of trenches and the placement of suitable bedding material to support and protect the positioned pipeline as described for the flood and float method above. The trenching, placement of the bedding layer, backfilling of the trench, the diffuser assembly and scour protection procedures would be as described for the flood and float method above. Laying of the outfall would be undertaken as described below.

Laying the outfall pipeline

The bottom-pull method would involve joining and pulling sections of the outfall pipeline towards the sea by using a barge. The pipes would be pulled into place by the barge as illustrated in **Figure 5**.

Sections of the outfall pipe would be arranged on land and readied for placing on rollers. The rollers would be aligned with the route of the outfall to ensure that the correct pipe alignment is achieved. Sections of the pipe would be joined in sequence to make pipe strings that could be placed onto the rollers.
The number and length of the pipe strings would be determined by the contractor.

The pipe strings would be pulled by winches mounted on a barge anchored offshore in a stepped process. The first pipe string would be pulled towards the sea then the next string would be moved across the rollers and joined to the first string at the tie-in position. This procedure would be repeated until all the strings have been joined and the outfall pipe has been laid in position.

[2] WRC (1990) Design guide for marine treatment schemes: Volumes I - IV

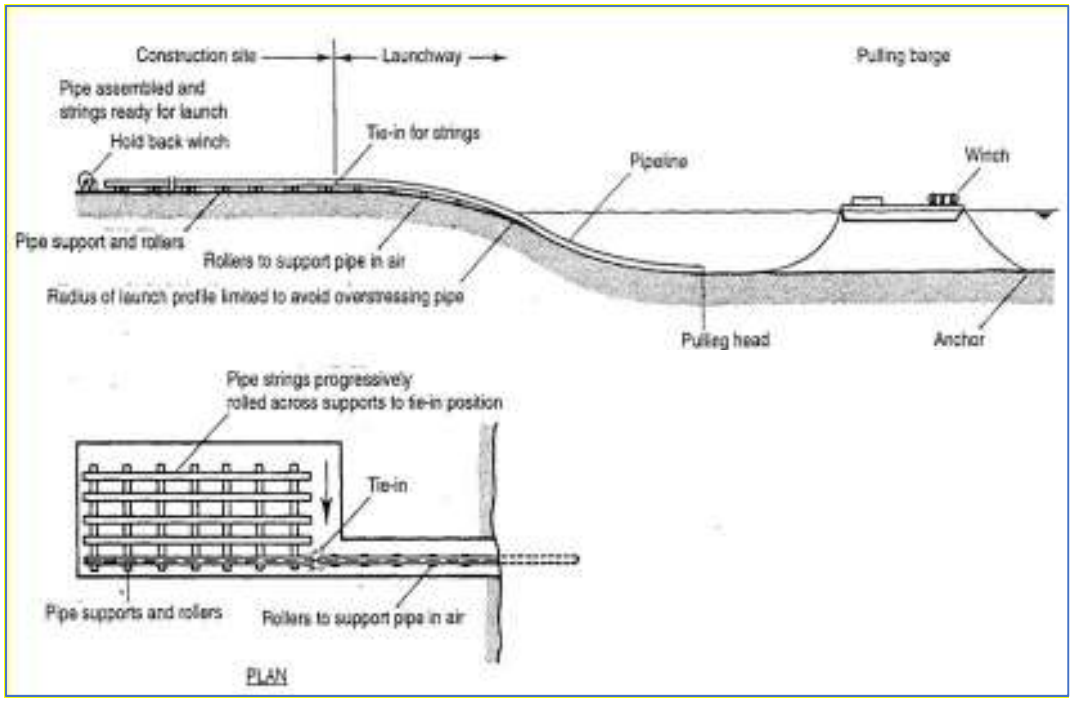


Figure 5: Bottom pull method of installing the outfalls (Source: CIRIA[3])

4.3.2 Construction – Specific details

<u>Proposed Rostellan Wastewater Pump Station</u>

It is proposed to construct an underground wastewater pumping station within Thomas Kent Memorial Park (**Photographs 1 & 2**), just north of the regional road R630. Above ground elements include a new access gate from the public road at the northern end of the Memorial Park, a proposed paved area and entrance gate, control kiosks and a proposed 7.6m high vent stack which will be designed in the form of a streetlight pole.

The habitat to be affected by the proposed development consists primarily of amenity grassland. The park is regularly mown to maintain very short swards. The park is bordered by a small concrete wall to the south and a similar sized stone wall to the east. A metal post and chain fence runs along the western and northern boundary of the park just before the land slopes steeply towards the estuary.

[3] CIRIA (1996) Sea outfalls - construction, inspection and repair: Report 159.

Photographs 1 & 2. Proposed location of the Rostellan terminal wastewater pumping station.

Proposed Rising Main to Connect Rostellan Pump Station to Lower Aghada

A proposed 1,417 long 110mm diameter rising main will convey flows from the proposed Rostellan pump station to the proposed pump station in Lower Aghada (**Photographs 3 &4**). The rising main will be constructed under the public road or in the verge alongside the public road. The R630 is composed of tarmacadam and is between 10-15m wide. The road is largely flanked by amenity grassland. A concrete/tarmac foot path 'the Peoples Path' runs along the northern side of the road, providing an amenity walkway for the local community. The road is at a minimum distance of 2m from the boundary of Cork Harbour.

Photographs 3 & 4. Shows the R630 where it is proposed to bury a 1417-metre-long rising main, which will connect the proposed Rostellan Pump Station to the proposed Lower Aghada Pump Station.

Proposed Lower Aghada Wastewater Pump Station

It is proposed to construct an underground wastewater pump station in land located to the west of the junction leading to the pier in Lower Aghada. Associated control kiosks, proposed vent stack, paved area and perimeter fencing would be erected above ground.

The proposed control kiosks would be located at the eastern side of the site, along the boundary with the public road. The existing gate access location would be used for access to

the new pump station. The proposed 7.6m vent stack would be constructed and designed in the form of a pole for lighting.

The proposed wastewater pumping station site lies within a largely greenfield site at the south western corner of the Lower Aghada pier (Photographs 5 & 6. The site is dominated by low value grassland.

A tarmacadam drive runs through the site for approximately 35m. The drive provides access to a TITAN package plant which is located underground and secured with lockable covers. The site also includes a modern stone control building.

The northern and eastern boundaries are formed by the working pier. Mud flats to the east of the pier are largely screened from the development site by a coastal wall, signage and parked cars. The western boundary of the site is formed by the estuary. The southern boundary is a small vegetated embankment.

Photographs 5 & 6. A greenfield site for the proposed Lower Aghada pumping station along with the existing plant and control building.

<u>Proposed Rising Main to Connect Lower Aghada Pump Station to a Gravity Sewer in Aghada</u>

A proposed 656-metre-long rising main will convey flows from the proposed Lower Aghada pump station to an existing sewer in the Upper Aghada sewerage network (**Photographs 7 & 8).** The rising main will be approximately 160mm in diameter and will be laid approximately 1.2m below existing ground level.

The rising main is to be laid within existing local road L3658. The road is bounded on both sides by a number of private dwellings with associated boundary hedgerows and treelines and private residential estates with small areas of amenity grassland along with associated concrete footpaths and modern stone walls.

Proposed upgrade works to the existing sewerage system will comprise replacement of c. 143 m of 150 mm diameter section of sewer with a 225 mm diameter sewer, in the townlands of Aghada and Curragh.

Photographs 7 & 8. The local road L3658, in which the rising mains is to be buried. Note the area of bedrock which the road dissects.

Proposed Whitegate Wastewater Pump Station

The proposed underground wastewater pump station will be located in Whitegate village square, in public open space in close proximity to the main street (**Photographs 9 & 10**). The proposed associated control kiosks, 7.6m high vent stack and paced areas would be erected above ground.

The site is currently a public open space area and since the new pump station would be underground, the space will continue to function as public open space with a paved and grass finish after construction.

The site is located in close proximity to Whitegate Bay. A small 2-foot breeze block wall separates a pedestrian footpath from the extensive mud shore habitat within the bay, approximately 4-5m below the level of the road.

Photographs 9 & 10. Showing Whitegate village in close proximity to Whitegate along with the regional road R630.

Proposed Glebe Manor (Ardnabourkey) Gravity Mains

A 530-metre-long 225 mm diameter gravity main will be laid in front of Glebe Manor residential estate (**Photographs 11 & 12**). The main will be laid approximately 1.2 m below existing

ground level. The full extent of the gravity main will be laid within the existing road network. The road, L3636, is composed of tarmacadam and slopes in a westerly direction. Treelines, narrow bands of broadleaved woodland, hedgerows and some vegetated earthbanks occur along the road. Species noted include Oak, Ash, Beech, Sycamore, Hawthorn and Elm.

Photographs 11 & 12. Shows the Glebe Manor estate and the L3646 road network bounded by man-made, hedgerow, treeline and woodland habitats.

Proposed Rising Main to Whitegate Pump Station to the Propose WwTP

A proposed 1,765-metre-long rising main will be laid from the Whitegate PS to the proposed WwTP. The rising main will be approximately 315mm in diameter and will be laid approximately 1.2m below existing ground level. All of the rising main will be laid within existing roads and laneways (**Photographs 13 & 14**). Most of the route is not located within or in proximity to the Cork Harbour SPA.

Photograph 13 & 14. The R630 and the laneway in which the proposed rising main connecting the proposed Whitegate PS to the proposed WWTP, is to be laid.

Wastewater Treatment Plant

The location of the proposed WWTP site is within an agricultural field with a recently planted monoculture of rye-grass that has been planted as part of an arable rotation (**Photograph 15**. The section in which the treatment plant is to be constructed slopes gently in a west, north-west direction. The site is bounded to the north by a hedgerow.

The overall WwTP will include;

- Inlet Works
  - Required earthworks, formwork and concrete. Incoming, outgoing pipework and associated chambers. Inlet channel, Inlet screen. Screenings handling unit. Bypass channel with screen. Associated control equipment, testing and commissioning.
- Primary Settlement
  - Required earthworks, formwork and concrete. Incoming, outgoing pipework and associated chambers. 3 no. pyramidal prefabricated primary settlement tanks. Desludging valves and pipework. Associated control equipment, testing and commissioning.
- Sludge Handling
  - Picket Fence Thickener (PFT). Required earthworks, formwork and concrete. Incoming, outgoing pipework, associated chambers, associated control equipment, testing and commissioning.
- Storm Handling
  - Circular stormwater holding tank. Required earthworks, formwork and concrete. Incoming, outgoing pipework and associated chambers. Storm tank mixer. Testing and commissioning.
- Miscellaneous
  - Site clearance. Road within the site. Watermain to the site and within the site. Water supply break tank. Kiosks and welfare facility.
- Pumping Stations
  - Sludge pumping station. Storm return pumping station. Wastewater booster set. Final effluent washwater booster set. Control kiosks.

Photograph 15. Location of proposed WWTP.

Effluent Outfall

Effluent will be discharged into Cork Harbour via a gravity system. The effluent outfall consists of a terrestrial section and a marine section (**Photographs 16**). The terrestrial gravity main will be approximately 880m long. This pipeline will be laid primarily within agricultural fields. The marine outfall length extends to c. 190 metres from the low water mark and 295m from the high water mark. This pipeline will not be located within the Cork Harbour SPA.

Photograph 16. Location of final effluent pipeline.

4.3.3 Operation

Following the completion of the construction works, wastewater treatment services at Whitegate-Aghada will be upgraded. The discharge of untreated sewage into Cork Harbour will cease and the proposed development will also provide sufficient wastewater treatment capacity to cater for the expected future population growth in Whitegate and Aghada.

Most of the proposed development is below ground. The exceptions to this will be the WWTP building and associated tanks/structures as well as the control kiosks associated with each pumping station.

There will be emissions from the proposed development during the operational phase. Treated effluent will be discharged to Cork Harbour from the proposed marine treated outfall linked to the WWTP, while dilute storm water discharges will also overflow from the pumping stations to receiving waters on an infrequent basis. Noise emissions from the proposed pumping stations and WWTP will also occur during the operational phase. However, these will be minimal as the main pumping equipment associated with the pumping stations will be underground, while no air blowers, typically high noise generating equipment, are proposed at the WWTP.

Dispersion modelling was carried out during the design process, the results of which are included in the "*Whitegate Aghada Far Field Modelling*" report, included in this planning application.

The conclusions of the report are summarised as follows:

"*Our results indicate that the 95%ile concentrations of both E. Coli and Intestinal Enterococci as well as the 50%ile concentrations of the other modelled nutrients are increased in the vicinity of the proposed outfall location. The increases however do not lead to the EQS at any of the designated EPA Surface Water Regulation monitoring points to be exceeded. It has also been demonstrated that the Whitebay shoreline still retains excellent water quality with the proposed outfall in place. The proposed scheme therefore does not cause any of the EQS thresholds in Cork harbour to be exceeded and the discharges from the proposed WwTP for Whitegate are in full compliance with the relevant EU water regulations*".

5 Natura 2000 sites

5.1 Cork Harbour SPA

In line with a precautionary approach, a Stage 2 Appropriate Assessment of the proposed development is considered necessary in respect of Cork Harbour SPA. The proposed development is partially located within the Cork Harbour SPA (**Table 1, Figure 6 and 7**). Therefore, a source-pathway-receptor link exists between the source (wastewater collection network of the Whitegate-Aghada agglomeration) and the receptor (Cork Harbour SPA).

An ecological appraisal of the proposed development site indicates that it supports common habitats which are not of high value in the context of the Natura 2000 designation. A full site synopsis for the Cork Harbour SPA is included below. Further details on the distribution of birds within Cork Harbour and in proximity to the works area is provided in the bird survey report which is attached as **Appendix C** of this report.

Table 1. Designated sites and their location relative to the proposed work site.

Site	Code	Distance from the proposed works at its closest point.
Special Protection Area (SPA)		
Cork Harbour	004030	0km Within - the proposed Rostellan Network pumping station site and sections of the proposed rising main to Lower Aghada network are within the boundary of the SPA. A source-pathway-receptor link exists between the source (wastewater collection network of the Whitegate-Aghada agglomeration) and the receptor (Cork Harbour SPA).

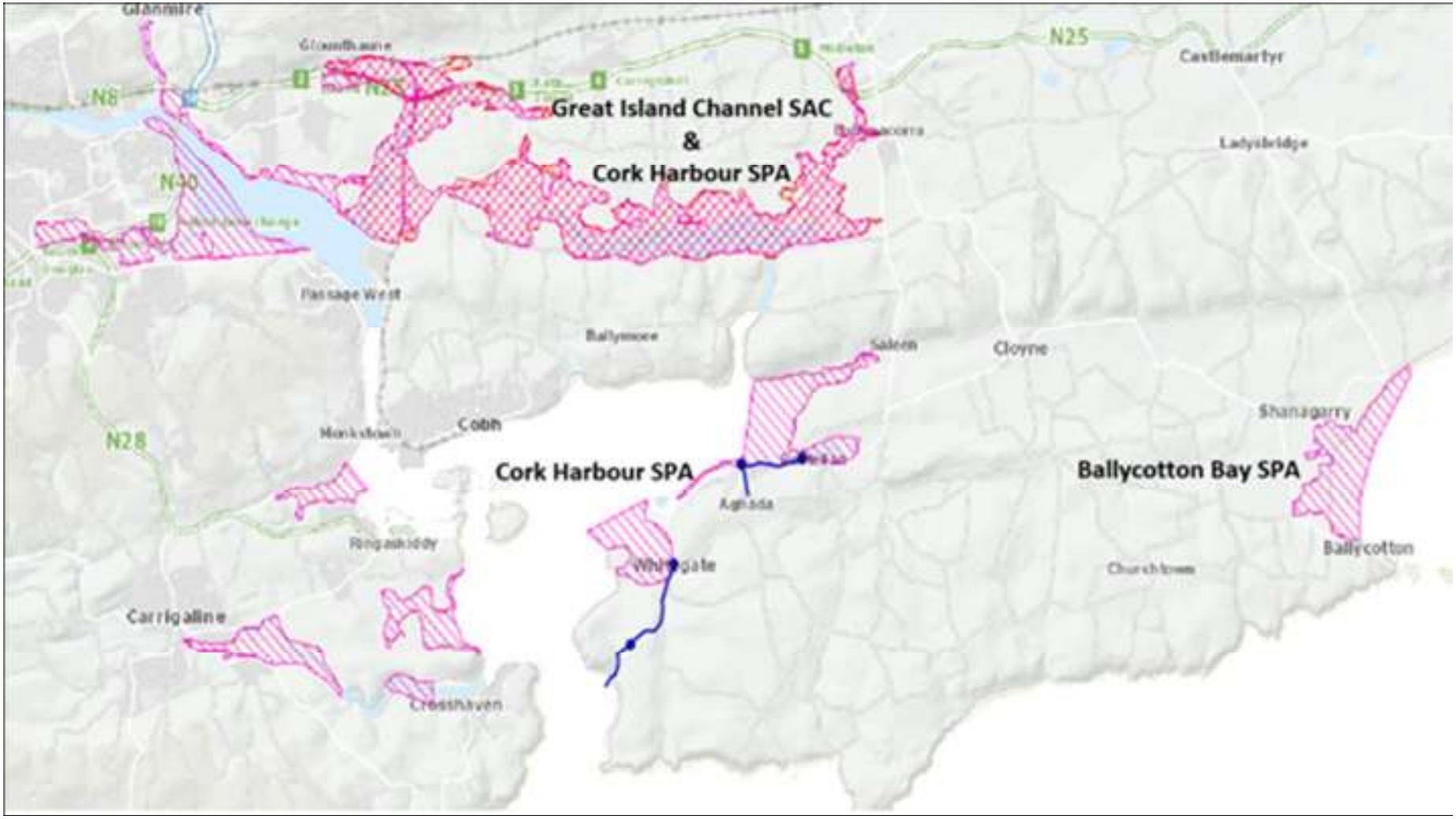


Figure 6: Proposed development site (Blue lines) in relation to surrounding Natura 2000 sites. (Source:www.npws.ie.)

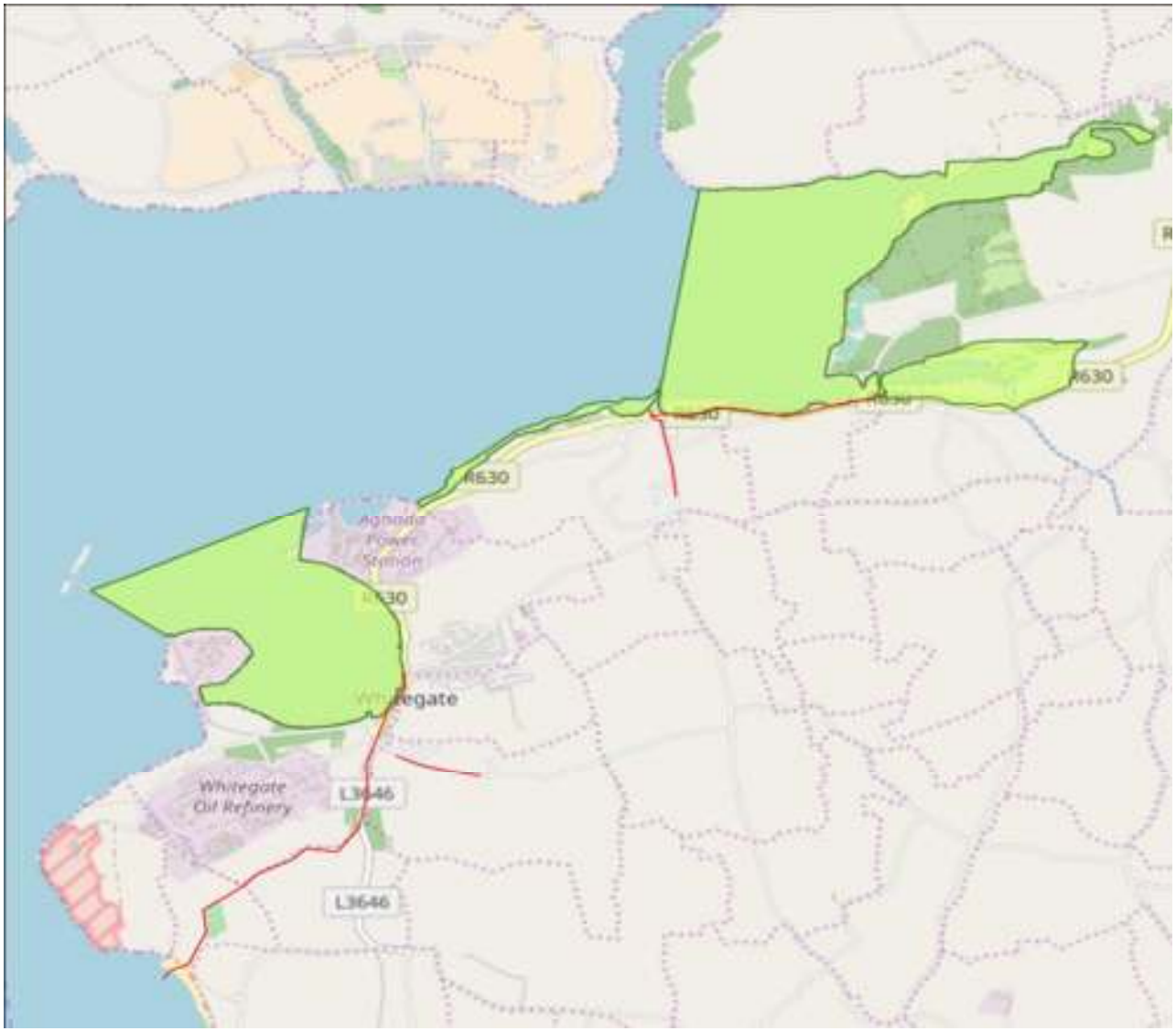


Figure 7(a): Shows the location of the wastewater collection network (Red Line) in relation to the Cork Harbour SPA (Green Shade).

Figure 7(b): Proposed development (within red line) and SPA (green) (Not to Scale) (aerial)

Figure 7(c): Proposed development (within red line) and SPA (green) (Not to Scale) (OS mapping)

Figure 7(d): Proposed Lower Aghada PS located adjacent to SPA (within red line) and SPA (green) (Not to Scale) (OS mapping)

Figure 7(d): Proposed Rostellan PS located within SPA (within red line) and SPA (green) (Not to Scale) (OS mapping)

5.2 Cork Harbour SPA (site code 004030) Site Synopses

Cork Harbour is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas, Owenboy and Owennacurra. 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, Ringabella Creek and the Rostellan and Poulnabibe inlets.

Owing to the sheltered conditions, the intertidal flats are often muddy in character. These muds support a range of macro-invertebrates, notably *Macoma balthica, Scrobicularia plana, Hydrobia ulvae, Nepthys hombergi, Nereis diversicolor* and *Corophium volutator*. Green algae species occur on the flats, especially *Ulva* sp. Cordgrass (*Spartina* sp.) has colonised the intertidal flats in places, especially where good shelter exists, such as at Rossleague and Belvelly in the North Channel. Salt marshes are scattered through the site and these provide

high tide roosts for the birds. Some shallow bay water is included in the site. Rostellan Lake is a small brackish lake that is used by swans throughout the winter. The site also includes some marginal wet grassland areas used by feeding and roosting birds.

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, Mallard, Pintail, Shoveler, Redbreasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Blackheaded 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.

Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl. Of particular note is that the site supports internationally important populations of Black-tailed Godwit (1,896) and Redshank (2,149) - all figures given are five year mean peaks for the period 1995/96 to 1999/2000. Nationally important populations of the following 19 species occur: Little Grebe (57), Great Crested Grebe (253), Cormorant (521), Grey Heron (80), Shelduck (2,009), Wigeon (1,791), Teal (1,065), Mallard (513), Pintail (57), Shoveler (103), Red-breasted Merganser (121), Oystercatcher (1,809), Golden Plover (3,342), Grey Plover (95), Lapwing (7,569), Dunlin (9,621), Bartailed Godwit (233), Curlew (2,237) and Greenshank (46). The Shelduck population is the largest in the country (over 10% of national total). Other species using the site include Mute Swan (38), Whooper Swan (5), Pochard (72), Gadwall (6), Tufted Duck (64), Goldeneye (21), Coot (53), Ringed Plover (73), Knot (26) and Turnstone (113). Cork Harbour is an important site for gulls in winter and autumn, especially Black-headed Gull (3,640), Common Gull (1,562) and Lesser Black-backed Gull (783), all of which occur in numbers of national importance. Little Egret and Mediterranean Gull, two species which have recently colonised Ireland, also occur at this site.

A range of passage waders occurs regularly in autumn, including such species as Ruff (5-10), Spotted Redshank (1-5) and Green Sandpiper (1-5). Numbers vary between years and usually a few of each of these species over-winter.

Cork Harbour has a nationally important breeding colony of Common Tern (102 pairs in 1995). The birds have nested in Cork Harbour since about 1970, and since 1983 on various artificial structures, notably derelict steel barges and the roof of a Martello Tower. The birds are monitored annually and the chicks are ringed.

Cork Harbour is of major ornithological significance, being of international importance both for the total numbers of wintering birds (i.e. > 20,000) and also for its populations of Black-tailed Godwit and Redshank. In addition, it supports nationally important wintering populations of 22 species, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Little Egret, Golden Plover, Bar-tailed Godwit, Ruff, Mediterranean Gull and Common Tern. The site provides both feeding and roosting sites for the various bird species that use it. Cork Harbour is also a Ramsar Convention site and part of Cork Harbour SPA is a Wildfowl Sanctuary.

5.3 European 2000 sites – Special Conservation Interests and Conservation Objectives.

The EU Habitats Directive contains a list of habitats (Annex I) and species (Annex II) for which SACs must be established by Member States. Similarly, the EU Birds Directive contains lists of important bird species (Annex I) and other migratory bird species for which SPAs must be established. Those that are known to occur at a site are referred to as 'qualifying interests' and are listed in the Natura 2000 forms which are lodged with the EU Commission by each Member State. A 'qualifying interest' is one of the factors (such as the species or habitat that is present) for which the site merits designation. The National Parks and Wildlife Service (NPWS) are responsible for the designation of SACs and SPAs in Ireland.

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network. European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status sites designated as Special Areas of Conservation and Special Protection Areas. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. Favourable conservation status of a habitat is achieved when its natural range, and area it covers within that range, is stable or increasing, and the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when population data on the species concerned indicate that it is maintaining itself, and the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. The conservation objectives for Cork Harbour SPA are included in *Cork Harbour Special Protection Area (Site Code 4030) Conservation Objectives Supporting Document version 1* (NPWS 2014). The species listed as Special Conservation Interests (SCIs) for the Cork Harbour SPA are included in **Table 2.**

Table 2. Special Conservation Interests (SCIs) for the Cork Harbour SPA

Species code	Species	Scientific name	Conservation objective
A004	Little Grebe	*Tachybaptus ruficollis*	Maintain
A005	Great Crested Grebe	*Podiceps cristatus*	Maintain
A017	Cormorant	*Phalacrocorax carbo*	Maintain
A028	Grey Heron	*Ardea cinerea*	Maintain

Species code	Species	Scientific name	Conservation objective
A048	Shelduck	*Tadorna tadorna*	Maintain
A050	Wigeon	*Anas penelope*	Maintain
A052	Teal	*Anas crecca*	Maintain
A054	Pintail	*Anas acuta*	Maintain
A056	Shoveler	*Anas clypeata*	Maintain
A069	Red-breasted Merganser	*Mergus serrator*	Maintain
A130	Oystercatcher	*Haematopus ostralegus*	Maintain
A140	Golden Plover	*Pluvialis apricaria*	Maintain
A141	Grey Plover	*Pluvialis squatarola*	Maintain
A142	Lapwing	*Vanellus vanellus*	Maintain
A149	Dunlin	*Calidris alpina*	Maintain
A156	Black-tailed Godwit	*Limosa limosa*	Maintain
A157	Bar-tailed Godwit	*Limosa lapponica*	Maintain
A160	Curlew	*Numenius arquata*	Maintain
A162	Redshank	*Tringa totanus*	Maintain
A179	Black-headed Gull	*Chroicocephalus ridibundus*	Maintain
A182	Common Gull	*Larus canus*	Maintain
A183	Lesser Black-backed Gull	*Larus fuscus*	Maintain
A193	Common Tern	*Sterna hirundo*	Maintain
A999	Wetland and Waterbirds		Maintain

Restore = Restore favourable conservation condition, Maintain = Restore favourable conservation condition

To acknowledge the importance of Ireland's wetlands to wintering waterbirds, “Wetland and Waterbirds” are included as a Special Conservation Interest for some SPAs that have been designated for wintering waterbirds and that contain a wetland site of significant importance to one or more of the species of Special Conservation Interest. Thus, a further objective is to maintain or restore the favourable conservation condition of the wetland habitat within the Cork Harbour SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

The ecological baseline for the proposed development site was based on a desktop review and direct surveys of the relevant works area and areas proximate to same. This focused on habitats and species that are listed as Qualifying Interests (QI) (in the case of SACs) and Special Conservation Interests (SCI) (in the case of SPAs) in the designations for the

European sites. Surveys for habitats, mammals, birds and invasive species were undertaken within the study area.

5.4 Status of qualifying interests for the Cork Harbour SPA

Cork Harbour SPA is a large, sheltered bay system that is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl, for which it is amongst the top ten sites in the country. Owing to the sheltered conditions, the intertidal flats are often muddy in character but described principally as 'mixed sediment to sandy mud with polychaetes and oligochaetes'. These muds support a range of macro-invertebrates, notably *Macoma balthica, Scrobicularia plana, Peringia (Hydrobia) ulvae, Nepthys hombergi, Nereis diversicolor* and *Corophium volutator*, all of which provide a food source for many wintering waterbird species. Salt marshes are scattered through the site and these provide high tide roosts for waterbirds (NPWS 2014).

The species listed as Special Conservation Interests of the Cork Harbour SPA are shown below in **Table 3.**

Table 3. Conservation status of SCI species for Cork Harbour SPA.

Species		**Birds Directive Annex**			**BOCCI***	
		I	**II**	**III**	**Red List**	**Amber List**
Phalacrocorax carbo	Cormorant					X
Numenius arquata	Curlew		X		X	
Limosa limosa	Black-tailed Godwit					X
Limosa lapponica	Bar-tailed Godwit	X				X
Tringatotanus	Redshank				X	
Anas penelope	Wigeon		X	X	X	
Ne,Anas crecca	Teal		X	X		X
Tachybaptus ruficollis	Little Grebe					X
Larus ridibundus	Black-headed Gull				X	
Larus canus	Common Gull					X
Larus fuscus	Lesser black-backed Gull					X
Vanellus vanellus	Lapwing		X		X	
Haematopus ostralegus	Oystercatcher					X
Tadorna tadorna	Shelduck					X
Ardea cinerea	Grey Heron					
Podiceps cristatus	Great Crested Grebe					X

Species		Birds Directive Annex			BOCCI*	
		I	II	III	Red List	Amber List
Anas acuta	Pintail		X	X	X	
Anas cylpeata	Shoveler		X	X	X	
Mergus serrator	Red-breasted Merganser		X			
Pluvialis apricaria	Golden Plover	X	X	X	X	
Pluvialis squatarola	Grey Plover					X
Calidris alpina	Dunlin	X			X	
Sterna hirundo	Common Tern	X				X
Symbol	**Description**					
I	**Annex 1**: species and sub-species are particularly threatened. Member States must designate Special Protection Areas (SPAs) for their survival and all migratory bird species.					
II	**Annex 2**: bird species can be hunted. However, the hunting periods are limited and hunting is forbidden when birds are at their most vulnerable: during their return migration to nesting areas, reproduction and the raising of their chicks.					
III	**Annex 3**: overall, activities that directly threaten birds, such as their deliberate killing, capture or trade, or the destruction of their nests, are banned. With certain restrictions, Member States can allow some of these activities for species listed here.					

*Colhoun & Cummins (2019) Birds of Conservation Concern in Ireland. *Irish Birds* **9**; 523-544

The reasons that these species are listed as Special Conservation Interests for the Cork Harbour SPA are as follows:

1. During winter the site regularly supports 1% or more of the all-Ireland population of Shelduck (*Tadorna tadorna*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,009 individuals.

2. During winter the site regularly supports 1% or more of the all-Ireland population of Wigeon (*Anas penelope*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,791 individuals.

3. During winter the site regularly supports 1% or more of the all-Ireland population of Teal (*Anas crecca*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,065 individuals.

4. During winter the site regularly supports 1% or more of the all-Ireland population of Pintail (*Anas acuta*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 57 individuals.

5. During winter the site regularly supports 1% or more of the all-Ireland population of Shoveler (*Anas clypeata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 103 individuals.

6. During winter the site regularly supports 1% or more of the all-Ireland population of Red-breasted Merganser (*Mergus serrator*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 121 individuals.

7. During winter the site regularly supports 1% or more of the all-Ireland population of Little Grebe (*Tachybaptus ruficollis*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 57 individuals.

8. During winter the site regularly supports 1% or more of the all-Ireland population of Great Crested Grebe (*Podiceps cristatus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 253 individuals.

9. During winter the site regularly supports 1% or more of the all-Ireland population of Cormorant (*Phalacrocorax carbo*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 521 individuals.

10. During winter the site regularly supports 1% or more of the all-Ireland population of Grey Heron (*Ardea cinerea*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 80 individuals.

11. During winter the site regularly supports 1% or more of the all-Ireland population of Oystercatcher (*Haematopus ostralegus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,809 individuals.

12. During winter the site regularly supports 1% or more of the biogeographic population of the Annex I species Golden Plover (*Pluvialis apricaria*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 3,342 individuals.

13. During winter the site regularly supports 1% or more of the all-Ireland population of Grey Plover (*Pluvialis squatarola*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 95 individuals.

14. During winter the site regularly supports 1% or more of the all-Ireland population of Lapwing (*Vanellus vanellus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 7,569 individuals.

15. During winter the site regularly supports 1% or more of the all-Ireland population of Dunlin (*Calidris alpina*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 9,621 individuals.

16. During winter the site regularly supports 1% or more of the biogeographical population of Black-tailed Godwit (*Limosa limosa*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,896 individuals.

17. During winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Bar-tailed Godwit (*Limosa lapponica*). The mean peak number within the SPA during the baseline period (1995/96 – 1999/00) was 233 individuals.

18. During winter the site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,237 individuals.

19. During winter the site regularly supports 1% or more of the biogeographical population of Redshank (*Tringa totanus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,149 individuals.

20. During winter the site regularly supports 1% or more of the all-Ireland population of Black-headed Gull (*Chroicocephalus ridibundus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 3,640 individuals.

21. During winter the site regularly supports 1% or more of the all-Ireland population of Common Gull (*Larus canus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,562 individuals.

22. During winter the site regularly supports 1% or more of the all-Ireland population of Lesser Black-backed Gull (*Larus fuscus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 783 individuals.

23. The site is selected for the breeding Annex I species Common Tern (*Sterna hirundo*). In 1995, 102 pairs were breeding at this site. This exceeds the All-Ireland 1% threshold for this species.

24. The wetland habitats contained within Cork Harbour SPA are identified of conservation importance for non-breeding (wintering) migratory waterbirds. Therefore, the wetland habitats are considered to be an additional Special Conservation Interest.

The specific conservation objectives for species listed as conservation interests for the Cork Harbour SPA (**Table 4**) are to maintain a favourable conservation condition of the non-breeding/breeding waterbirds and to maintain the favourable conservation condition of the wetland habitat at Cork Harbour SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

Table 4. SCI species for which a potential impact has been identified – specific targets

Species/Habitats	Attribute	Measure	Target
Little Grebe Great Crested Grebe Cormorant Grey Heron Shelduck	Population trend	Percentage change	Long term population trend stable or increasing

Species/Habitats	Attribute	Measure	Target
Wigeon Teal Pintail Shoveler Red-breasted Merganser Oystercatcher Golden Plover Grey Plover Lapwing Dunlin Black-tailed Godwit Bar-tailed Godwit Curlew Redshank Black-headed Gull Common Gull Lesser Black-backed Gull	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by each species, other than that occurring from natural patterns of variation
Common Tern	Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline
	Productivity rate: fledged young per breeding pair	Mean number	No significant decline
	Distribution: breeding colonies	Number; location; area (hectares)	No significant decline
	Prey biomass available	Kilogrammes	No significant decline
	Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase
	Disturbance at the breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the

Species/Habitats	Attribute	Measure	Target
			breeding common tern population
Wetlands	Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 2,587 hectares, other than that occurring from natural patterns of variation

Non-breeding waterbirds are counted at Cork Harbour each winter as part of the Irish Wetland Bird Survey (I-WeBS). The dataset spans the period 1994/95 to 2017/2018 and a total of 21 count subsites, covering some 2,961 ha have been monitored regularly (Crowe, 2005, Birdwatch Ireland 2020). I-WeBS results and the general population trends and status of SCI species within Cork Harbour SPA as well as national trends are discussed below.

5.4.1 Shelduck *Tadorna tadorna*

Numbers of Shelduck have been largely stable in Cork Harbour since 2004/05, although having declined across the long-term, The Owenboy Estuary, that can hold good numbers of Shelduck, received poor or no count coverage in the seasons 2006/07, 2008/09 and 2009/10, while Lough Beg was not counted in 2009/10; this will have affected recent site peaks so some caution is required. Nationally, numbers have shown a slight but steady decline since the mid 1990's (1999/00-2015/16). A slight increase in Shelduck numbers was recorded on 2017/2018 (n=953).

5.4.2 Wigeon *Anas Penelope*

Season peak counts for Wigeon in Cork Harbour and the rolling five-season means indicate that following a period of increasing numbers in the late 1990's and early 2000's, numbers have since declined. Nationally, numbers have been in decline since the mid 1990's while the all Ireland trend is also for decline. This trend is also seen at the level of individual I-WeBS count subsite. For example the subsite 'Ballintintubbrid' (North Channel) which has received good count coverage throughout and is favoured by Wigeon, supported peak numbers during the early 2000's at nearly twice the level as recorded in subsequent seasons. Season peaks were particularly low in the final two seasons (2011/12, 2012/13) despite a full count coverage September to March. However peak numbers in more recent years (2013/2014, 2017/2018) have increased. Counts in 2009/10 were likely affected by the cold weather spell (Crowe *et al.* 2011); January 2010 being the coldest January for 25 years (Met Éireann, 2010).

5.4.3 Pintail *Anas acata*

Numbers of Pintail have been highly variable in Cork Harbour with season peak counts often doubling or halving between successive seasons. The 'North Channel – Ballintubbrid' count subsite has consistently held greater numbers and it is therefore of note that this subsite received variable count coverage between the period 2001/02 to 2008/09 with no count being undertaken during the 2000/01 season. Rostellan Lake and Whitegate Bay, relatively well covered subsites during I-WeBS, have seen a notable decline in numbers in recent seasons.

In 2017/2018 a single Pintail was recorded. Overall interpretation of a long-term site trend is difficult and some caution is necessary.

5.4.4 Shoveler *Anas clypeata*

Numbers of Shoveler have declined across the long-term with season peak counts substantially lower during the last decade compared with the mid to late 1990's. Numbers have dropped sharply in favoured subsites Whitegate Bay and Rostellan Lake, both of which have received good count coverage across the years.

5.4.5 Red-breasted Merganser *Mergus serrator*

Red-breasted Merganser have declined over the long-term with no season site maxima reaching 100 individuals since the baseline period (1995/96 – 1999/00). Numbers across the recent five-season period however appear relatively stable.

5.4.6 Great Crested Grebe *Podiceps cirstatus*

Numbers of Great Crested Grebe appear to have declined substantially over the long-term with counts exceeding 200 individuals not recorded since the 2002/03 season, although slightly higher numbers were recorded during the 2016/2017 and 2017/2018 surveys. Key count subsites such as Ballintubbrid, Whitegate Bay and Aghada have received relatively good count coverage across the years.

5.4.7 Cormorant *Phalacrocorax carbo*

Some caution is necessary because peak numbers of Cormorant recorded in the recent five-season period were likely affected by the cold weather spells of 2009/10 and 2010/11. During cold weather, numbers might be expected to rise at coastal sites because the birds move away from frozen inland waterbodies, however numbers at Cork Harbour were relatively low in these seasons compared to most recent annual peaks. Cork Harbour is also known to support significant Cormorant night-time roosts; which are not monitored by the diurnal IWeBS methodology.

5.4.8 Oystercatcher *Haematopus ostralegus*

Key Cork Harbour subsites for Oystercatcher (generally supporting peaks of 100+ individuals) namely Lough Beg, Owenboy Estuary and Monkstown Creek were not counted in 2009/10 which will affect the recent five-season mean and its comparison with baseline data. Nationally numbers have shown an overall increase since I-WeBS began. With the exception of a high peak count in 2014/2015 (2334) numbers have been relatively stable in Cork Harbour in recent years.

5.4.9 Grey Plover *Pliuvialis sqyuatarola*

The long-term trend for decline in Grey Plover in Cork Harbour reflects relatively high annual peak counts during the baseline period, but numbers overall have been highly variable between seasons so interpretation of the long-term trend is difficult. Numbers have fluctuated across the recent five-season period (2008/09 - 2017/18). The national trend has seen an overall long-term decline although numbers have stabilised in recent seasons. In Britain, numbers now appear relatively stable after exhibiting a decline during the mid-1990's to mid-2000's.

5.4.10 Lapwing *Vanellus vanellus*

Lapwing's substantial long-term trend for decline in Cork Harbour is consistent with the national and all Ireland long-term trends for decline. Counts in 2009/10 were likely affected by the cold weather spell (Crowe *et al.* 2011); January 2010 being the coldest January for 25 years (Met Éireann, 2010). The site annual maxima for 2015/2016 was the lowest on record for this species (n=982) however numbers did recover in 2017/2018 (n=1658).

5.4.11 Dunlin *Calidris alpine*

The long-term site trend for decline is consistent with the national trend, numbers having declined throughout I-WeBS. Numbers were relatively stable with 2010-2013 seasons recording a season maxima of over 5,000 individuals. However, since 2013/2014 numbers have decreased to closer to 3,000 individuals. Numbers were notably low in 2016/2017 (n=1006), with numbers recoving in 2017/2018 (n=3286).

5.4.12 Curlew *Numenius arquata*

The long-term trend for declining Curlew numbers is consistent with the national trend where numbers have declined throughout I-WeBS by an average *circa* 3% per year. In the last two seasons, Curlew numbers in Cork Harbour have been below the 5-season mean. The all-Ireland trend is also for decline. In Britain, numbers of Curlew increased from the 1970's until the start of the 2000's but have steadily declined since then.

5.4.13 Redshank *Tringa tetanus*

A long-term trend for decline in Redshank numbers at Cork Harbour is evident with numbers not exceeding 2,000 individuals since the 2004/05 season. Numbers have stabilised in recent seasons. Nationally, numbers of Redshank have increased over the long-term while the all-Ireland trend is stable.

5.4.14 Golden Plover *Pluvialis apricaria*

Golden Plover numbers in Cork Harbour have fluctuated over the last 5-season period. In the last two-season period, numbers were significantly below the 5-season mean of 2054 (n=600 2016/2017; n=1450 2017/2018). During winter, Golden Plovers feed primarily within agricultural grassland and arable land. Tidal flats are used more as a roosting/resting habitat and the birds tend to favour large, open tidal flats. As a consequence, Golden Plovers tend to be in large aggregations when observed upon tidal flats.

5.4.15 Common Tern *Sterna hirundo*

Common Tern is a SCI species that is a summer visitor to Cork Harbour and is listed for its breeding population. It is not covered by routine I-WeBS counts, which mainly take place outside the times that it occurs in the harbour. It nests at a number of locations around the inner and western parts of the harbour but there are no nesting records from the eastern side of the harbour (O'Mahony and Smiddy 2017). Birds from the breeding colonies on the western side of the harbour are likely to visit White Bay to feed. Common Tern also form post-breeding roosts at various locations around the inner and western parts of the harbour. Traditional roost sites do not occur in the eastern side of the harbour. However, in August 2016, when very high numbers of terns were present in Cork harbour, mixed Common Tern and Sandwich Tern roosts occurred for a brief period on Long Point in Whitegate Bay.

6 Water quality

6.1 River Basin Management Plan for Ireland 2018 – 2021 (2nd Cycle)

The Water Framework Directive (WFD) sets out the environmental objectives which are required to be met through the process of river basin management planning and implementation of those plans. Specific objectives are set out for surface water, groundwater and protected areas. The challenges that must be overcome in order to achieve those objectives are very significant. Therefore, a key purpose of the River Basin Management Plan (RBMP) is to set out priorities and ensure that implementation is guided by these priorities.

The second-cycle RBMP aims to build on the progress made during the first cycle. Key measures during the first cycle included the licensing of urban waste-water discharges (with an associated investment in urban waste-water treatment) and the implementation of the Nitrates Action Programme (Good Agricultural Practice Regulations). The former measure has resulted in significant progress in terms both of compliance levels and of the impact of urban waste-water on water quality. The latter provides a considerable environmental baseline which all Irish farmers must achieve and has resulted in improving trends in the level of nitrates and phosphates in rivers and groundwater. It is acknowledged, however, that sufficient progress has not been made in developing and implementing supporting measures during the first cycle.

Overall, the RBMP cycle assesses the quality of water in Ireland and presents detailed scientific characterisation of our water bodies. The characterisation process also takes into account wider water quality considerations, such as the special water-quality requirements of protected areas. The characterisation process identifies those water bodies that are *At Risk* of not meeting the objectives of the WFD, and the process also identifies the significant pressures causing this risk. Based on an assessment of risk and pressures, a programme of measures has been developed to address the identified pressures and work towards achieving the required objectives for water quality and protected areas. Data relating to the waterbodies within the study area is provided in **Table 5**.

Treated wastewater from the proposed development site will ultimately be discharged to an area defined as outer Cork Harbour and works will take place in proximity to an area defined as Cork Harbour.

Table 5. Water Framework Directive Data – Relevant data

Catchment: Lee, Cork Harbour and Youghal Bay (Code 19) – 2nd Cycle
This catchment includes the area drained by the River Lee and all streams entering tidal water in Cork Harbour and Youghal Bay and between Knockaverry and Templebreedy Battery, Co. Cork, draining a total area of 2,153km². The largest urban centre in the catchment is Cork City. The other main urban centres in this catchment are Ballincollig, Macroom, Carrigaline, Crosshaven, Blarney, Glanmire, Midleton, Carrigtohill, Cobh, Passage West and Belvelly. The total population of the catchment is approximately 328,854 with a population density of 153 people per km². Several small coastal rivers drain the area to the southeast of Cork Harbour and the area at the eastern extreme of the catchment is drained by the Womanagh River which flows into the sea on the western side of Youghal Bay.

Catchment: Lee, Cork Harbour and Youghal Bay (Code 19) – 2nd Cycle		
The Lee-Cork Harbour catchment comprises 18 sub-catchments with 92 river water bodies, three lakes, 13 transitional, six coastal water bodies and 16 groundwater bodies. There are five heavily modified and no artificial water bodies in the catchment. The catchment assessment notes that: • Twenty-two river water bodies and all three lake water bodies in the catchment are At Risk of not meeting their water quality objectives. Measures will be needed in these water bodies to improve the water quality outcomes. Of these the waterbodies the Owennacurra 040 river waterbody (i.e. section of the Owenacurra River in proximity to the proposed development) is one of the rivers at risk due to its Moderate biological status. • There are eight Transitional and coastal water bodies in the catchment that are At Risk of not meeting their water quality objectives. Measures will be needed in these water bodies to improve the water quality outcomes. Of these the Owenacurra Estuary is listed as one. • Outer Cork Harbour water quality was defined as *Good* in the period from 2013-2018. Water quality in Cork Harbour was defined as *Moderate* in the same period. • There are five Special Areas of Conservation (SACs) in the catchment, not all of which have water quality and/or quantity conservation objectives for their qualifying interests. All three waterbodies relevant to this project listed below are within protected areas. • Diffuse urban pressures, caused, for example, by misconnections, leaking sewers and runoff from paved and unpaved areas, have been identified as a significant pressure in five river water bodies; which includes the Owennacurra 040 river waterbody and five transitional water bodies, which includes the Owenacurra Estuary. • The Owennacurra Estuary/North Channel is designated a Nutrient Sensitive Area (NSA). Alteration of hydromorphological (or physical) conditions is one of the most significant issues in rivers in the Lee-Cork Harbour. This includes inputs of excess fine sediment and alteration of the morphology of the river channel, which in turn alter habitat conditions. This can occur because of, for example, implementing river and field drainage schemes, forestry activities, animal access, and discharge from quarries.		
Waterbodies relevant to the proposed project		
Waterbody	**Status**	**Risk**
Cork Harbour	Moderate	Review
Outer Cork Harbour	Good	Review

Source: wfdireland map system & www.catchments.ie

7 Site inspection

The following site surveys were carried out at the site:

- Habitat and flora surveys were carried out on 18th of January 2018 and 20th February 2018 and 11th December 2019
- A survey for Otter and other Annex II mammals was carried out on 18th of January 2018 and 11th December 2019

- A survey for invasive species, including mapping, was carried out on 18th of January 2018, 20th February 2018 and 11th December 2019 (See Invasive Species Survey Untreated Agglomerations Study – Cork Project (Aghada/Whitegate, DixonBrosnan 2019).
- Three separate winter bird counts were carried out from January to March 2018 (See Winter Bird Surveys Untreated Agglomerations Study – Cork Project Aghada/Whitegate, DixonBrosnan, 2018)
- No roosting habitat, high value commuting or feeding habitat for bats will be affected by the proposed development and therefore no specialised bat surveys were considered necessary.
- Intertidal and subtidal surveys were carried out on the 1st September, 2020

7.1 Habitats

The only intertidal or sub-tidal habitat which will be directly affected is located at White Bay which is not located within the Cork Harbour SPA. There will be no impacts on mudflat habitat for birds within the Cork Harbour SPA. There will be some loss of common agricultural and amenity grassland which could potentially be of value for roosting birds, however such habitats dominate the local landscape. Shoreline habitats which will be affected by the proposed works support some specialist bird species. However these are located at White Bay which is located 2.2 km from the closest point of the Cork Harbour SPA.

Terrestrial habitats noted within the proposed works area or in close proximity to it consisted of the following.

- Buildings and artificial surfaces (BL3)
- Amenity grassland (improved) (GA2)
- Spoil and bare ground (ED2)/Recolonising bare ground (ED3)
- Arable crops (BC1)
- Improved agricultural grassland (GA1)
- Hedgerows (WL1)
- Scrub (WS1)/Dense bracken (HD1)
- Depositing/lowland rivers (FW2)
- Shingle and gravel banks (CB1)

The marine and intertidal habitats recorded within the survey area consisted of

- 'Barren or amphipod- dominated mobile sand shores' (JNCC, 2015, LS.LSa.MoSa, EUNIS A2.22)

- Barnacles and fucoids on moderately exposed shores - LR.MLR.BF (JNCC, 2015, EUNIS A1.21)

- Sabellaria alveolata reefs on sand-abraded eulittoral rock - LS.LBR.Sab.Salv (JNCC 2015, EUNIS A2.711).

- Infralittoral mobile clean sand with sparse fauna- SS.SSa.IFiSa.IMoSa (JNCC 2015, EUNIS A5.231) including *Zostera marina.*

- Alcyonium digitatum and faunal crust communities on vertical circalittoral bedrock CR.MCR.EcCr.AdigVt (JNCC 2015, EUNIS A4.215)

7.2 Birds

During 2010/2011 a waterbird survey programme was conducted by the NPWS within Cork Harbour. This waterbird survey programme was designed to investigate how waterbirds are distributed across coastal wetland sites during the low tide period. The surveys ran alongside and were complementary to the Irish Wetland Bird Survey (I-WeBS). Based on the NPWS data it can be concluded that the proposed development areas around Whitegate, Rostellan and Lower Aghada have the potential to support a range of important bird species due to the presence of high value mudflat habitat. White Bay has the potential to support piscivorous species associated with the Cork Harbour SPA as they forage within the coastal waters within the overall Harbour.

A winter bird survey was conducted by DixonBrosnan on three separate occasions; 25th of January 2018 and the 1st & 6th of February 2018. Results from the survey and a desktop review are provided in Winter Bird Surveys Untreated Agglomerations Study – Cork Project Aghada/Whitegate (DixonBrosnan 2018) which is attached as **Appendix C** of this report. The vantage point locations for the winter bird counts are shown in **Figure 8**.

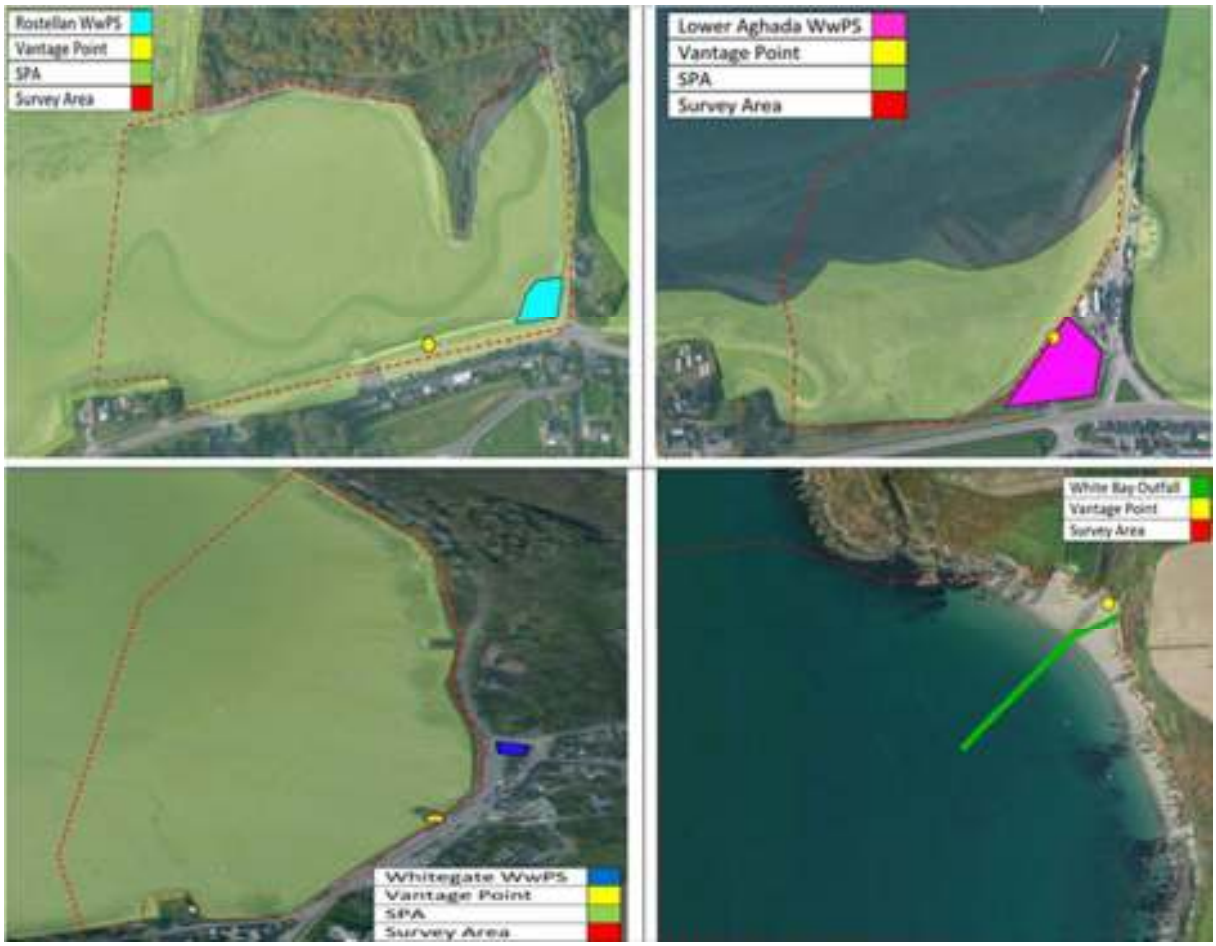


Figure 8. Vantage point location for the winter bird count in relation to specific construction areas.

Thirty species in total were recorded within the survey area during the site survey (24 species – Rostellan WWPS survey site, 18 species – Lower Aghada WWPs survey site, 18 species – Whitegate WWPS survey site, 7 species – White Bay Outfall). A total of sixteen species listed as qualifying interests for the Cork Harbour SPA were recorded, namely, Cormorant, Oystercatcher, Dunlin, Curlew, Redshank, Black-tailed Godwit, Lapwing, Shelduck, Wigeon, Teal, Shoveler**,** Great Crested Grebe, Little Grebe, Black-headed Gull, Common Gull and Lesser Black-backed Gull were recorded.

A total of 3,243 birds from 30 species were recorded from the site visits during the winter bird survey. Four Annex I bird species were recorded (Mediterranean Gull, Dunlin, Little Egret and Great Northern Diver). Eight Red Listed species were recorded, namely Black-headed Gull, Herring Gull, Redshank, Curlew, Wigeon, Lapwing, Shoveler and Dunlin.

A high tide roost of 11 Grey Heron & 3 Cormorant was recorded to the northeast of the proposed development site within Thomas Kent Park. The roost is visually screened from Thomas Kent Park (Rostellan WWPS Site) by a treeline and private dwelling along the local road L7660.

With the exception of Dunlin at Whitegate during a high tide event, none of the wintering birds, were recorded in numbers which would be considered nationally significant (i.e. 1% or more of the all-Ireland population of an Annex I species or 1% or more of the bio-geographical population of a migratory species).

The Rostellan WWPS survey site supported 24 different species of waterbirds, the hightest diversity of all the survey sites. Of these Mute Swan and Ring-billed gull were recorded at a higher percentage in relation to the five-season mean values obtained during the I-Webs counts for the whole of Cork Harbour. The number of Mute Swan recorded at the Rostellan WwTP site represented 23.53% of the I-WeBS 5-season mean recorded within Cork Harbour during the period (2008/09 to 2017/2018). Only small numbers of Ring-billed Gull were recorded by I-Webs counts, with the highest recording of 2 individuals recorded during the 2011/2012 season. This is a North American species and an occasional rare winter visitor to Ireland with around 10 to 15 individuals noted annually.

The Lower Aghada WWPS survey site recorded 18 different species of waterbird. Of these species only Snipe, Ringed Plover and Mediterranean Gull were recorded at moderate numbers with respect to the 2010-2015 I-Webs counts. All three species peak counts were taken during the low tide survey. None of these three species are classified as species of conservation interest for Cork Harbour SPA, however, Mediterranean Gull is listed on Annex I of the Birds Directive.

The Whitegate survey recorded 18 different species of waterbird. Mediterranean Gull was recorded at a higher percentage in relation to the five-season mean values obtained during the I-Webs counts for the whole of Cork Harbour. While the peak numbers of Dunlin were noted to only be of a moderate percentage (20.25%) of the I-WeBS 5-season mean, the number counted (573) is nationally important for the species. Dunlin is listed on Annex I of the Birds Directive and is also listed as a conservation interest for the Cork Harbour SPA.

The White Bay Outfall survey site, which is not proximate to the Cork Harbour SPA, had the lowest species diversity and lowest abundance of individual birds recorded of any of the vantage point count sites. A single Great Northern Diver was recorded foraging within the coastal waters during a high tide survey. Great Northern Divers are listed on Annex I of the Birds Directive. Cormorant, Oystercatcher and Black-headed Gull, which are listed as conservation interests for the Cork Harbour SPA, were also recorded within the survey site. However, they were recorded in very low numbers.

The winter bird survey report (**Appendix C**) concluded the following:

Based on the NPWS data it can be concluded that the proposed development areas around Whitegate, Rostellan and Lower Aghada have the potential to support a range of important bird species due to the presence of high value mudflat habitat. White Bay has the potential to support piscivorous species associated with the Cork Harbour SPA as they forage within the overall harbour.

The habitats in close proximity to the Rostellan WWPS site, Lower Aghada WWPS site and the Whitegate WWPS site have the potential to support some of the species listed as conservation interest of the Cork Harbour SPA. Different habitats will vary in their sensitivity periods based around function e.g. mudflats are most important during the winter for wintering waterbirds.

Cork Harbour is of high value for birds and mudflat habitat supports high numbers of wintering birds. Based on the desktop review of data and the results of the bird counts, it is concluded that the habitats in proximity to sections of proposed development area at Rostellan, Lower

Aghada and Whitegate are of moderate to high value for birds and works during the winter period will be avoided at these locations.

7.3 Invasive Species

An invasive species survey report (*Invasive species survey Untreated Agglomerations Study – Cork Project Aghada/Whitegate* (DixonBrosnan 2020) is attached as **Appendix D** of this report. An overview of the locations of Japanese Knotweed (*Fallopia japonica*) and Himalayan knotweed (*Persicaria wallichii*) are shown in **Figure 9**, along with GPS coordinates. In summary, Japanese Knotweed was recorded at five distinct locations and Himalayan Knotweed was recorded at two locations. Some sections of these stands are just outside the boundaries of the study area but have been included due to their proximity. No invasive species were recorded within the sections of the proposed development area that lie within the Cork Harbour SPA.

7.3.1 Japanese Knotweed Locations

A. Numerous immature stands (ranging from 1x1m to 2x12m) and sapling plants of Japanese knotweed were recorded, at a scattered distribution, within a large section of a well-maintained amenity grassland strip, along the southern fringe of the R630 where a 1426m long rising main to convey Rostellan Formula 'A' flows to the Lower Aghada network is proposed (**Appendix D, Photographs 1 to 6**). In addition, Japanese knotweed was also recorded within a shrub bed and treeline/coniferous woodland band/vegetated embankment both within and adjacent to this amenity grassland strip. A moderate sized stand of Japanese knotweed was also recorded growing within private property just east of the aforementioned stands. Amenity grassland separates the R630 road from each stand/plant of Japanese knotweed, however the width of the amenity grassland ranges from approximately 1m to 13m. Therefore, during the excavation works for the pipeline, the root system of the Japanese knotweed stand could potentially be impacted. During the December 2019 site survey, it was noted that all Japanese Knotweed stands remained in place, with no apparent signs of treatment.

B. A dense mature stand, approximately 25m in length and 5m wide, runs along the eastern fringe of the R630 (**Appendix D, Photographs 7 & 8**). The road at this point is approximately 6m wide with an additional grass/earth verge of 4m on the western side of the road. There is the potential that during the excavation works for the pipeline the root system of this Japanese knotweed stand may be impacted. During the December 2019 site survey, it was noted that this Japanese Knotweed stand remained in place, with no apparent signs of treatment.

C. A large stand of Japanese knotweed also exists where a laneway diverges from the R630 road (**Appendix D, Photographs 9 & 10**). This is a large mature stand which has the potential to impact on the proposed works area i.e. section of the proposed 1910-metre-long rising main, which will be laid from the Whitegate PS to the proposed WwTP. During the December 2019 site survey, it was noted that this Japanese Knotweed stand remained in place, with no apparent signs of treatment.

D. A large dense stand of Japanese Knotweed approximately 20m in length and 5m wide was recorded growing on top of an embankment within an area used to store old

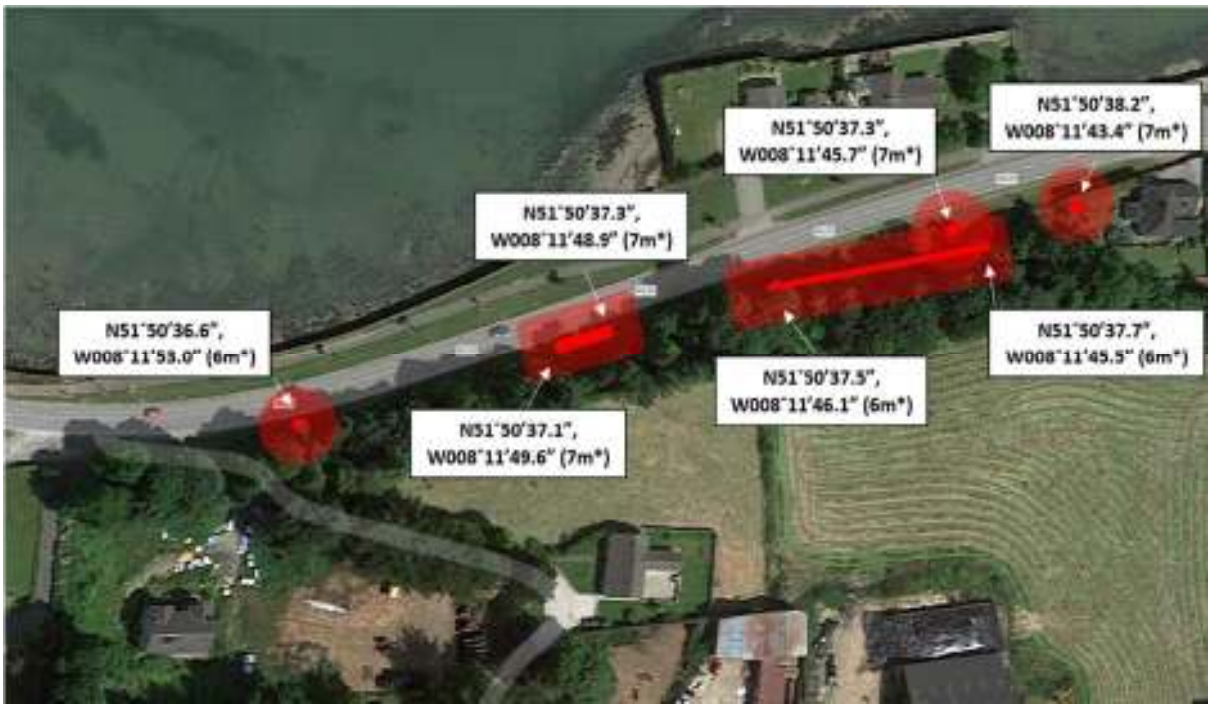
construction material and cabins (**Appendix D, Photographs 11 & 12**). This large area is located south and above (approx. 3-4m) an agricultural laneway in which it is proposed to lay a 1910-metre-long rising main from the Whitegate PS to the proposed WwTP. It is unlikely that this large stand of Japanese knotweed will be impacted by the proposed development. During the December 2019 site survey, it was noted that this Japanese Knotweed stand remained in place, with no apparent signs of treatment.

E. A very large dense mature stand of Japanese knotweed was recorded growing along the western periphery of an agricultural field in close proximity to White Bay. The stand is roughly 200m in length and up to 20m at its widest. The land slopes steeply towards the bay through an area of scrub/dense bracken habitat and Japanese Knotweed occurs within this area (**Appendix D, Photographs 13 & 16**). The final effluent gravity outfall has been routed away from this large mature stand, thus avoiding any disturbance to the stand or its underground root system. However, during the site visit in December 2019 it was noted that machinery had cleared a pathway through a section of the existing stand. As a result, numerous fragments of rhizomes have been spread via movement of machinery and the stockpiling of earth and vegetation along the public pathway leading to White Bay Beach. Scattered along the margins of the pathway, within the tracks of the machinery, are a large number of emerging Japanese knotweed shoots and abundant rhizome fragments. As a result, a section of the final effluent gravity outfall will dissect this new contaminated area thus leading to the potential for further spread of Japanese Knotweed (See **Appendix E, Photographs 19-21**).

7.3.2 Himalayan Knotweed Locations

A. A small stand of Himalayan Knotweed (approximately 3 x 2.5m) was recorded growing along the southern boundary of the proposed Lower Aghada WwPS site (**Appendix D, Photographs 17 & 18**). This stand of Himalayan knotweed is situated on a small raised embankment, approximately 12m east of the entrance gate and 7m north of the R630 road verge. There is the possibility that this stand may be impacted by the proposed works.

B. A stand of Himalayan knotweed was noted growing within the large stand of Japanese knotweed proximate to the outfall route as noted above. The final effluent gravity outfall has been routed away from this large stand, thus avoiding any disturbance to the stand or its underground root system.


N51˚50'38.2",
W008˚11'43.4" (7m*)
N51˚50'37.3",
W008˚11'45.7" (7m*)
N51˚50'37.3",
W008˚11'48.9" (7m*)
N51˚50'36.6",
W008˚11'53.0" (6m*)
N51˚50'37.7",
W008˚11'45.5" (6m*)
N51˚50'37.5",
W008˚11'46.1" (6m*)
N51˚50'37.1",
W008˚11'49.6" (7m*)

N51˚50'37.0", W008˚12'37.4"
(7m* - Himalayan knotweed)

N51˚48'57.5", W008˚14'16.9" (7m

Figure 9. Locations of Japanese knotweed & Himalayan knotweed along with GPS coordinates.

8 Assessment of Potential Impacts

Based on the EC Article 6 Guidance Document (2001) and IEEM guidelines '*Guidelines for Ecological Impact Assessment'* (IEEM, 2018) impacts are identified and assessed using a combination of professional judgement and criteria or standards where available. As Natura 2000 sites are of International importance, any significant adverse impacts would be significant at an 'International' level. However, where impacts are expected not to have a significant impact on the integrity of these habitats at an International level but are likely to have National or Local level impacts, this has been stated.

The potential impacts associated with the proposed development are discussed in the following section with respect to their likelihood to have significant impacts on European sites.

As part of the assessment direct, indirect and cumulative impacts were considered. Direct impacts refer to habitat loss or fragmentation arising from land-take requirements for development. Indirect and secondary impacts do not have a straight-line route between cause and effect, and it is potentially more challenging to ensure that all the possible indirect impacts of the project/plan - in combination with other plans and projects have been established.

Potential impacts were identified as follows:

- Loss of habitat during construction
- Impacts from noise, visual vibration and disturbance during construction

- Impacts on water quality during construction
- Impacts on water quality during operation
- Spread of invasive species during construction
- Cumulative impacts during construction and operation

8.1 Loss of habitat

Any habitat loss or fragmentation of Natura 2000 sites or deterioration in habitat quality could potentially reduce the extent of habitat available for QI species. This would decrease the viability of existing habitats and increase the pressure on existing habitat and may result in further deterioration.

The footprint of the Rostellan Network pumping station and sections of the associated rising main to Lower Aghada are within the Cork Harbour SPA. The habitats within the SPA that will be directly impacted are of low ecological value at a local level. Refer **to Figures 6** and **7** above.

Only very low value foraging habitat for species listed as conservation interests for the Cork Harbour SPA will be affected. No breeding habitat for species listed as qualifying interests for the Cork Harbour SPA will be affected. Therefore, the proposed development will not result in any significant deterioration in habitat quality or significant loss of habitat within the Cork Harbour SPA.

8.2 Impacts from noise and disturbance

Potentially increased noise and disturbance associated with the site works could cause disturbance/displacement of fauna. Sections of the proposed development area are located within and in close proximity to the Cork Harbour SPA.

The potential effects and impacts of disturbance have been widely recognised in wildlife conservation legislation, as has the need to develop conservation measures for birds whilst taking human activities into account. Article 4.4 of the Bird's Directive (79/409/EEC) requires member states to "*take appropriate steps to avoid… any disturbances affecting the birds, in so far as these would be significant having regard to the objectives of this Article*". This specifically relates to conservation measures concerning Annex I species.

Theoretically disturbance of important qualifying bird species could potentially occur during the construction phase of the project. However, predicting potential impacts on birds from disturbance can be problematic. Although there are many instances where waterfowl and people appear to co-exist on estuaries, there are widespread examples where effects and impacts of varying severity have been described.

Optimal foraging theory is a useful basis from which to understand likely effects of disturbance on feeding. Many studies have shown that birds concentrate where feeding is best. If birds are forced temporarily or permanently to leave these places, then there is an increased risk that their foraging ability will suffer. However, the severity of this type of situation and the way is which birds respond; vary in a very complex way. The multiplicity of variables underlying the observed interactions between birds and people makes it difficult to assess the cause and implications of a particular instance of disturbance. The magnitude of disturbance to birds may arise from synergistic effects of more than one activity.

Noise levels of 70dB and above are regularly cited within the literature as being the threshold beyond which disturbance to estuarine bird species can be predicted to occur (Cutts *et al.* 2013). However, the greatest levels of disturbance response typically occur when the difference between ambient noise levels and peak noise levels is greatest, and when combined with visual human presence (Cutts *et al*. 2013).

Burger (1981), in a study of a coastal bay, found that birds were present 42% of the time when people were present, but birds were present 72% of the time when people were absent. Human activities such as jogging or grass mowing, which involved rapid movement or close proximity to roosting birds, usually caused them to flush (fly away). Slow-walking birdwatchers and clammers did not usually cause birds to flush. Gulls and terns were least affected and usually returned to where they had been; ducks usually flushed and flew to the centre of the pond; and herons, egrets and shorebirds were most disturbed and flushed to distant marshes.

The magnitude and predictability of impacts as a result of disturbance ranges between species, seasons, weather, source and duration of disturbance, degree of previous exposure of the individuals to disturbance and the occurrence of additional disturbances. Most disturbances to wetland birds result in an interruption to normal activity and the displacement of birds over variable distances, often into sub-optimal habitats. This can be critical during severe winters and can lead to a reduction in the carrying capacities of important wintering wetland sites. However, in general studies show that most bird species have the ability to habituate to regular and continual sources of noise and visual disturbances providing there is no large 'startling' component.

Common Tern, a summer visitor and a SCI for Cork Harbour, do not nest on the eastern side (White Bay side) of Cork Harbour. However, terns could potentially visit White Bay in the late summer months to forage. As there are no breeding populations of Common Tern in proximity to the proposed development, the primary potential impact is on wintering birds on mudflat habitat adjoining the proposed development. Given there are no breeding grounds in the vicinity of the proposed development and foraging on or near the site is likely to be sporadic, there will be no significant impact on Common Tern during the construction period.

It is noted that most of the proposed development area within the SPA is located within or on the outskirts of the villages of Whitegate, Aghada and Rostellan. These areas are subject to noise disturbance and light pollution from neighbouring dwellings and industries. During the construction stage, there may be short-term increases in disturbance but it will not be significant in the context of existing noise levels.

Nonetheless, construction works associated with the proposed network and terminal WWPS's (Rostellan, Lower Aghada and Whitegate) have the potential to result in disturbance/displacement of wintering waterbirds, if undertaken during the wintering and passage season and without mitigation due to the proximity to key foraging and roosting areas. Therefore, works in close proximity to the Cork Harbour SPA will avoid the wintering bird season (September to March) as indicated in **Figure 10** (Refer also to Figures 6 and 7 above). This will minimise the disturbance to any wintering/migratory bird species utilising the harbour during this period. During operation there will not be a significant increase in noise or activity associated with the development and therefore no significant effects will occur.

Figure 10. Construction works will be avoided during the winter bird season at the areas outlined above. The most sensitive areas (Rostellan PS and Lower Aghada PS), which will require hoarding between the works and the waters edge, is shaded red.

The marine works will be located 2.9km from the closest point of the SPA at Curraghbinny Woods across the water and 1.81.km from the closest point of the Cork Habour SPA overland. It is noted that existing levels of disturbance are relatively high in Cork Harbour due to industrial activities and shipping. However, this area is outside the SPA and is of low value for wading birds. Winter bird counts recorded very low numbers of bird species listed as qualifying interests for the Cork Harbour SPA (Black Headed Gull, Cormorant, Oystercatcher) at the Whitebay Bay vantage point count

Whilst works could potentially disrupt feeding patterns, given the low levels of usage by SCI birds at the pipeline outfall location, availability of similar habitat in the surrounding area and the ability of birds to move away from temporary disturbance, construction of the pipeline will be a temporary impact in respect of noise and disturbance and no significant effect on bird species listed as SCIs for the Cork Harbour SPA will occur.

Over it has been concluded that given the scale and temporary nature of the works, the distances involved, existing disturbance factors and avoidance of works in key areas during the bird wintering period, no significant impacts are predicted to occur to the conservation objectives of Cork Harbour SPA as a result of noise or disturbance during construction.

8.3 Impacts on Water Quality during construction

A permanent marine outfall is proposed to discharge the treated effluent from the proposed WwTP in Ballytigeen TD to White Bay. The proposed outfall will extend approximately 295m beyond the high-water mark and will result in disturbance of marine substrates. Impacts on

aquatic habitats may also arise from pumped discharges of surface water from the works area or from overland flow from greenfield areas.

Two streams were recorded within the study area. Both flow into Cork Harbour. The Ardnabourkey Stream flows north in proximity to the R630. This stream is culverted three times under the R630 within 300m of the route. The SI information indicates that this watercourse crosses the road in the location shown below in 3 No. 600mm diameter concrete culverts. Based on the Ground Penetrating Radar (GPR), these culverts are at a depth of 1.8m and therefore the proposed rising main will cross over them, with no impact on the watercourse. The White Bay Stream flows from an area of woodland in a south westly direction towards White Bay. This stream will not be impacted by the proposed development and no effect on this stream will occur.

Potential impacts on aquatic habitats which can arise from this type of development include increased silt levels in surface water run-off, inadvertent spillages of hydrocarbons from fuel and hydraulic fluid. The duration and extent of the impact however is challenging to predict as it is influenced by many abiotic factors such as dilution, particle size, turbulence and tidal currents.

High levels of silt in surface water run-off from the storage areas, can impact in particular on fish species. If of sufficient severity, adult fish could theoretically be affected by increased silt levels as gills may become damaged by exposure to elevated suspended solids levels. If of sufficient severity, aquatic invertebrates may be smothered by excessive deposits of silt from suspended solids. In areas of stony substrate, silt deposits may result in a change in the macro-invertebrate species composition, favouring less diverse assemblages and impacting on sensitive species. Algal communities may also be affected by increased siltation. Submerged plants may be stunted and photosynthesis may be reduced.

Impacts on water quality could also impact on fish stocks which in turn could impact on populations of piscivorous birds. Reduced visibility may impact on feeding success for piscivorous birds.

Habitats which are estuarine in nature (estuaries, mudflats and sandflats etc.) are very unlikely to be affected. It is noted that due to the dilution provided in the marine environment and naturally fluctuating levels of silt impacts are only likely to arise from extremely severe levels of siltation. The risk of significant silt levels being generated is very low given the limited scope of the proposed development.

Inadvertent spillages of hydrocarbons during terrestrial construction works could introduce toxic chemicals into the aquatic environment via surface water run-off or groundwater contamination and have a direct toxicological impact on habitats and fauna. Given the robust nature of habitats within Cork Harbour SPA and the dilution provided in the marine environment, any impacts on water quality due to such minor spills during construction is considered negligible. Nonetheless as part of best practice environmental control measures will be employed during the construction phase of the development as part of the project.

During the construction of the outfall there will be temporary impact on marine habitats within White Bay Beach. The proposed outfall will be laid within White Bay Beach. The beach is bounded along its eastern boundary by a rocky sea cliff (CS1) habitat, however this habitat

will unaffected. The beach is a sheltered shore composed of mostly medium to fine-grained sand. Bedrock is exposed in places with Purple laver (*Porphyra umbilicalis*), Gut weed (*Ulva intestinalis*) and Bladder wrack (*Fucus vesiculosus*) recorded.

Mobilisation of marine sediments and increased tubidity levels will arise during works for the proposed outfall pipe. However the marine works will be located 2.9km from the closest point of the SPA (via a hydrological connection) at Curraghbinny Woods. Given the temporary nature and limited scope of the proposed works, the dilution provided in the marine environment and the limited potential for elevated turbididy/silt to impact on invertebrate populations in estuarine mudflats on which important bird populations feed, no impact on bird species listed as SCIs for the Cork Habour SPA has been identified.

8.4 Impacts on Water Quality during operation

A reduction in organic and nutrient loading to an estuary may have various consequences for the ecology of the estuarine system. For example, there could be a reduction in the abundance of benthic invertebrate prey species (Burton *et al.* 2001) particularly those invertebrates that thrive in organically-enriched sediments. This could have subsequent knock-on effects upon waterbird foraging distribution, prey intake rates, and ultimately upon survival and fitness. Given that sustained high levels of macroalgal growth is linked to organic enrichment, there is a potential for a reduction in macroalgal abundance as a result of improvements to sewage discharges. While exerting many influences upon the estuarine system, algal mats can have both negative and positive effects upon waterbird foraging ecology. Some waterbird species avoid them or may be negatively affected by lowered invertebrate abundances beneath them (Lewis & Kelly, 2001; Lopes *et al*. 2006) while on the other hand, herbivores such as Wigeon benefit from the algae being a source of food.

The populations dynamics of feeding birds within an estuary are complex and it is possible that the upgrade of the Whitegate-Aghada sewerage scheme may impact prey availability in estuarine muds and subsequently the distribution or density of wading birds within this European site. Lewis and Kelly (2012) have shown that the enrichment attributed to the Clonakilty WWTP within Clonakilty Bay SPA, coincided with particularly high abundances of the Ragworm *Hediste diversicolor*. This worm is a potential prey species for Black-tailed and Bar-tailed Godwit, Redshank, Curlew and Dunlin. Such implications have been noted previously (Burton *et al.* 2001) as have a reduction in bird numbers (Essink 1998 in Van der Kam *et al.* 2004).

Alves *et al.* (2011) explored the effects of untreated sewage discharges on the distribution and abundance of foraging Black-tailed Godwits and their main benthic prey (bivalves and polychaetes) on the Tejo estuary in Portugal, a major European Special Protection Area with ongoing wastewater improvements. Patches of mudflat in close proximity to sewage streams (<30m) can support polychaete densities and biomass that are an order of magnitude higher than more distant sites (>70m), and godwits foraging in these areas can attain the highest intake rates recorded for the estuary. However, they also found that high intake rates can also be attained on bivalve prey, and bivalve biomass and density increase slightly with distance from sewage streams. They concluded that as the organic input from sewage outfalls influences invertebrate abundance and godwit foraging rates over relatively small areas, the

ongoing implementation of a sewage treatment network on the estuary seemed likely to have only a limited impact on the wintering godwit population.

The localised effect of untreated sewage discharges on benthic communities suggests that the implications for predatory birds are relatively minor where alternative prey are available but may be more severe in locations with more depauperate, polychaete-dominated invertebrate communities.

"Good" water Quality status is required to meet Water Framework Directive objectives. However, it is possible that increases in water quality could result in decreased aquatic vegetation and/or invertebrate prey for SCI species. A balanced approach is needed to meet Irelands requirements, not only of the Habitats and Birds Directives, but also the Urban Wastewater Treatment Regulations and the Water Framework Directive. In the long-term, improvements in water quality in Cork Harbour will bring water quality in line with requirements of the Water Framework Directive as well as the Habitats Directive and Birds Directive and create a more sustainable ecosystem for QI's/SCI's. Therefore, considering the improvement of water quality is an important factor in maintaining the conservation objectives of Cork Harbour SPA, the operational phase of the proposed development will have a long-term positive impact on the conservation objectives of the SPA.

8.5 Spread of Invasive Species

There is potential during the construction phase of the proposed works for invasive species to be spread within the Cork Harbour SPA and negatively impact native species or habitats causing a decline or loss; or species that could impact either/both Natura 2000 sites and the goals of the WFD.

Japanese Knotweed was recorded growing in five distinct locations, two in close proximity to each other along the R630 and a vast stand adjacent to White Bay. Himalayan Knotweed was recorded at two locations. These sites are not located within or in immediate proximity to the Cork Harbour SPA and as detailed in the invasive species survey report in **Appendix D** (*Invasive Species Survey Untreated Agglomerations Study – Cork Project Aghada/Whitegate* (DixonBrosnan 2018) standard mitigation and hygiene measures will be implemented. Overall no impacts on the qualifying interests and conservation objectives for Natura 2000 sites from the spread of invasive species are predicted to occur.

8.6 Cumulative Impacts

Cumulative impacts refer to a series of individual impacts that may, in combination, produce a significant impact. The underlying intention of this in combination provision is to take account of cumulative impacts from existing or proposed plans and projects and these will often only occur over time.

The area surrounding the proposed development is also heavily populated with a mixture of residential estates and one-off dwellings including farmland. Wastewater is also discharged into Cork Harbour from several other settlements (e.g. Cork City, Carrigaline, Crosshaven, Ringaskiddy) and local industry.

There are a large number of active facilities and proposed developments within the Cork Harbour area which were taken into consideration as part of the assessment process. These include the following:

- ESB Aghada Power Station/BGE Power Station – Approximately 760m northeast of the proposed development is the ESB Power Station, at Whitegate.
- Bord Gáis Eireann (BGE) Power Station Whitegate - Approximately 1.13kmm from the proposed development site
- Cork Lower Harbour Main Drainage Scheme - Irish Water has completed construction of a new municipal sewage treatment plant at Shanbally, Ringaskiddy, for the Cork Lower Harbour Main Drainage Scheme. The plant has been operational since December 2016.
- Haulbowline Island Remediation Project, – The Ispat steel manufacturing facility, located adjacent to the naval base on Haulbowline Island, ceased operation in 2001 and the buildings on the site have been demolished. Remediation works are complete and plans are currently being progressed to open the park once a lease has been finalised.
- Spike Island – there is a masterplan in place since 2012 but no planned/permitted projects. Increased boat traffic to Spike Island and increased activity on the island, which could potentially impact on bird populations.
- Residential Developments
- Ferry and Cruise Ship Business.

As part of the proposed development a Water Quality impact assessment was carried out by Arup Consulting Engineers (see *Irish Water Cork UTAS Whitegate Aghada Far Field Modelling* (Arup 2020)). This report in included in **Appendix G** of this NIS. This report determined background concentrations of the modelled water quality parameters by including coliform/nutrient discharges from three separate sources:

- All relevant WWTP and industrial outfalls in Cork Harbour;
- Primary rivers that flow into the Cork Harbour;
- Open sea boundary.

Table 21 (**Appendix F**) of this report presents the flow rates and concentrations for all discharges included in the model.

In the context of the EU water quality regulations, the predicted increase of WWTP hydraulic loads for these future scenarios do not lead to an exceedance of the relevant environmental quality standard (EQS) thresholds at any of the monitoring points.

In the absence of any significant impact associated with this project no cumulative impacts on water quality have been identified. Similarly, no significant cumulative impacts in relation to noise and disturbance or spread of invasive species have been identified.

9 Mitigation measures

The proposed mitigation measures will function effectively. The mitigation measures have been drawn up in line with current best practice and include an avoidance of sensitive habitats at the design stage and mitigation measures will function effectively in preventing significant ecological impacts. The following mitigation measures will be implemented:

Construction measures – guidelines

- All personnel involved with the project will receive an on-site induction relating to operations and the environmentally sensitive nature of European sites and to re-emphasize the precautions that are required as well as the precautionary measures to be implemented. All staff and subcontractors have the responsibility to:
    - Work to agreed plans, methods and procedures to eliminate and minimise environmental impacts,
    - Understand the importance of avoiding pollution on-site, including noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact;
    - Respond in the event of an incident to avoid or limit environmental impact;
    - Report all incidents immediately to their line manager;
    - Monitor the work place for potential environmental risks and alert the immediate line manager if any are observed; and
    - Co-operate as required, with site inspections.
- A construction environmental management plan (CEMP) has been prepared and will be implemented during site works This CEMP, which will be further developed by the Contractor, prior to construction, specifies the mitigation measures to be implemented and is included as part of the planning application for the proposed development. A copy of the CEMP is included in **Appendix G**. The key mitigation measures included in the plan are detailed below.
- The supervising ecologist who will be employed by the contractor will liaise with the contractor and will be responsible for dealing with any specific ecological issues which may arise during the works and liaising with statutory bodies if required.

Construction works – water quality

The employment of good construction management practices will minimise the risk of pollution of soil, storm water run-off, river water or groundwater. The Construction Industry Research and Information Association (CIRIA) in the UK has issued a guidance note on the control and management of water pollution from construction sites, *Control of Water Pollution from Construction Sites, guidance for consultants and contractors* (Masters-Williams et al 2001). Key measures to be employed are outlined below:

- Hazardous material will be bunded to be able to contain 110% volume to guard against potential accidental spills.
- Works will not be undertaken during periods of heavy rainfall.
- Wash down and washout of concrete transporting vehicles will not be permitted at the location of construction. Such wash down and washout activities will take place at an appropriate facility offsite or at the location where concrete was sourced.
- Spill kits are retained to ensure that all spillages or leakages are dealt with immediately and staff are trained in their proper use. Any such spills, in the unlikely event of their occurrence would be minor.

- The working area used during construction will be clearly outlined prior to the commencement of works and will be kept to the minimum area necessary to effectively complete the works. Vegetation will be retained where possible.
- All site personnel will be trained and aware of the appropriate action in the event of an emergency, such as the spillage of potentially polluting substances. In the event of spillage of any polluting substance and/or pollution of a watercourse, Cork County Council, Inland Fisheries Ireland and the NPWS shall be notified.
- All personnel involved with the project will receive an on-site induction relating to operations and the environmentally sensitive nature of the Cork Harbour SPA and re-emphasise the precautions that are required as well as the mitigation to be implemented.
- A silt fence will be installed downgradient of the site works in green field areas and the Cork Harbour SPA during construction. The use of Terrastop Premium Silt Fence (or similar) will provide effective protection during construction works.
- It is possible that there will be some surface water or ground water ingress into excavations. Any pumping from the works area should discharge to a green vegetated area to allow for settlement of suspended solids or via silt mitigation measures (i.e. Silt settlement tank discharging through a silt sock or settlement lagoon with silt fence) as appropriate where no green area is available. The chosen methodology will be inspected by the supervising ecologist.
- Vehicles used on site will be inspected on a daily basis to ensure there are no minor leaks of hydrocarbons. All site personnel will be trained and aware of the appropriate action in the event of an emergency, such as the spillage of potentially polluting substances.
- All site personnel will be trained and aware of the appropriate action in the event of an emergency, such as the spillage of potentially polluting substances. Spill kits will be retained to ensure that all spillages or leakages are dealt with immediately and staff are trained in their proper use.

- Concrete pouring will not take place during heavy rain when run off is likely due to excess water. Shuttering will be designed to accommodate small increases in the volume of material contained within the shuttered area due to rainfall.

- Wash down and washout of concrete transporting vehicles will not be permitted at the location of construction. Such wash down and washout activities will take place at an appropriate facility offsite or at the location where concrete was sourced.

Construction works – storage and waste

- Oil, petrol and other fuel containers will be double-skinned and bunded to be able to contain 110% volume to guard against potential accidental spills or leakages entering local watercourses linked to the European sites. Bund specification will conform to the current best practice for oil storage such as Enterprise Irelands Best Practice Guidelines. Construction materials will be stored in a secure compound to prevent the potential for vandalism and theft of material.

- Dedicated fuel storage areas will be introduced on-site or fuelling should take place offsite.

Construction works – Ecology

- Works will primarily take place during hours of daylight to minimise disturbance to any roosting birds or feeding nocturnal mammal species.

Construction works – noise

- Best practice noise and vibration control measures will be employed by the contractor. The best practice measures set out in BS 5228 (2009) Parts 1 and 2 will be complied with. This includes guidance on several aspects of construction site environmental measures, including, but not limited to the following:

    - The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected.

    - If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control “at source”. This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

    - Mobile plant will be switched off when not in use and will not be left idling.

    - All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Bird Mitigation Measures

- As detailed in **Section 8.2**, works in close proximity to the Cork Harbour SPA will avoid the wintering bird season (September to March) as indicated in **Figure 5**. This will minimise the disturbance to any wintering/migratory bird species utilising the harbour during this period. During operation there will not be a significant increase in noise or activity associated with the development.

- Hoarding will be required between the works area and the adjoining shoreline habitats at the proposed WWPS at Lower Aghada and Rostellan PS during works during the summer period as this area is used by feeding birds during the summer months.

Invasive species

- Measures for dealing with invasive species are outlined in the invasive species report Invasive Species Survey Untreated Agglomerations Study – Cork Project (Aghada/Whitegate, DixonBrosnan 2019). It noted that management of invasive species must be based on up to date data at the time of construction, by an invasive species specialist. The methodology to be employed by the contractor can then be ascertained and implemented via an up to date, site specific invasive species management plan. Due to potential disturbance, Japanese Knotweed distribution will have changed by the time construction commences. A pre-construction invasive species survey will ensure up to date data is available. The method for the elimination of Japanese knotweed within the works area and measures to prevent the spread of invasive species outside the works area will be implemented with reference to the relevant codes of practice and guidelines: Best Practice Management Guidelines – Invasive Species Ireland (Maguire *et al*. 2008), NRA (2010) and EA (2007) Managing Japanese Knotweed on Development Sites: The Knotweed Code of Practice and Irish Waters Japanese Knotweed Guidance (IW-AMT-SOP_009).

10 Conclusions

The only European site for which potential significant impacts have been identified, is the Cork Harbour SPA. It is noted that no potential negative impacts during operation have been identified and that works will result in an improvement in water quality.

A range of mitigation measures have been incorporated into the project design, and other mitigation measures have been developed and proposed for the construction stage, with the purpose of avoiding or minimising impacts on the qualifying interests and conservation objectives of the Cork Harbour SPA. No difficulties in the effective implementation of these measures was identified.

The provisions of Article 6 of the 'Habitats' Directive 92/43/EC (2000) defines 'integrity' as the 'coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and / or population of species for which the site is or will be classified'. *The draft documents Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (Draft)* (EC, 2015) states that the integrity of the site can be usefully defined as the coherent sum of the site's ecological structure, function and ecological

processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated”

Following a comprehensive evaluation of the potential direct, indirect and cumulative impacts on the qualifying interests and conservation objectives for the Cork Harbour SPA, it has been concluded by the authors of this NIS that the proposed development on its own and in combination with other plans or projects will not have an adverse effect on the integrity of the Cork Harbour SPA or any other Natura 2000 sites. Cork County Council, as the competent authority, will make the final determination in this regard.

11 Reference list

Alves, J. A., W. J. Sutherland J. A. Gill (2011). Will improving wastewater treatment impact shorebirds? Effects of sewage discharges on estuarine invertebrates and birds. Animal Conservation Volume15, Issue1

Burton, N.H.K., Maskell, J.M., Armitage, M.J.S, Hutchings, C.J., Rehfisch, M.M. (2001). Effects of Reductions in Organic and Nutrient Loading on Bird Populations in Estuaries and Coastal Waters of England and Wales. Interim Report. British Trust for Ornithology, The Nunnery, Thetford, Norfolk.

BWPi (2004) Birds of the Western Palearctic Interactive. BirdGuides Ltd. 2004.

Crowe, O. (2005). Ireland's Wetlands and their Waterbirds: Status and Distribution. BirdWatch

Cutts, N, K Hemingway & J Spencer (2013) Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning & Construction Projects

Delaney, S., Scott, D., Dodman, T. & Stroud, D. (2009) (eds) An atlas of wader populations in Africa and Western Eurasia. Wetlands International, Wageningen, The Netherlands.

Environmental Protection Agency Ireland (http://www.epa.ie/)

Fossitt, J. A. (2000). A Guide to Habitats in Ireland. The Heritage Council of Ireland Series

Invasivespecies Ireland (http://invasivespeciesireland.com/)

Ireland, Newcastle, Co. Wicklow.

Lewis, L. J., & Kelly, T. C. (2012). Aspects of the spatial ecology of waders along an estuarine gradient. Irish Birds, 9, 375-384.

National Biodiversity Data Centre (http://www.biodiversityireland.ie/)

National Parks and Wildlife Service website (www.npws.ie)

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland

NPWS (2014) Cork HArbour Special Protection Area (Site Code 4030) Conservation Objectives Supporting Document VERSION 1.

O'Mahony, B. & Smiddy, P. (2017). Breeding of the Common Tern Sterna hirundo in Cork Harbour, 1983-2017. Irish Birds, 10, 535–540.

Van de Kam, J., Ens, B., Piersma, T. & Zwarts, L. 2004. Shorebirds: An illustrated behavioural ecology. KNNV Publishers, Utrecht, The Netherlands

Wernham, V. V., Toms, M. P., Marchant, J. H., Clark, J. A., Siriwardena, G. M. & Baillie, S. R. (eds)(2002) The Migration Atlas: movements of birds of Britain and Ireland. T & A D Poyser. London.