

Ringsend Wastewater Treatment Plant Upgrade Project



TJ O'CONNOR
& ASSOCIATES
CONSULTING ENGINEERS

BARRY
& PARTNERS
consulting engineers

 **Royal
HaskoningDHV**
Enhancing Society Together

Appropriate Assessment Screening and Natura Impact Statement

June 2018



RINGSEND WASTEWATER TREATMENT PLANT UPGRADE

PROVISION OF INFORMATION FOR HABITATS DIRECTIVE ASSESSMENTS

STAGE 1: SCREENING FOR APPROPRIATE ASSESSMENT

STAGE 2: NATURA IMPACT STATEMENT

May 2018



Contents

1.	INTRODUCTION	1
1.1.	Background	1
1.2.	Legislative context	1
1.3.	The Stages in the Appropriate Assessment process	2
1.4.	Guidance	3
1.5.	Authors' qualification and expertise	4
2.	ADOPTED METHODOLOGY AND INFORMATION COLLECTED	5
2.1.	Methodology	5
2.2.	Information collected	6
2.3.	Consultations	7
2.4.	Relationship between the Proposed Upgrade Project and other Plans and Projects	7
3.	STAGE 1: SCREENING FOR APPROPRIATE ASSESSMENT	9
3.1.	Description of the Proposed Upgrade Project	9
3.2.	Determination of Zone of Influence	10
3.3.	Description of the European Sites	12
3.4.	Assessment of Likely Effects	13
3.5.	Screening Conclusion	22
4.	STAGE 2: NATURA IMPACT STATEMENT	23
4.1.	Introduction	23
4.2.	Project Description	23
4.3.	Assessment of Impacts	25
4.4.	European Sites	26
4.5.	Identification and Appraisal of Impacts on European Sites	30
5.	MITIGATION MEASURES	42
5.1.	Direct effects on South Dublin Bay and River Tolka Estuary SPA	42
5.2.	Indirect effects on South Dublin Bay and River Tolka Estuary SPA	42
6.	MONITORING	43
6.1.	Monitoring for disturbance to waterbirds	43
6.2.	Monitoring of potential changes in waterbird related to effluent discharge	43
6.3.	Monitoring of invasive plant species	43
7.	CONCLUDING STATEMENT	44
8.	REFERENCES	45
	APPENDIX 1: Brief descriptions of the European sites	48
	APPENDIX 2: Existing Outfall Dissolved Inorganic Nitrogen	55
	APPENDIX 3: Site Location and extent of Ringsend WwTP Component	58

1. INTRODUCTION

1.1. Background

Irish Water (The Applicant) is seeking permission from An Bord Pleanála (ABP), pursuant to Section 37A of the Planning & Development Act 2000, as amended, for development comprising two principal components. These are: -

- Revised Upgrade works at the existing Wastewater Treatment Plant (WwTP) at Ringsend, Dublin 4 - referred to throughout this report as the “Ringsend WwTP Component”; and,
- The provision of a Regional Biosolids Storage Facility (RBSF) at Newtown, North Road, Dublin 11 - referred throughout this report as the “RBSF Component”.

These two Components combine to form the development that is the subject of this assessment - referred to throughout this report as the “**Proposed Upgrade Project**”. Further details regarding the planning application and Proposed Development are available in the Planning Application Report submitted as part of this application.

This Appropriate Assessment Screening report and Natura Impact Statement accompanies the planning application, with the purpose of providing the information required to enable the Competent Authority (ABP) to undertake an Appropriate Assessment of the Proposed Upgrade Project in accordance with the requirements as set out under Article 6(3) of the Habitats Directive (92/42/EEC). That is to determine whether aspects of the Proposed Upgrade Project have the potential to result in significant adverse effects on the qualifying interests or on the conservation objectives of Natura 2000 sites as described under the Directive

In that regard it provides a focused assessment of the likely effects, if any, of the Proposed Upgrade Project on the Natura 2000 sites (Special Areas of Conservation (SAC) and Special Protection Areas (SPA), referred to in Irish Legislation as European sites) in Dublin Bay and neighbouring coasts.

1.2. Legislative context

European sites are protected at a European level by the EU Habitats Directive (92/43/EEC) and the EU Birds Directive (79/409/EEC) amended in 2009 as the Directive 2009/147/EC. These Directives have been transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No 477 of 2011).

Under these Directives and Acts, European sites are designated to legally protect faunal and floral species and important/vulnerable habitats. The categories of designation are as follows;

- Candidate Special Areas of Conservation (SAC) are designated under the EU Habitats Directive (92/43/EEC) which are transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No 477 of 2011).
- Special Protection Areas (SPAs) are designated under the EU Birds Directive (79/409/EEC) amended in 2009 as the Directive 2009/147/EC.

These SACs and SPAs are considered to be of international importance.

Under Article 3 of the EU Habitats Directive “*a coherent European network of special areas of conservation shall be set up under the title Natura 2000*” and “*the Natura 2000 network shall include special protection areas classified by the Member States pursuant to Directive 79/409/EEC*”. In an Irish context, these Natura 2000 sites (referred to as European sites) include only SACs and SPAs.

Article 6(3), paragraph 3 of the EU Habitats Directive 92/43/EEC states that:

Any plan or project not directly connected with or necessary to the management of the 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. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

Under Article 6(3) of the EU Habitats Directive (92/43/EEC), (which is given effect in Ireland by Part XAB of the Planning and Development Act 2000) any plan or project, which is not necessary to the management of a European site and has the potential to significantly affect the integrity of a European Site (i.e. SAC or SPA) or have a significant effect on the conservation objectives of the site, must be subject to an Appropriate Assessment. The integrity of a site can be regarded as the coherence of ecological structure and function, across the entirety of a site, which enables it to sustain all the ecological resources for which it has been valued.

The main conservation objective of all the Special Areas of Conservation is “to maintain or restore the favourable conservation condition of the Annex I habitat(s) and /or the Annex II species for which the SAC has been selected”.

The main conservation objective of the Special Protection Areas is “to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for the SPA”.

The favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which 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 dynamics data on the species concerned indicate that it is maintaining itself on a long - term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is 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 statutory agency responsible for European sites in Ireland is the National Parks and Wildlife Service of the Department of Culture, Heritage and the Gaeltacht. Guidelines were issued by the Department of Environment, Heritage and Local Government in 2009 and revised in 2010.

1.3. The Stages in the Appropriate Assessment process

There are four stages in the Appropriate Assessment process as outlined in the document *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities* (2010). The following is a summary of these steps;

1.3.1. Stage 1 – Screening for Appropriate Assessment:

Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3) of the EU Habitats Directive and Section 177U of the Planning and Development Act 2000:

- i) whether a project is directly connected to or necessary for the management of the European site;
- ii) whether a project, alone or in combination with other plans and projects is likely to have significant effects on a European site in view of its conservation objectives.

Where it is likely that a plan or project will have significant effects on a site, or where it is uncertain whether there will be significant effects, then a stage 2 Appropriate Assessment is required.

1.3.2. Stage 2 - Appropriate Assessment:

This stage considers whether the project, alone or in combination with other projects or plans, including mitigation measures will have adverse effects on the integrity of a European site, and includes mitigation measures. The proponent of the project is required to submit a Natura Impact Statement to identify and characterise any possible implications for a European site in view of the site's Conservation Objectives, taking account of in-combination effects. To grant planning permission, the Board must have determined that the proposed development would not adversely affect the integrity of the European site if carried out with the consent and the modifications or conditions attaching thereto.

1.3.3. Stage 3 - Assessment of Alternative Solutions:

Should the Appropriate Assessment determine that adverse impacts are likely upon a European site, this stage examines alternative ways of implementing the project that, where possible, avoid these adverse impacts. The alternative can be permitted either through modifications to the existing planning application or a new application.

1.3.4. Stage 4 - Assessment where no alternative solutions exist and where adverse impacts remain:

This stage examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a project that will have adverse effects on the integrity of a European site to proceed in cases where it has been established that no less damaging alternative solution exists. Replacement measures must be proposed and assessed at this stage.

1.4. Guidance

This Appropriate Assessment Screening Report and Natura Impact Statement has been prepared in accordance with the following guidance documents where relevant:

- *Assessment of Plans and Projects significantly affecting Natura 2000 Sites*: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission, 2001.
- *Managing Natura 2000 Sites*: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC, European Commission, 2000.

- *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities.* National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government. Dublin, 2009 (with revision notes published in February 2010).
- *Note on Appropriate Assessments for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007), as amended.* Environmental Protection Agency, 2012.

1.5. Authors' qualification and expertise

This Natura Impact Assessment Report (NIS) has been prepared on behalf of the Applicant by Richard Nairn of Natura Consultants in association with Ben Huskinson of JB Barry and Partners.

Richard Nairn BA (Mod) MA (Natural Sciences) MSc (Zoology) CEnv FIEEM MIBiol is a Senior Environmental Scientist and the Managing Director of Natura. He is a Chartered Environmentalist and Fellow of the Chartered Institute of Ecology and Environmental Management. He has a comprehensive knowledge of ecology and survey methodology as well as nature conservation and environmental management in Ireland. In the 1970s he worked as a nature reserve warden with the National Trust (Northern Ireland) and in the 1980s he was National Director of IWC BirdWatch Ireland. Since 1990 he has specialised in Environmental Impact Assessment for a variety of developments including roads, pipelines, port developments, sewage treatment works and industrial developments.

Richard has also been commissioned to undertake several major planning studies in relation to the use of the natural environment. These include management plans for two National Parks, a Coastal Zone Management Policy for Ireland, environmental appraisals of the south-east and south-west coasts of Ireland and a Management Plan for the Skelligs SPA.

He was the editor of the publication Status of EU Protected Habitats and Species in Ireland (National Parks and Wildlife Service 2008). He prepared the Guidelines for Assessment of the Ecological Impacts of National Road Schemes for the Irish National Roads Authority and Ecology Guidelines for Electricity Transmission Projects for EirGrid. He is an experienced writer and photographer and has published extensively in the scientific literature. He is author of two books: *Wild Wicklow* (1998) and *Ireland's Coastline* (2005) and co-editor, with Professor John O'Halloran, of *Bird Habitats in Ireland* (2012).

Ben Huskinson is a Senior Environmental Consultant with JB Barry & Partners. He holds a Bachelor (Hons.) Degree in Environmental Science from University College Cork and a Diploma in Planning and Environmental Law from the Law Society of Ireland. He is also a Chartered Environmentalist (CEnv) with the Society for the Environment (Soc Env) and a Full Member of the Institute of Environmental Sciences (MIEnv.Sc). He has worked in environmental consultancy for over eleven years and is a highly experienced consultant, specialising in Environmental Assessments of medium to large scale infrastructural projects and in the coordination and management of Appropriate Assessment and Environmental Impact Assessment processes.

2. ADOPTED METHODOLOGY AND INFORMATION COLLECTED

This section provides detail on the adopted methodology and the information gathered to inform the overall assessment process.

The information for the purposes of informing Stage 1 (Screening) of the AA Process presented in Section 3 of this document. Sections 4- 7 provide the information to inform the Stage 2 of the Appropriate Assessment.

2.1. Methodology

This Screening Statement and Natura Impact Statement has been prepared in accordance with relevant guidance document listed in Section 1.3 above.

2.1.1. Screening for appropriate Assessment

Screening for Appropriate Assessment involves the following:

- Determining whether a project or plan is directly connected with or necessary to the conservation management of any European Site.
- Description of plan or project and determination of the spatial extent of the impacts that may be associated with project ('zone of influence').
- Identification of relevant European sites, and compilation of information on their qualifying interests and conservation objectives
- Assessment of the potential of likely effects of the proposed project on relevant European sites.

The assessment includes direct, indirect and in-combination effects – which is based on available information such as a desk studies, consultation with statutory and non-statutory authorities, field surveys and other primary research as necessary. Screening is undertaken without the consideration of mitigation measures, unless potential impacts can clearly be avoided through modification or redesign of the project.

If, on the basis of objective information provided at Stage 1, the Competent Authority cannot exclude that the proposed development will have a significant effect on a European Site then it must determine that a Stage 2 Appropriate Assessment be undertaken for the Proposed Upgrade Project.

2.1.2. Appropriate Assessment

Aspects of the proposed project or plan that, either individually or in combination with other plans or projects, have the potential to adversely affect the integrity of European sites must be examined with respect to the specific conservation objectives of the relevant European sites.

This is a process focused on the potential for the proposed development to impact on the conservation objectives of European sites and determine the proposed development would impact on the integrity of European sites.

Therefore, this stage involves the collection of information which is specifically relevant to determining this, including:

- Describing the details of the project/plan proposals and other plans or projects that may in-combination affect any European sites;

- Describing the characteristics of relevant European sites including in particular their conservation objectives and an understanding of current factors which either maintain or threaten those conservation objectives; and
- Assessing aspects of the proposed development which could negatively impact the conservation objectives and integrity of European sites

2.2. Information collected

The information gathered for the purposes of this report was based on a desktop study, field surveys and consultation with statutory and non-statutory organisations. This is detailed as follows:

2.2.1. Desk Study

A desk study was carried out to collate available information on the Proposed Upgrade Project and the existing ecological environment. The following sources of information were accessed:

Environmental Impact Assessment Report

This report has been informed by the Environmental Impact Assessment Report (EIAR) prepared for the planning application. The EIAR contains a detailed description of the Proposed Upgrade Project, together with an assessment of the potential impacts that may be associated with the scheme. Of particular relevance to this report are the following sections of the EIAR:

- Volume 2, Section 3 – EIAR Proposed Development
- Volume 2 Section 4 – Consideration of Alternatives
- Volume 3 Section 4 – Water
- Volume 3 Section 5 – Biodiversity Marine
- Volume 3 Section 6 – Biodiversity Terrestrial
- Volume 3 Section 8 – Air and Climate
- Volume 3 Section 9 – Noise and Vibration
- Volume 3 Section 13 – Traffic
- Volume 3 Section 19 – Cumulative Impacts
- Volume 4 Section 4 - Water

Qualifying Sites and Conservation Objectives

The National Parks and Wildlife Service (NPWS) database was consulted concerning all European sites, their Conservation Objectives and any supporting documents for these objectives.

Available Survey Data, Bird Counts and relevant Scientific Literature

Count data from the Irish Wetland Bird Survey (I-WeBS) was used to inform the AA process. I-WeBS waterbird data for Dublin Bay is based on counts carried out at the higher stages of the tide, when waders concentrate towards, and at, high tide roosting areas. The most recent I-WeBS data available is for the winter of 2013/14. Low tide count data, giving information on the feeding distribution of waders and other waterbirds, are summarized in the supporting documents for the Special Protection Areas in Dublin Bay. This information was gathered from the Waterbird Survey Programme of 2011/12 (NPWS, 2014). Data was also analysed from the Dublin Bay Birds Project carried out by BirdWatch Ireland with support from Dublin Port Company. This collected data on low tide and high tide numbers and distribution of all waterbirds in Dublin Bay in all months of the year from July 2013 to June 2016 (Tierney *et al.* 2017, Berrow *et al.* 2014, Rogan and Berrow 1996 and MERC 2012a, 2012b).

2.2.2. Field Surveys for this Assessment

Field surveys of the habitats on the construction site and immediate surrounds were undertaken in 2015 and 2016 to describe and evaluate the terrestrial habitats (including flora and fauna). Information from previous Environmental Impact Assessments, where available, was taken into account in this assessment (Dublin City Council 2012). Terrestrial flora and habitats at proposed construction sites and in their vicinity were surveyed, and previous records of birds on these habitats were reviewed.

Habitat surveys of the proposed RBSF site at Newtown, Dublin 11 were completed in September 2017, together with surveys of birds, large mammals and bats. A biological survey of the small stream that borders the site was undertaken in December 2017 (McGarrigle, 2018). A breeding bird survey of the RBSF site was undertaken in May 2018.

2.3. Consultations

The National Parks and Wildlife Service (NPWS) have been formally consulted on the Proposed Upgrade Project (Consultation Reference Gpre00088/2016). As part of the consultation process, a meeting was held with the NPWS on the 30th November 2017)

At the meeting, the Proposed Upgrade was discussed, focusing on issues of relevance to the Ringsend WwTP Component and the RBSF Component. This included:

- Discussion about ESB cable works within the SPA Grassland to the south of the site.
- Existing and water quality within Dublin Bay
- Current Status, program, and construction phase of the Ringsend WwTP Component
- Regional Biosolid Storage Facility – location with respect to designated conservation areas.
- Ongoing Environmental Assessments, Impact Avoidance & Mitigation measures that have been undertaken as part of the planning and assessment of the Proposed Upgrade Project.

2.4. Relationship between the Proposed Upgrade Project and other Plans and Projects.

Article 6(3) of the Habitats Directive requires that in-combination effects of the project with other plans or projects are considered in an Appropriate Assessment. As the underlying intention of the in-combination provision is to take account of cumulative effects, and as these effects often only occur over time, plans or projects that are completed, approved but uncompleted, or proposed (but not yet approved) should be considered in this context (Department of Environment, Heritage and Local Government, 2010).

The Proposed Upgrade Project sits within and under other strategic plans that influence development in the local and wider area and therefore will be developed alongside other policies and objectives contained therein. The assessment identifies relationships with the following other plans, projects and studies:

- National Planning Framework
- Dublin City Council Development Plan 2016 – 2022
- Local Framework - Ringsend Wastewater Treatment Facility
- Draft Dublin Port Masterplan 2040
- Fingal County Council Development Plan 2017-2023
- Dublin Waste to Energy - ABP Reg. Ref. PL29S.EF2022;
- West of the Waste to Energy Site (ESB) – Reg. Ref. 2234/17;
- Alexandra Basin Redevelopment - ABP Reg. Ref. PL29N.PA0034 ;
- ESB Site Poolbeg Power Station, Pigeon House Road, Ringsend, Dublin 4;

- National Oil Reserves Agency, Reg. Ref. 2656/16;
- Poolbeg SDZ (Currently on Appeal to An Bord Pleanála).
- Greater Dublin Drainage Project (currently pre-planning)

The potential for 'in-combination' effects of the Proposed Upgrade Project with the plans, projects and studies listed above, on European sites as a result of the implementation of the Proposed Upgrade Project has been considered in this report.

3. STAGE 1: SCREENING FOR APPROPRIATE ASSESSMENT

3.1. Description of the Proposed Upgrade Project

For the purposes of this screening assessment, the description of the Proposed Upgrade Project has been informed by Volume 2, Section 3 of the Environmental Impact Assessment Report (EIAR) that accompanies this report in the planning application.

The Proposed Upgrade Project comprises of two principal components:

- **Ringsend WwTP:** Revised Upgrade works at the Ringsend WwTP; and,
- **RBSF:** A Regional Biosolids Storage Facility at Newtown, North Road, Dublin 11.

Maps showing the location of both components are provided in Appendix 3 to this Report.

3.1.1. Ringsend WwTP

The proposed works to be carried out by Irish Water at the Ringsend WwTP comprises revisions to the 2012 Approval. The works will continue to facilitate the expansion of the existing wastewater treatment plant, within the confines of its current site, to its eventual design capacity of 2.4 million population equivalent, as permitted in the 2012 Approval. However, this will now be achieved primarily through the introduction of aerobic granular sludge (AGS) technology within the plant. The introduction of this technology will facilitate the continued use of the existing outfall whilst still adhering to the parameters set by the Urban Waste Water Treatment Directive. Therefore, the 9 kilometre Long Sea Outfall Tunnel (LSOT), associated onshore inlet shaft and construction compound will be omitted.

The following additional development works are now proposed at the Ringsend WwTP:

- Reconfiguration and retrofitting of the existing Sequencing Batch Reactor (SBR) Tanks, up to 24no. in total, to facilitate the use of a new AGS technology; and
- Associated works including provision of:
 - Phosphorus Recovery Facility
 - Sludge Pasteurisation Building
 - Treated effluent emergency/maintenance by-pass culvert
 - Temporary access road off Pigeon House Road and temporary bund removal to be made permanent
 - Ancillary site development, including connection to ESB Cable and landscape works.
 - A new underground electrical connection to an existing underground ESB cable, along the southern boundary of the site (at the south west corner only) and at the edge of and extending to within the South Dublin Bay and River Tolka Estuary SPA.

It is also proposed to include two construction compounds, previously approved in January 2018 (ABP Ref 29N.YM0004) as part of the Upgrade Project, thereby extending the duration of their approved temporary use from 3 years to 10 years. The third compound approved as part of that application will not be required beyond the 3 year planning lifetime and therefore, is not included in the present planning application. However, this third compound has been included within the scope of this assessment.

3.1.2. Regional Biosolid Storage Facility

The RBSF, which forms part of the Proposed Development, is an 11 Ha site at Newtown, Dublin 11 and will include the following elements:

- Demolition of existing buildings and some site infrastructure;
- 2 no. biosolids storage buildings, including solar panels on the roof of one building;
- Administration and welfare building with staff parking;
- Internal roads;
- 2 no. weighbridges;
- HGV parking area;
- HGV cleaning area;
- Odour control units with ventilation stacks;
- Site services, including electricity supply substation;
- Landscaping and site boundary treatment;
- Use of the existing vehicular access off the R135 regional road.

3.2. Determination of Zone of Influence

There is no set recommended distance from a proposal for which European sites should be considered for inclusion in the assessment. The DoEHLG guidance (NPWS, 2010) recommends that *'the distance should be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects'*.

A Source-Pathway-Receptor model has been used to determine the spatial extent to which the Proposed Upgrade Project may result in the rise of significant effects. For screening purposes the presence of the following are required:

- 'Source' of impact – in this case, activities or emissions that may be associated with the construction and operation of the Proposed Upgrade Project.
- 'Receptor' - European sites or their qualifying interests,
- A Pathway between the source and the receptor (e.g. waterbodies connecting the Proposed Upgrade Project to a European site).

The presence of a pathway does not automatically mean that significant effects will arise. The likelihood for significant effects will depend upon the characteristics and relationship between all three elements.

The zone of influence has been informed by examination of the Environmental Impact Assessment Report that accompanies this report and the NPWS data and maps on European Sites. Objective information, such as the outputs of the water quality models and operational noise models have been used where available. Where there is a degree of uncertainty regarding the extent of a potential impact (for example construction noise), then a conservative or pre-cautionary estimate or buffer has been placed around the project.

For the purposes of this assessment, the determination of the zone of influence has been determined for each component prior to determination on an overall project basis.

3.2.1. Ringsend WwTP Component

The zone of influence of the Ringsend WwTP Component of the Proposed Upgrade Project is presented in Figure 1 and has been determined by:

- Water quality Models that represents the predicted Water Quality_depth - average_concentration 50% Quartile for Dissolved Inorganic Nitrogen (DIN). Maps of the modelled output are presented in Appendix 2 to this report.
- Construction Noise - based on a typical daytime background noise levels measured and the expected noise levels from the site works, under certain conditions, it is estimated that construction may be audible at up to 2.5km distance from the site.
- A conservative 10km buffer has been employed to cater for all other identified potential impacts.

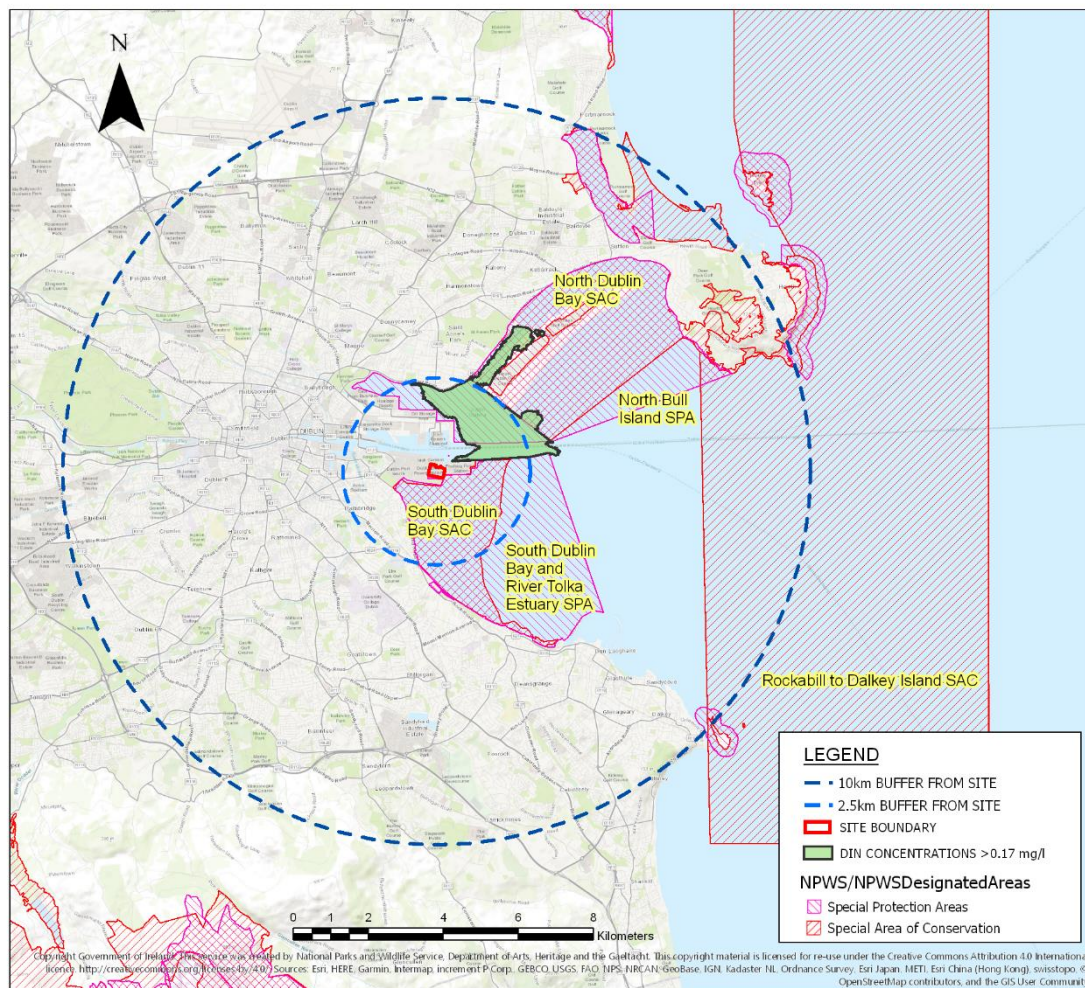


Figure 1: Zone of influence of the proposed WwTP Component and European site boundaries

3.2.2. Regional Biosolid Storage Facility

The zone of influence of the Ringsend WwTP Component of the Proposed Upgrade Project is presented in Figure 2 below and has been determined by:

- Potential Pathway from the proposed RBSF Component to the Broadmeadow Estuary SAC via the surface water network.
- Traffic between the GDD and Ringsend WwTP
- A conservative 10km buffer has been employed to cater for all other identified potential impacts.

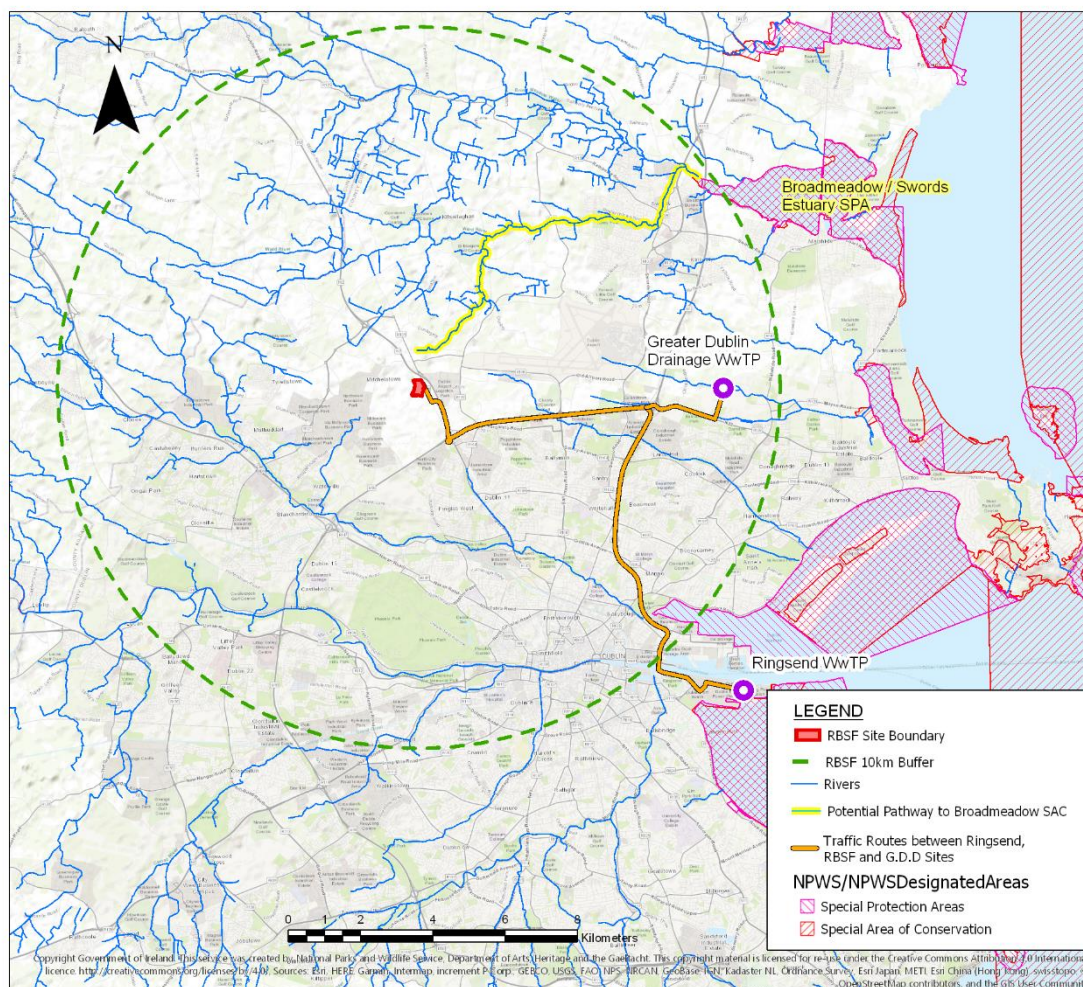


Figure 2: Zone of influence of the proposed WwTP Component and European site boundaries

3.3. Description of the European Sites

This section identifies the European sites within the zone of influence of the Ringsend WwTP Component and the RBSF Component of the Proposed Upgrade Project. The two Components have been screened separately as they are geographically separate and present different potential impacts on the same European sites. Subsequently they have been screened for in-combination impacts.

3.3.1. Ringsend WwTP COMPONENT

There are eight European sites which are either within 10km of the Ringsend WwTP or within the potential zone of influence from the WwTP outfall, which need to be considered in this report. The potential pathways arise because of the discharge of treated effluent to the waters of Dublin Bay (see Figure 1). This screening report evaluates whether there is potential for effects of the Proposed Upgrade Project. All of these European sites are located, either wholly or partly within Dublin Bay, the seaward limit of which is defined by a line between the Baily at Howth Head and Dalkey Island. These are:

- South Dublin Bay and River Tolka Estuary SPA (site code 004024)
- South Dublin Bay SAC (000210)
- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- Howth Head Coast SPA (004113)

- Howth Head SAC (000202)
- Dalkey Islands SPA (004172)
- Rockabill to Dalkey Island SAC (003000)

These are shown in Figure 1. Their locations in relation to the outfall are shown on Figure 2. The qualifying interests for each site are provided in Table 1. The site synopses and full versions of the Conservation Objectives for each of the European sites can be found on the NPWS website at: <http://www.npws.ie/protectedsites/>

3.3.2. RBSF Component

There are three European sites which are within the zone of influence for the proposed RBSF Component. These are:

- Malahide Estuary SAC
- Malahide Estuary SPA
- South Dublin Bay and River Tolka Estuary SPA (site code 004024)

These are shown in Figure 2. A brief description of each of the European sites is provided in Appendix 1. The qualifying interests for each site are provided in Table 2. The site synopses and full versions of the Conservation Objectives for each of the European sites can be found on the NPWS website at: <http://www.npws.ie/protectedsites/>

3.4. Assessment of Likely Effects

This section of the Screening determines whether Appropriate Assessment is necessary. It does this by:

1. Confirming in this instance that the Proposed Upgrade Project is not directly connected with or necessary to, the conservation management of any of the European sites;
2. Describing the details of the project/plan proposals and other plans or projects that may cumulatively affect any European sites. These details are presented in Tables 1 and 2 below.

Table 1: European sites within the potential zone of influence of the Ringsend WwTP component of the Proposed Upgrade Project.

European Site (Site Code)	Distance from WwTP (approx.)	Qualifying Interests	Source – Pathway – Receptor Linkages between the Ringsend WwTP Component and the European Site, with the potential to result in significant adverse effects.	Further Assessment Required
South Dublin Bay and River Tolka Estuary SPA 004024	Directly adjacent to works.	A046 Light-bellied Brent Goose <i>Branta bernicla hrota</i> A130 Oystercatcher <i>Haematopus ostralegus</i> A137 Ringed Plover <i>Charadrius hiaticula</i> A141 Grey Plover <i>Pluvialis squatarola</i> A143 Knot <i>Calidris canutus</i> A144 Sanderling <i>Calidris alba</i> A149 Dunlin <i>Calidris alpina alpina</i> A157 Bar-tailed Godwit <i>Limosa lapponica</i> A162 Redshank <i>Tringa totanus</i> A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> A192 Roseate Tern <i>Sterna dougallii</i> A193 Common Tern <i>Sterna hirundo</i> A194 Arctic Tern <i>Sterna paradisaea</i> A999 Wetlands and waterbirds	<p>Direct Effects</p> <ul style="list-style-type: none"> Laying of a new underground electrical connection to an existing underground ESB cable, along the southern boundary of the site (at the south west corner only) and at the edge of, and extending to within the South Dublin Bay and River Tolka Estuary SPA. . This will involve excavation of a trench, laying and jointing of cables and reinstatement of the land. The construction area will be approximately 30 m x 10 m and is within the South Dublin Bay and River Tolka Estuary SPA. <p>Indirect Effects:</p> <ul style="list-style-type: none"> Construction run-off: Accidental discharge of hazardous material during construction to the surface water network could result in significant impacts on receiving watercourses and associated habitats and species. Surface Waters: Discharge of treated effluent from the WwTP both during the construction and operational phases of the proposed Ringsend WwTP Component. As the existing and proposed discharges are at the same location in the Liffey Estuary, there is potential that these changes could affect habitats or species that occur in the tidal part of Dublin Bay. Air Quality: The construction phase of the Ringsend WwTP Component of the Proposed Upgrade Project may potentially include temporary disturbance and changes in air quality during construction to wintering waterbirds using the grassland adjacent to the WwTP which is part of the South Dublin Bay and River Tolka Estuary SPA. Noise: Construction noise during construction phase may affect Brent Geese and breeding Terns within the South Dublin Bay and River Tolka Estuary SPA. Invasive Species – The spread of invasive plant species (i.e. those species listed on Schedule 3 of the Birds and Habitats Regulations, 2011), to grassland areas within the SPA has been identified as a potential impact, due to the presence of Japanese Knotweed (<i>Fallopia Japonica</i>) within the site boundary. 	Yes

Ringsend WwTP Upgrade Project: Appropriate Assessment Screening and NIS

European Site (Site Code)	Distance from WwTP (approx.)	Qualifying Interests	Source – Pathway – Receptor Linkages between the Ringsend WwTP Component and the European Site, with the potential to result in significant adverse effects.	Further Assessment Required
South Dublin Bay SAC (000210)	Adjacent to works	1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 Salicornia and other annuals colonising mud and sand 2110 Embryonic shifting dunes	<p>Direct Effects</p> <ul style="list-style-type: none"> None identified. <p>Indirect Effects:</p> <ul style="list-style-type: none"> Surface Waters: Discharge of treated effluent from the WwTP both during the construction and operational phases of the proposed Ringsend WwTP Component. As the existing and proposed discharges are at the same location in the Liffey Estuary, there is potential that these changes could affect habitats or species that occur in the tidal part of Dublin Bay. Air Quality: The construction phase of the Ringsend WwTP Component of the Proposed Upgrade Project may potentially include temporary disturbance and changes in air quality during construction. Construction run-off: Accidental discharge of hazardous material during construction to the surface water network could result in significant impacts on receiving watercourses and associated habitats and species. 	Yes
North Bull Island SPA	1.7km from the outfall	A046 Light-bellied Brent Goose <i>Branta bernicla hrota</i> A048 Shelduck <i>Tadorna tadorna</i> A052 Teal <i>Anas crecca</i> A054 Pintail <i>Anas acuta</i> A056 Shoveler <i>Anas clypeata</i> A130 Oystercatcher <i>Haematopus ostralegus</i> A140 Golden Plover <i>Pluvialis apricaria</i> A141 Grey Plover <i>Pluvialis squatarola</i> A143 Knot <i>Calidris canutus</i> A144 Sanderling <i>Calidris alba</i> A149 Dunlin <i>Calidris alpina alpina</i> A156 Black-tailed Godwit <i>Limosa limosa</i> A157 Bar-tailed Godwit <i>Limosa lapponica</i>	<p>Direct Effects</p> <ul style="list-style-type: none"> None present. <p>Indirect Effects:</p> <ul style="list-style-type: none"> Surface Waters: Discharge of treated effluent from the WwTP both during the construction and operational phases of the proposed Ringsend WwTP Component. As the existing and proposed discharges are at the same location in the Liffey Estuary, there is potential that these changes could affect habitats or species that occur in the tidal part of Dublin Bay. Air Quality: The construction phase of the Ringsend WwTP Component of the Proposed Upgrade Project may potentially include temporary disturbance and changes in air quality during construction to wintering waterbirds using the grassland adjacent to the WwTP which is part of the South Dublin Bay and River Tolka Estuary SPA. 	Yes

Ringsend WwTP Upgrade Project: Appropriate Assessment Screening and NIS

European Site (Site Code)	Distance from WwTP (approx.)	Qualifying Interests	Source – Pathway – Receptor Linkages between the Ringsend WwTP Component and the European Site, with the potential to result in significant adverse effects.	Further Assessment Required
		A160 Curlew <i>Numenius arquata</i> A162 Redshank <i>Tringa totanus</i> A169 Turnstone <i>Arenaria interpres</i> A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> A999 Wetlands	<ul style="list-style-type: none"> Noise: Construction noise during construction phase may affect brent geese and breeding terns within the South Dublin Bay and River Tolka Estuary SPA. Construction run-off: Accidental discharge of hazardous material during construction to the surface water network could result in significant impacts on receiving watercourses and associated habitats and species. <p>Other potential indirect effects could only occur where the qualifying interests are affected by tidal water in Dublin Bay.</p>	
North Dublin Bay SAC 000206	1,7km from the outfall	1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 <i>Salicornia</i> and other annuals colonising mud and sand 1330 Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) 1395 Petalwort <i>Petalophyllum ralfsii</i> 1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>) 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes) 2190 Humid dune slacks	<p>Direct Effects</p> <ul style="list-style-type: none"> None present. <p>Indirect Effects:</p> <ul style="list-style-type: none"> Surface Waters: Discharge of treated effluent from the WwTP both during the construction and operational phases of the proposed Ringsend WwTP Component. As the existing and proposed discharges are at the same location in the Liffey Estuary, there is potential that these changes could affect habitats or species that occur in the tidal part of Dublin Bay. Air Quality: The construction phase of the Ringsend WwTP Component of the Proposed Upgrade Project may potentially include temporary disturbance and changes in air quality during construction. Construction run-off: Accidental discharge of hazardous material during construction to the surface water network could result in significant impacts on receiving watercourses and associated habitats and species. 	Yes
Howth Head Coast SPA 004113	6,7 km from the outfall	A188 Kittiwake <i>Rissa tridactyla</i>	<p>The qualifying interest of this site, Kittiwake, may use parts of Dublin Bay that are within the zone of influence of the proposed Upgrade Project for foraging.</p> <p>Direct Effects</p> <ul style="list-style-type: none"> None present. 	Yes

Ringsend WwTP Upgrade Project: Appropriate Assessment Screening and NIS

European Site (Site Code)	Distance from WwTP (approx.)	Qualifying Interests	Source – Pathway – Receptor Linkages between the Ringsend WwTP Component and the European Site, with the potential to result in significant adverse effects.	Further Assessment Required
			<p>Indirect Effects:</p> <ul style="list-style-type: none"> Surface Waters: Discharge of treated effluent from the WwTP both during the construction and operational phases of the proposed Ringsend WwTP Component. As the existing and proposed discharges are at the same location in the Liffey Estuary, there is potential that these changes could affect habitats or species that occur in the tidal part of Dublin Bay 	
Howth Head SAC 000202	6.7km from the site.	1230 Vegetated sea cliffs of the Atlantic and Baltic coasts 4030 European dry heaths	<ul style="list-style-type: none"> Where other qualifying interests are exclusively terrestrial in occurrence, there is no pathway for potential impacts for surface water. The European site is of sufficiently remote from the Ringsend WwTP site to objectively conclude a finding of no significant effect in relation to airborne impacts such as air and noise. The Proposed Upgrade Project, as a whole does not present any further source-pathway-receptors with this European site. When assessed in combination with other plans or projects, the project is not likely to give rise to significant effects on this European site. The European site, can have thus objectively be screened out of further assessment. 	No
Dalkey Islands SPA 004172	9.0 km from the outfall	A192 Roseate Tern <i>Sterna dougallii</i> A193 Common Tern <i>Sterna hirundo</i> A194 Arctic Tern <i>Sterna paradisaea</i>	<p>The qualifying interests of this site may use parts of Dublin Bay that are within the zone of influence for foraging.</p> <p>Direct Effects</p> <ul style="list-style-type: none"> None present. <p>Indirect Effects:</p> <ul style="list-style-type: none"> Surface Waters: Discharge of treated effluent from the WwTP both during the construction and operational phases of the proposed Ringsend WwTP Component. As the existing and proposed discharges are at the same location in the Liffey Estuary, there is potential that these changes could affect habitats or species that occur in the tidal part of Dublin Bay. 	Yes

Ringsend WwTP Upgrade Project: Appropriate Assessment Screening and NIS

European Site (Site Code)	Distance from WwTP (approx.)	Qualifying Interests	Source – Pathway – Receptor Linkages between the Ringsend WwTP Component and the European Site, with the potential to result in significant adverse effects.	Further Assessment Required
			Where other qualifying interests are exclusively terrestrial in occurrence, there is no pathway for potential impacts of the project. The European sites, that are listed for such interests only, have thus been screened out.	
Rockabill to Dalkey Island SAC 003000	6,2 km from the outfall	1170 Reefs 1351 Harbour porpoise <i>Phocoena phocoena</i>	<p>One qualifying interest of this site, the Harbour Porpoise, may use parts of Dublin Bay for foraging. Due to the predicted dispersal of effluent discharge there is a potential pathway for adverse impacts to occur.</p> <p>Direct Effects</p> <ul style="list-style-type: none"> • None present. <p>Indirect Effects:</p> <ul style="list-style-type: none"> • Surface Waters: Discharge of treated effluent from the WwTP both during the construction and operational phases of the proposed Ringsend WwTP Component. As the existing and proposed discharges are at the same location in the Liffey Estuary, there is potential that these changes could affect habitats or species that occur in the tidal part of Dublin Bay. 	Yes

*SAC = Special Area of Conservation; SPA = Special Protection Area.

Table 2: European sites within the potential zone of influence of the RBSF component of the Proposed Upgrade Project.

European Site (Site Code)	Distance from WwTP (approx.)	Qualifying Interests	Source – Pathway – Receptor Linkages between the Ringsend WwTP Component and the European Site, with the potential to result in significant adverse effects.	Further Assessment Required
South Dublin Bay and River Tolka Estuary SPA 004024	9km directly from RBSF site. No Hydrological pathway	A046 Light-bellied Brent Goose <i>Branta bernicla hrota</i> A130 Oystercatcher <i>Haematopus ostralegus</i> A137 Ringed Plover <i>Charadrius hiaticula</i> A141 Grey Plover <i>Pluvialis squatarola</i> A143 Knot <i>Calidris canutus</i> A144 Sanderling <i>Calidris alba</i> A149 Dunlin <i>Calidris alpina alpina</i> A157 Bar-tailed Godwit <i>Limosa lapponica</i> A162 Redshank <i>Tringa totanus</i> A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> A192 Roseate Tern <i>Sterna dougallii</i> A193 Common Tern <i>Sterna hirundo</i> A194 Arctic Tern <i>Sterna paradisaea</i> A999 Wetlands and waterbirds	<p>Direct Effects</p> <ul style="list-style-type: none"> None associated with the RBSF Component site. <p>Indirect Effects:</p> <ul style="list-style-type: none"> There are no hydrological or hydrogeological pathways present. The European site is sufficiently remote from the proposed RBSF site to objectively conclude a finding of no significant effect in relation to airborne impacts such as air and noise. <p>Notwithstanding the above, the RBSF Component of the project should be brought forward as part of the Proposed Upgrade Project as whole, for in-combination assessment.</p>	Yes
Malahide Estuary SAC (000205)	9.5 km direct. Approx. 13.3km via hydrological pathways	1140 Mudflats and sandflats not covered by seawater at low tide 1310 Salicornia and other annuals colonising mud and sand 1320 Spartina swards (<i>Spartinion maritimae</i>) 1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) 1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>) 2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)	<p>Direct Effects</p> <ul style="list-style-type: none"> None identified. <p>Indirect Effects:</p> <ul style="list-style-type: none"> Surface Waters: There is a potential pathway between the RBSF Component of the Proposed Upgrade Project and the Malahide Estuary SAC via the surface water network. <p>However no significant effects are predicted, due to the absence of discharge/emissions from the proposed site, other than the collection of rainfall and surface water runoff.</p> <p>Predicted impacts from the RBSF component on the surface water network have been assessed in Volume 4, Section 4 of the EIAR, and the pre-mitigation impact assessment identifies no potentially significant impacts on receiving water courses.</p>	No

Ringsend WwTP Upgrade Project: Appropriate Assessment Screening and NIS

European Site (Site Code)	Distance from WwTP (approx.)	Qualifying Interests	Source – Pathway – Receptor Linkages between the Ringsend WwTP Component and the European Site, with the potential to result in significant adverse effects.	Further Assessment Required
			<ul style="list-style-type: none"> The European site is sufficiently remote from the proposed RBSF site to objectively conclude a finding of no significant effect in relation to airborne impacts such as air and noise. The Proposed Upgrade Project, as a whole does not present any further potentially significant or interactions with this European site. When assessed in combination with other plans or projects, the project is not likely to give rise to significant effects on this European site. The European site, can have thus objectively be screened out of further assessment. 	
Malahide Estuary SPA (004025)	9.5 km direct. Approx. 13.3km via hydrological pathways	A005 Great Crested Grebe <i>Podiceps cristatus</i> A046 Brent Goose <i>Branta bernicla hrota</i> A048 Shelduck <i>Tadorna tadorna</i> A054 Pintail <i>Anas acuta</i> A067 Goldeneye <i>Bucephala clangula</i> A069 Red-breasted Merganser <i>Mergus serrator</i> A130 Oystercatcher <i>Haematopus ostralegus</i> A140 Golden Plover <i>Pluvialis apricaria</i> A141 Grey Plover <i>Pluvialis squatarola</i> A143 Knot <i>Calidris canutus</i> A149 Dunlin <i>Calidris alpina alpina</i> A156 Black-tailed Godwit <i>Limosa limosa</i> A157 Bar-tailed Godwit <i>Limosa lapponica</i> A162 Redshank <i>Tringa totanus</i> A999 Wetlands	<p>Direct Effects</p> <ul style="list-style-type: none"> None are present. <p>Indirect Effects:</p> <ul style="list-style-type: none"> Surface Waters: There is a potential pathway between the RBSF Component of the Proposed Upgrade Project and the Malahide Estuary SAC via the surface water network. However no significant effects are predicted, due to the absence of discharge/emissions from the proposed site, other than the collection of rainfall and surface water runoff. Predicted impacts from the RBSF component on the surface water network have been assessed in Volume 4, Section 4 of the EIAR, and the pre-mitigation impact assessment identifies no potentially significant impacts on receiving water courses. The European site is sufficiently remote from the proposed RBSF site to objectively conclude a finding of no significant effect in relation to airborne impacts such as air and noise. The Proposed Upgrade Project, as a whole does not present any further potentially significant impacts or interactions with this European site. 	No

Ringsend WwTP Upgrade Project: Appropriate Assessment Screening and NIS

European Site (Site Code)	Distance from WwTP (approx.)	Qualifying Interests	Source – Pathway – Receptor Linkages between the Ringsend WwTP Component and the European Site, with the potential to result in significant adverse effects.	Further Assessment Required
			<ul style="list-style-type: none"> • When assessed in combination with other plans or projects, the project is not likely to give rise to significant effects on this European site. • The European site, can have thus objectively be screened out of further assessment. 	

3.5. Screening Conclusion

It can be concluded, on the basis of objective information, that the Proposed Upgrade Project, individually or in combination with other plans and projects, will not result in significant effects on the following European sites:

- Howth Head SAC
- Malahide Estuary SAC (000205)
- Malahide Estuary SPA (004025)

On the basis of objective information, it cannot be concluded at this stage that the Proposed Upgrade Project, either individually or in-combination with other plans and projects will result in no significant effect on the following European sites:

- South Dublin Bay and River Tolka Estuary SPA (site code 004024)
- South Dublin Bay SAC (000210)
- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- Howth Head Coast SPA (004113)
- Dalkey Islands SPA (004172)
- Rockabill to Dalkey Island SAC (003000)

Therefore, adopting the precautionary approach, in accordance with current guidance, an Appropriate Assessment of the Proposed Upgrade Project is required to be undertaken by the competent authorities based, *inter alia*, on information provided in the Natura Impact Statement (Section 4).

4. STAGE 2: NATURA IMPACT STATEMENT

4.1. Introduction

Section 1 and Section 3.1 of the Appropriate Assessment Screening Report and Natura Impact Statement provide a background and description of this Proposed Upgrade Project, which is generally summarised here as comprising of the following two components:

- **Ringsend WwTP Component** - proposed upgrade of the existing Ringsend WwTP, and proposed revisions under this Section 37E Application.
- **RBSF Component** - proposed Regional Biosolids Storage Facility at Newtown, Dublin 11.

Stage 2 of the assessment process evaluates the entire Proposed Upgrade Project, taking account of the potential for direct, indirect impacts, alone or in combination with other plans and projects. According to EC guidance for the management of European sites (EC, 2000), and recent decisions of the CJEU, the integrity of a site involves its ecological functions and the need to preserve the site at a favourable conservation status. Thus, any decision as to whether it is adversely affected should focus on the site's conservation objectives and favourable conservation status.

Stage 2 of the assessment process has been informed by the EIAR submitted in conjunction with this report and as part of this application. The EIAR provides detail of the project description and associated impacts to determine the likely effects (direct, indirect, short- and long-term, isolated, interactive and cumulative) and their impacts on the conservation objectives and status of the European Site.

This section of the report provides information on the potential for significant effects arising from the proposed Upgrade Project on the integrity of the following SPAs and SAC's:

- South Dublin Bay and River Tolka Estuary SPA (site code 004024)
- South Dublin Bay SAC (000210)
- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- Howth Head Coast SPA (004113)
- Dalkey Islands SPA (004172)
- Rockabill to Dalkey Island SAC (003000)

The qualifying interests for each European site screened for inclusion in this assessment are detailed in Tables 1 and 2. This information was used to predict the potential for significant adverse effects on the conservation objectives and the integrity of any European site.

4.2. Project Description

4.2.1. Component 1 - Ringsend WwTP

The Ringsend WwTP Component of the Proposed Upgrade Project comprises revisions and alterations to the developed permitted 2012 Approval on an overall site. The development that forms the subject of this assessment consists of:

- Reconfiguration and retrofitting of the existing Sequencing Batch Reactor (SBR) Tanks, up to 24no. in total, to facilitate the use of a new AGS technology.
- Associated works, including the provision of:
 - A Sludge Pasteurisation Building (approximately c.31.5m x c.14.5m x c.8.5m high)
 - A Phosphorus Recovery Building (approximately c.38.5m x c.15.5m x c.20m high)

- Ancillary site development works (pipework and electrical works), plant (new and adjustments to existing) and landscape works (including boundary treatments) to accommodate the above development, including:
- The use on a permanent basis of a vehicular entrance off Pigeon House Road, and associated landscaping and internal road, along the eastern boundary of the site, previously granted a temporary permission under ABP Ref. 29N.YM0002.
- A new underground electrical connection to an existing underground ESB cable, along the southern boundary of the site (at the south west corner only) and at the edge of, and extending to within the South Dublin Bay and River Tolka Estuary SPA.
- Bypass Culvert, Ultraviolet (UV) Lamps, internal road reconfigurations and additional car parking.
- The continued use of 2 no. temporary construction compounds (C1 and C2) for the 10 year duration of the permission sought. These compounds were previously permitted under ABP Ref. 29N.YM0004 for a period of 3 years. Proposals for the temporary Construction Compound C1 includes a pedestrian connection to the south-west corner of the Ringsend WwTP.
- The continued use of Compound C3 for a period of 3 years, as previously permitted under ABP Ref. 29N.YM0004.
- The omission of the permitted 9 km Long Sea Outfall (in tunnel) for the purposes of discharging into the Dublin Bay area from an onshore inlet shaft approximately 350 metres east of the existing Ringsend WwTP (including any associated construction works) which in turn provides for the continued use of the existing outfall to the River Liffey serving the Ringsend WwTP.

The overall application site area of the development proposed at the Ringsend WwTP is approximately 17.9 Ha. The overall existing Ringsend WwTP is 14.7 Ha and is divided into two sites by Pigeon House Road; 11.2 Ha to the south of the road where the Ringsend WwTP is located, with a further 3.5Ha located to the north of the road.

The 2no. temporary construction compounds which are the subject of this application amount to approximately 3.79 Ha, part of which is located within the 14.7 Ha site of the Ringsend WwTP.

The Ringsend agglomeration including the WwTP has an existing discharge licence in accordance with the requirements of the Waste Water Discharge (Authorisation) Regulations 2007, as amended. A licence review application will be required in accordance with Regulation 14 of those regulations.

4.2.2. Component 2 - RBSF

Permission is also sought for development of a Regional Biosolids Storage Facility at a separate 11 Ha site comprising:

- Demolition of existing single storey structures on site comprising of a security kiosk (approx. 22 sq.m gfa), the weighbridge kiosk (approx. 19 sq.m gfa), an ESB Sub-Station (approx. 16 sq.m gfa) and an administration building (approx. 85 sq.m gfa), together with the partial removal of existing internal roads and partial removal / diversion of existing drainage infrastructure as appropriate to accommodate the development.
- Provision of 2no. biosolids storage buildings, each approximately 50m wide, 105m long and 15m in height, including solar panels on the roof of one building. These buildings have a combined capacity to store up to 48,000 cubic metres of biosolids waste at any one time.
- Provision of 4no. odour control units, each with 18.2m high discharge flues.
- Mechanical and electrical control building (approx. 35 sq.m gfa, 4 m high)
- Provision of a single storey site administration building for office, welfare facilities and meeting rooms (approx. 130 sq.m gfa) and associated staff car parking.

- Use of the existing vehicular access off the R135, including provision of new 2.7m high entrance gates to serve the Regional Biosolids Storage Facility.
- All ancillary landscape and site development works, including:
 - Provision of 2no. new weighbridge facilities (1no. weighbridge on entry and exit of the Regional Biosolids Storage Facility).
 - Provision of new ESB Sub-Station (approx. 40 sq.m gfa).
 - Landscaping and boundary treatments, including new 2.7m high boundary to North Road/R135.
 - Provision of fire protection holding tank (approx. 6.7m high).
 - Provision of a HGV cleaning and set down area.
 - Formation of new footpath and landscaped verge to R135 along site frontage.
 - Provision of drainage, water, external lighting, and other utilities.
 - Diversion of 450mm surface water pipe.
 - 1no. signage structure, 5.2m in height erected on posts accommodating 2no. signage zones: 2.4m x 1.7 and 2.4m x 1.2m, located at the site entrance.

The Regional Biosolids Storage Facility will require a Certificate of Registration for the activity of storing biosolids (treated wastewater sludge).

4.3. Assessment of Impacts

The following definitions of impact significance, probability and duration are those given in the *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)* (EPA, 2017)

Significance of Impacts

The significance of effects are defined in Table 3 below:

Table 3: Significance of Effects

Type of effect	Description
Imperceptible	An effect capable of measurement but without noticeable consequences.
Not Significant Effects	An effect which causes noticeable changes in the character of the environment but without noticeable consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant Effects	An effect which, by its character, magnitude, duration or intensity alters the majority of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics

Probability of Effects

The Probability of Effects is broken into the following types:

Likely effects are those that can reasonably be expected to occur as a result of the project; *Indeterminable effects* when the consequence of a change in the environment cannot be described. *Worst case effects* are those impacts which, inclusive of mitigation measures, are significant.

Duration of Effects

The duration of effects are defined in Table 4 below.

Table 4: Duration of Effects

Description	Timescale
Momentary Effects	Seconds to Minutes
Brief Effects	Less than a day
Temporary Effects	Less than a year
Short-term Effects	Lasting 1 to 7 years
Medium-term Effects	Lasting 7 to 15 years
Long-term Effects	Lasting 15 to 60 years

4.4. European Sites

The potential for significant effects arising from the Proposed Upgrade Project on the integrity of South Dublin Bay and River Tolka Estuary SPA, South Dublin Bay SAC, North Bull Island SPA, North Dublin Bay SAC, Howth Head Coast SPA, Dalkey Island SPA and Rockabill to Dalkey SAC in light of their conservation objectives, is examined in this section.

4.4.1. South Dublin Bay and River Tolka Estuary SPA

The Natura Standard Data Form for this Site (NPWS, 2017) states that this site comprises a substantial part of Dublin Bay. It includes virtually all of the intertidal area in the south bay, as well as much of the Tolka Estuary to the north of the River Liffey. A portion of the shallow bay waters is also included. In the south bay, the intertidal flats extend for almost 3 km at their widest. The sediments are predominantly well-aerated sands. The site is an internationally important population of Light-bellied Brent Geese *Branta bernicla hrota*, which feeds on *Zostera noltii* in the autumn. It has nationally important numbers of a further 6 species: Oystercatcher *Haematopus ostralegus*, Ringed Plover *Charadrius hiaticula*, Knot *Calidris canutus*, Sanderling *Calidris alba*, Dunlin *Calidris alpina* and Bar-tailed Godwit *Limosa lapponica*.

This is an important site for wintering gulls and is an autumn roosting site for significant numbers of terns. The main threat to the site is land reclamation, with other threats including oil pollution from Dublin Port, commercial bait digging and disturbance by walkers and dogs.

The Conservation Objectives for the South Dublin Bay & River Tolka Estuary SPA (NPWS, 2015) are described as in Table 5 below.

Table 5: Qualifying interest for South Dublin Bay and River Tolka Estuary SPA

European Site (Site Code)	Qualifying Interests
South Dublin Bay and River Tolka Estuary SPA 4024	A046 Light-bellied Brent Goose <i>Branta bernicla hrota</i> A130 Oystercatcher <i>Haematopus ostralegus</i> A137 Ringed Plover <i>Charadrius hiaticula</i> A141 Grey Plover <i>Pluvialis squatarola</i> (Note 1) A143 Knot <i>Calidris canutus</i> A144 Sanderling <i>Calidris alba</i> A149 Dunlin <i>Calidris alpina alpina</i> A157 Bar-tailed Godwit <i>Limosa lapponica</i> A162 Redshank <i>Tringa tetanus</i> A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> A192 Roseate Tern <i>Sterna dougallii</i> A193 Common Tern <i>Sterna hirundo</i> A194 Arctic Tern <i>Sterna paradisaea</i> A999 Wetlands and waterbirds

4.4.2. South Dublin Bay SAC

The Natura 2000 Standard Data Form (NPWS, 2017) lists the cSAC as a fine example of extensive intertidal flats, of predominantly sand with muddy sands in more sheltered areas. It also hosts the largest stand of Eel Grass *Zostera* on the east coast. It provides a supporting role to important populations of wintering bird populations of Dublin Bay. Threats to the site include land reclamation, oil pollution from Dublin Port, commercial bait digging and disturbance walkers and dogs.

The Conservation Objectives for the South Dublin Bay cSAC (NPWS, 2015) are described as in Table 6 below.

Table 6: Qualifying interest for South Dublin Bay

European Site (Site Code)	Qualifying Interests
South Dublin Bay cSAC 00210	Annex I habitats for which the sites is designated: Mudflats and sandflats not covered by seawater at low tide [1140]

The Conservation Objectives for the South Dublin Bay cSAC (NPWS, 2013) are described as: *To maintain or restore the favourable conservation condition of the Annex I habitat for which the cSAC has been selected*, i.e. '[1140] Mudflats and sandflats not covered by seawater at low tide' (NPWS, 2013a).

4.4.3. North Bull Island SPA

The Natura 2000 Standard Data Form (NPWS, 2017) lists the SPA as one of the top ten sites in the country for wintering waterfowl. It provides important feeding and roosting habitat for bird species listed as Special Conservation Interests (SCIs) for the site and supports internationally important

populations of Light-bellied Brent Goose and Bar-tailed Godwit. The quality of the estuarine habitats in the SPA are considered to be very good, part of which are designated as North Dublin Bay cSAC. There are no serious imminent threats to the wintering birds. Threats to the site include oil pollution from Dublin Port along with localised commercial bait digging, disturbance from activities such as sailing, walkers and dogs.

Table 7: Qualifying interest for South Dublin Bay

European Site (Site Code)	Qualifying Interests
North Bull Island SPA (004006)	A046 Light-bellied Brent goose (<i>Branta bernicla hrota</i>) A048 Shelduck (<i>Tadorna tadorna</i>) A052 Teal (<i>Anas crecca</i>) A054 Pintail (<i>Anas acuta</i>) A056 Shoveler (<i>Anas clypeata</i>) A130 Oystercatcher (<i>Haematopus ostralegus</i>) A140 Golden plover (<i>Pluvialis apricaria</i>) A141 Grey plover (<i>Pluvialis squatarola</i>) A143 Knot (<i>Calidris canutus</i>) A144 Sanderling (<i>Calidris alba</i>) A149 Dunlin (<i>Calidris alpina</i>) A156 Black-tailed godwit (<i>Limosa limosa</i>) A157 Bar-tailed godwit (<i>Limosa lapponica</i>) A160 Curlew (<i>Numenius arquata</i>) A162 Redshank (<i>Tringa totanus</i>) A169 Turnstone (<i>Arenaria interpres</i>) A179 Black-headed Gull (<i>Chroicocephalus ridibundus</i>) A999 Wetland and Waterbirds

4.4.4. North Dublin Bay SAC

The Natura 2000 Standard Data Form (NPWS, 2017) lists the cSAC as a fine example of extensive intertidal flats. This site covers all of the inner part of north Dublin Bay, with the seaward boundary extending from the Bull Wall lighthouse across to Drumleck Point at Howth Head. This Natura 2000 site is of international importance on account of both the total number of waterfowl and the individual populations of light-bellied Brent Goose, black-tailed godwit and bar-tailed godwit that use it. Also of significance is the regular presence of several species that are listed on Annex I of the EU Birds Directive. Qualifying interests for the site are set out in Table 8 below.

The Conservation Objectives for the North Bull Island SPA (NPWS, 2015) are described as: ‘To maintain the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.’

Table 8: Qualifying interest for South Dublin Bay cSAC

European Site (Site Code)	Qualifying Interests
North Dublin Bay cSAC (000206)	<p><u>Annex I habitats for which the sites is designated:</u></p> <p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p>Annual vegetation of drift lines [1210]</p> <p><i>Salicornia</i> and other annuals colonizing mud and sand [1310]</p> <p>Atlantic salt meadows <i>Glaucopuccinellietalia maritima</i> [1330]</p> <p>Mediterranean salt meadows <i>Juncetalia maritimi</i> [1410]</p> <p>Embryonic shifting dunes [2110]</p> <p>Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]</p> <p>Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]</p> <p>Humid dune slacks [2190]</p> <p><u>Annex II species for which the sites is designated:</u></p> <p>Petalwort <i>Petalophyllum ralfsii</i> [1395]</p>

4.4.5. Howth Head Coast SPA

The Natura 2000 Standard Data Form (NPWS, 2017) lists the SPA as hosting important has important colonies of breeding seabirds, with nationally important populations of *Rissa tridactyla*, *Alca torda* and *Cephus grylle*, and a regionally important population of *Uria aalge*. The site comprises approximately 3 km of sea cliff, which vary between about 60 m and 90 m in height. A typical maritime cliff flora occurs. Where the gradient allows, shallow glacial drift supports a typical maritime flora and there is a fringe of coastal heath on the cliff tops. The cliffs also support a breeding pair of *Falco peregrinus*, a species listed on Annex I of the E.U. Birds Directive. The site is easily accessible and has important amenity and educational value due to its proximity to Dublin City. The qualifying interests for this site are listed in Table 9 below.

Table 9: Qualifying interest for Howth Head SPA

European Site (Site Code)	Qualifying Interests
Howth Head SPA (004113)	A188 Kittiwake <i>Rissa tridactyla</i>

4.4.6. Dalkey Island SPA

The Natura 2000 Standard Data Form (NPWS, 2017) lists the SPA hosting being of importance for breeding and staging *Sterna* terns. The site, along with other parts of south Dublin Bay is used by the three *Sterna* tern species as a major post-breeding/pre-migration autumn roost.

The site comprises Dalkey Island, Lamb Island, Maiden Rock, the intervening rocks and reefs between Dalkey Island, Lamb Island and Clare Rock, and the sea area around Maiden Rock to a distance of 100 m. Dalkey Island, which is the largest in the group, lies ca.400m off Sorrento Point and is separated by a deep channel. The island is low-lying, the highest point at c.15m is marked by a Martello Tower. Soil

cover consists mainly of thin peaty layers, though in a few places there are boulder clay deposits. Vegetation cover is low, consisting mainly of grasses. Lamb Island lies to the north of Dalkey Island, attached at low-tide by a rocky reef. It has thin soil cover and a sparse vegetation cover. Further north lies Maidens Rock, a bare angular granite rock up to 5m high. There is no vegetation cover. Dalkey Island is grazed by a herd of feral goats.

Table 10: Qualifying interest for Dalkey Island SPA

European Site (Site Code)	Qualifying Interests
Dalkey Island SPA (004172)	[A192] Roseate Tern (<i>Sterna dougallii</i>) [A193] Common Tern (<i>Sterna hirundo</i>) [A194] Arctic Tern (<i>Sterna paradisaea</i>)

4.4.7. Rockabill to Dalkey Island cSAC

The area selected for designation represents a key habitat for the Annex II species harbour porpoise, within the Irish Sea. The selected site forms a strip of dynamic inshore and coastal waters in the western Irish Sea, extending approximately 40 km in length and 7km in width, encompassing a range of comparatively shallow marine habitats, including diverse seabed structures, reefs, islets and islands.

This site is of conservation importance for Reefs, listed on Annex I, and Harbour Porpoise, listed on Annex II, of the EU Habitats Directive. The Conservation Objectives for the Rockabill to Dalkey Island cSAC (NPWS, 2013) are described as: ‘To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected’, i.e. ‘[1170] Reefs’ and Harbour porpoise (*Phocoena phocoena*) (NPWS, 2013b).

Table 11: Qualifying interest for Rockabill to Dalkey Island SAC

European Site (Site Code)	Qualifying Interests
Dalkey Island SPA (004172)	[1170] Reefs [1351] Harbour Propoise <i>Phocoena phocoena</i>

4.5. Identification and Appraisal of Impacts on European Sites

A screening assessment of the Proposed Upgrade Project, as a whole and its’ individual components, the following potential impacts have been identified as having the potential to result in significant effects on European Sites:

Impacts resulting from the proposed Upgrade Project that have the potential (without mitigation) to result in significant environmental effects have been identified in Tables 1 and 2 of Section 3 and can be summarised as follows:

Ringsend WwTP Component

- Discharge of Treated Effluent from the Ringsend WwTP Component both at construction and operation phases.
- Accidental Pollution Incident during Construction

- Air Quality / Dust Impacts during the construction phase of the project
- Construction noise
- Operation Noise.
- Potential Spread of invasive species.

RBSF Component

- No individual aspect of the proposed RBSF component is predicted to result in significant environmental effects on European sites. Notwithstanding, this Component is required to be subject to assessment as part of the Proposed Upgrade Project as a whole and in-combination with other plans and projects.

This section examines those impacts in greater detail to determine the likelihood of significant adverse effects on qualifying interests and the conservation objectives of the European sites identified described in Section 4.4.

4.5.1. Potential impact – Discharge of treated effluent, impacts on water quality, effects on qualifying interests

As part of the assessment of the Proposed Upgrade Project, water quality modelling of treated discharge was undertaken by the project team. Details of the water quality modelling are contained in Volume 3, Section 4 and Appendix 4A of the EIAR for the Proposed Upgrade Project and were used to inform this assessment.

The assessment uses two models – the DHI MIKE 3 FM model analyses how the final effluent discharge disperses within the receiving water, while the CEFAS DCPM model analyses the biological response to the final effluent being discharged into the receiving water. The CEFAS DCPM model is additionally focused on the particular area of the receiving water that is most influenced by the final effluent discharge.

The extent of the effects of the discharge plume have been modelled as being largely confined to subtidal and intertidal areas between the South Wall and Tolka Estuary.

This has the potential to result in significant effects on the following habitats that are qualifying interests for North Dublin Bay following qualifying interest habitats of South Dublin Bay.

- [1140] - Mudflats and sandflats not covered by seawater at low tide
- [1210] Annual vegetation of drift lines
- [1310] Salicornia and other annuals colonizing mud and sand
- [1330] Atlantic salt meadows *Glauco-Puccinellietalia maritimae*
- [1410] Mediterranean salt meadows *Juncetalia maritimi*
- [2110] Embryonic shifting dunes

Water quality also has the potential to affect species listed as qualifying interests for SPA's that utilise the intertidal and estuarine habitats in Dublin Bay for feeding and/or roosting.

The proposed upgrade works for the Ringsend WwTP Component will not result in direct physical disturbance of the seabed because there will be no change to the existing outfall. The intertidal and shallow subtidal macroinvertebrate communities in Dublin Bay will therefore not experience any of the negative impacts usually associated with that type of disturbance, *e.g.* habitat destruction and/or changes in species abundance and community composition associated with abrasion, smothering or direct removal.

During the construction stage, there will be some reduction in treatment capacity at the plant in the Winter of 2019/2020 due to a approximate nine month overlap between the construction of the AGS structures and the SBR retrofit. During this nine month period, the estimated average effluent quality will be as shown in Table 12 below.

Table 12: Estimated average effluent quality during construction process.

Parameter	Unit	(Expected) Value effluent SBR
		5 blocks
BOD	mg/l	18
COD	mg/l	79
TSS	mg/l	32
NH ⁺ -N	mg/l	15
TON	mg/l	3

The reduction in the effluent quality will arise from the increased flow through the remaining operational blocks of tanks when one block is undergoing upgrade. There will also be an increase in the number of storm water overflows from approximately 1.2% of influent to 2.5-3.3% of influent. This may result in a temporary impact on marine aquatic and benthic ecology, however the magnitude and duration of the impact is not of a sufficient scale to result in adverse significant effects to European sites.

In the operational phase, the proposed upgrade of the Ringsend WwTP Component will result in an increase in the plant capacity and also an improvement in the final effluent quality. This will result in a reduction in the licensed parameters discharged into the receiving water, with significantly reduced quantities in respect of ammonia and phosphorous.

The predicted final effluent discharge when the proposed Upgrade Project is operational is provided in the Table 13 below.

Table 13: Final Effluent Discharge – Load Reduction Summary

Parameter	Current Average	Future Average	% Reduction
BOD (Biochemical Oxygen Demand)	8,739 kg/day	7,206 kg/day	17.5%
Suspended Solids	16,205 kg/day	10,508 kg/day	35.2%
Ammonia	4,370 kg/day	600 kg/day	86.3%
DIN (Dissolved Inorganic Nitrogen)	5,939 kg/day	4,804 kg/day	19.1%
MRP Molybdate Reactive Phosphate)	1,056 kg/day	420 kg/day	60.2%

In addition to the load reduction estimated for the above parameters, it is also estimated that the proposed AGS process will result in a 50% reduction in the bacteriological (E.Coli) content in the final effluent.

This will likely result in an environment whereby water quality in Inner Dublin Bay will be enhanced because of a reduction in the nutrient load for which the WwTP is currently a major source, *i.e.* phosphorous and ammonia (see O’Higgins and Wilson 2005) as well as suspended solids.

The North Dublin Bay SAC area has green algal mats (*Enteromorpha* spp., *Ulva lactuca*) that cover large areas of the sand flats during Summer months (Wilson., pers. comm). These sediments have a rich

macrofauna, with high densities of lugworm (*Arenicola marina*) in parts of the north lagoon. Mussels (*Mytilus edulis*) exist in places, along with bivalves such as *Cerastoderma edule*, *Macoma balthica* and *Scrobicularia plana*. The gastropod *Hydrobia ulvae* occurs in high densities in places, while the crustaceans *Corophium volutator* and *Carcinus maenas* are common. The sediments on the seaward side of North Bull Island are mostly sands. Sands to the east of Bull Island are characterised by the small tubicolous spionid, *Spio martinensis*.

According to the EU Habitats Directive *Favourable Conservation Status* of an Annex I habitat is achieved when 'The specific structures and functions which are necessary for its long term maintenance exist and are likely to continue in the foreseeable future' and for an Annex II species when 'There is, and probably will continue to be, a sufficiently large habitat to maintain its population'. The work of O'Higgins and Wilson (2005) suggested that nutrient inputs from the River Liffey (TON) and the Ringsend WwTP (PO₄; NH₄⁺) affect chlorophyll a levels within the walled parts of Dublin Bay, especially in the northern section. Results of the new model study show significant differences in levels of ammonia and MRP levels but only minor reductions in levels of DIN.

The effect of the reduced nutrient load is likely to be positive and limited to the communities in the Tolka Estuary and the lagoons and intertidal mudflats of North Bull Island where an increase in macroinvertebrate diversity and richness could be expected. Any reduction in the abundance of opportunistic, pollution tolerant species will be compensated by an increase in the abundance of other species less tolerant to nutrient enrichment and the development of an overall more diverse assemblage. In addition to an improvement in the overall water quality for the bay, it is possible that a reduction in the nutrient levels could lead to a reduction in the green algal cover in the channels between the Clontarf Road and North Bull Island. This effect could in turn result in reduction in BOD and the development of a richer faunal community as a result. However, it is likely that these changes will be slow as these areas will continue to be chiefly influenced by the riverine outputs as the major sources of nutrient loads.

Overall no significant adverse effects on are foreseen and indeed, a slight positive effect is possible. Effects of discharge during the operational phase of the project from the upgrade project will therefore have imperceptible impact on habitats listed within these European sites.

In Dublin Bay, the Tolka Estuary has been traditionally regarded as being dominated by an impoverished community where no benthic macrofauna or one species system of nereids at very low abundance were the norm (Roth and Wilson, 1998; Wilson, 1982). These studies are in contrast with the results in the Ringsend WwTP Upgrade EIAR (Section 5. Marine Biodiversity) which suggest that the benthic assemblage found in the Tolka Estuary has experienced an increase in species diversity and abundance. It is possible that this recovery could be linked to an improvement in water quality conditions in inner Dublin Bay since the Ringsend WwTP became fully operational in 2003 (DKM 2012). Although the assemblage in the Tolka Estuary will continue to be affected by some level of organic enrichment from the Liffey and Tolka rivers (which are major sources of nutrients (TON, DIN and P) into the bay ecosystem), it is predicted that this same recovery direction, *i.e.* towards a more diverse and richer stage in the faunal succession will continue if the proposed upgrade works go ahead and nutrient discharges are reduced.

It is therefore unlikely that the food resource of waterbirds in the Tolka Estuary will be negatively affected. Opportunistic species could give way to a wider array of sediment ingesters and filter feeders that would in turn attract predators including a range of crustaceans. It is predicted that total abundance of benthic macroinvertebrates might decrease but diversity will likely increase allowing birds to diversify their diet. Nonetheless, these changes will be slow and difficult to establish in the short term. The resulting impacts of these changes will be long-term positive but will not have any

significant effects on the favourable conservation status of the qualifying interests or on the conservation objectives of the European sites within Dublin Bay.

The ecological modelling of opportunistic macroalgae in the North Bull Island lagoons suggests that the nutrient reduction predicted to result from the proposed upgrade of Ringsend WwTP would not reduce the biomass of macroalgae significantly due to the relatively high 'background' nutrients in Dublin Bay and the Irish Sea (McGarrigle, 2016). Consequently, it is predicted that there will be no significant knock-on effects on the waterbirds such as Light-bellied Brent Geese and Wigeon that forage on these macroalgae. Effects of the discharge from the construction and operational phase from the upgrade project will therefore have imperceptible impacts on the conservation objectives of waterbirds and species listed as qualifying interests of SPAs within Dublin Bay.

The predicted reductions in nutrients in the receiving waters resulting from the proposed upgrade of Ringsend WwTP will not have any impacts on fish populations in Dublin Bay. Harbour Porpoise, a qualifying interest of the Rockabill to Dalkey SAC forages on a range of small shoaling fish (Rogan and Berrow, 1996). Fish are also the main prey species of the waterbirds such as Kittiwake, which is the qualifying interest for Howth Head SPA and Arctic Tern, Common Tern and Roseate Tern, which are the qualifying interests for Dalkey Island SPA.

Thus there is no potential for in-combination impacts of any other plan and project with the Ringsend WwTP Component of the proposed Upgrade Project.

In-Combination Impacts

The Scoping process for assessing water quality identified known projects that would need to be included as part of the cumulative impact assessment with the final effluent discharge from the Ringsend Wastewater Treatment Plant. These are:

- Dublin Waste to Energy Plant, which has a cooling water discharge into the Lower Liffey Estuary;
- Greater Dublin Drainage Project, which is proposed to discharge another WwTP final effluent to the north-east of Ireland's Eye;
- Alexandra Basin Redevelopment, which is a redevelopment of a Dublin Port dock; and
- Poolbeg Cooling Water Channel - (Sheet-Pile Repairs), which is the discharge point for the Ringsend WwTP.

The nature and typical volume of each of these sources were integrated into the water model as detailed in Section 7.2.4 of Appendix 4A of Volume 3 of the EIA. The output of the model and subsequent analysis demonstrates that there is no significant difference between the future hydrodynamic environment as modelled and any of the 3 projects individually assessed for cumulative impacts. There is some minor interaction with the Poolbeg Cooling Water Channel project, whereby there appears to be a minor increase in the interaction with the Tolka Estuary, but it is not considered to be significant. The assessment concludes that there is no cumulative impact between the Proposed WwTP Component and the other three projects. There are no further plans or projects that are likely to give rise to significant environmental effects.

The primary potential impact on Habitats and Species of Conservation Interest is largely dependent on water quality, which as confirmed above, includes a cumulative impact in its overall assessment, including consideration of riverine inputs from the Tolka and Liffey rivers.

The assessment does confirm that the Proposed WwTP Component will not give rise to impacts on waterbird populations, however cumulative medium and long-term changes to waterbird numbers

may become more difficult to discern, as they may become part of cumulative changes arising from other factors such as disturbance from non-related projects or climate change.

Summary

Potential impact Without Mitigation	Likely, positive, long-term, imperceptible to significant effects, resulting from in an overall improvement of water quality in Dublin Bay, leading to a direction where a more diverse and richer stage in the faunal succession within the Liffey Estuary and Tolka Estuary.
Proposed Mitigation	None further to mitigation embedded in the design and operation of the Ringsend WwTP.
Residual Impact	No significant adverse effect on qualifying interests or conservation objectives.
Monitoring	Refer to Section 6.2

4.5.2. Potential Impacts of Construction works within European Sites

This potential impact involves the laying of a new underground electrical connection to an existing underground ESB cable, along the southern boundary of the site (at the south west corner only) and at the edge of, and extending to within the South Dublin Bay and River Tolka Estuary SPA..

The grassland area was provided as a winter feeding area for Light-bellied Brent Geese, under condition No. 10 of the 1997 certification for the Dublin Bay Project extension to Ringsend Waste Water Treatment Works (WwTP). It lies immediately to the south of Ringsend WwTP, and to the north of Irishtown Nature Park. The replacement grassland supports internationally important numbers of Light-bellied Brent Geese. Peak Counts of Light-bellied Brent Geese on the replacement grassland give 5-year peaks of 281 (mean 281) in 2001/02 to 2005/06, and 440 (mean 300) in 2006/07 to 2010/11. The grassland is also used by smaller numbers of waders, such as Oystercatcher, Black-tailed Godwit, Redshank and Curlew.

The works will involve temporary excavation of a trench, laying and jointing of cables and reinstatement of the land. The construction area of approximately 30 m x 20 m will be within the section of the SPA that is immediately adjacent to the southern boundary of the WwTP.

The bird species that use this site are Light-bellied Brent Goose, Oystercatcher, Black-tailed Godwit, Redshank and Curlew all of which are qualifying interests of the SPAs in Dublin Bay.

In-Combination Impacts

There are no other plans or projects that will give rise to direct effects within the grassland area.

Summary

Potential impact Without Mitigation	Disturbance and displacement of qualifying interests (bird species) during the construction works, leading to temporary significant effects. Habitat loss, leading to potentially long term / permanent significant effects.
Proposed Mitigation:	Works to take place during the summer months when sensitive bird populations are absent (i.e. May to August). A re-instatement plan is to be implemented to ensure that the construction works area is to be fully re-instated to its original habitat.
Residual Impact	No Significant Effect.
Monitoring	Refer to Section 6.1

4.5.3. Potential impact of the spread of invasive species.

It has been confirmed that the Ringsend WwTP has existing strands of Japanese Knotweed *Fallopia japonica* are present at four locations along the eastern site boundary in small localised areas. In the absence of mitigation, where invasive species are disturbed during construction activities, they have the potential to spread to surrounding sites and/or into the receiving water environment. This would be considered a permanent, significant impact on European sites due to habitat loss.

An Outline Invasive Species Management Plan has been produced and is contained in Appendix 6A.

In-Combination Impacts

There are no other plans or projects that will give rise to direct effects within the grassland area.

Summary

Potential impact Without Mitigation	Spread of Japanese Knotweed onto amenity grasslands within the South Dublin Bay and Tolka Estuary, could lead to habitat loss, leading to potentially long term / permanent significant effects.
Proposed Mitigation:	The project will develop and implement an invasive species management plan, as detailed in Appendix 6A of Volume 3 of the EIAR.
Residual Impact	No Significant Effect.
Monitoring	Refer to Section 6.3

4.5.4. Potential Impact of visual disturbance to sensitive species

Construction works at Ringsend WwTP Component have the potential to cause disturbance to waterbird populations due to construction traffic/activities and workers on the site. This relates to those waterbirds that use the replacement grassland area that forms part of the the South Dublin Bay and River Tolka Estuary SPA), immediately south of the WwTP. Construction traffic/personnel on the project site will not be visible to waterbirds in other parts of any of the SPAs in Dublin Bay.

Any disturbance arising during construction, that prevents the birds from feeding here, has potential to cause adverse effects on the bird populations in Dublin Bay. The five species that are recorded here are qualifying interests of the SPAs in Dublin Bay. These impacts could be significant without could

cause disturbance to birds which would have temporary significant effects on the conservation objectives of this SPA.

In-Combination Impacts

There are no other plans or projects that will give rise to visual disturbance within the grassland area.

Summary

Potential impact Without Mitigation	Potentially temporary to medium-term, imperceptible to significant effects, dependent on the magnitude of the disturbance
Proposed Mitigation:	Solid screening will be erected between the construction site and the grassland area prior to construction to reduce or eliminate any visual disturbance.
Residual Impact	Unlikely to result in significant effects.
Monitoring	Refer to Section 6.1

4.5.5. Potential Impacts from accidental pollution during construction works.

In the absence of mitigation, accidental spillage of hazardous substances (oils, hydraulic fluids, concrete/cement etc.) during construction works could potentially discharge into the Liffey Estuary and ultimately to Dublin Bay. Whilst considered unlikely, if the incident was of sufficient magnitude and duration to significantly affect water quality, this could potentially result in significant effects on intertidal and subtidal habitats South Dublin Bay cSAC and North Dublin Bay cSAC in Dublin Bay and Special Conservation interest (SCI) species of SPA’s within Dublin Bay.

In-Combination Impacts

Dublin Port and the Poolbeg Peninsula contain a number of Seveso sites and EPA Licensed facilities, all of which present a risk of accidental discharge to the Liffey Estuary. The detailed risk assessment of a major accident and/or disaster occurring to which the Proposed WwTP Component may be vulnerable is considered ‘Medium’, due to the present risk of a major incident at an adjacent Seveso establishment or EPA licensed site. However, it is noted that this risk is present in the baseline environmental scenario and it is not expected that the application of this Proposed WwTP Component will contribute further to the existing risk profile. Furthermore, external Emergency Response Plans have been developed to adequately control this risk to acceptable levels, in accordance with COMAH Regulations.

Summary

Potential impact Without Mitigation	Unlikely, temporary to long-term, imperceptible to significant effects, dependent on the magnitude of the pollution event
Proposed Mitigation:	Implementation of Construction Environmental Management Plan. Develop and maintain an Environmental Incident Response Procedure and ensure adequate spill response. Provision of spill kits are available on site.
Residual Impact	Significant effects are highly unlikely
Monitoring	Standard monitoring and inspection practice in accordance with the requirements of the CEMP.

4.5.6. Potential Impacts –Indirect effects of temporary construction noise disturbance

An indirect effect of the Proposed Project could occur as temporary construction noise at Ringsend WwTP has the potential to cause disturbance to wintering waterbirds and nesting terns within the South Dublin Bay and River Tolka Estuary SPA.

On average, birds hear less well than many mammals, including humans. Acoustic deterrents or 'scarecrow' devices are not generally effective because birds habituate to them and eventually ignore them completely. Devices that purport to use sound frequencies outside the hearing range of humans are most certainly inaudible to birds as well because birds have a narrower range of hearing than humans do (Birkhead, 2012). Dooling (2002) reviewed the literature on how well birds can hear in noisy (windy) conditions and suggested that birds cannot hear certain mechanical noises as well as humans can in these conditions.

The sounds that birds hear could be divided into threatening and non-threatening sounds. Examples of non-threatening sounds are wave noise on a beach or constant traffic noise from a road. Threatening sounds would include impulsive sounds such as gunfire, explosion or barking of a dog. The sound of construction is not impulsive (sudden, loud or shocking) but tends to be continuous and low frequency noise such as that made by machinery and vehicle traffic. Waterbirds in Dublin Bay are habituated to construction noise. For example, pile-driving in the Alexandra Basin, Dublin Port in March 2017 had no impact on foraging waterbird species which are qualifying interests of the SPAs, in the neighbouring Tolka Estuary during waterbird census work carried out once per month from October 2016 to March 2017 (Richard Nairn, personal observations, Tierney *et al.* 2017). Similarly, waders using a high tide roost within 150-200 m of the construction site for a major sewage treatment works in Galway Bay showed no negative effects of disturbance during construction which involved blasting and pile-driving (Nairn, 2005).

The Common tern (*Sterna hirundo*) colony at Poolbeg (which is part of South Dublin Bay and River Tolka Estuary SPA) is located approximately 380m from the nearest part of the Proposed Upgrade Project. The predicted levels of construction noise have been assessed by the project noise specialists (AWN Consulting) to range typically between 40 to 45 dB LA_{eq} at the tern colony area.

The tern colony itself generates noise up to 70 to 80 dB(A) through the continuous calling of over 1,000 terns during the breeding season (trial measurements carried out 09 June 2015). The noise levels generated by the tern colony exceeds the expected construction noise levels at that location by some 30dB to 40dB. Results of a trial for a colony of another species, the Crested Tern (*Sterna bergii*) in Australia, found that the maximum responses observed, preparing to fly or flying off, were restricted to exposures to simulated aircraft noise levels of greater than 85 dB(A). This is approximately 45dB greater than the predicted construction noise levels. It was suggested that visual stimulus is likely to be an important component of aircraft noise disturbance (Brown 1990). The Proposed Upgrade Project will not be visible from the tern colony.

It is therefore concluded that construction noise from the proposed upgrade site will not be threatening to birds and that they will not be disturbed by it. Construction noise will therefore have imperceptible impacts on the conservation objectives of any European site.

In-Combination Impacts

This assessment is informed by the baseline surveys, which includes cumulative emissions from all sources in the local area. As stated above Waterbirds in Dublin Bay are habituated to construction noise within the area.

As the predicted impacts to the environment are slight in the short term, the cumulative impacts from simultaneous construction of Proposed WwTP Component and any external developments in the immediate vicinity of the site are deemed to be short-term and slight with appropriate mitigation measures put into place.

The potential cumulative impact of the Proposed WwTP Component, when considered in the context of proposed but not yet constructed developments is deemed to be insignificant once appropriate mitigation measures are put into place.

Specific consideration was given to the Dublin Waste to Energy facility (WtE) (ABP Reg. Ref. PL29S.EF2022), which is located adjacent to the proposed Ringsend WwTP project. Due to their location, both projects could result in in-combination disturbance to the waterbirds that utilise the existing grasslands to the south of the Ringsend WwTP site.

Compliance monitoring data for WtE site has been reviewed by the noise specialist to determine potential in-combination noise impacts. The monitoring report indicates the site is compliant with its permitted noise limits and such will remain in line with impact predictions. As such, the cumulative impacts arising are deemed to be insignificant. Furthermore, planning conditions for the Dublin Waste-to-Energy project included the following requirement:

- *Monitoring of the use by wildfowl of the grasslands located south of the wastewater treatment plant shall be carried out for a period of at least 1 year prior to the enclosure and use of the temporary construction area, during construction works and for a period of at least three years following the commissioning of the plant.*

Monitoring of the goose use of this grassland has been undertaken annually since 2007/08. Use of the replacement grassland by Brent Geese was higher in 2014/15 than in the previous four seasons, and also higher than the monitoring programme average use for this site (Mayes, 2015). This demonstrates that construction activities associated with the Waste-to-Energy Plant have not resulted in disturbance effects on the qualifying interests of the South Dublin Bay and River Tolka Estuary SPA and thus no potential for in-combination impacts with the Ringsend WwTP upgrade project.

Summary

Potential impact Without Mitigation	Construction noise at Ringsend WwTP has the potential to cause disturbance to wintering waterbirds and nesting terns within the South Dublin Bay and River Tolka Estuary SPA. This could result in temporary to short-term, imperceptible to significant effects, dependent on the intensity of construction noise.
Proposed Mitigation:	Development of a Construction Noise and Vibration Management Plan as detailed in Volume 3 Section 9 of the EIAR and in the Section 6.5 of the CEMP for the scheme.
Residual Impact	Construction noise will therefore have imperceptible impacts on the conservation objectives of any European site.
Monitoring	Construction and operational noise monitoring will be undertaken as committed to in the EIAR. Refer to Section 6.1 and 6.2 for monitoring of Species of Conservation Interest.

4.5.7. Potential Impact – Indirect effects of Dust Deposition to qualifying interests

The movement of excavated earth within the Ringsend WwTP site has the potential to generate significant potential quantities of dust. Excavated material will be transported by dump trucks along the site roads. Un-cleaned vehicles leaving the site also have the potential to deposit mud and dirt along the access road and public highway. This has the potential to generate fugitive dust. There is the

potential for roadways, stockpiles and other un-vegetated surfaces to produce dust emissions during dry, windy conditions and these may travel in the wind to the adjacent areas of the European sites.

Unusually high levels of dust deposition, such as that from quarrying and opencast mining, can have negative effects on vegetation. Dust may affect photosynthesis, respiration, transpiration and allow the penetration of phytotoxic gaseous pollutants (Farmer, 1991). Dust is constantly present in the urban air as particulate matter generated by road traffic, quarrying, factory emissions and burning of fossil fuels. Birds foraging within the European sites in Dublin Bay are habituated to normal levels of dust in the air and there is no evidence of any negative impacts on their populations or behaviour. Any dust is normally washed off vegetation during heavy rainfall and has no permanent effects on the foraging of waterbirds in the grassland adjacent to the project site.

There is an identified requirement to minimise and manage the level of dust generation on the site, to ensure that fugitive emissions are kept within an acceptable threshold of 350mg/m² to ensure that the Proposed Upgrade Project does not impact on local air quality. A Dust Management Plan will be developed to meet this commitment and is detailed in Volume 3, Section 8 of the EIAR Section 6.7 of the CEMP.

Dust deposition from the construction site will therefore have imperceptible impacts on the conservation objectives of any European site.

In-Combination Impacts

There are a number of other significant developments in the vicinity of the Proposed WwTP Component which have been granted planning permission. These include large scale developments such as Dublin Port, Dublin Waste to Energy (complete), Alexandra Basin Re-development and the Poolbeg Strategic Development Zone.

Should the construction phases of the Proposed WwTP Component overlap with these permitted developments, there is the potential for cumulative construction dust impacts at nearby sensitive receptors. However, it is predicted that appropriate mitigation measures can be put in place to reduce any potential impacts such that they are considered to be not significant.

Summary

Potential impact Without Mitigation	Construction activities at the Ringsend WwTP has the potential to generate significant quantities of dust. Left unmitigated, this has the potential result in significant effects on adjacent habitats, notably the grasslands to the south of the site that form part of the South Dublin Bay and River Tolka Estuary SPA. This could result in temporary to short-term, imperceptible to significant effects, dependent on the levels of dust generated.
Proposed Mitigation:	Development of a Dust Management Plan, as detailed in Volume 3 Section 8 of the EIAR and in Section 6.7 of the CEMP for the EIAR. This will ensure that dust deposition levels will not exceed 350mg/m ² /day.
Residual Impact	Dust deposition from the construction site will therefore have imperceptible impacts on the conservation objectives of any European site.
Monitoring	Dust monitoring will be undertaken in accordance with the commitments outlined in the CEMP and the EIAR.

4.5.8. Potential Impact– Indirect effects of Air Quality to qualifying Habitats and Interest in European sites.

The impacts of the Proposed WwTP Component on air quality is dealt with in Volume 3, Section 8: Air and Climate. The predicted annual average NO_x level in South Dublin Bay near the construction access road exceeds the limit value for the protection of vegetation (Air Quality Standards Regulations SI 180 of 2011) of 30 µg/m³ for the “Do-nothing” scenario, with NO_x concentrations reaching 146% of this limit. Levels with construction taking place will be higher, reaching 152% of the limit value for the period during peak construction. The impact of the construction traffic will lead to an increase in NO_x concentrations of at most 4.54 µg/m³ within the South Dublin Bay and the River Tolka Estuary SPA. Appendix 9 of the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (NRA, 2011) state that where the scheme or development is expected to cause an increase of more than 2 µg/m³ and the predicted concentrations (including background) are close to, or exceed the standard, then the sensitivity of the habitat to NO_x should be assessed by the project ecologist.

In light of the air quality impact predictions, the potential for any indirect impact on sensitive ecological receptors (waterbirds on the amenity grassland in particular) was assessed. This level of deposition of NO_x will have no significant effect on the habitat (improved grassland) or on the bird species that use the amenity grassland adjacent to the WwTP site. The maximum increase in the NO₂ dry deposition rate is 0.22 kg(N)/ha/yr during the peak construction period.

This reaches only 4.4% of the critical load for inland and surface water habitats of 5-10 kg(N)/ha/yr. Brent Geese, wader and gull species are not sensitive to this compound and will continue to use the grassland habitat and intertidal areas during construction.

This level of deposition of NO_x will have no significant effect on the habitat (improved grassland) or on the bird species that use the South Dublin Bay and the River Tolka Estuary SPA. Air emissions in general from the construction site will therefore have imperceptible impacts on the conservation objectives of this European site.

In-Combination Impacts

Cumulative effects of the operational phase have been assessed by the Air Quality specialists (AWN), as recommended in the EU Directive on EIA (Council Directive 97/11/EC) and using the methodology of the UK DEFRA. Any schemes that are predicted to be in place during the future year have been included in future traffic increases, as significant increases in vehicle emissions due to other developments have the potential to increase background concentrations and therefore raise the significance of impact due to the Proposed WwTP Component. Whilst cumulative effect are considered to be long-term, negative and not significant in terms of air quality and climate impacts.

The construction and operation of the Proposed Upgrade Project is not expected to give in-combination emissions that will result in significant adverse effects.

Summary

Potential impact Without Mitigation	Potential for NOx emissions from the construction and operation phase of the proposed Upgrade project, to impact on grasslands and intertidal habitats. The maximum increase in the NO ₂ dry deposition rate is 0.22 kg(N)/ha/yr during the peak construction period, which amounts only 4.4% of the critical load for inland and surface water habitats. No significant effects resulting from this impact is anticipated.
Proposed Mitigation:	None required
Residual Impact	No likely significant effect on qualifying interests for European sites.
Monitoring	None required.

5. MITIGATION MEASURES

5.1. Direct effects on South Dublin Bay and River Tolka Estuary SPA

The works include a new underground electrical connection to an existing underground ESB cable, along the southern boundary of the site (at the south west corner only) and at the edge of, and extending to within the South Dublin Bay and River Tolka Estuary SPA.. The construction area of approximately 30 m x 20 m will be within the section of the SPA that is immediately adjacent to the southern boundary of the WwTP. The works required will be carried out entirely in the period between 1st May and 31st August (when the Brent Geese are absent from the SPA) and the construction area will be fully reinstated by backfilling with the original soil and laying of grass turves in their original position. The grassland will thus be fully reinstated in time for the return of the geese in September/October.

5.2. Indirect effects on South Dublin Bay and River Tolka Estuary SPA

An indirect effect of the Proposed Upgrade Project could occur as construction works at Ringsend WwTP have the potential to cause disturbance to waterbird populations on the grassland immediately adjacent to the works, due to the activity of construction workers on the site. To effectively eliminate the potential for likely significant effects on European sites, the following mitigation measures are recommended:

Screening will be provided around the southern perimeter of the WwTP and on the scaffolding around the SBR tanks. This will prevent any visual disturbance to the waterbirds that utilise the grassland area.

The project will develop and implement an invasive species management plan, as detailed in Appendix 6A of Volume 3 of the EIAR.

Implementation of Construction Environmental Management Plan. Develop and maintain an Environmental Incident Response Procedure and ensure adequate spill response. Provision of spill kits are available on site.

Development of a Dust Management Plan, as detailed in Volume 3 Section 8 of the EIAR and in Section 6.7 of the CEMP for the EIAR. This will ensure that dust deposition levels will not exceed 350mg/m²/day.

Development of a Construction Noise and Vibration Management Plan as detailed in Volume 3 Section 9 of the EIAR and in the Section 6.5 of the CEMP for the scheme.

The provision of these mitigation measures will ensure that there are no adverse impacts of the proposed upgrade of Ringsend WwTP on South Dublin Bay and River Tolka Estuary SPA.

6. MONITORING

6.1. Monitoring for disturbance to waterbirds

A series of monthly surveys of waterbirds will be undertaken by the Applicant on the grassland, immediately south of the proposed project, each winter between October and April for the period of construction and for one year following completion of the works. When compared with the baseline period (data given above) and general population trends this will allow assessment of the efficacy of the mitigation measures on potential disturbance. A record will be maintained of any disturbance incidents to the waterbirds on this site where these are connected with the construction works.

6.2. Monitoring of potential changes in waterbird related to effluent discharge

A comprehensive monitoring programme currently being undertaken by BirdWatch Ireland for all of Dublin Bay, which can be used to allow assessment of the efficacy of potential changes in waterbird populations related to effluent discharge.

6.3. Monitoring of invasive plant species

Annual monitoring of potentially invasive plant species by the developer in the immediate vicinity of the proposed project will be undertaken to assess the efficacy of control measures proposed in the Invasive Species Management Plan.

The above monitoring proposals are required to demonstrate that the mitigation measures proposed are part of the development are sufficient to ensure that the project will not result in significant effects on the integrity of European Sites. In the unlikely event that results from the monitoring programs results indicate a failure or shortcomings within the proposed mitigation measures proposed, the Applicant, in consultation with the National Parks and Wildlife Service and other statutory stakeholders as relevant, will develop and implement additional control measures as necessary.

7. CONCLUDING STATEMENT

On the basis of the findings of this Natura Impact Statement, it is concluded that the proposals to upgrade the treatment process at Ringsend WwTP and the development of a RBSF, on their own or in combination with other plans and projects, will not have any significant effect on the integrity of any European site. This concludes the Natura Impact Statement.

8. REFERENCES

- Berrow, S., Hickey, R., O'Connor, I. and McGrath, D. 2014. Density estimates of harbour porpoise (*Phocoena phocoena*) at eight coastal sites in Ireland. *Biology and Environment* 114B (1), 19-34.
- Birkhead, T. (2012) *Bird Sense: What it's like to be a bird*. Bloomsbury. London.
- Brown, A.L. (1990) Measuring the effect of aircraft noise on sea birds. *Environment International* 16: 587-592.
- Chivers, L.S., Lundy, M.G., Colhoun, K., Newton, S.F. and Reid, N. (2012) Diet of Black-legged Kittiwakes (*Rissa tridactyla*) feeding chicks at two Irish colonies highlights the importance of clupeids. *Bird Study* 59, 363-367.
- Department of the Environment, Heritage and Local Government (2009). *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*. (with revision notes published in February 2010).
- Dooling, R. (2002) Avian Hearing and the Avoidance of Wind Turbines. National Renewable Energy Laboratory, Colorado, USA. Technical Report no. NREL/TP-500-30844.
- Dublin City Council (2012) Ringsend Wastewater Treatment Works Extension. Environmental Impact Statement.
- European Commission (2000). *Managing European Sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC*.
- European Commission (2001). *Assessment of Plans and Projects significantly affecting European Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*.
- Farmer, A.M. (1991) The effects of dust on vegetation: a review. *Environmental Pollution* 79: 63-75.
- Mayes, Eleanor, Ecological Consultant (2015). Dublin Waste to Energy Facility Wildfowl Monitoring Winter 2014/15. Report prepared for Dublin Waste to Energy Limited. <http://dublinwastetoenergy.ie>
- McGarrigle, M. (2016). *Synthesis of Impacts on Biodiversity (Marine and Terrestrial) European sites and on the Ecological Status of Water Bodies*. Ringsend Wastewater Treatment Plant Upgrade Project: Environmental Impact Statement
- McGarrigle, M. (2018) Biological Survey of Small Stream at Proposed Kilshane Cross Biosolids Storage Site. Unpublished report to J.B. Barry & Partners. Limnos Consultancy.
- MERC (2012a) Intertidal Reef Survey of Lambay Island SAC and SPA, Rockabill Island SPA, Ireland's Eye SAC, Dalkey Islands SPA and Muglins. Carried out by MERC on behalf of the Marine Institute in partnership with National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.
- MERC (2012b) Subtidal Reef Survey of Lambay Island SAC and SPA, Rockabill Island SPA, Ireland's Eye SAC, Dalkey Islands SPA and Muglins. Carried out by MERC on behalf of the Marine Institute in partnership with National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.

- Nairn, R.G.W. (2005) Use of a high tide roost by waders during engineering work in Galway Bay, Ireland. *Irish Birds* 7: 489-496.
- Nairn, R., Jeffrey, D. and Goodbody, R. (2017) Dublin Bay: Nature and History. Cork. The Collins Press.
- NPWS (2013) Conservation Objectives: North Dublin Bay SAC 000206. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: South Dublin Bay SAC 000210. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: Rockabill to Dalkey Island SAC 003000. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: Malahide Estuary SAC 000205. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: Malahide Estuary SPA 004025. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2014) North Bull Island Special Protection Area (Site Code 4006) & South Dublin Bay and River Tolka Estuary Special Protection Area (Site Code 4024). Conservation Objectives Supporting Document Version 1. National Parks & Wildlife Service.
- NPWS (2015) Conservation objectives for Howth Head SAC [000202]. Generic Version 4.0. Department of Arts, Heritage and the Gaeltacht.
- NPWS (2015) Conservation Objectives: North Bull Island SPA 004006. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2015) Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2015) Conservation objectives for Howth Head Coast SPA [004113]. Generic Version 4.0. Department of Arts, Heritage and the Gaeltacht.
- NPWS (2015) Conservation objectives for Dalkey Islands SPA [004172]. Generic Version 4.0. Department of Arts, Heritage and the Gaeltacht.
- O'Higgins, T.G., Wilson, J.G., 2005. Impact of the river Liffey discharge on nutrient and chlorophyll concentrations in the Liffey estuary and Dublin Bay (Irish Sea). *Estuar. Coast. Shelf Sci.* 64, 323–334.
- Rogan, E. and Berrow, S.D. (1996) A review of Harbour Porpoises *Phocoena phocoena*, in Irish waters. *Report of International Whaling Commission* 460, 595-605.
- Roth, S., & Wilson, J. G. 1998. Functional analysis by trophic guilds of macrobenthic community structure in Dublin Bay, Ireland. *Journal of Experimental Marine Biology and Ecology*, 222(1-2), 195-217

Tierney, N., Whelan, R., Boland, H. & Crowe, O. (2017) *The Dublin Bay Birds Project: Synthesis 2013-2016*. Kilcoole, Wicklow. BirdWatch Ireland.

Wilson, J., 1982. The littoral fauna of Dublin Bay. Irish Fish. Investig. Ser. B 26

Yrjölä, R.A. & Santaharju, J.L.M. (2015) The impact of road construction on a community of farmland birds. *Annales Zoologici Fennici* 52(1-2): 33-44.

APPENDIX 1: Brief descriptions of the European sites.

South Dublin Bay and River Tolka Estuary SPA (004024)

The South Dublin Bay and River Tolka Estuary SPA comprises a substantial part of Dublin Bay. It includes the intertidal area between the River Liffey and Dun Laoghaire, and the estuary of the River Tolka to the north of the River Liffey, as well as Booterstown Marsh. A portion of the shallow marine waters of the bay is also included.

The South Dublin Bay and River Tolka Estuary SPA is of international importance for Light-bellied Brent Goose and of national importance for nine other waterfowl species. As an autumn tern roost, it is also of international importance. Furthermore, the site supports a nationally important colony of Common Tern. All of the tern species using the site are listed on Annex I of the E.U. Birds Directive, as are Bartailed Godwit and Mediterranean Gull.

Special Conservation Interests:

- *Branta bernicla hrota* (Light-bellied Brent Goose) (wintering)
- *Haematopus ostralegus* (Oystercatcher) (wintering)
- *Charadrius hiaticula* (Ringed Plover) (wintering)
- *Pluvialis squatarola* (Grey Plover) (wintering)
- *Calidris canutus* (Knot) (wintering)
- *Calidris alba* (Sanderling) (wintering)
- *Limosa lapponica* (Bar-tailed Godwit) (wintering)
- *Tringa totanus* (Redshank) (wintering)
- *Sterna dougallii* (Roseate Tern) (passage)
- *Sterna hirundo* (Common Tern) (breeding)

Conservation Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.

South Dublin Bay SAC (000210)

This site lies south of the River Liffey and extends from the South Wall to the west pier at Dun Laoghaire. It is an intertidal site with extensive areas of sand and mudflats, a habitat listed on Annex I of the E.U. Habitats Directive. The sediments are predominantly sands but grade to sandy muds near the shore at Merrion gates. The main channel which drains the area is Cockle Lake.

This site is a fine example of a coastal system with extensive sand and mudflats, a habitat listed on Annex I of the E.U. Habitats Directive. South Dublin Bay is also an internationally important bird site.

Qualifying Interests/Species:

- Mudflats and sandflats not covered by seawater at low tide (1140)

Conservation Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and /or the Annex II species for which the SAC has been selected.

North Bull Island SPA (004006)

This site covers all of the inner part of north Dublin Bay, with the seaward boundary extending from the Bull Wall lighthouse across to Drumleck Point at Howth Head. The North Bull Island sand spit is a relatively recent depositional feature, formed as a result of improvements to Dublin Port during the

18th and 19th centuries. It is almost 5 km long and 1 km wide and runs parallel to the coast between Clontarf and Sutton. Part of the interior of the island has been converted to golf courses.

The North Bull Island SPA is an excellent example of an estuarine complex and is one of the top sites in Ireland for wintering waterfowl. It is of international importance on account of both the total number of waterfowl and the individual populations of Lightbellied Brent Goose, Black-tailed Godwit and Bar-tailed Godwit that use it. Also of significance is the regular presence of several species that are listed on Annex I of the E.U. Birds Directive, notably Golden Plover and Bar-tailed Godwit, but also Ruff and Short-eared Owl.

Special Conservation Interests:

- *Branta bernicla hrota* (Light-bellied Brent Goose) (wintering)
- *Tadorna tadorna* (Shelduck) (wintering)
- *Anas crecca* (Teal) (wintering)
- *Anas acuta* (Pintail) (wintering)
- *Anas clypeata* (Shoveler) (wintering)
- *Haematopus ostralegus* (Oystercatcher) (wintering)
- *Pluvialis squatarola* (Grey Plover) (wintering)
- *Calidris canutus* (Knot) (wintering)
- *Calidris alba* (Sanderling) (wintering)
- *Limosa limosa* (Black-tailed Godwit) (wintering)
- *Limosa lapponica* (Bar-tailed Godwit) (wintering)
- *Numenius arquata* (Curlew) (wintering)
- *Tringa totanus* (Redshank) (wintering)
- *Arenaria interpres* (Turnstone) (wintering)
- Wetlands and Waterbirds

Conservation Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.

North Dublin Bay SAC (000206)

This site covers the inner part of north Dublin Bay, the seaward boundary extending from the Bull Wall lighthouse across to the Martello Tower at Howth Head.

This site is an excellent example of a coastal site with all the main habitats represented. The site holds good examples of ten habitats that are listed on Annex I of the E.U. Habitats Directive; one of these is listed with priority status. Several of the wintering bird species have populations of international importance, while some of the invertebrates are of national importance. The site contains a number of rare and scarce plants including some which are legally protected. Its proximity to the capital city makes North Dublin Bay an excellent site for educational studies and research.

Qualifying Interests/Species:

- Mudflats and sandflats not covered by seawater at low tide (1140)
- Annual vegetation of driftlines (1210)
- *Salicornia* and other annuals colonizing mud and sand (1310)
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330)
- Mediterranean salt meadows (*Juncetalia maritimi*) (1410)
- Embryonic shifting dunes (2110)
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (2120)

- Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)
- Humid dune slacks (2190)
- *Petalophyllum ralfsii* (1395)

Conservation Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and /or the Annex II species for which the SAC has been selected.

Howth Head Coast SPA (004113)

Howth Head is a rocky headland situated on the northern side of Dublin Bay. The peninsula is composed of Cambrian rock of the Bray Group, the most conspicuous component being quartzite. The site comprises the sea cliffs extending from just east of the Nose of Howth to the tip of the Bailey Lighthouse peninsula. The marine area to a distance of 500 m from the cliff base, where seabirds socialise and feed, is included within the site.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for Kittiwake. This site is of high ornithological importance, with four seabird species having populations of national importance. It is also a traditional nesting site for Peregrine Falcon. The site is easily accessible and has important amenity and educational value due to its proximity to Dublin City.

Special Conservation Interests:

- *Rissa tridactyla* (Kittiwake) (breeding)

Conservation Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.

Dalkey Islands SPA (004172)

The site comprises Dalkey Island, Lamb Island and Maiden Rock, the intervening rocks and reefs, and the surrounding sea to a distance of 200 m. Dalkey Island, which is the largest in the group, lies c. 400 m off Sorrento Point on the Co. Dublin mainland from which it is separated by a deep channel. The island is low-lying, the highest point of which (c. 15 m) is marked by a Martello Tower.

Dalkey Islands SPA is of particular importance as a post-breeding/pre-migration autumn roost area for Roseate Tern, Common Tern and Arctic Tern. The recent nesting by Roseate Tern is highly significant. All three tern species using the site are listed on Annex I of the E.U. Birds Directive.

Special Conservation Interests:

- *Sterna dougallii* (Roseate Tern) (passage)
- *Sterna hirundo* (Common Tern) (passage)
- *Sterna paradisea* (Arctic Tern) (passage)

Conservation Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.

Howth Head SAC (000202)

Howth Head is a rocky headland situated on the northern side of Dublin Bay. The peninsula is composed of Cambrian slates and quartzites, joined to the mainland by a post glacial raised beach. Limestone occurs on the north-west side while glacial drift is deposited against the cliffs in places.

Howth Head contains sea cliffs and dry heaths, two habitats listed on Annex I of the EU Habitats Directive.

Howth Head displays a fine range of natural habitats, including two Annex I habitats, within surprisingly close proximity to Dublin city. The site is also of scientific importance for its seabird colonies, invertebrates and lichens. It also supports populations of at least two legally protected plant species and several other scarce plants.

Qualifying Interests/Species:

- Vegetated sea cliff of the Atlantic and Baltic coasts (1230)
- European dry heaths (4030)

Conservation Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and /or the Annex II species for which the SAC has been selected.

Rockabill to Dalkey Island SAC (003000)

This site includes a range of dynamic inshore and coastal waters in the western Irish Sea. These include sandy and muddy seabed, reefs, sandbanks and islands. This site extends southwards, in a strip approximately 7 km wide and 40 km in length, from Rockabill, running adjacent to Howth Head, and crosses Dublin Bay to Frazer Bank in south county Dublin. The site encompasses Dalkey, Muglins and Rockabill islands.

The area selected for designation represents a key habitat for the Annex II species harbour porpoise, within the Irish Sea. Population survey data show that porpoise occurrence within the site boundary meets suitable reference values for other designated sites in Ireland. The species occurs year-round within the site and comparatively high group sizes have been recorded. Porpoises with young (i.e. calves) are observed at favourable, typical reference values for the species. Casual and effort-related sighting rates from coastal observation stations are significant for the east coast of Ireland and the latter appear to be relatively stable across all seasons. The selected site contains a wide array of habitats believed to be important for harbour porpoise including inshore shallow sand and mud-banks and rocky reefs scoured by strong current flow. The site also supports Harbour seal (*Phoca vitulina*) and Grey seal (*Halichoerus grypus*), for which terrestrial haul-out sites occur in immediate proximity to the site. Bottlenose dolphin (*Tursiops truncatus*) has also occasionally been recorded in the area. A number of other marine mammals have been recorded in this area including minke, fin and killer whales and Risso's and common dolphins.

Reef habitat is uncommon along the eastern seaboard of Ireland due to prevailing geology and hydrographical conditions. Expansive surveys of the Irish coast have indicated that the greatest resource of this habitat within the Irish Sea is found fringing offshore islands which are concentrated along the Dublin coast. A detailed survey of selected suitable islands has shown areas with typical biodiversity for this habitat both intertidally and subtidally. Species recorded in the intertidal included *Fucus spiralis*, *Fucus serratus*, *Pelvetia canaliculata*, *Ascophyllum nodosum*, *Semibalanus balanoides* and *Necora puber*. Subtidally, a wide range of species include *Laminaria hyperborea*, *Flustra foliacea*, *Alaria esculenta*, *Halidrys siliquosa*, *Pomatocereos triqueter*, *Alcyonium digitatum*, *Metridium senile*, *Caryophyllia smithii*, *Tubularia indivisa*, *Mytilus edulis*, *Gibbula umbilicalis*, *Asterias rubens*, and *Echinus esculentus*. These Reefs are subject to strong tidal currents with an abundant supply of suspended matter resulting in good representation of filter feeding fauna such as sponges, anemones and echinoderms.

This site is of conservation importance for reefs, listed on Annex I, and Harbour Porpoise, listed on Annex II, of the E.U. Habitats Directive.

Qualifying interests:

- [1170] Reefs
- Harbour porpoise *Phocoena phocoena*

Malahide Estuary SAC (000205)

The outer part of the estuary is mostly cut off from the sea by a large sand spit, known as 'the island'. The outer estuary drains almost completely at low tide, exposing sand and mud flats. There is a large bed of Eelgrass (Dwarf Eelgrass, *Zostera noltii*, and Narrow-leaved Eelgrass, *Z. angustifolia*) in the north section of the outer estuary, along with Beaked Tasselweed (*Ruppia maritima*) and extensive mats of green algae (*Enteromorpha* spp., *Ulva lactuca*). Common Cord-grass (*Spartina anglica*) is also widespread in this sheltered part of the estuary. The dune spit has a well-developed outer dune ridge dominated by Marram Grass (*Ammophila arenaria*). The dry areas of the stabilised dunes have a dense covering of Burnet Rose (*Rosa pimpinellifolia*), Red Fescue (*Festuca rubra*) and species such as Yellow-wort (*Blackstonia perfoliata*), Autumn Gentian (*Gentianella amarella*), Hound's tongue (*Cynoglossum officinale*), Carline Thistle (*Carlina vulgaris*) and Pyramidal Orchid (*Anacamptis pyramidalis*). Much of the interior of the spit is taken up by a golf course. The inner stony shore has frequent Sea-holly (*Eryngium maritimum*). Well-developed saltmarshes occur at the tip of the spit. Atlantic salt meadow is the principle type and is characterised by species such as Sea-purslane (*Halimolobos portulacoides*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea Arrowgrass (*Triglochin maritima*) and Common Saltmarsh-grass (*Puccinellia maritima*). Elsewhere in the outer estuary, a small area of Mediterranean salt meadow occurs which is characterised by the presence of Sea Rush (*Juncus maritimus*). Below the salt marshes there are good examples of pioneering glasswort (*Salicornia* spp.) swards and other annual species, typified by *S. dolichostachya* and Annual Sea-blite (*Suaeda maritima*).

The inner estuary does not drain at low tide apart from the extreme inner part. Here, patches of saltmarsh and salt meadows occur, with Sea Aster, Sea Plantain (*Plantago maritima*) and Sea Club-rush (*Scirpus maritimus*). Beaked Tasselweed occurs in one of the channels. The site includes a fine area of rocky shore south-east of Malahide and extending towards Portmarnock. This represents the only continuous section through the fossiliferous Lower Carboniferous rocks in the Dublin Basin, and is the type locality for several species of fossil coral. The estuary is an important wintering bird site and holds an internationally important population of Brent Goose and nationally important populations of a further 15 species. Average maximum counts during the 1995/96-1997/98 period were: Brent Goose 1217; Great Crested Grebe 52; Mute Swan 106; Shelduck 471; Pochard 200; Goldeneye 333; Red-breasted Merganser 116; Oystercatcher 1228; Golden Plover 2123; Grey Plover 190; Redshank 454; Wigeon 50; Teal 78; Ringed Plover 106; Knot 858; Dunlin 1474; Greenshank 38; Pintail 53; Black-tailed Godwit 345; Bar-tailed Godwit 99. The high numbers of diving birds reflects the lagoon-type nature of the inner estuary. The estuary also attracts migrant species such as Ruff, Curlew Sandpiper, Spotted Redshank and Little Stint. Breeding birds of the site include Ringed Plover, Shelduck and Mallard. Up to the 1950s there was a major tern colony at the southern end of the island and the habitat remains suitable for these birds.

Qualifying interests

- Mudflats and sandflats not covered by seawater at low tide [1140]
- *Salicornia* and other annuals colonising mud and sand [1310]
- *Spartina* swards (*Spartinion maritimae*) [1320]
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
- Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
- Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]

Malahide Estuary SPA (004025)

Malahide Estuary is situated in north Co. Dublin, between the towns of Malahide and Swords. The site encompasses the estuary, saltmarsh habitats and shallow subtidal areas at the mouth of the estuary. A railway viaduct, built in the 1800s, crosses the site and has led to the inner estuary becoming lagoonal in character and only partly tidal. Much of the outer part of the estuary is well-sheltered from the sea by a large sand spit, known as "The Island". This spit is now mostly converted to golf-course. The outer part empties almost completely at low tide and there are extensive intertidal flats exposed. Substantial stands of eelgrass (both *Zostera noltii* and *Z. angustifolia*) occur in the sheltered part of the outer estuary, along with Tasselweed (*Ruppia maritima*). Green algae, mostly *Ulva* spp., are frequent on the sheltered flats. Common Cord-grass (*Spartina anglica*) is well established in the outer estuary and also in the innermost part of the site. The intertidal flats support a typical macroinvertebrate fauna, with polychaete worms (*Arenicola marina* and *Hediste diversicolor*), bivalves such as *Cerastoderma edule*, *Macoma balthica* and *Scrobicularia plana*, the small gastropod *Hydrobia ulvae* and the crustacean *Corophium volutator*. Salt marshes, which provide important roosts during high tide, occur in parts of the outer estuary and in the extreme inner part of the inner estuary. These are characterised by such species as Sea Purslane (*Halimione portulacoides*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea Arrowgrass (*Triglochin maritima*) and Common Saltmarsh-grass (*Puccinellia maritima*).

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Great Crested Grebe, Light-bellied Brent Goose, Shelduck, Pintail, Goldeneye, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit and Redshank. 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. This site is of high importance for wintering waterfowl and supports a particularly good diversity of species. It has internationally important populations of Light-bellied Brent Goose (1,104 individuals or 5% of the all-Ireland total) and Black-tailed Godwit (409 individuals or 2.9% of the all-Ireland total) - figures given here and below are mean peaks for the five winters 1995/96-1999/2000. Furthermore, the site supports nationally important populations of an additional 12 species: Great Crested Grebe (63), Shelduck (439), Pintail (58), Goldeneye (215), Red-breasted Merganser (99), Oystercatcher (1,360), Golden Plover (1,843), Grey Plover (201), Knot (915), Dunlin (1,594), Bar-tailed Godwit (156) and Redshank (581). The high numbers of diving ducks reflects the lagoon-type nature of the inner estuary, and this is one of the few sites in eastern Ireland where substantial numbers of Goldeneye can be found.

A range of other species occurs, including Mute Swan (37), Pochard (36), Ringed Plover (86), Lapwing (1,542), Curlew (548), Greenshank (38) and Turnstone (112). The estuary also attracts other migrant wader species such as Ruff, Curlew Sandpiper, Spotted Redshank and Little Stint. These occur mainly in autumn, though occasionally in spring and winter. Breeding birds of the site include Ringed Plover, Shelduck and Mallard. Up to the 1950s there was a major tern colony at the southern end of Malahide Island. Grey Herons breed nearby and feed regularly within the site. Malahide Estuary SPA is a fine example of an estuarine system, providing both feeding and roosting areas for a range of wintering waterfowl. The lagoonal nature of the inner estuary is of particular value as it increases the diversity of birds which occur. The site is of high conservation importance, with internationally important populations of Light-bellied Brent Goose and Black-tailed Godwit, and nationally important populations of a further 12 species. Two of the species which occur regularly (Golden Plover and Bar-tailed Godwit) are listed on Annex I of the E.U. Birds Directive. Malahide Estuary (also known as Broadmeadow Estuary) is a Ramsar Convention site.

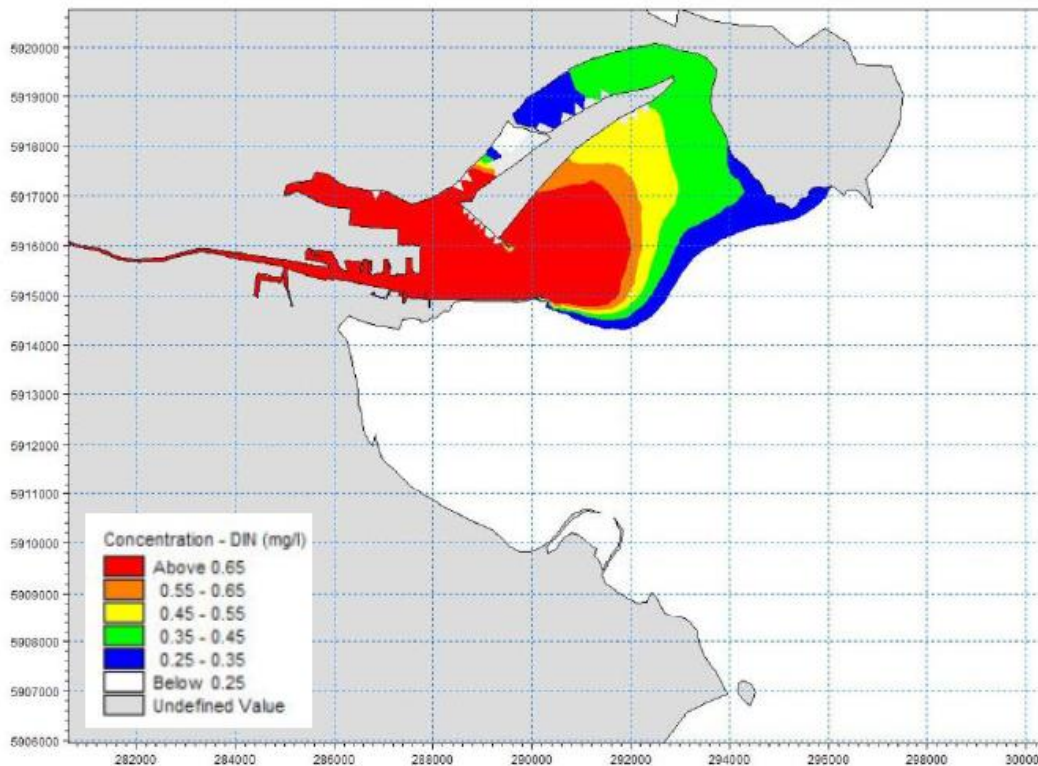
Qualifying interests

- Great Crested Grebe (*Podiceps cristatus*) [A005]

- Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]
- Shelduck (*Tadorna tadorna*) [A048]
- Pintail (*Anas acuta*) [A054]
- Goldeneye (*Bucephala clangula*) [A067]
- Red-breasted Merganser (*Mergus serrator*) [A069]
- Oystercatcher (*Haematopus ostralegus*) [A130]
- Golden Plover (*Pluvialis apricaria*) [A140]
- Grey Plover (*Pluvialis squatarola*) [A141]
- Knot (*Calidris canutus*) [A143]
- Dunlin (*Calidris alpina*) [A149]
- Black-tailed Godwit (*Limosa limosa*) [A156]
- Bar-tailed Godwit (*Limosa lapponica*) [A157]
- Redshank (*Tringa totanus*) [A162]
- Wetland and Waterbirds [A999]

APPENDIX 2: Existing Outfall Dissolved Inorganic Nitrogen

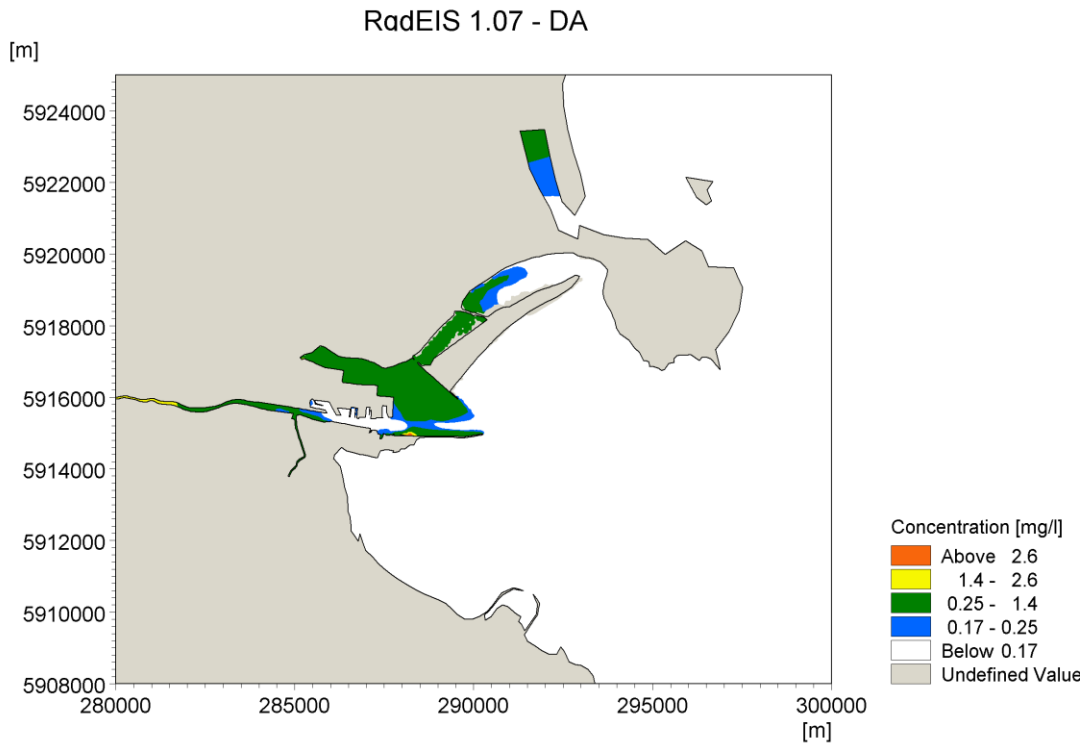
The below image has been extracted from the Ringsend WwTP Upgrade Project Environmental Impact Assessment Report (2018). The image shows the highest concentration of dissolved inorganic nitrogen at any time in each grid cell and represents the worst case scenario at each point and is not a representation of one particular time.



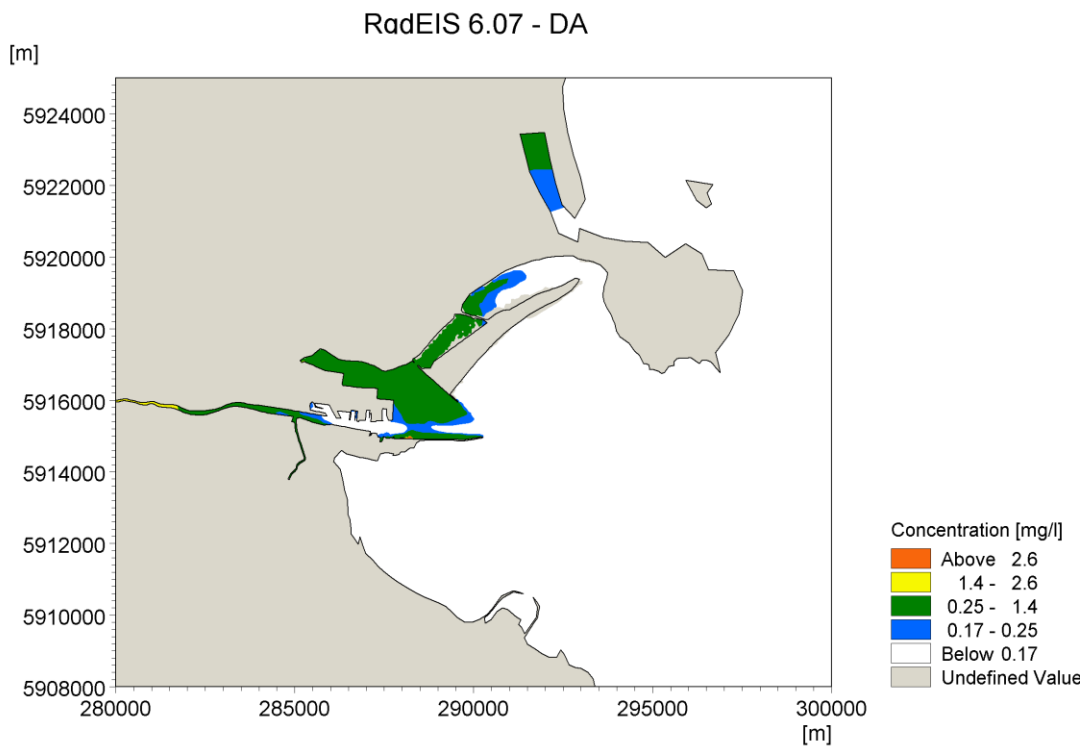
“Ringsend WwTP Upgrade Project Environmental Impact Assessment Report” (March 2018).

The following three images show the dissolved inorganic nitrogen plots for annual average conditions (50%ile and depth averaged). They show:

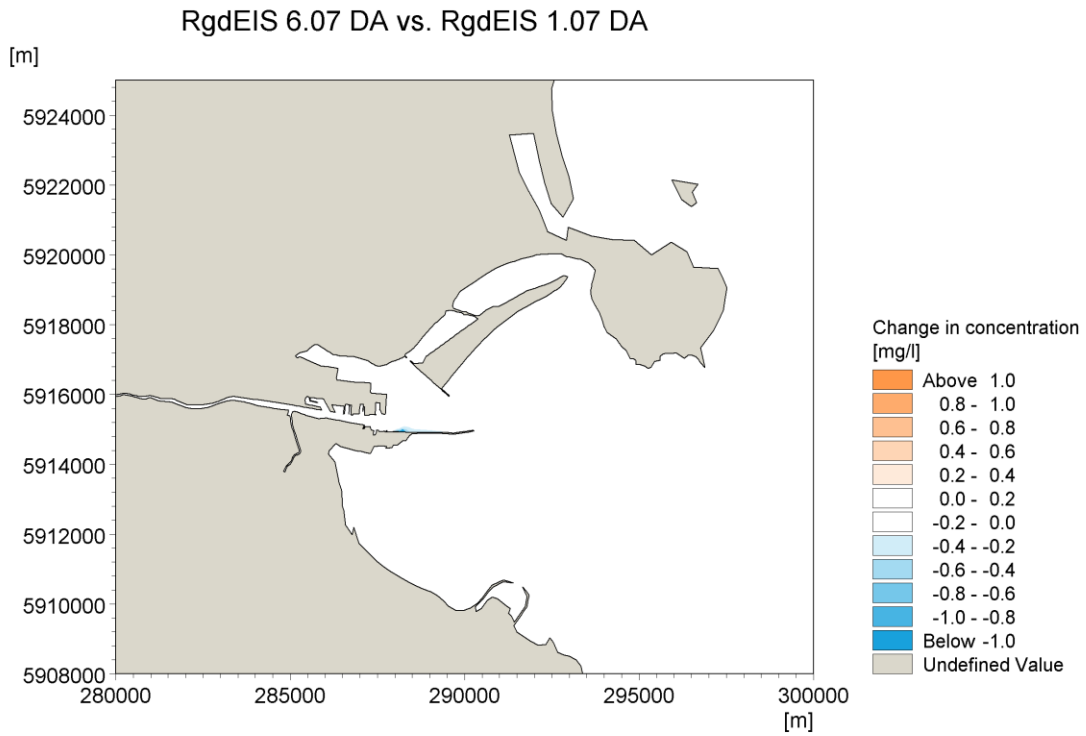
- Existing conditions
- Future conditions
- A comparison of the two



Existing dissolved inorganic nitrogen plot for annual average conditions, 50%ile and depth averaged



Future dissolved inorganic nitrogen plot for annual average conditions, 50%ile and depth averaged



Comparison of existing and future dissolved inorganic nitrogen plot for annual average conditions, 50%ile and depth averaged

APPENDIX 3: Site Location and extent of Ringsend WwTP Component

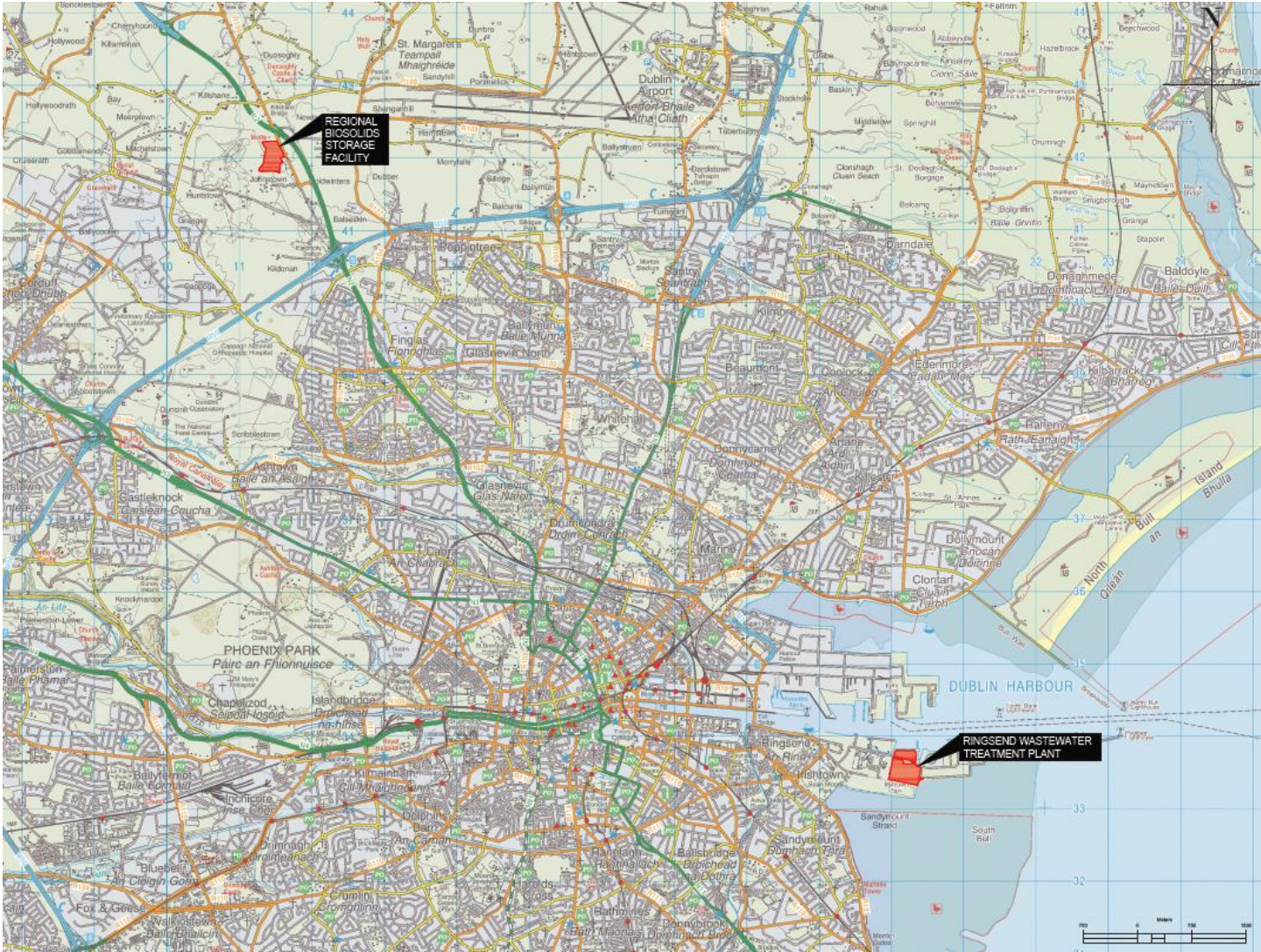


Figure A3-1 – Ringsend WwTP Upgrade Project, Site Location

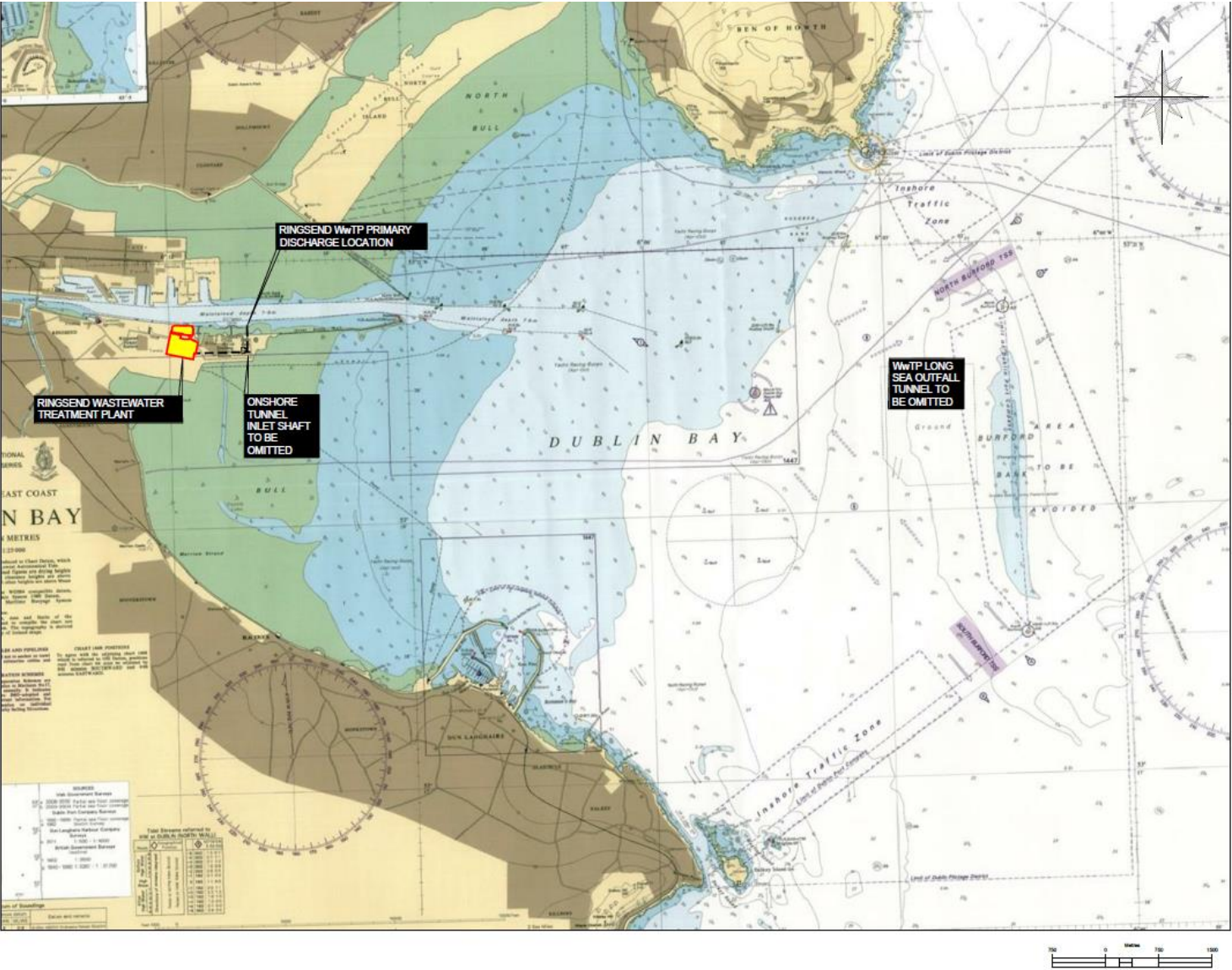


Figure A3-2 – Proposed Upgrade Project, Ringsend WwTP Component, In context of Dublin Bay (Also refer to EIAR drawing Y15710-PL-915)

Ringsend WwTP Upgrade Project: Appropriate Assessment Screening and NIS

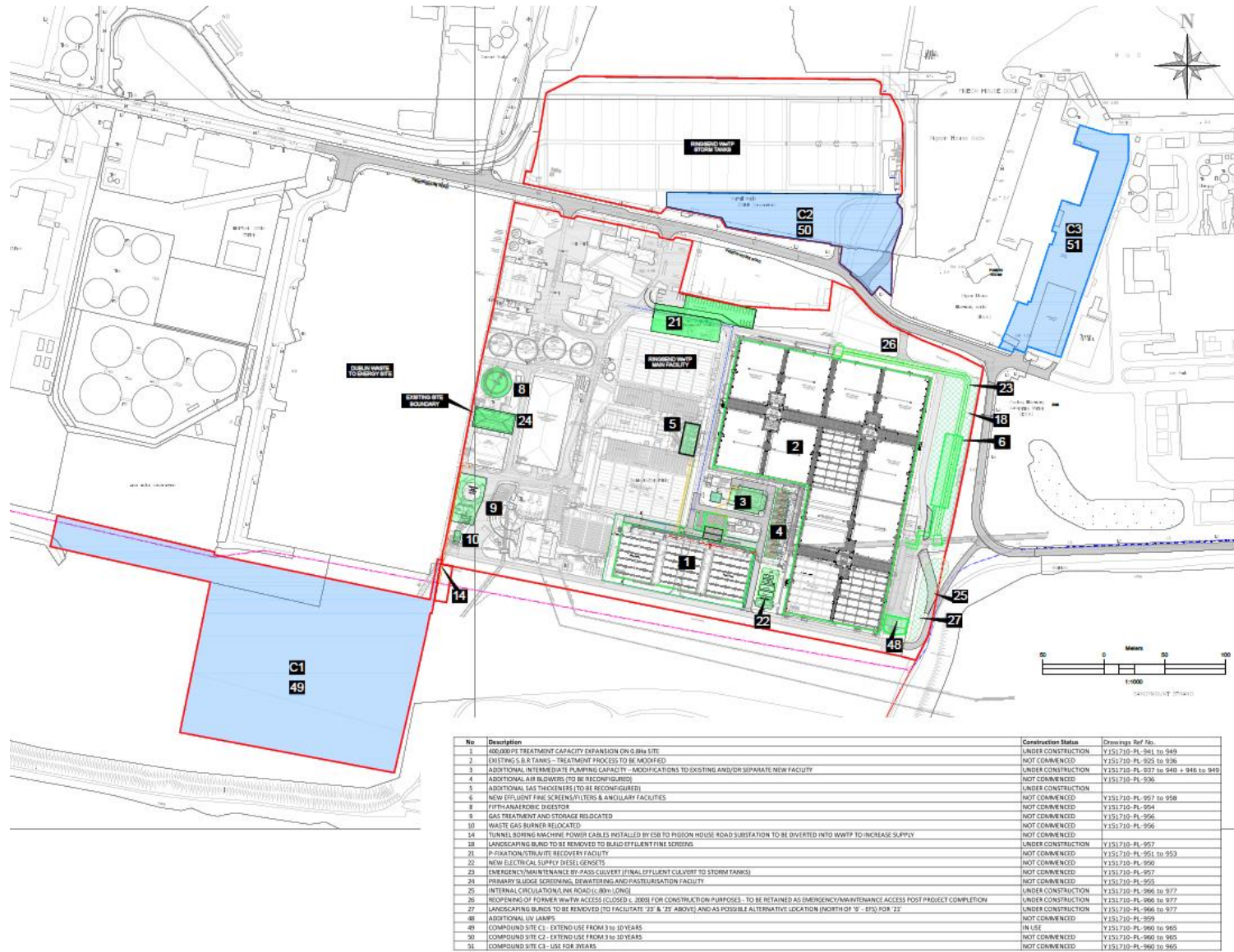


Figure A3-3 – Proposed Upgrade Project, Ringsend WwTP Component (Also refer to EIAR drawing Y15710-PL-916)



TJ O'CONNOR
& ASSOCIATES
CONSULTING ENGINEERS

BARRY
& PARTNERS
consulting engineers

 **Royal
HaskoningDHV**
Enhancing Society Together