Appendix A4.1 Key Wastewater Treatment Standards Report

Greater Dublin Drainage

Key Wastewater Treatment Standards

Irish Water

December 2017

Contents

List of Tables

List of Acronyms

ASA	Alternative Site Assessment
BIM	Bord Iascaigh Mhara
BOD	Biochemical Oxygen Demand
cfu	Colony forming units (of bacteria)
COD	Chemical Oxygen Demand
DIN	Dissolved Inorganic Nitrogen
DoECLG	Department of Environment, Community and Local Government
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERBD	Eastern River Basin District
EU	European Union
FEEE	Foundation of Environmental Education in Europe
GDA	Greater Dublin Area
GDSDS	Greater Dublin Strategic Drainage Study
MPN	Most Probable Number
NHA	Natural Heritage Area
NPWS	National Parks and Wildlife Service
P.E.	Population Equivalent
pNHA	Proposed Natural Heritage Area
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SFPA	Sea Fisheries Protection Authority
S.I.	Statutory Instrument
SPA	Special Protected Area
TSS	Total Suspended Solids
TU	Toxicity Unit

UWWT	Urban Wastewater Treatment
WFD	Water Framework Directive
WWDA	Wastewater Discharge Authorisation
WwTP	Wastewater Treatment Plant

1 Introduction

1.1 Title

The official name of the project is Greater Dublin Drainage – Regional Wastewater Treatment Plant, Marine Outfall & Orbital Drainage System

1.2 Core Requirements

The core requirement of the Greater Dublin Drainage project is to safely deliver through the entire planning process a:

- *Regional WwTP and associated marine outfall located at a site, to be selected as part of this process, in the northern part of the Greater Dublin Area (GDA), and*
- an Orbital Drainage System linking the Regional WwTP to the existing regional sewer network and to provide for future connections for identified developing areas within the catchment.

1.3 Client

The Client is Irish Water.

1.4 Project Engineering Consultant

Following a competitive tender process Jacobs Engineering Ireland Ltd. supported by TOBIN Consulting Engineers was appointed to act as Project Engineering Consultant on this project with formal signing of the Contract on the 14th March 2011.

1.5 Project Communications Consultant

Following a competitive tender process RPS Project Communications was appointed by FCC to act as Project Communications Consultant on this project.

1.6 Previous Reference Studies

- *Greater Dublin Strategic Drainage Study (GDSDS) completed in April 2005, and*
- *Strategic Environmental Assessment of the Greater Dublin Strategic Drainage Study (SEA of GDSDS)*

1.7 Project Stages

The Project is divided into a number of stages as follows:

- *Sub-stage (a): Project Inception*
- *Sub-stage (b): Alternative WwTP Site Assessment (ASA) / Pipeline and Marine Outfall Route Selection Report*

- *Sub-stage (c): Concept Design Report (CDR)*
- *Sub-stage (d): Environmental Impact Statement (EIS)*
- *Sub-stage (e): Wayleave / Land Acquisition*
- *Sub-stage (f): Additional Reports*
- *Sub-stage (g): Planning Process*
- *Sub-stage (h): Any Other Work*

1.8 Study Area

The study area is shown in Fig.1.1 included overleaf.

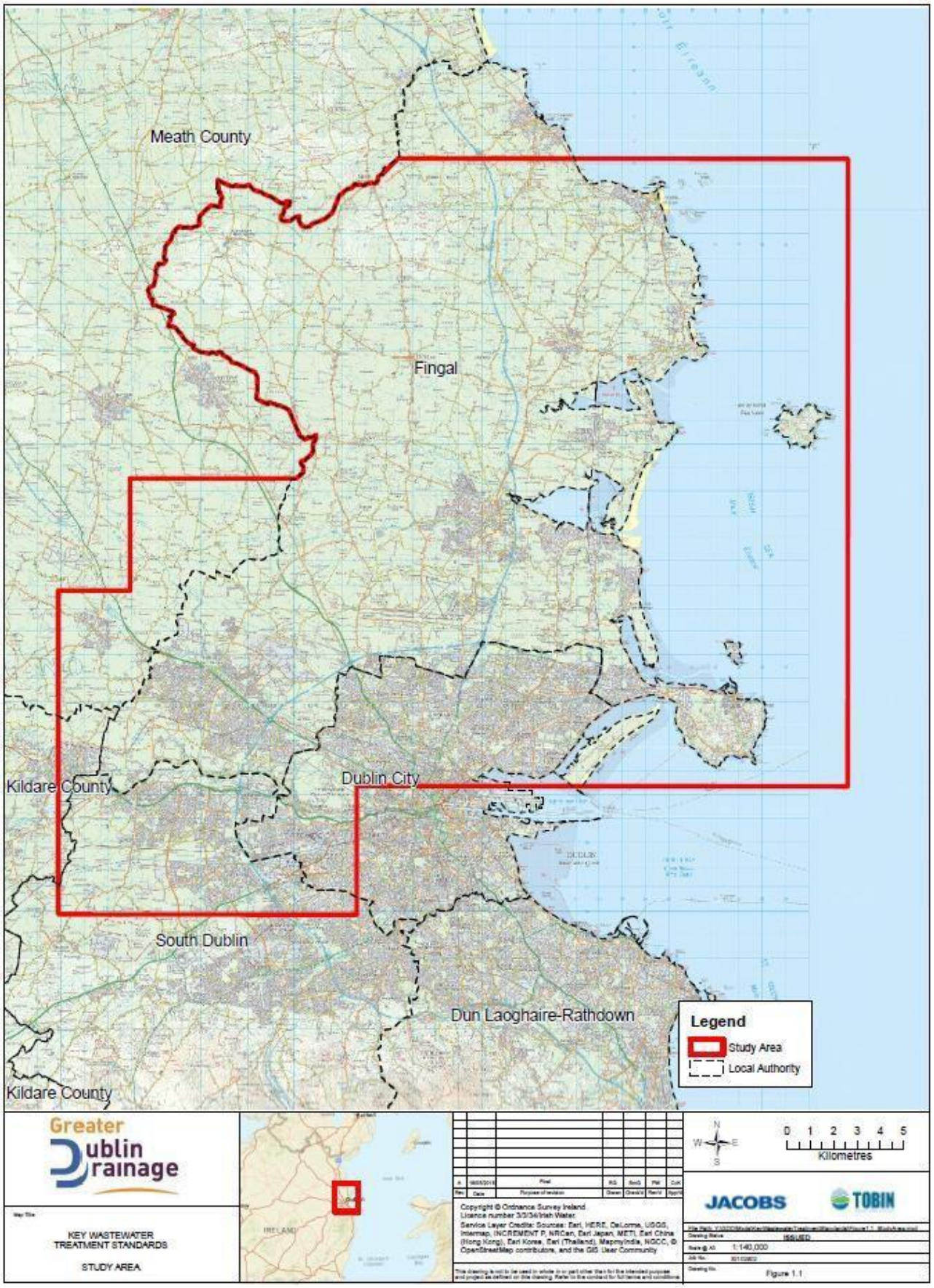

Figure 1.1 Study Area

1.9 Commencement Date

The official commencement date of the project is set as the 14th March 2011.

2 Key Wastewater Treatment Standards

2.1 Introduction

The Greater Dublin Strategic Drainage Study (GDSDS) final strategy recommendations are based on the implementation of a sustainable Regional Drainage Strategy, which underpin long term development in the Region and which are consistent with the EU's Water Framework Directive.

The key recommendation of the GDSDS as amended by its subsequent Strategic Environmental Assessment (SEA) was:

- The provision of a single Regional Wastewater Treatment Plant (WwTP) to be located in North County Dublin with the treated wastewater to be discharged to the marine environment of the Irish Sea.

The coastal waters off North County Dublin are classified as 'Good Status' under the Water Framework Directive (WFD).

This proposed discharge must not cause pollution, deterioration of existing water quality or other nuisance outside of the discharge mixing zone; consequently, standards are required to be defined for the treated wastewater to determine the acceptability of such a discharge and its impacts on the receiving environment.

This Key Wastewater Treatment Standards Report examines the wastewater treatment standards required for a treated wastewater discharge to the Irish Sea off the coast of North County Dublin.

This report will outline key European and National Legislation and relevant guidance which determine the appropriate discharge standards for Wastewater Treatment Plants (WwTP) in Ireland. It will also review existing parametric emission limit values set in the Wastewater Discharge Authorisations (WWDA) given to currently licenced WwTPs discharging to the Irish Sea off the coast of County Dublin.

A treated wastewater discharging to the Irish Sea off the coast of North County Dublin, while complying with Urban Wastewater Treatment (UWWT) Regulations will add pollutant load to the receiving environment, which contains many areas that are designated as environmentally sensitive.

3-dimensional hydrodynamic modelling of the discharge point will be undertaken to confirm dilution and dispersion characteristics, to ensure that there would be no change in water quality outside the immediate vicinity of the discharge point from a wastewater discharge treated to the standards proposed in this report and that there would be no impact on the environmentally sensitive areas.

2.2 Consultation

Consultation on the wastewater treatment standards required for the proposed discharge to the Irish Sea off the coast of North County Dublin took place with the following organisations over the period April '11 – August '11.

- EPA
- Marine Institute
- NPWS
- DoECLG
- Inland Fisheries Ireland
- ERBD Project Team
- Bord Iascaigh Mhara (BIM)

- Sea Fisheries Protection Authority (SFPA)

Key outcome of these consultation meetings were:

- The treated wastewater must comply with the Urban Wastewater Treatment (UWWT) Regulations and must be checked for compliance with other relevant Directives, including the Water Framework Directive, Shellfish Waters Directive, Bathing Waters and Marine Strategy Directive.

3 Receiving Environment

The coast of North County Dublin and the marine environment of the Irish Sea off the north Dublin coast contain many areas that are designated as environmentally sensitive, which must be assessed for impact from the treated wastewater discharge from the proposed Regional WwTP. These environmentally sensitive areas are listed in Table 3.1 and illustrated on figures 3.1 to 3.6. The Water Framework Directive (WFD) coastal water bodies are illustrated on Fig. 3.7.

Table 3.1: Environmental Sensitive Areas in the Vicinity of the GDD Project

Special Areas of Conservation (SACs) – Fig. 3.1 - Baldoyle Bay - Howth Head - Ireland's Eye - Lambay Island - Malahide/Swords/Broadmeadow Estuary[1] - Rogerstown Estuary - North Dublin Bay - Rockabill to Dalkey Island	**Special Protected Areas (SPAs) – Fig. 3.2** - Baldoyle Bay - Rockabill - Skerries Islands - Rogerstown Estuary - Lambay Island - Malahide/Swords/Broadmeadow Estuary[1] - Ireland's Eye - Howth Head Coast - North Bull Island - South Dublin Bay & River Tolka Estuary
Natural Heritage Areas (NHAs) – Fig. 3.3 - Skerries Islands	**Proposed Natural Heritage Areas (pNHAs) – Fig. 3.3** - Rockabill Island - Loughshinny Coast - Rogerstown Estuary - Portraine Shore - Lambay Island - Malahide/Swords/Broadmeadow Estuary[1] - Baldoyle Bay - Ireland's Eye - Howth Head - North Dublin Bay
Designated Shellfish Waters – Fig. 3.4 - Balbriggan/Skerries - Malahide	**RAMSAR Convention Wetland Areas – Fig. 3.4** - North Bull Island - Baldoyle Estuary - Malahide/Swords/Broadmeadow Estuary[1] - Rogerstown Estuary
Designated Bathing Waters – Fig. 3.5 - Sutton (Burrow Beach) - Skerries (South Beach) - Rush (South Beach) - Rush (North Beach) - Portrane (Brook beach) - Portmarnock, Velvet Strand Beach - Malahide Beach - Loughshinny Beach - Donabate (Balcarrick Beach) - Balbriggan (Front Strand Beach)	**Sensitive Waters as per UWWT[2] Regulations – (Fig. 3.6)** - Malahide/Swords/Broadmeadow Estuary[1] - Liffey Estuary *Note 1: Referred to as Malahide Estuary in figures.* *Note 2: Urban Waste Water Treatment (Amendment) Regulations 2010 (S.I. No. 48 of 2010)*

• Claremont Beach • Dollymount Strand	

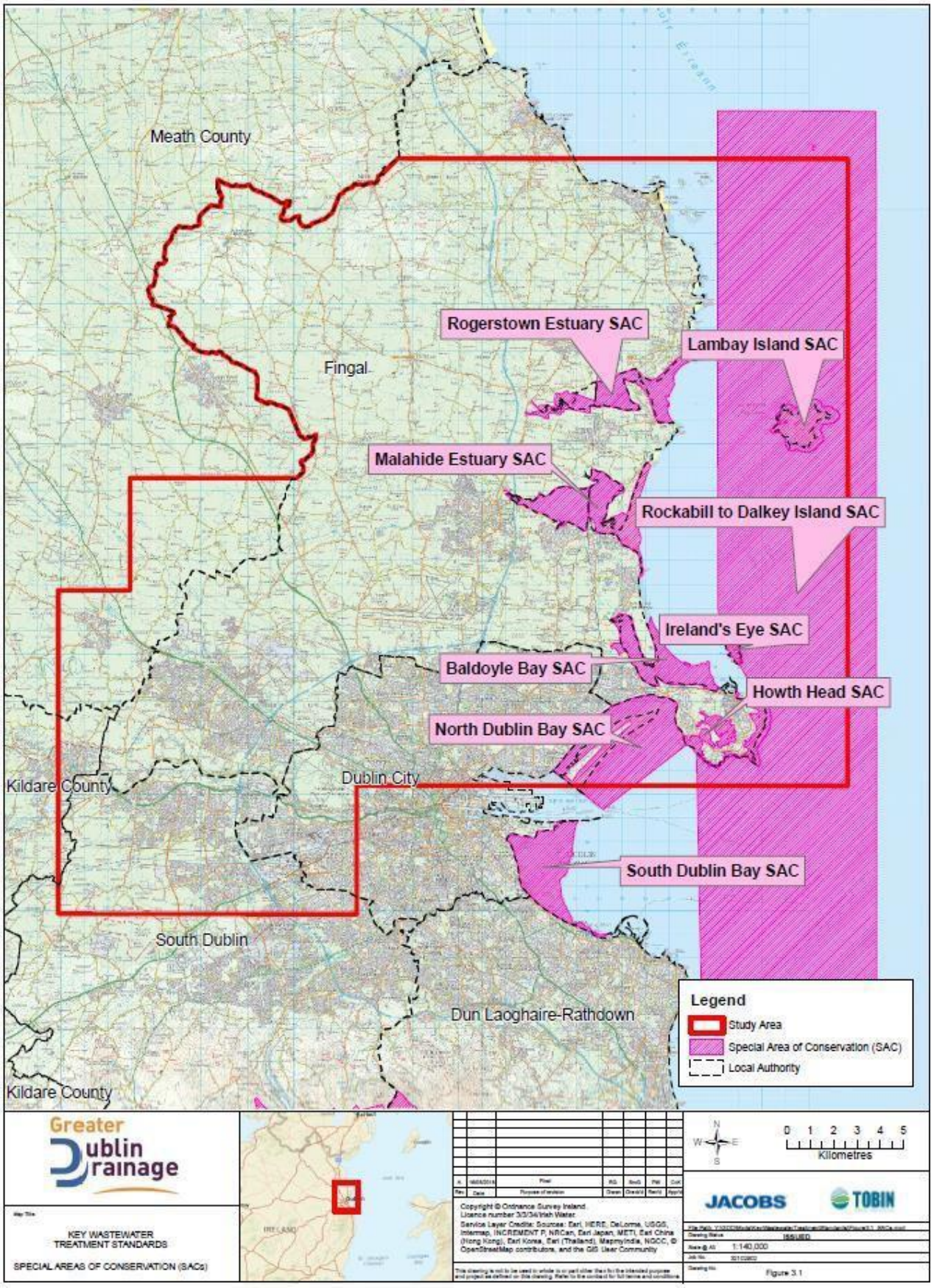

Figure 3.1 Special Areas of Conservation

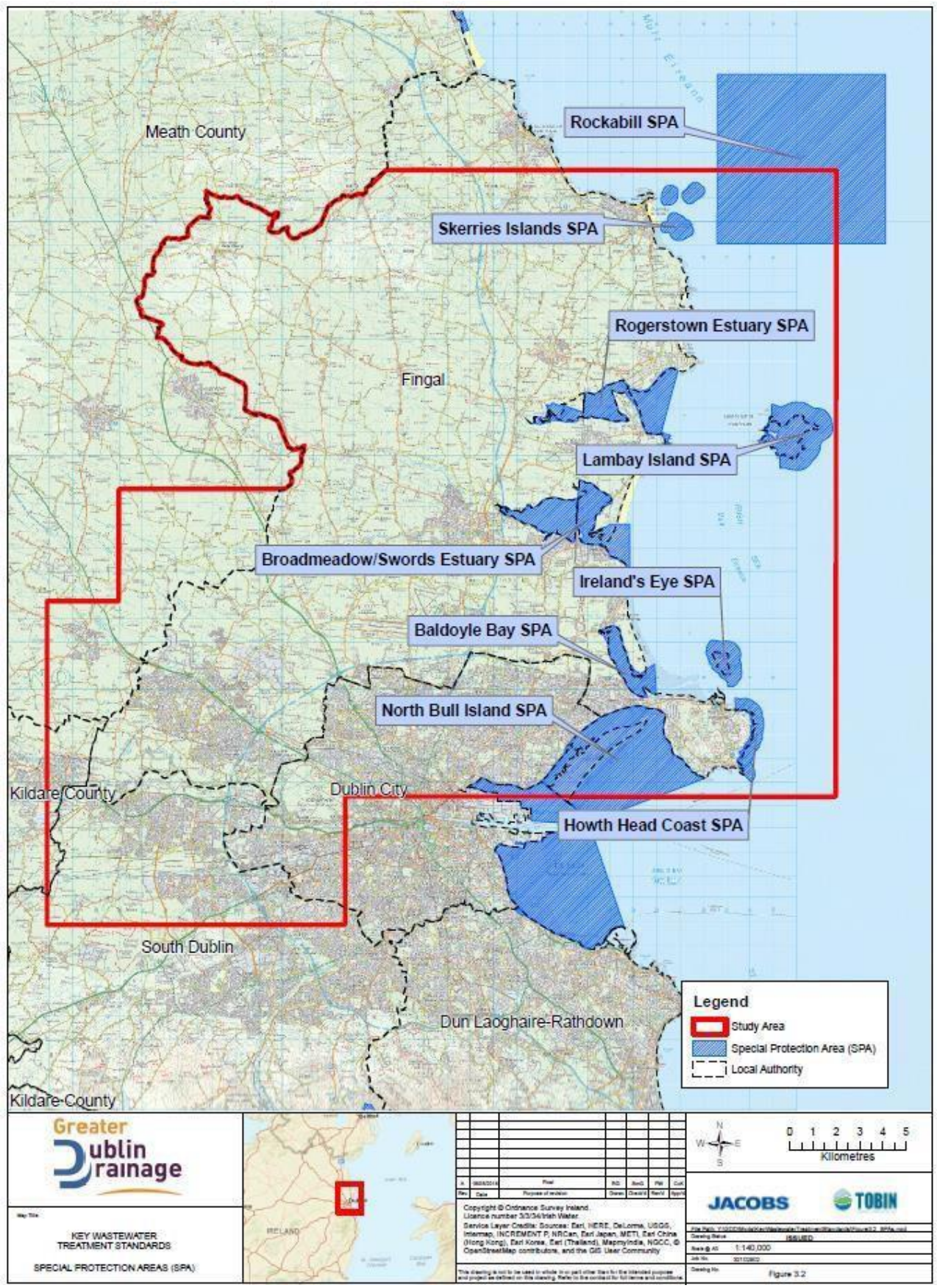

Figure 3.2 Special Protected Areas

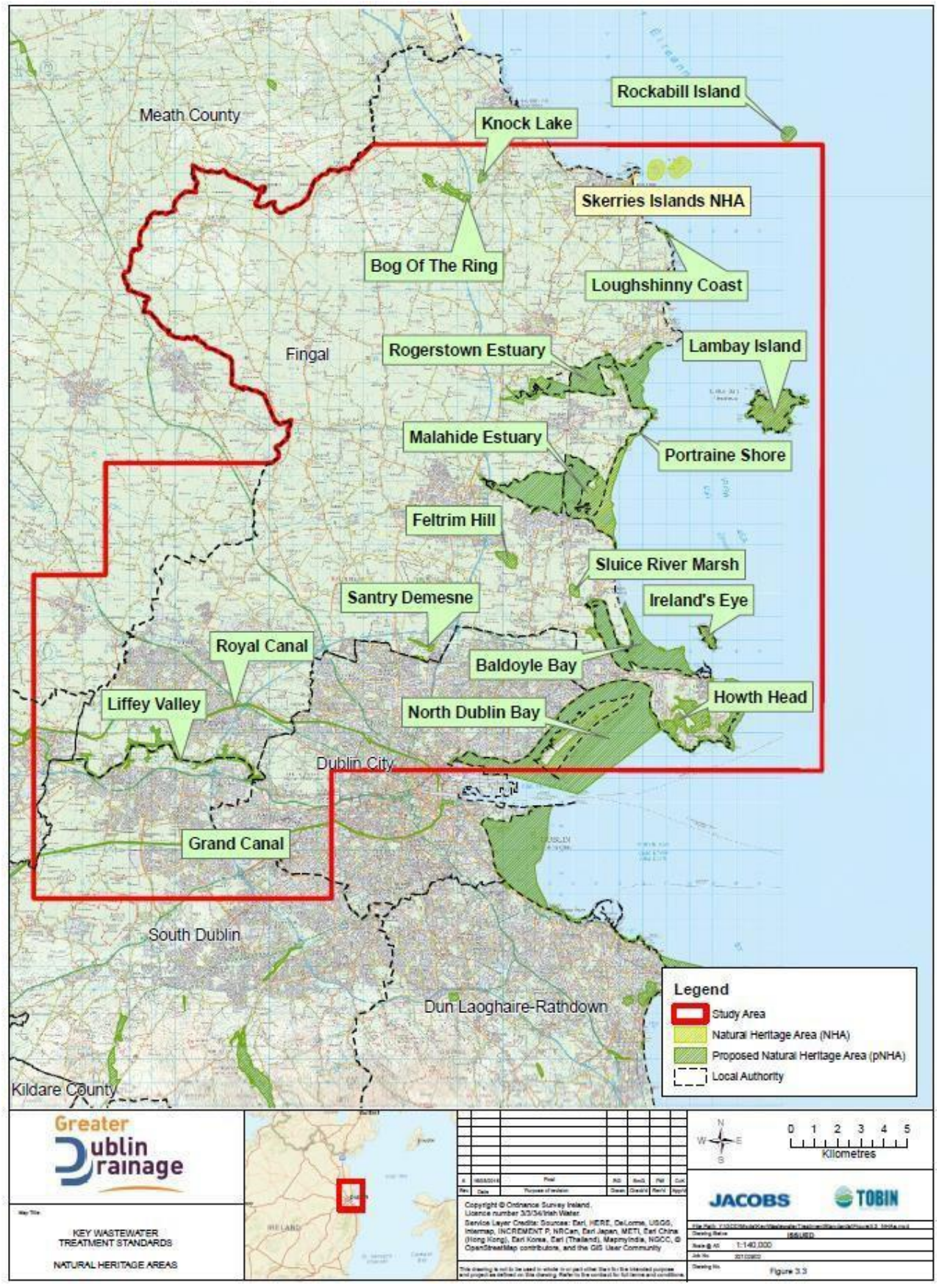

Figure 3.3 Natural Heritage Areas

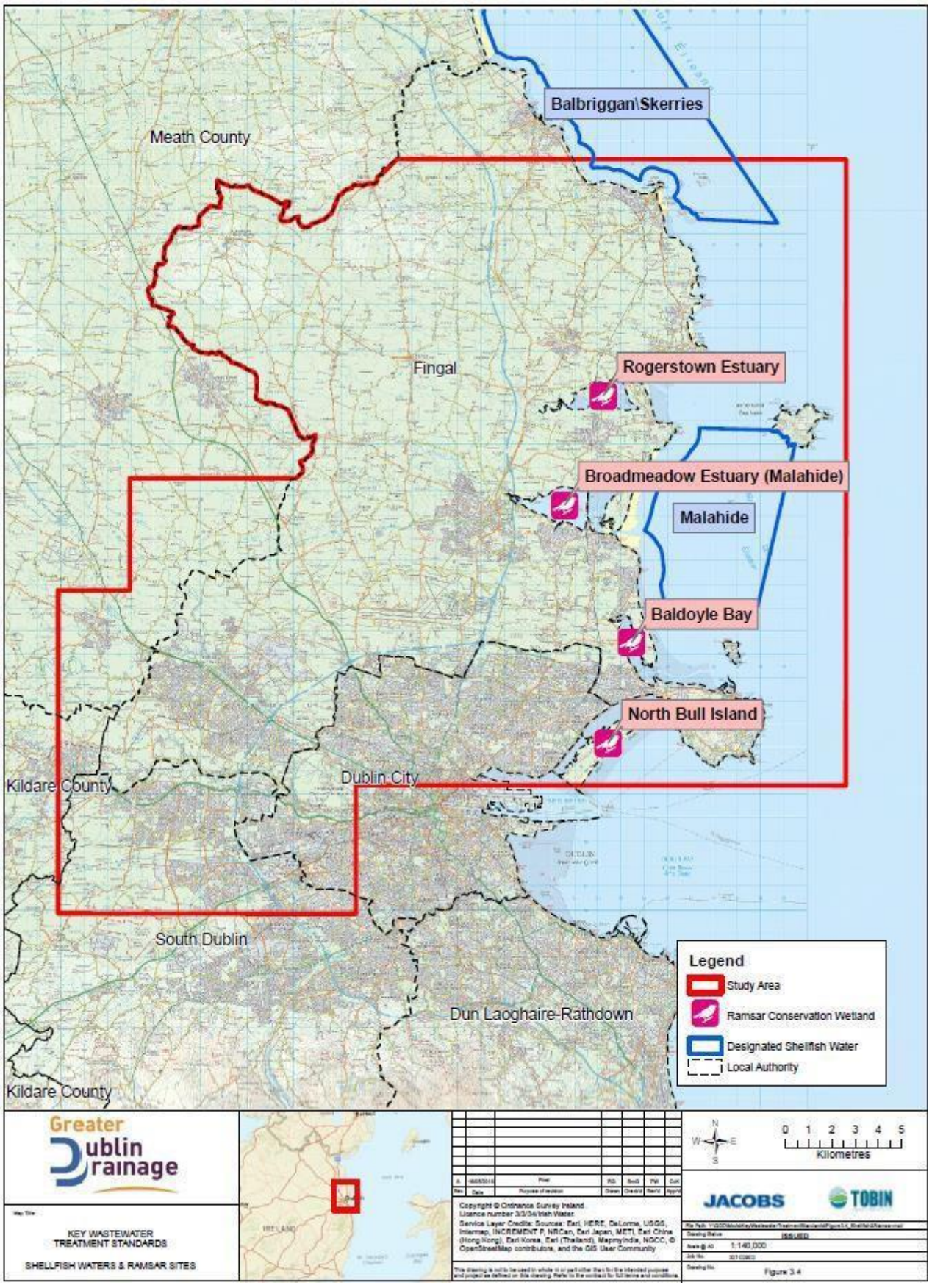

Figure 3.4 Designated Shellfish Waters & Ramsar Areas

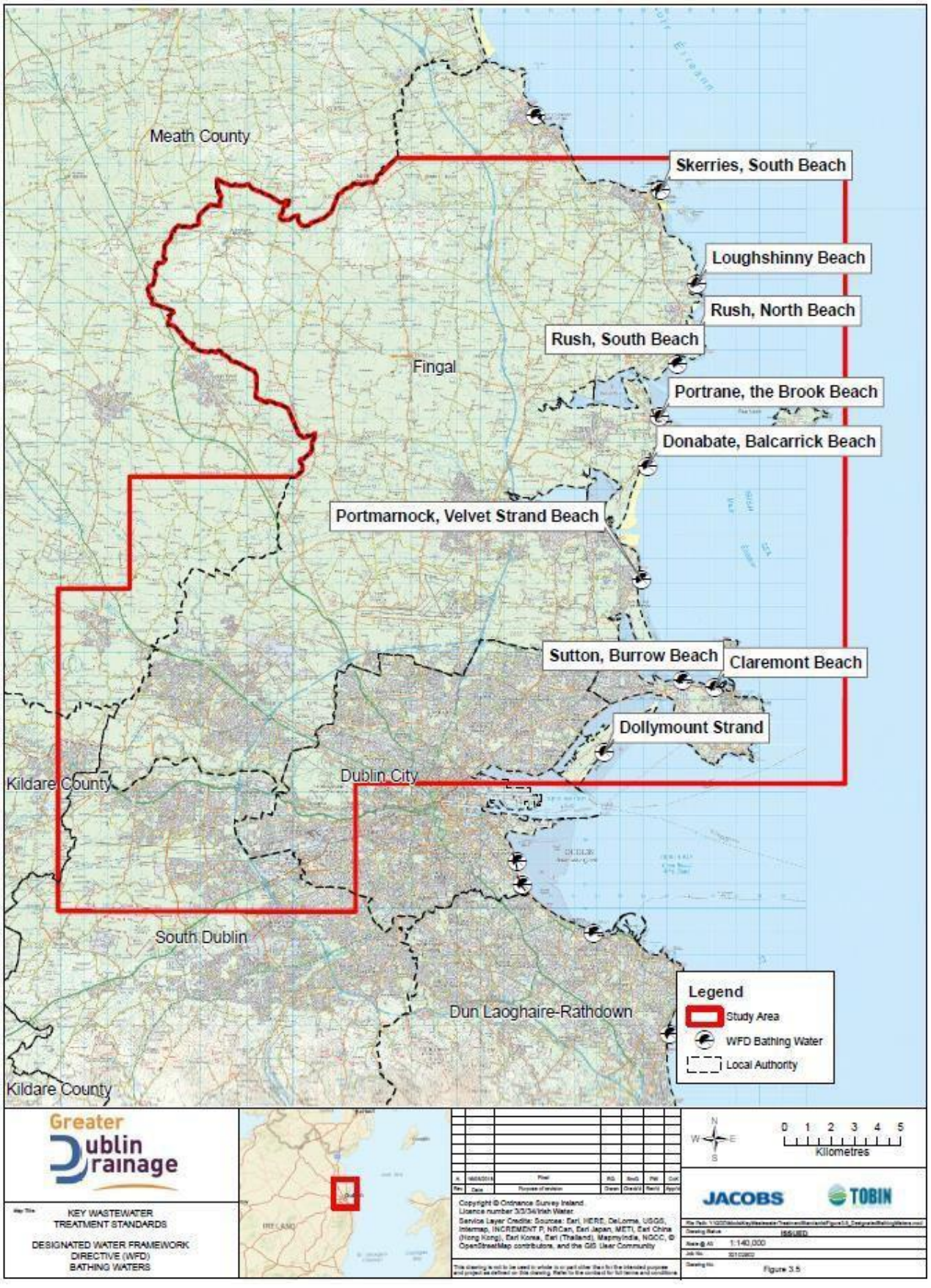

Figure 3.5 Designated Bathing Waters

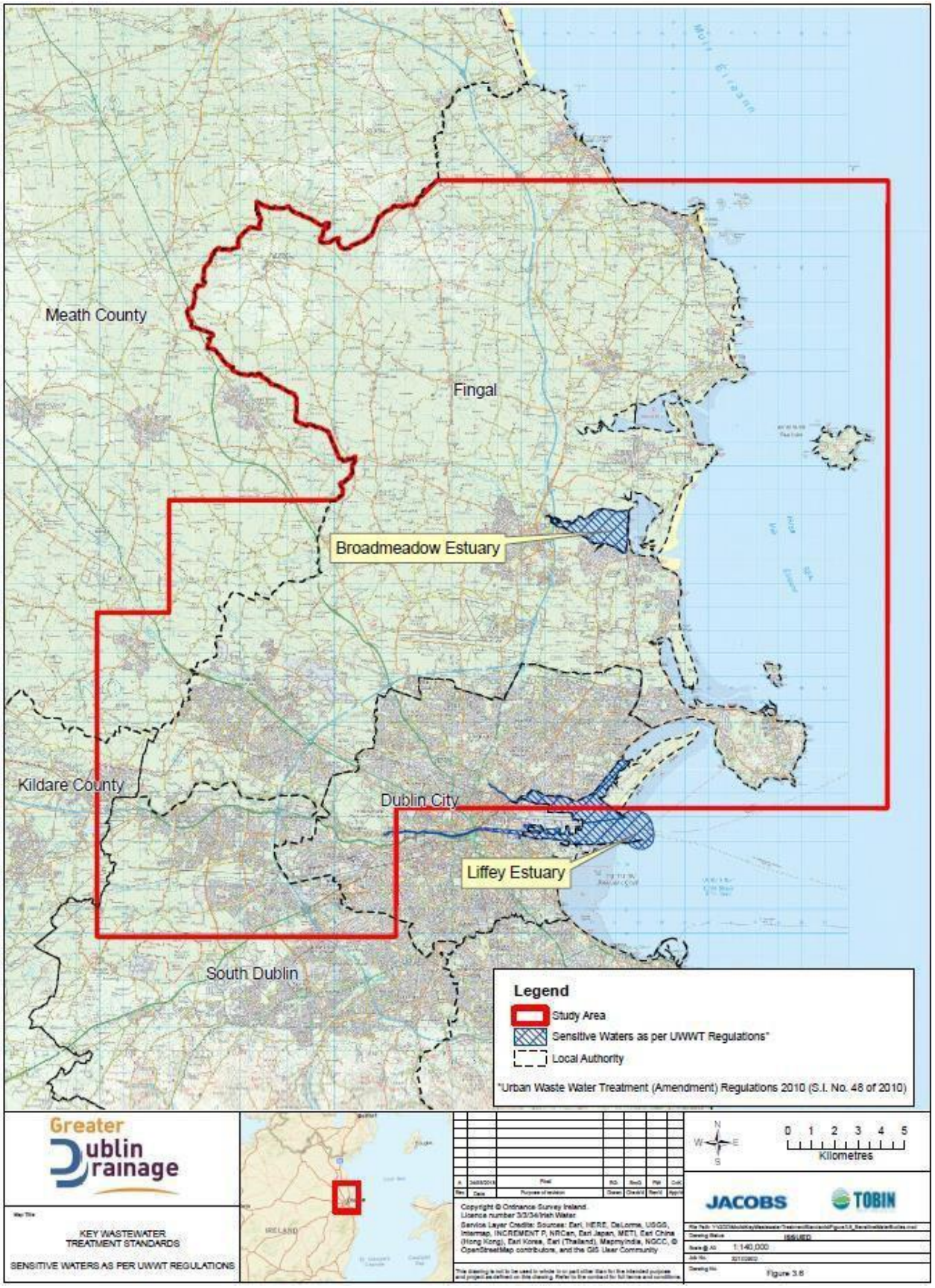

Figure 3.6 Sensitive Water Bodies

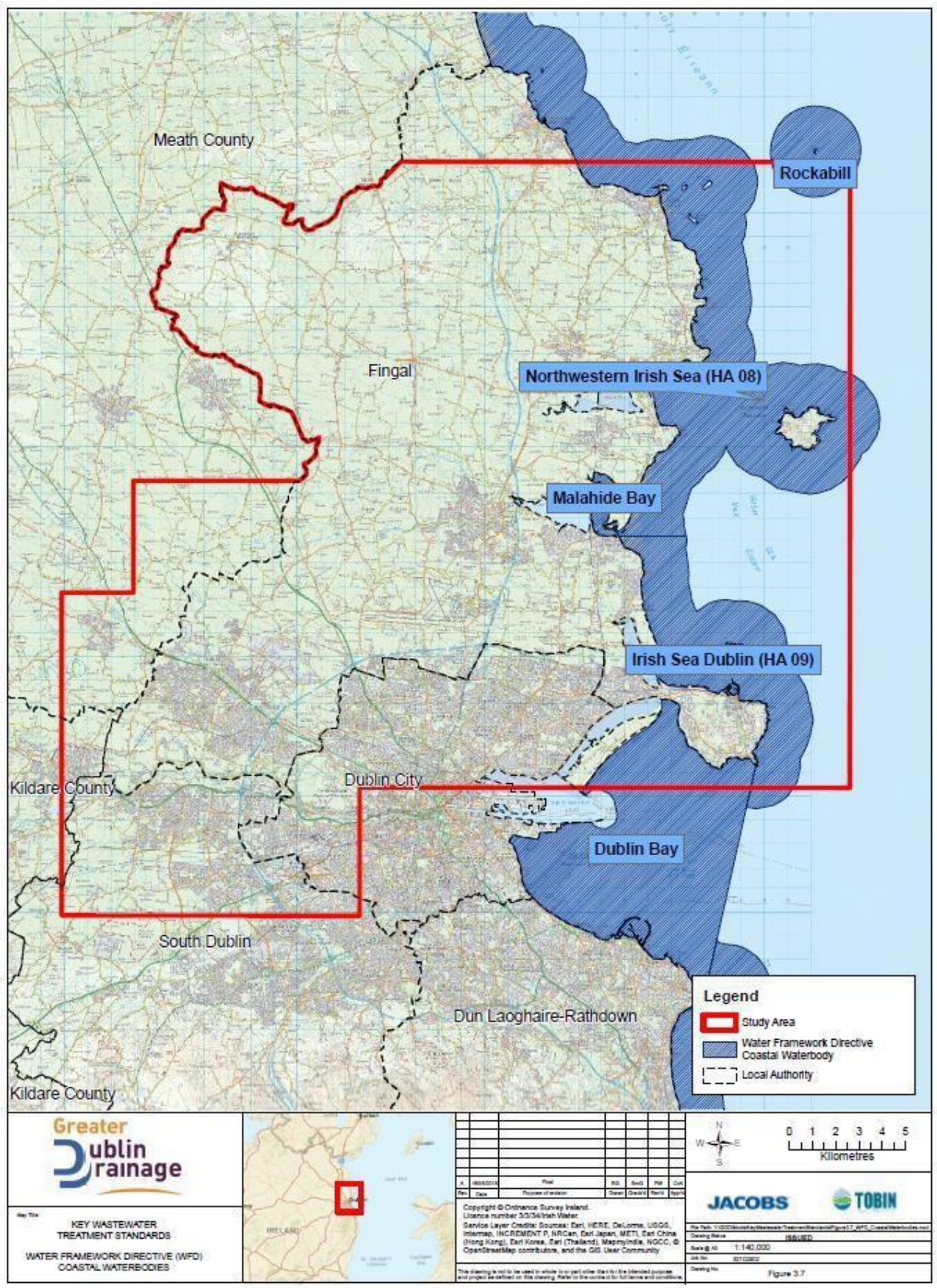

Figure 3.7 Water Framework Directive Coastal Water Bodies

4 Legislative Framework

4.1 Introduction

The key European and National Legislation and relevant guidance which determine the appropriate discharge standards for Wastewater Treatment Plants (WwTP) in Ireland and which are outlined in this section of the Report are:

- the Waste Water Discharge (Authorisation) Regulations 2007 (S.I No. 684 of 2007).
- Waste Water Discharge (Authorisation) (Amendment) Regulations 2010 (S.I. No. 231 of 2010).
- Waste Water Discharge (Authorisation) (Environmental Impact Assessment) Regulations 2016 (S.I. No. 652 of 2016)
- Urban Waste Water Treatment (UWWT) Regulations; 2001 to 2010.
- European Communities (Waste Water Treatment) (Prevention of Odours and Noise) Regulations 2005 (S.I. No. 787 of 2005)

4.2 Enforcement of Wastewater Discharges by the EPA

A system for the licensing or certification of wastewater discharges from areas served by local authority sewer networks was brought into effect on 27th September 2007 with the introduction of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I No. 684 of 2007) and as amended by the Waste Water Discharge (Authorisation) (Amendment) Regulations 2010 (S.I. No. 231 of 2010), and further amended by the 2016 S.I. This licensing and certification process gives effect to a number of EU Directives by the imposition of restrictions or prohibitions on the discharge of dangerous substances and the implementation of measures required under the Water Framework Directive (WFD) and thus preventing or reducing the pollution of waters by waste water discharges. All discharges to the aquatic environment from sewerage systems owned, managed and operated by water service authorities require a waste water discharge licence or certificate of authorisation from the EPA.

The authorisation process provides for the EPA to place conditions on the operation of such discharges to ensure that potential effects on the receiving water bodies are limited and controlled with the aim of achieving good surface water status and good groundwater status no later than December 2015, or at the latest 2027.

The proposed Regional WwTP will require a waste water discharge licence to be granted by the EPA under the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I No. 684 of 2007) prior to commissioning of the treatment plant.

4.3 Urban Waste Water Treatment Regulations 2001 (S.I. No. 254 of 2001)

as amended by:

- Urban Waste Water Treatment (Amendment) Regulations 2004 (S.I. No. 440 of 2004); and
- Urban Waste Water Treatment (Amendment) Regulations 2010 (S.I. No. 48 of 2010).

These Regulations give effect to the provisions of EU Council Directive 91/271/EEC Concerning Urban Waste Water Treatment (as amended by EU Council Directive 98/15/EC) and the Water Framework Directive 2000/60/EC.

The type of treatment facilities required (by the Regulations) for individual agglomerations depend on:

- the size of the agglomeration;
- the type of receiving water body (freshwater, estuarine or coastal water); and
- whether the receiving water body is sensitive (or not), as defined by the Regulations.

The Regulations indicate that in respect of all discharges from agglomerations with a population equivalent (PE) of more than 15,000, secondary treatment or an equivalent treatment must be provided.

One of the principal requirements of the Regulations is to specify emission limit values for BOD (Biochemical Oxygen Demand), COD (Chemical Oxygen Demand) and TSS (Total Suspended Solids). Where discharges to sensitive water bodies occur, the Regulations also specify emission limit values for total phosphorus and/or total nitrogen.

Within the study area (Figure 1.1) the Broadmeadow Estuary (inner) and the Liffey Estuary (from Islandbridge weir to Poolbeg Lighthouse, including the River Tolka basin and South Bull Lagoon) are the only water bodies designated as 'sensitive' under the Regulations.

As the Broadmeadow Estuary is also designated as a Special Area of Conservation (SAC), Special Protected Area (SPA), Ramsar site and is proposed as a Natural Heritage area (pNHA) it is not proposed to discharge the treated wastewater from the new Regional WwTP in this area. Therefore, discharge of the treated wastewater will be to the marine environment of the Irish Sea.

The Regulations therefore require that wastewater discharging to the Irish Sea off the North Dublin coast from the proposed Regional WwTP be treated in a treatment plant which provides for secondary treatment. There is no legislative requirement for the provision of nutrient (nitrogen and phosphorous) reduction in addition to secondary treatment for the treated wastewater in this situation. Given these considerations the provision of nutrient (nitrogen and phosphorous) reduction facilities is not considered necessary for the new Regional WwTP at this time.

The Regulations also require local authorities to monitor surface waters, which receive discharges from urban wastewater treatment plants where it is anticipated that the receiving waters will be significantly affected, with implications for compliance with other Directives.

Within the coastal zone of the study area there are many designated bathing waters, some with 'Blue Flag' status, as well as designated shellfish waters, SPA's and SAC's. Therefore, when undertaking 3-dimensional hydrodynamic modelling of the proposed outfall, it will be necessary to assess the impact of a proposed wastewater discharge, treated to secondary standards (as defined in the Regulations) for compliance with the water quality standards set in other Directives.

5 Other Relevant Legislation & Directives

5.1 Introduction

As previously described the coastal zone of North County Dublin contains many areas that are designated as environmentally sensitive with water quality standards established under various EU Directives. These water quality standards will apply to the discharge from the proposed Regional WwTP and include:

- Quality of Shellfish Waters Regulations (S.I. No 200 of 1994) as amended;
- European Communities Environmental Objectives (Surface Water) Regulations 2009 (S.I. No 272 of 2009);
- Quality of Bathing Waters Regulations (S.I. No 155 of 1992) as amended; and
- The water quality standards required by the Blue Flag Beach Programme.
- Marine Strategy Framework Directive

It will therefore be necessary to assess the impact of the proposed wastewater discharge for compliance with the water quality standards set out in the above Regulations. This assessment forms part of the 3-dimensional hydrodynamic modelling studies that are being carried out on the proposed outfall areas.

5.2 Quality of Shellfish Waters Regulations (S.I. No. 200 of 1994)

as amended by:

- Quality of Shellfish Waters (Amendment) Regulations 2001 (S.I. No. 459 of 2001);
- European Communities (Quality of Shellfish Waters) (Amendment) Regulations 2006 (S.I. No. 268 of 2006); and
- European Communities (Quality of Shellfish Waters) (Amendment) Regulations 2009 (S.I. No. 55 & 464 of 2009).

The above regulations implement the requirements of The Shellfish Waters Directive 2006/113/EC into Irish law.

The aim of the Shellfish Waters Directive is to protect or improve shellfish waters in order to support shellfish life and growth. It is designed to protect the aquatic habitat of bivalve and gastropod molluscs, which include oysters, mussels, cockles, scallops and clams. The Directive requires Member States to designate waters that need protection in order to support shellfish life and growth. The Directive sets physical, chemical and microbiological requirements that designated shellfish waters must either comply with or endeavour to improve.

The Directive also provides for the establishment of pollution reduction programmes for the designated waters.

Responsibility for the Shellfish Waters Directive in Ireland transferred from the Department of Agriculture, Fisheries and Food to the Department of the Environment, Community and Local Government on 5 November 2008.

Two sectors in the Irish Sea off the coast of North County Dublin are designated as Shellfish Waters under these regulations, i.e. Malahide Shellfish Waters & Balbriggan / Skerries Shellfish Waters.

5.3 European Communities Environmental Objectives (Surface Water) Regulations 2009 (S.I. No. 272 of 2009)

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive (WFD)) commits member states to preventing deterioration and achieving at least good status in all of our rivers, lakes, transitional, coastal and groundwaters by the year 2015; extensions have been applied to certain water bodies to 2021 or 2027, where justified in line with the reasons specified in the legislation.

The WFD was transposed into Irish law by Irish S.I.s including, inter alia, S.I. No. 722/2003 - EC Water Policy Regulations, as amended and S.I. No. 272/2009 – EC Environmental Objectives (Surface Waters) Regulations. The WFD takes a holistic approach to water resources management, the key objective of the WFD is to protect and improve the quality of rivers, lakes, transitional and coastal waters, and groundwater.

The WFD specifies the factors which must be used in determining the ecological status or ecological potential and the surface water chemical status of a surface water body. The Environmental Protection Agency (EPA) has developed classification systems and Environmental Quality Standards (EQS) for the purpose of assessing the status of surface waters. Classification systems provide a way of comparing waters and looking at changes in status over time. This enables improvements to be planned and the environmental benefits of these actions to be demonstrated.

Under the WFD, River Basin Management Plans (RBMP) and Programmes of Measures (PoMs) were prepared for each of the eight River Basin Districts (RBDs) within the island of Ireland. RBMP take an integrated approach to the protection, improvement and sustainable management of the water environment. The planning process revolves around a six-year planning cycle of action and review, so that every six years a revised RBMP is produced. The existing RBMPs were valid for a six-year period and ran from 2009 – 2015.

The RBMPs summarised the waterbodies that may not meet the environmental objectives of the WFD by 2015 and identified which pressures are contributing to the environmental objectives not being achieved. The RBMPs described the classification results and identified measures that can be introduced in order to safeguard waters and meet the environmental objectives of the WFD. The Eastern River Basin District (ERBD) RBMP 2009 – 2015 covered the implementation of the WFD for the east coast of Ireland and covered the study area for the Proposed Project.

Preparation of the 2nd Cycle RBMPs (2015 – 2021) is now underway. For the 2nd Cycle, the Eastern, South Eastern, South Western, Western and Shannon RBDs will be merged to form one national RBD. Consultation on the significant water management issues (SWMIs) for second cycle RBMPs, led by the Local Authorities (L.As) at regional level closed in August 2017. In total 956 local submissions were received covering a broad range of issues and interests. These submissions have been collated to assist the Department of Housing, Planning and Local Government in the development of the pending Plan, due to be published early 2018.

Under the WFD:

- “Transitional Waters” are bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows; and

- “Coastal Waters” are defined as waters out to a distance of one nautical mile beyond the baseline from which territorial waters are measured.

As the Proposed Project’s proposed outfall discharge point is located in coastal waters, the WFD standards are applicable to this study. Figure 8.1 Coastal and Transitional Waterbodies shows the water body boundaries under the WFD and the proposed outfall pipeline route (marine section).

S.I. No. 386/2015 - European Union Environmental Objectives (Surface Waters) (Amendment) Regulations came into effect in 2015 and apply to all surface waters and give effect to the measures needed to achieve the environmental objectives established for bodies of surface water by the WFD. Wastewater Discharge

Authorisations (WDAs) must set standards (emission limits) that will contribute to the receiving waters will comply with the standards for environmental quality laid out in these regulations. **T**he water quality standards proposed for the general physico-chemical conditions supporting the biological elements in transitional and coastal waters are listed in Table 5.1.

Table 5.5.1: Environmental Quality Objectives from SI 386 of 2015

Parameter	Transitional	Coastal
Biochemical Oxygen Demand (BOD) (mg/l O_2)	n/a	Good Status ≤4.0 (95%ile)
Dissolved Inorganic Nitrogen (DIN) (mg/l N)		
0 psu[1]	Good Status ≤ 2.60	Good Status ≤ 2.60
34.5 psu	Good Status ≤ 0.25	Good Status ≤ 0.25
34.5 psu	High Status ≤ 0.17	High Status ≤ 0.17
Molybdate Reactive Phosphorus (MRP) (mg/l P)		n/a
0-17 psu	≤ 0.06	
35 psu	≤ 0.04	
psu: The practical salinity unit defines salinity in terms of a conductivity ratio of a sample to that of a solution of 32.4336g of KCL at 15°C in 1kg of solution. A sample of seawater at 15°C with a conductivity equal to this KCL solution has a salinity of exactly 35 psu		

The principal quality standard of concern in relation to wastewater discharges to Coastal Waters is for nutrients in the form of Dissolved Inorganic Nitrogen (DIN). DIN is considered to be the limiting nutrient in coastal waters and a breach of the environmental quality standard may lead to eutrophic conditions (algal blooms, etc) and consequently the only nutrient standards in place for coastal waters are for DIN.

5.4 Quality of Bathing Waters Regulations (S.I. No. 155 of 1992)

as amended by:

- Quality of Bathing Waters (Amendment) Regulations 1994 (S.I. No. 145 of1994);
- Quality of Bathing Waters (Amendment) Regulations 1996 (S.I. No. 230 of1996);
- Quality of Bathing Waters (Amendment) Regulations 1998 (S.I. No. 177 of1998);
- Quality of Bathing Waters (Amendment) Regulations 2001 (S.I. No. 22 of 2001);
- Bathing Water Quality Regulations, 2008 (S.I. No. 79 of 2008);
- Bathing Water Quality (Amendment) Regulations, 2011 (S.I. No. 351 of 2011); and
- Bathing Water Quality (Amendment) Regulations, 2016 (S.I. No. 163 of 2016).

These regulations implement the requirements of the Bathing Water Directive (76/160/EC) into Irish law. The purpose of the legislation is to ensure that the quality of bathing water is maintained and where necessary, improved so that it complies with specified standards designed to protect public health and the environment.

A new Bathing Water Directive (2006/7/EC) was entered into force in March 2006. This new Directive aims to provide greater benefits in relation to improved health protection for bathers and a more pro-active approach to beach management including public involvement. The new Bathing Water Quality Regulations 2008 (S.I. No. 79 of 2008) transposed the 2006 Directive into Irish Law on 24 March 2008.

Table 5.2 Bathing Water Quality Regulations, 2008 (S.I. No. 79 of 2008)

Bathing Water Quality Standards Schedule 4			
Parameters	**Excellent Quality**	**Good Quality**	**Sufficient Quality**
Intestinal enterococci (cfu/100ml)	100 (95-percentile)	200 (95-percentile)	185 (90-percentile)
Escherichia coli (cfu/100ml)	250 (95-percentile)	500 (95-percentile)	500 (90-percentile)

5.5 Blue Flag Beach Programme

The Foundation for Environmental Education (FEE) which is a non-governmental non-profit organisation, is the awarding body for Blue Flags. The Blue Flag Beach Programme is run in Ireland by An Taisce.

The Blue Flag beach criteria as of 2017 are listed on the Blue Flag global website. These criteria must be adopted unless stricter national standards are already in existence, in which case the beach must comply with the more demanding national standards for bathing water quality.

The Water Quality Criteria for the Blue Flag Program are;

- The beach must fully comply with the water quality sampling and frequency requirements of the Blue Flag programme.
- The beach must fully comply with the standards and requirements for water quality analysis.
- No industrial, waste-water or sewage-related discharges should affect the beach area.
- The beach must comply with the Blue Flag requirements for the microbiological parameter faecal coli bacteria (E.coli) and intestinal enterococci/streptococci.
- The beach must comply with the Blue Flag requirements for physical and chemical parameters.

The Blue Flag requirements for microbial parameters are illustrated in Table 5.2:

Table 5.3 Blue Flag Programme for Beaches - Water Quality Standards (microbial parameters)

Parameter	Limit Value (Coastal and Transitional Waters)
Faecal Coliforms (E.Coli)[1]	250 cfu / 100 ml
Intestinal enterococci (Streptococci)	100 cfu / 100 ml

(Source: www.blueflag.org)

All applicant beaches must achieve 95th percentile compliance of the limit values shown in Table 5.2 above, in accordance with the 2006 EU Bathing Water Directive and the recommendation of the World Health Organisation. For award of the Blue Flag the percentile has to be calculated for each parameter and also met for each parameter.

The Blue Flag requirements for physical and chemical parameters are:

- There must be no oil film visible on the surface of the water and no odour detected. On land the beach must be monitored for oil and emergency plans should include the required action to take in case of such pollution.

- There has to be an absence of floatables such as tarry residues, wood, plastic articles, bottles, containers, glass or any other substance.

Tests for pH values may be carried out, its values usually range between 6 - 9 for bathing waters.

5.6 Marine Strategy Framework Directive

Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) was formally adopted by the European Union in June 2008. It established a legal framework for the development of marine strategies designed to achieve good environmental status in the marine environment by the year 2020. The Marine Strategy Framework Directive was transposed into Irish law on 31 May 2011 with the S.I. No. 249/2011 - EC (Marine Strategy Framework) Regulations.

At present, there are no standards for the discharge of treated wastewater to the open sea apart from the emission standards contained in the UWWT Regulations.

6 A Review of Wastewater Treatment Discharge Licences for existing Wastewater Treatment Plants

The existing Wastewater Treatment Plants (WwTP) discharging treated wastewater off the coast of County Dublin are listed in Table 6.1 and illustrated on Figure 6.1.

Table 6.1 Wastewater Treatment Plants Discharging off the coast of County Dublin

Wastewater Treatment Plant	Design PE	Local Authority
Shanganagh WwTP	186,000	Dun Laoghaire Rathdown
Ringsend WwTP	1,640,000*	Dublin City
Malahide WwTP	21,000	Fingal
Swords WwTP	90,000	Fingal
Portrane WwTP	65,000	Fingal
Barnageeragh	70,000	Fingal
Leixlip WwTP	150,000	Kildare

*Ringsend WwTP will have upgrades to its capacity in 2019 to approximately 2,100,000 PE and in 2022 to approximately 2,400,000 PE

Wastewater discharge licences have been granted by the EPA under the Waste Water Discharge (Authorisation) (WWDA) Regulations, 2007 (S.I No. 684 of 2007) to the above wastewater treatment plants as follows:

- Shanganagh WwTP (licence Register No. D0038-01)
- Ringsend WwTP (licence Register No. D0034-01)
- Malahide WwTP (licence Register No. D0021-01)
- Portrane WwTP (licence Register No. D0114-01)
- Barnageeragh WwTP (licence Register No. D0023-01)
- Swords WwTP (licence Register No. D0024-01)
- Leixlip WwTP (licence Register No. D0004-02)

Table 6.2 provides a summary of the main parametric emission limit values set by the EPA in the grant of licence for each of the above treatment plants.

The WWDA for Ringsend WwTP is the only licence to set emission limit values for faecal coliforms (these must be sampled and monitored during the bathing season, 1st May until 31st August annually) due to the presence of Dollymount Strand, a designated bathing area, in close proximity to the current discharge location. Ringsend and Swords are the only WWDA to set emission limit values for total nitrogen and total phosphorus as they discharge to the Liffey Estuary and Broadmeadow Estuary respectively, which are designated sensitive waterbodies under the Urban Wastewater Treatment Regulations. The limits for these values are listed in

Table 6.2 below.

The WWDA for Malahide WwTP and Swords WwTP are the only licences to set emission limit values for Total Oxidised Nitrogen. The waterbody Malahide Bay (outer Broadmeadow Estuary), into which the primary discharge from Malahide WwTP outfalls, is classified as having Moderate status (WFD Final Classification 2010 - 2015). The dissolved inorganic nitrogen (DIN) level and the presence of opportunistic green algae caused the waterbody to achieve less than good status. The trophic status of Malahide Bay (outer Broadmeadow Estuary) is classified "Potentially Eutrophic" for the period 2007 – 2009 based on the EPA's Trophic Status Assessment Scheme (TSAS). Malahide Bay failed due to the level of DIN and the presence of opportunistic green algae. As nitrogen is the limiting nutrient in coastal waters emission limits were set for Ammonia and Total Oxidised Nitrogen in the WWDA for Malahide WwTP.

Currently outer Broadmeadow Estuary is classified as "Intermediate" on the 2010 – 2012 Trophic Status Assessment Scheme.

Swords WwTP discharges into inner Broadmeadow Estuary, which is classified as having moderate status (2010 - 2015).

The WWDA for Barnageeragh WwTP is the only licence to set emission limit values for Coloration (after filtration) (<10% deviation), Salinity (<10% deviation), Dissolved Oxygen (>70%), Polychlorinated biphenyls (0.0003) and Metals (dissolved). This is as a result of the discharge occurring within the designated Balbriggan - Skerries shellfish waters.

All the wastewater treatment plants (WwTP) listed in Table 6.1, except for Swords, Shanganagh and Leixlip provide UV disinfection to the treated wastewater during the bathing season due the presence of designated bathing beaches in their vicinity. Barnageeragh WwTP provides UV disinfection to the treated wastewater all year round as the outfall pipe is located in the designated Balbriggan-Skerries Shellfish Waters. Malahide and Swords provide nutrient removal during tertiary treatment, and Shanganagh only provides primary and secondary treatment to the wastewater.

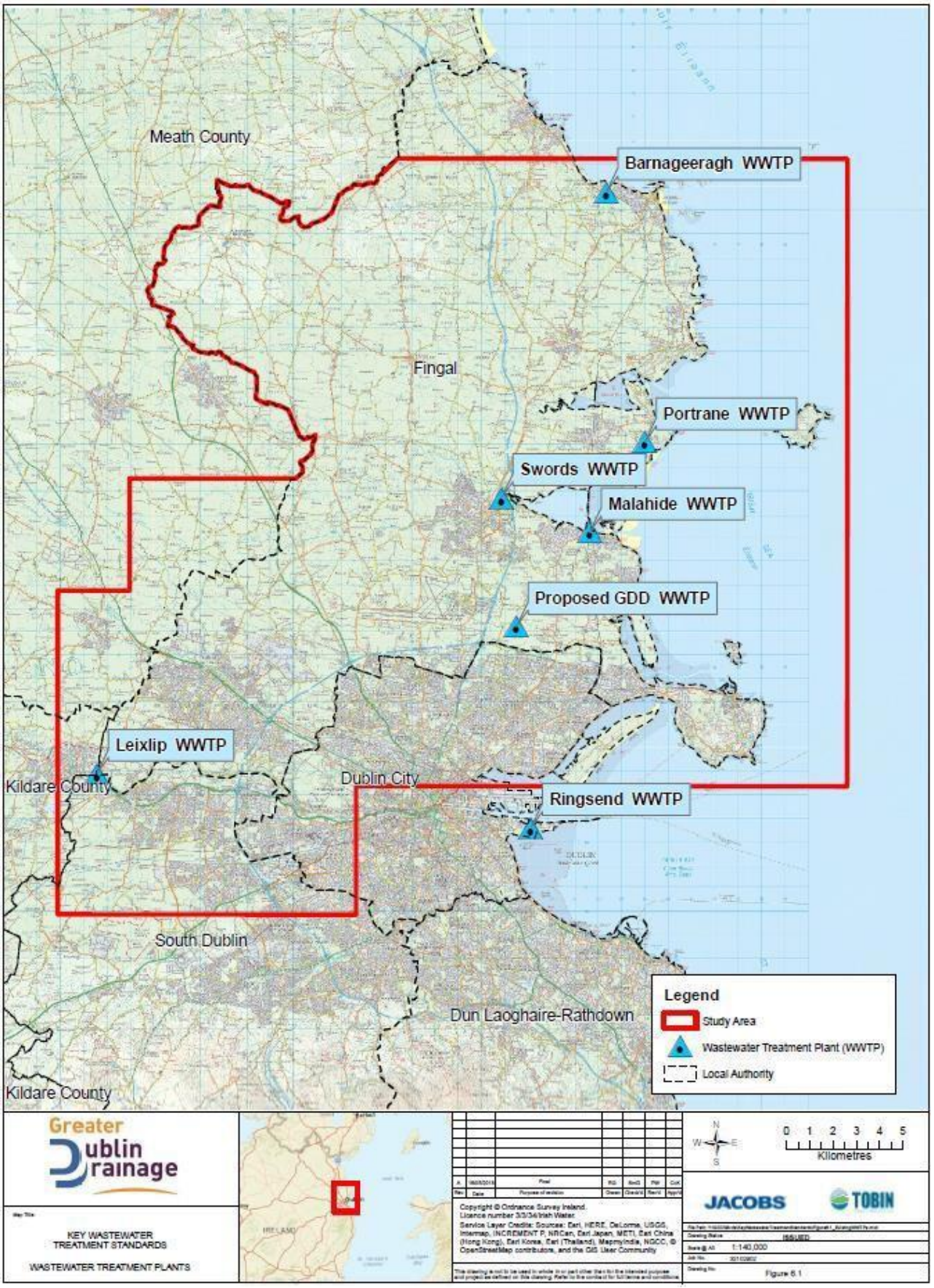

Figure 6.1 Location of Existing Wastewater Treatment Plants

Table 6.2 Wastewater Discharge Authorisation Emission Limits for currently licenced Wastewater Treatment Plants

Parameter	Barnageeragh (Ref. D0023-01)	Portrane (Ref. D0114-01)	Ringsend (Ref. D0034-01)	Shanganagh (Ref. D0038-01)	Malahide (Ref. D00021-01)
PE	>10,000	2,001- 10,000	>10,000	>10,000	>10,000
Sensitive locations in vicinity of Discharge	Three designated bathing waters, Shellfish waters & Special Protection Area (SPA)	Two designated bathing waters; Shellfish waters	Designated a sensitive waterbody	-	Designated bathing area, close proximity to a (nutrient) sensitive area, shellfish waters, Special Area of Conservation (SAC), proposed Natural Heritage Area (pNHA), Ramsar site
pH	6-9	6-9	6-9	6-9	6-9
Toxicity	5 TU	5 TU	5 TU	5 TU	-
Faecal coliforms	-	-	100,000MPN/100ml[i]	-	-
CBOD	25 mg/l	25 mg/l	25 mg/l	25 mg/l	25 mg/l
COD	125 mg/l	125 mg/l	125 mg/l	125 mg/l	125 mg/l
Suspended Soilds	35 mg/l	35 mg/l	35 mg/l	35 mg/l	35 mg/l
Total Nitrogen	-	-	10 mg/l	-	-
Total Oxidised Nitrogen (as N)	-	-	-	-	35 mg/l[ii]
Ammonia					5 mg/l

Parameter	Barnageeragh (Ref. D0023-01)	Portrane (Ref. D0114-01)	Ringsend (Ref. D0034-01)	Shanganagh (Ref. D0038-01)	Malahide (Ref. D00021-01)
(as N)					
Total Phosphorus (as P)	-	-	1 mg/l	-	-
Temperature	25˚C (max)	25˚C (max)	-	25˚C (max)	-
Coloration (after filtration)	<10% deviation[iii]	-	-	-	-
Salinity	<10% deviation	-	-	-	-
Dissolved Oxygen	≥70%[iv]	-	-	-	-
Polychlorinated biphenyls	0.0003 mg/l	-	-	-	-
Metals (dissolved)	Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver, Zinc [v]	-	-	-	-

[i] Limit shall apply from 1st May to 31st August annually
[ii] This is the sum of the concentrations of nitrate and nitrite
[iii] The licensee shall establish a baseline value against which deviation can be measured. This value should be agreed with the Agency.
[iv] No individual measurement should indicate a value less than 60% unless it can be established that there are no harmful consequences for the development of shellfish. Should an individual measurement indicate less than 70% measurements must be repeated.
[v] The concentration of each substance in the shellfish water must not exceed a level that gives rise to harmful effects on shellfish or their larvae. The synergic effects of these metals must also be taken into consideration.

Parameter	Leixlip (Ref. D0004-02)	Swords (Ref. D0024-01)
PE	>10,000	>10,000
Sensitive locations in vicinity of Discharge	Nutrient Sensitive Area (river), proposed Natural Heritage Area (pNHA)	Bathing Water Area, Shellfish Area, S.A.C., S.P.A., proposed Natural Heritage rea (pNHA), nutrient sensitive area), Ramsar location
pH	6 – 9	6 - 9
Toxicity	-	-
Faecal coliforms	-	-
CBOD	4 mg/l	25 mg/l
COD	125 mg/l	125 mg/l
Suspended Soilds	35 mg/l	35 mg/l
Total Nitrogen	-	15
Total Oxidised Nitrogen (as N)	-	-
Ammonia (as N)	0.8 mg/l	-
Total Phosphorus (as P)	1 mg/l	2 mg/l
Temperature		25˚C
Coloration (after filtration)	-	-
Salinity	-	-
Dissolved Oxygen	-	-
Polychlorinated biphenyls	-	-
Metals (dissolved)	-	-
Orthophosphate	0.1 mg/l	-
Fluoride	160 kg/day	-

7 Proposed Discharge Standards for Wastewater from the new Regional Wastewater Treatment Plant

It is intended that the discharge from the new Regional WwTP be located away from 'sensitive' or designated waterbodies, such that the discharge will not have a direct impact on these waterbodies.

The Urban Wastewater Treatment Regulations 2001 to 2010, require that any wastewater discharging to the Irish Sea off the North Dublin coast from the proposed Regional WwTP be treated in a treatment plant which provides for secondary treatment.

As discussed in Section 4 above there is no legislative requirement for the provision of nutrient (nitrogen and phosphorous) reduction in addition to secondary treatment for the treated wastewater. Therefore, the provision of nutrient reduction in addition to secondary treatment is not considered necessary for the new Regional WwTP at this time.

3-dimensional hydrodynamic modelling of the discharge point has been undertaken to assess the impact of the treated wastewater discharge on the receiving waters outside the limits of the discharge mixing zone and to assess the implications for compliance with the Directives / Regulations discussed in Section 5 of this report. In particular the potential requirement to provide UV disinfection to the treated wastewater discharge to comply with the Bathing Water Quality Regulations 2008 (S.I. No 79 of 2008) and the Quality of Shellfish Waters Regulations (S.I. No 200 of 1994) was examined.

The extensive modelling undertaken as part of the EIAR has predicted that the Proposed Project will have an imperceptible to slight impact on the water quality of the coastal waters off Co. Dublin. It predicts that the Proposed Project will not will not influence any designated bathing waters nor blue flag beaches nor any designated shellfish waters

Therefore, it is proposed, that the final wastewater produced at the new Regional Wastewater Treatment Plant should conform to the standards outlined in Table 7.1:

Table 7.1 Final Wastewater Emission Limits for proposed Regional WwTP

Parameter		Emission Limit
pH		6 – 9
Temperature		25°C (max)
BOD_5	95th Percentile	25 mg/l O_2
	Not to be exceeded	50 mg/l O_2
COD	95th Percentile	125 mg/l O_2
	Not to be exceeded	250 mg/l O_2
TSS	95th Percentile	35 mg/l O_2
	Not to be exceeded	87.5 mg/l O_2

Appendix A. List of Relevant Legislation & Regulations

- Waste Water Discharge (Authorisation) Regulations, 2007 (S.I No. 684 of 2007) as amended by
  - Waste Water Discharge (Authorisation) (Amendment) Regulations 2010 (S.I. No. 231 of 2010).
  - Waste Water Discharge (Authorisation) (Environmental Impact Assessment) Regulations 2016 (S.I. No. 652 of 2016)
- Urban Waste Water Treatment Regulations 2001(S.I. No. 254 of 2001) as amended by:
  - Urban Waste Water Treatment (Amendment) Regulations 2004 (S.I. No. 440 of 2004); and
  - Urban Waste Water Treatment (Amendment) Regulations 2010 (S.I. No. 48 of 2010).
- Quality of Shellfish Waters Regulations (S.I. No 200 of 1994) as amended by:
  - Quality of Shellfish Waters (Amendment) Regulations 2001 (S.I. No. 459 of 2001);
  - European Communities (Quality of Shellfish Waters) (Amendment) Regulations 2006 (S.I. No. 268 of 2006);
  - European Communities (Quality of Shellfish Waters) (Amendment) Regulations 2009 (S.I. No. 55 & 464 of 2009
- European Communities Environmental Objectives (Surface Water) Regulations 2009 (S.I. No 272 of 2009) as amended by:
  - European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2012 (S.I. No. 327 of 2012)
  - European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2015 (S.I. No. 386 of 2015)
- Quality of Bathing Waters Regulations (S.I. No 155 of 1992) as amended by:
  - Quality of Bathing Waters (Amendment) Regulations 1994 (S.I. No. 145 of 1994)
  - Quality of Bathing Waters (Amendment) Regulations 1996 (S.I. No. 230 of 1996),
  - Quality of Bathing Waters (Amendment) Regulations 1998 (S.I. No. 177 of 1998),
  - Quality of Bathing Waters (Amendment) Regulations 2001 (S.I. No. 22 of 2001)
  - Bathing Water Quality Regulations, 2008 (S.I. No. 79 of 2008)
  - Bathing Water Quality (Amendment) Regulations, 2011 (S.I. No. 351 of 2011)
  - Bathing Water Quality (Amendment) Regulations, 2016 (S.I. No. 163 of 2016).
- Blue Flag Beach Programme