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Greater Dublin Drainage Project

Irish Water

Environmental Impact Assessment Report: Volume 3 Part A of 6

Chapter 10 Biodiversity (Marine Ornithology)

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Contents

10. Biodiversity (Marine Ornithology)	1
10.1 Introduction	1
10.2 Methodology	3
10.2.1 Introduction	3
10.2.2 Estuarine Ornithological Survey	3
10.2.3 Coastal and Marine Vantage Point Surveys	4
10.2.4 Boat Based Assessment of Auk Fledging	4
10.2.5 Defining Ecological Importance	4
10.2.6 Defining Ecological Impacts	5
10.2.7 Determination of Significance	6
10.2.8 Non-Statutory Consultation	7
10.3 Baseline Environment	8
10.3.1 Wintering Birds and the Baldoyle Bay Special Protection Area	8
10.3.2 Adjacent Special Protection Areas and Designated Sites	9
10.3.3 Estuarine Ornithological Baseline	9
10.3.4 Marine Birds and Related Special Protection Areas in the Vicinity of Dublin Bay	21
10.3.5 Marine Birds Ornithological Baseline	22
10.3.6 Ecological Value of Estuarine and Marine Birds	29
10.4 Parameters for Assessment	31
10.4.1 Overview of the Proposed Project Works and Magnitude of Potential Impacts	31
10.4.2 Parameters Included in Assessment (Construction Phase)	31
10.4.3 Parameters Excluded from Assessment (Construction Phase)	33
10.4.4 Parameters Included in Assessment (Operational Phase)	34
10.4.5 Parameters Excluded from Assessment (Operational Phase)	35
10.5 Potential Impacts on Ornithological Receptors	35
10.5.1 Disturbance and/or Displacement	35
10.5.2 Indirect Impacts	37
10.6 Assessment of Significance	37
10.6.1 Construction Phase	37
10.6.2 Operational Phase	49
10.7 ‘Do Nothing’ Impact	49
10.8 Cumulative Impacts	49
10.9 Mitigation Measures	49
10.9.1 Construction Phase – Estuarine Ornithology	49
10.9.2 Construction Phase – Marine Ornithology	50

10.9.3 Operational Phase – Estuarine Ornithology 51

10.9.4 Operational Phase – Marine Ornithology 52

10.10 Residual Impacts 52

10.10.1 Estuarine Ornithology 52

10.10.2 Marine Ornithology 52

10.11 References 52

10. Biodiversity (Marine Ornithology)

This Chapter of the Environmental Impact Assessment Report identifies, describes and assesses the likely significant effects of the proposed Greater Dublin Drainage Project (hereafter referred to as the Proposed Project) on estuarine, coastal and marine ornithology. The key areas of the route which may be particularly sensitive are the Baldoyle Bay and Ireland's Eye Special Protection Areas and the bird species associated with them. Birds are highly mobile, so they can occur both inside and outside designated areas with which they are associated.

Estuarine and marine surveys were undertaken between 2014 and 2017 to assess the bird populations using the areas in which the proposed outfall pipeline route (marine section) will be constructed and their surroundings. Monitoring of the Ireland's Eye auk colony in summer 2016 and 2017 was also carried out.

During the Construction Phase, proposed temporary construction compounds for microtunnelling works will be established adjacent to the eastern and western boundaries of Baldoyle Bay. Providing that the embedded mitigation of suitable screening at each of the proposed temporary construction compounds is in place prior to construction, no impacts due to disturbance are predicted.

The temporary piling noise during the Construction Phase at the microtunnelled/subsea interface, and the fibre optic cable crossing, could result in disturbance to foraging seabirds. The construction of the proposed outfall pipeline route (marine section) subsea section, including the proposed marine diffuser, has the potential to result in disturbance to seabirds from Ireland's Eye, with auks being particularly sensitive. Auk chicks leaving Ireland's Eye at the end of the breeding season may be flightless and, though unlikely, in some instances could approach the proposed construction corridor in large numbers. Such birds are highly susceptible to disturbance.

In order to ensure that the Ireland's Eye Special Protection Area and the seabirds it supports, particularly auks, are not disturbed during the Construction Phase, and to ensure that the Special Protection Area is not disturbed unnecessarily, a Vessel Management Plan for marine ornithology will be implemented.

No impacts are predicted as a result of the Operational Phase of the Proposed Project.

There are also no predicted significant residual effects upon estuarine, coastal and marine ornithological receptors.

10.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) provides a characterisation of the receiving environment and an assessment of the ecological impacts of the Greater Dublin Drainage Project (hereafter referred to as the Proposed Project) on estuarine, coastal and marine ornithology.

The assessment addresses the potential impacts on birds using the estuarine, intertidal and marine environments. Please refer to Chapter 11 Biodiversity (Terrestrial and Freshwater Aquatic) in Volume 3 Part A of this EIAR for the impact assessment on terrestrial ornithology including breeding birds.

The table below includes a summary of the Proposed Project elements. A full description of the Proposed Project is detailed within Volume 2 Part A, Chapter 4 Description of the Proposed Project, of this EIAR.

Proposed Project Element	Outline Description of Proposed Project Element
Proposed Wastewater Treatment Plant (WwTP)	<ul style="list-style-type: none"> • WwTP to be located on a 29.8 hectare (ha) site in the townland of Clonshagh (Clonshaugh) in Fingal. • 500,000 population equivalent wastewater treatment capacity. • Maximum building height of 18m. • Sludge Hub Centre (SHC) to be co-located on the same site as the WwTP with a sludge handling and treatment capacity of 18,500 tonnes of dry solids per annum. • SHC will provide sustainable treatment of municipal wastewater sludge and domestic septic tank sludges generated in Fingal to produce a biosolid end-product. • Biogas produced during the sludge treatment process will be utilised as an energy source. • Access road from the R139 Road, approximately 400m to the southern boundary of the site. • Egress road, approximately 230m from the western boundary of the site, to Clonshaugh Road. • A proposed temporary construction compound to be located within the site boundary.
Proposed Abbotstown pumping station	<ul style="list-style-type: none"> • Abbotstown pumping station to be located on a 0.4ha site in the grounds of the National Sports Campus at Abbotstown. • Abbotstown pumping station will consist of a single 2-storey building with a ground level floor area of 305m² and maximum height of 10m and a below ground basement 17m in depth with floor area of 524m² incorporating the wet/dry wells. • The plan area of the above ground structure will be 305m² and this will have a maximum height of 10m. • A proposed temporary construction compound to be located adjacent to the Abbotstown pumping station site.
Proposed orbital sewer route	<ul style="list-style-type: none"> • The orbital sewer route will intercept an existing sewer at Blanchardstown and will divert it from this point to the WwTP at Clonshagh. • Constructed within the boundary of a temporary construction corridor. • 13.7km in length; 5.2km of a 1.4m diameter rising main and 8.5km of a 1.8m diameter gravity sewer. • Manholes/service shafts/vents along the route. • Odour Control Unit at the rising main/gravity sewer interface. • Proposed temporary construction compounds at Abbotstown, Cappoge, east of Silloge, Dardistown and west of Collinstown Cross to be located within the proposed construction corridor.
Proposed North Fringe Sewer (NFS) diversion sewer	<ul style="list-style-type: none"> • The NFS will be intercepted in the vicinity of the junction of the access road to the WwTP with the R139 Road in lands within the administrative area of Dublin City Council. • NFS diversion sewer will divert flows in the NFS upstream of the point of interception to the WwTP. • 600m in length and 1.5m in diameter. • Operate as a gravity sewer between the point of interception and the WwTP site.
Proposed outfall pipeline route (land based section)	<ul style="list-style-type: none"> • Outfall pipeline route (land based section) will commence from the northern boundary of the WwTP and will run to the R106 Coast Road. • 5.4km in length and 1.8m in diameter. • Pressurised gravity sewer. • Manholes/service shafts/vents along the route. • Proposed temporary construction compounds (east of R107 Malahide Road and east of Saintdoolaghs) located within the proposed construction corridor.
Proposed outfall pipeline route (marine section)	<ul style="list-style-type: none"> • Outfall pipeline route (marine section) will commence at the R106 Coast Road and will terminate at a discharge location approximately 1km north-east of Ireland's Eye. • 5.9km in length and 2m in diameter. • Pressurised gravity tunnel/subsea (dredged) pipeline. • Multiport marine diffuser to be located on the final section. • Proposed temporary construction compounds (west and east of Baldoyle Bay) to be located within the proposed construction corridor.
Proposed Regional Biosolids Storage Facility	<ul style="list-style-type: none"> • Located on an 11ha site at Newtown, Dublin 11. • Maximum building height of 15m. • Further details and full impact assessment are provided in Volume 4 Part A of this EIAR.

The total Construction Phase will be approximately 48 months, including a 12 month commissioning period to the final Operational Phase. The Proposed Project will serve the projected wastewater treatment requirements of existing and future drainage catchments in the north and north-west of the Dublin agglomeration, up to the Proposed Project's 2050 design horizon.

Please also note that the ornithological impact assessment of the proposed Regional Biosolids Storage Facility aspect of the Proposed Project is addressed in Chapter 6 Biodiversity in Volume 4 Part A of this EIAR. There is no marine ornithological assessment of the proposed Regional Biosolids Storage Facility, as the site is located inland.

10.2 Methodology

10.2.1 Introduction

The marine ornithology assessment is based on the construction and operation of a new proposed outfall pipeline route (marine section). This will consist of a microtunnelled section commencing at the western side of the Baldoyle Bay Estuary, a subsea section which begins off the coast of Velvet Strand Beach and a proposed marine diffuser located approximately 1km north-east of the island of Ireland's Eye (see Chapter 4 Description of the Proposed Project).

The following sources of information have been used during the assessment:

- Literature assessment (using published data and literature) of the Fingal coastline, including Fingal Local Biodiversity Action Plan (LBAP) (Fingal County Council (FCC) 2010), and citations for Baldoyle Bay, Ireland's Eye and Howth Head Coast Special Protection Areas (SPAs); and
- Estuarine and coastal surveys, encompassing:
 - Walkover survey data collected between December 2014 and March 2018 to characterise the abundance and distribution of bird species associated with the Baldoyle Bay SPA and surrounding habitats;
 - Vantage Point (VP) surveys from two locations between December 2014 and March 2018 to assess the usage by bird species of the proposed outfall pipeline route (marine section); and
 - Boat based assessment of the timing of auk species leaving Ireland's Eye in the later part of the breeding season.

The methodology for the assessment of impacts on estuarine, coastal and marine ornithological interests is in line with *Guidelines for Ecological Impact Assessment in Britain and Ireland Marine and Coastal* issued by the Chartered Institute of Ecology and Environmental Management (CIEEM) for marine environments (CIEEM 2010) and *Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater and Coastal* (CIEEM 2016) for terrestrial environments. The Environmental Protection Agency's (2017) *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* were also consulted.

10.2.2 Estuarine Ornithological Survey

A wetland bird survey was undertaken during 2014/2015, 2015/2016 and 2017/18 to characterise the ornithological interests of Baldoyle Bay and surrounding areas, particularly with respect to spatial and temporal distribution of key SPA species. A summary of survey effort is provided in Table A10.1, Appendix A10.1 in Volume 3 Part B of this EIA. Surveys were carried out twice per month between December 2014 and May 2016, and an up-to-date survey campaign was restarted in 2017 with surveys again being conducted twice per month between March 2017 and March 2018.

The survey methodology was based on the British Trust for Ornithology (BTO) Wetland Bird Survey (WeBS) and Irish WeBS (I-WeBS) methodology as outlined in Gilbert et al. (1998) and BTO (2016a; 2016b). The survey method included both high tide and low tide waterbird counts. Surveys were conducted throughout a range of weather conditions and times of the day where good visibility prevailed. The spatial extent of the surveys is illustrated in Figure 10.1 Location and Extent of Marine, Coastal and Estuarine Ornithological Surveys.

Full details of the methodologies employed during these surveys are provided in Appendix A10.1 in Volume 3 Part B of this EIA.

10.2.3 Coastal and Marine Vantage Point Surveys

VP surveys were carried out from December 2014, with six hours of surveys carried out monthly per VP to July 2017. Surveys were carried out twice per month between December 2014 and July 2016, and again twice per month between March 2017 and March 2018. Details of survey effort are provided in Table A10.5 of Appendix A10.1.

Two VPs were utilised: one on the mainland (“Velvet Strand” (IO250423, Lat. 53.41631, Long. -6.11966, mean viewing angle 70°)), and one on Ireland’s Eye (“Ireland’s Eye” (IO287415, Lat. 53.40792, Long. -6.06387, mean viewing angle 0°). The Velvet Strand VP covered the area of the proposed outfall pipeline route (marine section) out to sea using a 2km viewing arc, and the Ireland’s Eye VP covered the remaining proposed outfall pipeline route (marine section) using a 2km viewing arc. In this way, the proposed outfall pipeline route (marine section) and a large buffer was covered by the surveys. The locations of these VPs and the viewing arcs are illustrated in Figure 10.1 Location and Extent of Marine, Coastal and Estuarine Ornithological Surveys.

Surveys were timed to give coverage over a range of tidal states through the year, and to ensure that both spring and neap tides were covered. Key species/species groups for the VP surveys were primarily seabirds which utilise the marine environment for foraging and roosting/loafing and social interaction, particularly during the breeding season when nests are established on cliffs or offshore islands such as the Ireland’s Eye SPA.

Full details of the methodologies employed during these surveys, along with a priority species list and detailed records of survey timings is provided in Appendix A10.1.

10.2.4 Boat Based Assessment of Auk Fledging

There is a substantial population of breeding auks at Ireland’s Eye. When fledging, chicks and one or both parents tend to depart nests and disperse from breeding colonies to offshore areas to moult and avoid predation of chicks by other seabirds. This can result in a situation where many birds are in the water at once, which could be susceptible to disturbance and displacement. The aim of the surveys was to assess the use of waters surrounding Ireland’s Eye by auks during this leaving event.

Surveys were conducted in July 2016 and July 2017 and consisted of a single surveyor on a boat travelling around Ireland’s Eye and noting numbers of auk chicks in nests on the cliffs, and any birds in the water. Visits occurred approximately twice weekly and were supplemented by additional observations from the boatman, who was present in the area almost daily.

10.2.5 Defining Ecological Importance

The importance of different ecological receptors was defined as negligible (site), low (local), medium (county), high (national) or very high (international). The criteria used to inform decisions regarding the value of each receptor are outlined in Table 10.1.

Table 10.1: Ecological Value Criteria

Ecological Value	Criteria Used in this Chapter
Very high (international)	Populations present within survey area exceed 1% threshold of international importance. Cited interest feature of connected/relevant SPA or Ramsar.
High (national)	Species that contribute to the integrity of an SPA but which are not cited as a species for which the site is designated. Species listed on Annex I of Directive 2009/147/EC of 30 November 2009 of the European Parliament and of the Council on the conservation of wild birds (Birds Directive). Resident or regularly occurring populations (>1% national threshold) of the following: - Species protected under the Wildlife Acts (1976-2002); and - Species listed on the Red or Amber List of Birds of Conservation Concern in Ireland (BoCCI).

Ecological Value	Criteria Used in this Chapter
	Resident or regularly occurring populations of the above populations where a 1% national threshold is not available (excluding BoCCI Amber listed species).
Medium (county)	Resident or regularly occurring populations (<1% national threshold) of the following: - Species protected under the Wildlife Acts (1976-2002); and - Species listed on the Red List of BoCCI. For BoCCI Amber listed species, resident or regularly occurring populations of the above populations are >1% national threshold or a 1% national threshold is not available. Locally important populations of priority species identified in a Local Area Plan (LAP) (if one has been prepared). Populations of species that are uncommon within the county. Species that are rare or undergoing a decline in quality or extent at a national level.
Low (local)	All other species of conservation interest, i.e. those species on the BoCCI Amber (<1% national threshold or present in very low peak numbers) and Green lists
Negligible (site)	All other features that are widespread and common and which are not present in locally, regionally or nationally important numbers.

The aim of the EIAR is to report on significant impacts, rather than every conceivable impact. As such, following the assessment of baseline data, a number of receptors were scoped out of the assessment as the survey results indicated that significant impacts were not likely to occur, for example if the number of individuals recorded was extremely low in relation to their relevant reference populations and/or site usage was rare. Such impacts do not require assessment under the terms of the EIA legislation in Ireland. Both the *Draft Guidelines on Information to be Contained in Environmental Impact Assessment Reports* (Environmental Protection Agency 2017) and *Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater and Coastal* (CIEEM 2016) recommend that only information that is required for the assessment of likely significant impacts is included.

10.2.6 Defining Ecological Impacts

The impact assessment process involves identifying and characterising impacts and, where adverse impacts on ecological receptors cannot be avoided, incorporating measures to mitigate these impacts. The significance of any residual impacts after mitigation must also be assessed. If relevant, appropriate compensation measures to offset significant residual impacts, along with opportunities for ecological enhancement, should be identified.

When describing ecological impacts, the following parameters are considered:

- Physical nature;
- Type (positive/negative, direct/indirect);
- Spatial extent;
- Magnitude (Table 10.2);
- Duration (Table 10.3);
- Timing;
- Frequency; and
- Reversibility.

Definitions of all of these parameters are provided in CIEEM (2016).

Table 10.2: Criteria for Determining the Magnitude of Potential Ecological Impacts

Magnitude	Examples
Very high	The proposal (either on its own or with other proposals) will result in a total loss or very major alteration to key elements of the baseline conditions such that character/composition/attributes will be fundamentally changed and may be lost from the site altogether.
High	The proposal (either on its own or with other proposals) will result in a major alteration to key elements/features of the baseline conditions such that character/composition/attributes will be fundamentally changed.
Medium	The proposal (either on its own or with other proposals) will result in a loss or alteration to one or more key elements/features of the baseline conditions such that character/composition/attributes of baseline would be partially changed.
Low	The proposal (either on its own or with other proposals) will result in a minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character/composition/attributes of conditions would be similar to pre-development circumstances/patterns.
Negligible	The proposal (either on its own or with other proposals) will result in a very slight change from baseline conditions (barely distinguishable from or approximating to the 'no change' situation).

Table 10.3: Duration of Impact

Duration	Criteria
Permanent	Effects continuing indefinitely beyond one human generation (approximately 25 years), except where there is likely to be a substantial improvement after this period, whereby these would be described as 'very long-term effects'.
Temporary	Long-term (15 to 25 years or longer) Medium (5 to 15 years) Short-term (up to 5 years)

10.2.7 Determination of Significance

The overall significance of an ecological impact on a particular receptor is a function of the impact magnitude and ecological value. As a starting point, this is determined by using the matrix presented in

Table 10.4. However, the results from the impact matrix are not considered to be definitive. The final significance of an impact is determined through a combination of the impact matrix, a review of available evidence (where possible with reference to published scientific studies relevant to the impact and receptor under assessment) and application of expert judgement to ensure that the conclusion is consistent with the available evidence. The assessment takes account of design measures included to avoid unnecessary impacts.

Once identified and characterised for magnitude and significance, each potential impact is assigned a confidence of prediction (post-mitigation). CIEEM (2010) outlines the following terminology for outlining the likelihood of impact occurrence:

- Certain (100%);
- Near-certain (95–100%);
- Probable (50–95%);
- Unlikely (5–50%); and
- Extremely unlikely (0–5%).

A statement of residual impacts (taking account of embedded mitigation) is then provided. Residual impacts identified as 'Moderate' and/or 'Major Adverse' are considered to be ecologically significant. Impacts of 'Negligible' or 'Minor' significance are considered to be not significant.

Table 10.4: Impact Significance Matrix

Impact Significance		Ecological Value				
		Very High	High	Medium	Low	Negligible
Magnitude	Very High	Major	Major	Major	Moderate	Minor
	High	Major	Major	Moderate	Minor	Negligible
	Medium	Major	Moderate	Minor	Minor	Negligible
	Low	Moderate	Minor	Minor	Negligible	Negligible
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible

10.2.8 Non-Statutory Consultation

The following table summarises the issues raised during non-statutory consultation on the Proposed Project.

Table 10.5: Issues Raised During Non-Statutory Consultation on the Proposed Project.

Stakeholder	Date Received	Submission Details
An Taisce	17 January 2014	<ul style="list-style-type: none"> Concerns raised about the potential impact on protected areas: Baldoyle Bay candidate Special Area of Conservation (cSAC) (Site Code: 000199), Baldoyle Bay SPA (Site Code: 004016) and the Rockabill to Dalkey Island cSAC (Site Code: 003000). Environmental Impact Statement should address potential impacts on each protected area and relevant mitigation measures.
BirdWatch Ireland	12 December 2013	<ul style="list-style-type: none"> Concerns regarding activities near Baldoyle Bay SPA (Site Code: 004016). Concerns regarding the proximity of the proposed outfall pipeline route (marine section) to Ireland's Eye SPA (Site Code: 004117). Potential impact of nutrient reduction on the estuarine environment. Issues with disturbance relating to breeding seabirds and wintering waterbirds. Location of the proposed WwTP (site boundary proposed at 50m from Cuckoo Stream, a tributary of the Mayne River – struggling with ecological status).
Department of Culture, Heritage and the Gaeltacht National Parks and Wildlife Service (Formerly Department of Arts, Heritage and the Gaeltacht)	10 January 2014	<ul style="list-style-type: none"> Mitigation measures for proposed drilling under Baldoyle Bay cSAC to include avoidance of the wintering bird season, if construction is likely to disturb wintering birds. Portmarnock South LAP (FCC 2013) contains bird data which may be of use to the proposed tunnelling within the area covered by the LAP. Proposed Project should be subject to Appropriate Assessment Screening and, where necessary, Appropriate Assessment as per Article 6.3 of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive). Consultation with the relevant Local Authorities is recommended to determine if there are any projects or plans which alone or in combination could impact on any Natura 2000 sites.
BirdWatch Ireland	08 December 2017	<ul style="list-style-type: none"> The construction of the proposed pipeline routes and potential impacts to conservation interests in the SPAs and SACs on the route of the pipeline and out into the Irish Sea. BirdWatch Ireland's I-WeBS data and other survey data for bird species relevant to these sites and other sites not designated but important for birds will need to be consulted and included in the assessment of impacts. Migratory bird species may use fields en route from the proposed WwTP to the coast for foraging. This may include light-bellied brent geese, oystercatchers, curlew and more. It would be worthwhile contacting the Irish Brent Goose Study Group about any data that they might have for brent geese in this area. The assessment of cumulative impacts of the Proposed Project in combination with other potential projects, as well as other projects which have inputs to the waters of

Stakeholder	Date Received	Submission Details
		<p>Dublin Bay, will require careful consideration. This includes projects which currently permit dumping at sea of dredge materials and other marine pollutants.</p> <ul style="list-style-type: none"> • The waters surrounding the pipeline outfall pipeline route (marine section) are important feeding grounds for several conservation interests such as kittiwake, which has been listed as Vulnerable on the EU Red List of birds, and Annex 1 bird species such as common tern and roseate tern amongst others. Assessment of impacts on these species will be important. • Assessment of the impacts on forage fish for bird species should also be included. • The impacts on water quality and a description of contingency plans for pollution incidents will need to be carefully considered. The potential failures to the treatment process as well as failures at the proposed outfall pipeline route (marine section) discharge point will need to be described and mitigation developed. • The timing of any construction works which may impact on conservation interests of the SPAs both inside and outside of the sites must avoid sensitive times for species (e.g. winter months for overwintering species). • The data that BirdWatch Ireland has on bird species in the area of the Proposed Project may throw up other issues which will need to be considered. • The precautionary principle should also apply.

10.3 Baseline Environment

The proposed outfall pipeline route (marine section) extends under or across habitats used by birds using Baldoye Bay and the nearshore and marine environments between Velvet Strand and Ireland’s Eye.

10.3.1 Wintering Birds and the Baldoye Bay Special Protection Area

Baldoye Bay is a sheltered estuary separated from the Irish Sea by the Portmarnock sand dune system (Figure 10.1 Location and Extent of Marine, Coastal and Estuarine Ornithological Surveys). Two small rivers, the Mayne River and the Sluice River, flow into the Baldoye Bay. At low tide, extensive areas of intertidal mixed substrate flats are exposed. Areas of saltmarsh occur near Portmarnock Bridge and at Portmarnock Point, with narrow strips found along other parts of Baldoye Estuary.

Baldoye Bay is designated as an SPA under the Birds Directive. It is also designated as a Ramsar site and an Important Bird Area. It regularly supports an internationally important population of wintering light-bellied brent goose, and nationally important populations of ringed plover, bar-tailed godwit, shelduck, golden plover and grey plover. These species are listed as Special Conservation Interests (SCIs), along with the wetland habitats within the SPA boundary.

Nationally important populations of great-crested grebe and pintail are also present. Other species which occur in considerable numbers during the wintering season are teal, mallard, common scoter, oystercatcher, lapwing, knot, dunlin, black-tailed godwit, curlew, redshank, greenshank and turnstone. These species are also included in the SPA citation.

Table 10.6 summarises the Baldoye Bay SPA qualifying species. Five-year population means for each species are also provided: one set from when the site was designated, and more-recent equivalents.

Conservation objectives provided for the site (National Parks and Wildlife Service 2013) are considered in more detail in the Natura Impact Statement.

10.3.2 Adjacent Special Protection Areas and Designated Sites

Baldoyle Bay is one of several neighbouring wetland sites of significant importance for overwintering waterbirds in the wider Dublin Bay and Fingal area. Other sites include:

- Malahide Estuary SPA (004025), 6km north of Baldoyle Bay;
- Rogerstown Estuary SPA (004015), 11km north;
- Skerries Island SPA (004122), 19km north;
- North Bull Island SPA (004006), 3km south; and
- South Dublin Bay and Tolka River Estuary SPA (004024), 9km south.

Together, these sites regularly support more than 50,000 wintering waterbirds and are an area of international importance (Tierney et al. 2017). Waterbirds are likely to undertake regular movements around Dublin Bay and neighbouring SPAs during the wintering season.

To the west of Baldoyle Bay are the 'Portmarnock South Zoned Lands' which form part of the Portmarnock South LAP.

The Portmarnock South LAP seeks to protect and enhance the function of the ecological buffer zone through appropriate mitigation and management measures as set out in the Green Infrastructure and Landscape Strategy. This is reflected in Table 5.0 of Section 5 of that LAP where it proposes that a 'quiet zone' is 'established to the south of the residential development area to cater for Brent Geese and wader species. The 'quiet zone' to consist of grassland pasture. This 'quiet zone' will be enclosed by a fence and hedge to prevent disturbance during the winter migratory bird season. The enclosure must be dog proof but can permit overlooking of the 'quiet zone' e.g. 1.2 metre high fence with hedge planting of native species'.

The Portmarnock South Zoned Lands include a low intervention landscape approach to the ecological buffer zone lands to retain the supporting ecological functions that this landscape provides to the estuary habitats, including a 'quiet zone' for migratory birds and arable crop areas for native bird species.

10.3.3 Estuarine Ornithological Baseline

Sources of Information

Appendix A10.1 presents the peak monthly counts and the mean of these counts (peak mean) of the estuarine walkover surveys. Table A10.2 of Appendix A10.1 contains peak mean data for the Baldoyle Bay SPA SCIs and Table A10.3 contains data for the other named qualifying features. Two-year peak means recorded during the estuarine walkover surveys are presented in Table 10.6, along with a range of other information relating to the conservation status of each species and 1% national thresholds.

For bird species that are not qualifying species of the Baldoyle Bay SPA, peak counts by month for the entire estuarine survey programme are presented in Table A10.4 of Appendix A10.1. Table 10.7 ranks these species by peak count, as well as providing a range of conservation information and 1% national thresholds where available. Corresponding international thresholds are presented if they were available when 1% national thresholds were not.

Figures A10.1 to A10.53 in Appendix A10.1 show the distribution of various species of birds across the Baldoyle Bay estuarine survey area (Figure 10.1 Location and Extent of Marine, Coastal and Estuarine Ornithological Surveys) recorded during the estuarine walkover surveys. Distribution of the SCIs of the Baldoyle Bay SPA are presented in Figures A10.1 to A10.6, whilst the distribution of other species included on the Natura 2000 data form are presented in Figures A10.7 to A10.22. Figures A10.23 to A10.53 contain the distributions of species that were recorded during the estuarine walkover surveys that are not included on the

Natura 2000 data form for the Baldoyle Bay SPA. They are ordered as per the species groupings in Table A10.4 of Appendix A10.1. Figures were produced for species that are named on citations of the Ireland's Eye SPA or Howth Head Coast SPA, or for other species if more than 10 records of the species were made during the surveys.

Special Conservation Interests of the Baldoyle Bay Special Protection Area

Light-bellied brent goose was present in peak numbers during the wintering and passage periods, and was generally absent during the breeding season (April to August) (Appendix A10.1, Table A10.2). The two-year peak mean was 816 birds, exceeding the 1% national threshold of 360 birds and the 1% international threshold of 400 birds. Brent geese were observed across the surveyed section of the SPA and on both the seaward and landward sides of the estuary. It should be noted that almost all of these records were of birds in flight (Figure A10.2, Appendix A10.1). Within the SPA, birds were frequently seen in association with wetted channels, where they were observed feeding, loafing and bathing. Birds were observed roosting in the north, west and east of the section of the SPA that was surveyed.

Shelduck was present in the estuarine survey area all year round (Appendix A10.1, Table A10.2). Peaks in the population size occurred over winter, but birds were also present in reasonable numbers during the breeding season. This suggests a small resident population which is swelled by additional wintering birds. The two-year peak mean of 138 birds exceeds the 1% national threshold of 120 birds, but not the 1% international threshold of 3,000 birds. Shelducks were distributed relatively evenly throughout the wetted portion of the SPA covered by the surveys, and were infrequently recorded in association with habitats beyond the SPA (Figure A10.6, Appendix A10.1). They were frequently seen individually or in small groups.

Bar-tailed godwit was present in peak numbers during the wintering and passage periods, and in low numbers during the breeding season. The two-year peak mean was 275 birds, exceeding the 1% national threshold of 150 birds, but not the 1% international threshold of 1,200 birds. Bar-tailed godwit records were predominantly located within the intertidal area of Baldoyle Bay SPA (Figure A10.1, Appendix A10.1). Small numbers of birds were recorded in the intertidal area of Velvet Strand Beach to the east of the SPA, and a single record was made in a field to the north of the R123 Moyne Road, west of the SPA. Over two-thirds of records were feeding birds, with roosting on the estuary fringes the next most commonly recorded behaviour. The main roosting locations were areas in the north and north-west of the SPA, with some roosting birds recorded at the western shoreline of the SPA.

Ringed plover numbers peaked during the autumn passage and winter periods in 2015/2016, and were also regularly recorded during the breeding season (Appendix A10.1, Table A10.2). The two-year peak mean of 204 birds exceeded the 1% national threshold of 100 birds, but not the 1% international threshold of 730 birds. This species showed a preference for the habitats associated with the eastern side of the Baldoyle Bay SPA (Figure A10.5, Appendix A10.1). As well as being recorded within the SPA, relatively substantial numbers of records were made on the land to the western side of the Portmarnock Golf Course, and a smaller number of birds were recorded on the course itself. A handful of records were also made in the Velvet Strand Beach intertidal area to the east of the SPA.

Grey plover was present in peak numbers during the passage periods, and was generally absent during the breeding season. In the winter, it was only present in low numbers (Appendix A10.1, Table A10.2). Because of the large passage peaks (two-year peak mean of 487 birds), the 1% national threshold of 30 birds was exceeded by a large amount. The 1% international threshold of 2,500 birds was not exceeded. Grey plovers were observed within the estuarine survey area almost exclusively within the Baldoyle Bay SPA (Figure A10.4, Appendix A10.1). This species showed a preference for habitat to the eastern side of the Baldoyle Bay, though records were made across the estuary of birds feeding, roosting and loafing.

Golden plover, like grey plover, was present in peak numbers during the wintering and passage periods and was generally absent during the breeding season. The two-year peak mean of 3,061 birds exceeded the 1% national threshold of 1,200 birds, but not the 1% international threshold of 9,300 birds. There were comparatively few records of golden plover during the estuarine surveys, though when recorded, birds were present in large groups of up to 3,300 birds (Figure A10.3, Appendix A10.1). Most observations of this species were made within the Baldoye Bay SPA boundary, though some groups of birds were recorded in the field to the west. Several groups of roosting birds were recorded towards the north of the estuary.

Other Named Qualifying Species of the Baldoye Bay SPA

The other qualifying species listed in the Natura 2000 data form for the Baldoye Bay SPA can be grouped into three broad categories of temporal distribution.

- Species that were absent during the breeding season, with peaks in the population occurring in the winter or passage seasons: great-crested grebe, knot, pintail, red-breasted merganser and sanderling.

Great-crested grebes were recorded on just three occasions within the Baldoye Bay SPA. All other records were made in the intertidal area to the east of the SPA at Velvet Strand, where birds were recorded feeding and loafing (Figure A10.10, Appendix A10.1). The two-year peak mean of 44 birds exceeded the 1% national threshold of 40 birds, but fell well short of the 1% international threshold of 3,500 birds.

Knots were recorded in low numbers and favoured the area of Baldoye Bay several hundred metres to the south of the microtunnelled section of the proposed outfall pipeline route (marine section), where they were recorded feeding and roosting (Figure A10.13, Appendix A10.1). The two-year peak mean of 126 birds did not exceed the 1% national threshold of 280 birds.

Only two records of pintails were made during the estuarine surveys (Figure A10.17, Appendix A10.1). Both were made within the Baldoye Bay SPA boundary, just to the south of the proposed microtunnelled section of the proposed outfall pipeline route (marine section). The 1% national threshold of 20 birds was not exceeded.

Red-breasted mergansers were observed feeding within the SPA boundary, with the majority of records made in the southern portion of the estuarine survey area (Figure A10.18, Appendix A10.1). There were greater numbers of records of this species in the sea off Velvet Strand to the east of the Baldoye Bay SPA than in the SPA itself. The two-year peak mean was 26 birds, which exceeded the 1% national threshold of 20 birds. The 1% international threshold of 1,700 birds was not exceeded.

Sanderlings were recorded infrequently during the estuarine surveys, with only a single record of this species made within the Baldoye Bay SPA (Figure A10.20, Appendix A10.1). All other records of this species were made in the intertidal area of Velvet Strand to the east of the Baldoye Bay SPA. The two-year peak mean of 50 birds was below the 1% national threshold of 60 birds.

- Species that were present in low/very low numbers of non-breeding/early returning birds during the breeding season, with peaks in the population occurring in the winter or passage seasons: black-tailed godwit, dunlin, greenshank, lapwing, redshank, teal and turnstone.

Black-tailed godwits were recorded in relatively modest numbers during the estuarine surveys, and were located almost exclusively within the Baldoye Bay SPA (Figure A10.7, Appendix A10.1). Birds were recorded on the fringes of the SPA slightly more often than in the middle of it. The 1% national threshold of 190 was greater than the two-year peak mean of 166 birds. The two-year peak mean also did not exceed the 1% international threshold of 610 birds.

Dunlins were frequently recorded in the Baldoye Bay SPA, with the majority of sightings made to the south of the proposed outfall pipeline route (marine section) (Figure A10.9, Appendix A10.1). Small numbers of birds

were also observed in the northern area of the SPA and in the intertidal area to the east. The two-year peak mean of 525 birds was below the 1% national threshold of 570 birds.

Greenshanks were recorded feeding and roosting predominantly in the Baldoyle Bay SPA to the south of the microtunnelled section of the proposed outfall pipeline route (marine section) (Figure A10.11, Appendix A10.1). No birds were recorded in terrestrial habitats. The two-year peak mean for greenshank was 20 birds, which is equal to the 1% national threshold.

Lapwings were recorded in the Baldoyle Bay SPA and terrestrial habitats to the west (Figure A10.14, Appendix A10.1). Within the SPA close to the mouth of the Mayne River, there were numerous records of this species. Birds recorded in the fields to the west of the estuary included several pairs holding breeding territories, and birds also feeding and roosting. The two-year peak mean of 534 birds was lower than the 1% national threshold of 1,100 birds.

Redshanks were recorded across the estuarine section of the estuarine survey area, utilising numerous areas for feeding, loafing and roosting (Figure A10.19, Appendix A10.1). Most observations throughout the SPA were associated with river channels or the saltmarsh areas at the fringe of the intertidal flats. To the south of the proposed microtunnelled section of the proposed outfall pipeline route (marine section), records were concentrated to the eastern and western margins of the Baldoyle Bay SPA. Small numbers of records were made in the sea off Velvet Strand. The two-year peak mean of 294 birds was lower than the 1% national threshold of 300 birds.

Teals were most frequently associated with river channels in both the estuary itself, but also upstream (Figure A10.21, Appendix A10.1). There was a concentration of records within the Baldoyle Bay SPA towards the western edge. The two-year peak mean of 328 birds was lower than the 1% national threshold of 340 birds.

Turnstones were recorded infrequently, with records distributed across the Baldoyle Bay SPA section of the estuarine survey area (Figure A10.22, Appendix A10.1). A small number of records were also made on the intertidal area to the east of the SPA. The two-year peak mean of 74 birds was lower than the 1% national threshold of 95 birds.

- Species that are present in larger numbers throughout the year, with peaks in the population occurring in the winter or passage seasons: curlew, grey heron, mallard and oystercatcher. There may be small resident populations of these species, which increase in the winter as birds which have spent the breeding seasons elsewhere arrive to Baldoyle Bay.

Curlews were distributed fairly evenly throughout the Baldoyle Bay SPA, with birds recorded feeding and roosting across the SPA habitat (Figure A10.8, Appendix A10.1). There were small numbers of birds recorded in the fields to the west of the SPA, on Portmarnock Golf Course to the east, and in the intertidal area to the east of the SPA. The two-year peak mean of 164 birds was lower than the 1% national threshold of 350 birds.

Grey herons were recorded primarily in association with the Mayne River and other watercourses to the west of the Baldoyle Bay SPA. They were also recorded frequently in the north-west corner of the Baldoyle Bay SPA (Figure A10.12, Appendix A10.1), and in modest numbers across the Baldoyle Bay SPA itself, particularly on the western and eastern fringes of the SPA. The two-year peak mean of 15 birds was lower than the 1% national threshold of 25 birds.

Mallards were recorded across the Baldoyle Bay Estuary and surrounding habitats, with several 'hotspots' where numbers of records were much higher (Figure A10.15, Appendix A10.1). These hotspots were used for feeding and roosting, and were generally located close to the estuary and SPA edges where rivers flow into it. They were also seen regularly on the Mayne River to the west of the SPA. Substantial numbers were

recorded on the Portmarnock Golf Course to the east of the SPA in association with water bodies. The two-year peak mean of 185 birds was lower than the 1% national threshold of 290 birds.

Oystercatchers were most frequently recorded within the SPA boundary to the south of the microtunnelled section of the proposed outfall pipeline route (marine section) (Figure A10.16, Appendix A10.1). In addition, birds were recorded frequently on Portmarnock Golf Course feeding and roosting, and substantial numbers were also observed feeding in the intertidal zone to the east of Portmarnock Golf Course and the SPA at Velvet Strand. The peak count over two years of 739 birds exceeded the 1% national threshold of 690 birds, but not the international threshold of 8,200 birds.

Table 10.6: Species Listed on the Baldoyle Bay Special Protection Area Citation Recorded During Baseline Estuarine Surveys

Species	Common Name	Baldoyle Bay SPA Qualifying Species*	Annex I Species	BoCCI Status**	Recent Five-Year Mean (i)	Site Population Trend (Five Year)	Site Population Trend (12 Year)	Site Conservation Condition	1% International Threshold***	1% All Ireland Threshold***	Two-Year Peak Mean During Baseline Surveys****	Peak Months
<i>Branta bernicla</i>	Brent goose	SCI	No	Amber (w)	874	+30.0	+43.7	Favourable	400	360	816	Feb 2016 Dec 2017
<i>Tadorna tadorna</i>	Shelduck	SCI	No	Amber (b,w)	290	+118.1	+141.5	Favourable	3,000	120	138	Jan 2015 Dec 2015
<i>Charadrius hiaticula</i>	Ringed plover	SCI	No	Green	122	-4.3	-7.3	Intermediate Unfavourable	730	100	204	Sept 2015 Nov 2017
<i>Pluvialis squatarola</i>	Grey plover	SCI	No	Amber (w)	96	-53.6	-49.3	Unfavourable	2,500	30	487	Mar 2015 Mar 2016
<i>Pluvialis apricaria</i>	Golden plover	SCI	Yes	Red (b,w)	914	-1.6	-37.7	Unfavourable	9,300	1,200	3,061	Jan 2015 Feb 2018
<i>Limosa lapponica</i>	Bar-tailed godwit	SCI	Yes	Amber (w)	134	-7.4	-52.8	Highly Unfavourable	1,200	150	275	Nov 2015 Nov 2017
<i>Podiceps cristatus</i>	Great-crested grebe	Yes	No	Amber (b,w)	29	-	-	-	3,500	40	44	Nov 2015 Feb 2018
<i>Anas crecca</i>	Teal	Yes	No	Amber (b,w)	238	-	-	-	5,000	340	328	Feb 2016 Feb 2018
<i>Anas platyrhynchos</i>	Mallard	Yes	No	Green	212	-	-	-	45,000	290	185	Jan 2015 Sept 2015
<i>Anas acuta</i>	Pintail	Yes	No	Red (w)	26	-	-	-	600	20	1	Jan 2015
<i>Mergus serrator</i>	Red-breasted merganser	Yes	No	Green	17	-	-	-	1,700	20	26	Nov 2015 Apr 2017
<i>Haematopus ostralegus</i>	Oystercatcher	Yes	No	Amber (b,w)	837	-	-	-	8,200	690	739	Mar 2015 Sept 2015
<i>Vanellus vanellus</i>	Lapwing	Yes	No	Red (b,w)	365	-	-	-	20,000	1,100	534	Jan 2016 Feb 2018
<i>Calidris canutus</i>	Knot	Yes	No	Amber (w)	111	-	-	-	4,500	280	126	Feb 2015 Feb 2016
<i>Calidris alpina</i>	Dunlin	Yes	No	Red (b,w)	185	-	-	-	13,300	570	525	Dec 2015 Dec 2017
<i>Limosa limosa</i>	Black-tailed	Yes	No	Amber	204	-	-	-	610	190	166	Mar 2015

Species	Common Name	Baldoyle Bay SPA Qualifying Species*	Annex I Species	BoCCI Status**	Recent Five-Year Mean (i)	Site Population Trend (Five Year)	Site Population Trend (12 Year)	Site Conservation Condition	1% International Threshold***	1% All Ireland Threshold***	Two-Year Peak Mean During Baseline Surveys****	Peak Months
	godwit			(w)								Mar 2018
<i>Numenius arquata</i>	Curlew	Yes	No	Red (b,w)	130	-	-	-	8,400	350	164	Sept 2015 Feb 2016
<i>Tringa totanus</i>	Redshank	Yes	No	Red (b,w)	314	-	-	-	2,400	300	294	Dec 2015 Dec 2017
<i>Tringa nebularia</i>	Greenshank	Yes	No	Green	20	-	-	-	2,300	20	12	Mar 2015 Sept 2017
<i>Arenaria interpres</i>	Turnstone	Yes	No	Green	77	-	-	-	1,400	95	74	Dec 2015 Mar 2017
<i>Calidris alba</i>	Sanderling	Yes	No	Green	21	-	-	-	1,200	60	50	Mar 2016 Nov 2017
<i>Ardea cinerea</i>	Grey heron	Yes****	No	Green	16	-	-	-	2,700	25	15	Dec 2015 Nov 2017

Notes

*SCI = Special Conservation Interest, Yes = Named Natura 2000 Species

**b = breeding, w = wintering

***Taken from I-WeBS 2018 and British Trust for Ornithology 2018 if no data from I-WeBS.

****Highest peak in a single survey recorded during estuarine surveys.

*****Species of interest only.

Other Bird Species

Auks, which are SCIs and/or qualifying species of the Ireland's Eye SPA and Howth Head Coast SPA, were recorded in very low numbers within Baldoyle Bay. Birds were recorded during the winter/passage period and the late summer following either failed breeding or fledging (Table A10.4, Appendix A10.1). The peak count was 20 for common guillemot, six for razorbill and four for black guillemot. Records of auks within the Baldoyle Bay SPA were rare, with just three guillemot observations recorded (Figure A10.24, Appendix A10.1). Black guillemot (Figure A10.23, Appendix A10.1) and razorbill (Figure A10.25, Appendix A10.1) were only recorded in the sea off the Velvet Strand Beach. Given that these groups of birds are seabirds and are not primarily associated with estuaries, it is not considered that Baldoyle Bay is a habitat of great importance to auks.

Divers were recorded in relatively low numbers during the wintering and passage periods (September to March) (Table A10.4, Appendix A10.1). There were odd individuals present during the breeding season. All great northern diver records (Figure A10.26, Appendix A10.1) and all but two red-throated diver records (Figure A10.27, Appendix A10.1) were recorded in the sea off the Velvet Strand Beach. The peak counts were 16 for red-throated diver and six for great northern diver and did not exceed the 1% national thresholds for these species (20 and 25 respectively). Given that these groups of birds are seabirds except when breeding, and are not primarily associated with estuaries, it is not considered that Baldoyle Bay is a habitat of great importance to them.

Two of the three geese and swan species recorded were only observed during passage periods. Seventy-three Canada geese were observed on two occasions, with a lone pink-footed goose being observed once throughout the surveys. On this basis, it appears these species are occasional visitors. Mute swans were present at Baldoyle Bay in low numbers throughout the year, suggesting a small resident population. They were recorded in association with river channels (Figure A10.28, Appendix A10.1), with records more frequent at the mouths of the Sluice River in the north of Baldoyle Bay, and the Mayne River.

Wigeon was regularly recorded in relatively large numbers during the winter and passage periods. Records were confined to within the Baldoyle Bay SPA boundary (Figure A10.33, Appendix A10.1). The peak of 257 birds did not exceed the 1% national threshold of 630 birds. The species was largely absent from the estuarine survey area in May, June and July, but present in more substantial numbers for the other months.

Duck species recorded on a single occasion only were eider (two-year peak of three birds), goldeneye (two-year peak of eight birds) and shoveler (two-year peak of two birds). Long-tailed duck and tufted duck were present slightly more regularly, but only in small numbers.

Common scoters were recorded in relatively large numbers during the spring and autumn passage periods. The peak count of 233 birds exceeds the 1% national threshold of 140 birds. No common scoters were recorded in Baldoyle Bay; all records were made in the sea off Velvet Strand (Figure A10.29, Appendix A10.1).

Coot, moorhen and little grebe were recorded in low numbers throughout the year, suggesting the presence of small resident populations (Table A10.4, Appendix A10.1). Coots were only observed in association with freshwater habitats (Figure A10.30, Appendix A10.1), and little grebes were located predominantly in association with water features on the Portmarnock Golf Course (Figure A10.31, Appendix A10.1). The distribution of moorhens was similar (Figure A10.32, Appendix A10.1). Black-necked grebes were recorded once during the survey programme (Table A10.4, Appendix A10.1). The 1% national thresholds were not reached for any of these species.

Five species of gull were recorded throughout the year: black-headed gull (Figure A10.34, Appendix A10.1), common gull (Figure A10.35, Appendix A10.1), great black-backed gull (Figure A10.36, Appendix A10.1),

herring gull (Figure A10.37, Appendix A10.1) and lesser black-backed gull (Figure A10.39, Appendix A10.1). Of these, herring gull is an SCI of the Ireland's Eye SPA, with great black-backed gull a named qualifying species. These commonly encountered gull species were recorded across many habitats found within the estuarine survey area. They are highly adaptable birds and will utilise a range of coastal, inland and offshore habitats. Kittiwake (Figure A10.38, Appendix A10.1), Mediterranean (Figure A10.51, Appendix A10.1) and ring-billed gulls were very occasional visitors and were recorded in low numbers. National population estimates were not available for these species.

Cormorant (an SCI of the Ireland's Eye SPA) and shag were recorded regularly, but in low numbers throughout most of year, with cormorants being the more commonly encountered of the two species (Table A10.4, Appendix A10.1). The presence of these species is common in coastal locations. Whilst shags (Figure A10.44, Appendix A10.1) were recorded only in the sea off Velvet Strand, cormorants (Figure A10.43, Appendix A10.1) were recorded both off Velvet Strand and in the Baldoyle Bay SPA. The 1% national threshold was not exceeded for either species.

Four species of raptor were occasionally observed during the estuarine surveys (Table A10.4, Appendix A10.1). Buzzards and peregrines (the latter being an SCI of the Howth Head Coast SPA) were the most frequent and numerous raptors recorded. Buzzard records were largely confined to the open fields to the east of the Baldoyle Bay SPA, with a further three records made over Portmarnock Golf Course (Figure A10.41, Appendix A10.1). Peregrines were recorded predominantly to the eastern edge of the Baldoyle Bay SPA, though 10 records across the whole survey programme suggests Baldoyle Bay is of limited importance overall to this species (Figure A10.42, Appendix A10.1). All raptor records were of birds in flight. Other species recorded were kestrel (Figure A10.50, Appendix A10.1) and sparrowhawk.

Five species of tern were recorded within the Baldoyle Bay SPA between March and September each year (Table A10.4, Appendix A10.1). Of these, common and Sandwich tern were the most abundant, with Arctic, black and roseate (Figure A10.52, Appendix A10.1) terns only recorded in low numbers. It is likely that these were either foraging birds from local breeding colonies or birds on passage. The two most frequently recorded tern species, common tern (Figure A10.45, Appendix A10.1) and Sandwich tern (Figure A10.46, Appendix A10.1), were recorded almost exclusively off the coast of Velvet Strand. Only four records in total of both species were made within the Baldoyle Bay SPA.

Several species of non-breeding wader were recorded in Baldoyle Bay, usually in small numbers (<10) (Table A10.4, Appendix A10.1). The three most commonly recorded were whimbrel, common snipe and common sandpiper. Whimbrel had a peak count of 76 in spring, with records distributed across the Baldoyle Bay SPA (Figure A10.49, Appendix A10.1). Common snipe was recorded at the fringes of the Baldoyle Bay SPA, and on the fields to the east of the SPA boundary (Figure A10.48, Appendix A10.1). Common sandpiper was most numerous at the mouth of the Sluice River (Figure A10.47, Appendix A10.1). Other wading species which were occasionally recorded and in low numbers were curlew sandpiper (two-year peak of six birds), ruff (two-year peak of eight birds; Figure A10.53, Appendix A10.1), purple sandpiper (two-year peak of two birds) and little stint (two-year peak of one bird). Avocet and green sandpipers were both recorded once during the survey programme (Table A10.4, Appendix A10.1).

Little egrets were recorded throughout the intertidal area of the estuarine survey area (Figure A10.40, Appendix A10.1). The two-year peak for this species was 20 birds during the passage season, but smaller numbers were recorded throughout the year.

Other species recorded only once during the surveys were snow bunting (two-year peak of six birds), hooded crow (two-year peak of four birds) and stonechat (two-year peak of 11 birds). A single individual of the

following species was seen only once: blue tit, fulmar, kingfisher, mistle thrush, pheasant, red-legged partridge, song thrush and wheatear.

Table 10.7: Species Not Listed on the Baldoyle Bay Special Protection Area Citation Recorded During Baseline Estuarine Surveys

Species	Common Name	Ireland's Eye SPA Qualifying Species	Howth Head Coast SPA Qualifying Species	Annex I Species	BoCCI Status	Two-Year Peak During Baseline Surveys*	All Ireland Threshold**	Month in Which Peak Recorded
<i>Chroicocephalus ridibundus</i>	Black-headed gull				Red (b)	404	22,000***	Sept
<i>Larus argentatus</i>	Herring gull**	SCI	Yes		Red (b)	331	7300***	Sept
<i>Anas penelope</i>	Wigeon				Red (w)	257	630	Dec
<i>Melanitta nigra</i>	Common scoter				Red (b)	233	140	Nov
<i>Larus canus</i>	Common gull				Amber (b)	84	16,400***	Feb
<i>Numenius phaeopus</i>	Whimbrel				Green	76	6,700***	May
<i>Branta canadensis</i>	Canada goose				Green	73	-	Jan
<i>Larus marinus</i>	Great black-backed gull**	Yes			Amber (b)	69	4,200***	Sept
<i>Larus fuscus</i>	Lesser black-backed gull				Amber (b)	46	5,500***	Jun
<i>Phalacrocorax carbo</i>	Cormorant	SCI			Amber (b,w)	42	120	Oct
<i>Sterna sandvicensis</i>	Sandwich tern			Yes	Amber (b)	42	1,700***	Aug
<i>Gallinago gallinago</i>	Snipe				Amber (b,w)	35	20,000***	Feb
<i>Sterna hirundo</i>	Common tern			Yes	Amber (b)	34	1,800***	Aug
<i>Uria aalge</i>	Guillemot*, ***	SCI	Yes		Amber (b)	20	-	Dec
<i>Egretta garzetta</i>	Little egret				Green	20	20	Sept
<i>Gavia stellata</i>	Red-throated diver			Yes	Amber (b)	16	20	Mar and Oct
<i>Cygnus olor</i>	Mute swan				Amber (b,w)	15	90	Aug
<i>Podiceps nigricollis</i>	Black-necked grebe				Red (w)	14	-	Nov
<i>Gallinula chloropus</i>	Moorhen				Green	12	20	Apr
<i>Saxicola torquatus</i>	Stonechat				Green	11	-	Jan
<i>Phalacrocorax aristotelis</i>	Shag**	Yes			Amber (b)	11	2,000***	Oct
<i>Sterna dougallii</i>	Roseate tern			Yes	Amber (b)	11	-	Jul
<i>Bucephala clangula</i>	Goldeneye				Red (w)	8	60	Jan
<i>Philomachus pugnax</i>	Ruff			Yes	Amber (passage)	5	8***	Sept
<i>Alca torda</i>	Razorbill*, ***	SCI	Yes		Amber (b)	6	-	May
<i>Gavia immer</i>	Great northern diver			Yes	Amber (w)	6	20***	Nov
<i>Rissa tridactyla</i>	Kittiwake*, ***	SCI	SCI		Amber (b)	6	20,000***	Mar
<i>Plectrophenax nivalis</i>	Snow bunting				Green	6	-	Apr
<i>Calidris ferruginea</i>	Curlew sandpiper				Green	6	10,000***	Nov
<i>Tachybaptus ruficollis</i>	Little grebe				Amber (b,w)	5	20	Jun
<i>Sterna paradisaea</i>	Arctic tern			Yes	Amber (b)	5	20,000***	Jun
<i>Cephus grylle</i>	Black guillemot**	Yes			Amber (b)	4	-	Apr and Oct
<i>Fulica atra</i>	Coot				Amber (b,w)	4	220	Apr
<i>Clangula hyemalis</i>	Long-tailed duck				Red (w)	4	110	Jan
<i>Ichthyaetus melanocephalus</i>	Mediterranean gull			Yes	Amber (b)	4	770***	Sept
<i>Corvus cornix</i>	Hooded crow				Green	4	-	May

Species	Common Name	Ireland's Eye SPA Qualifying Species	Howth Head Coast SPA Qualifying Species	Annex I Species	BoCCI Status	Two-Year Peak During Baseline Surveys*	All Ireland Threshold**	Month in Which Peak Recorded
<i>Somateria mollissima</i>	Eider				Amber (b,w)	3	35	Apr
<i>Buteo</i>	Buzzard				Green	3	-	May
<i>Actitis hypoleucos</i>	Common sandpiper				Amber (b)	3	-	Apr and Sept
<i>Anas clypeata</i>	Shoveler				Red (w)	2	30	Nov
<i>Falco tinnunculus</i>	Kestrel				Amber (b)	2	-	Aug
<i>Falco peregrinus</i>	Peregrine*,***	Yes		Yes	Green	2	-	Feb and Apr
<i>Chlidonias niger</i>	Black tern			Yes	Green	2	7,100***	Aug
<i>Calidris maritima</i>	Purple sandpiper				Green	2	20	Mar
<i>Anser brachyrhynchus</i>	Pink-footed goose				Green	1	3,500***	Mar
<i>Aythya fuligula</i>	Tufted duck				Red (w)	1	310	Jan, Feb, Jul and Nov
<i>Larus delawarensis</i>	Ring-billed gull				Green	1	-	Jan and Mar
<i>Cyanistes caeruleus</i>	Blue tit				Green	1	-	Feb
<i>Fulmarus glacialis</i>	Fulmar	Yes	Yes		Green	1	-	Dec
<i>Alcedo atthis</i>	Kingfisher			Yes	Amber (b)	1	-	Dec
<i>Turdus viscivorus</i>	Mistle thrush				Amber (b)	1	-	Mar
<i>Phasianus colchicus</i>	Pheasant				Green	1	-	May
<i>Alectoris rufa</i>	Red-legged partridge				Green	1	-	Feb
<i>Turdus philomelos</i>	Song thrush				Green	1	-	Mar
<i>Oenanthe oenanthe</i>	Wheatear				Amber (b)	1	-	May
<i>Accipiter nisus</i>	Sparrowhawk				Amber (b)	1	-	Mar, Sept, Oct and Nov
<i>Recurvirostra avosetta</i>	Avocet			Yes	Green	1	75***	Apr
<i>Calidris minuta</i>	Little stint				Green	1	-	Aug

Notes

*Highest peak recorded during estuarine surveys.

**Taken from I-WeBS 2018 and British Trust for Ornithology 2018 if no data from I-WeBS.

***International 1% threshold, used when no all-Ireland threshold available.

10.3.4 Marine Birds and Related Special Protection Areas in the Vicinity of Dublin Bay

There are several breeding seabird colonies of international and national importance located near the proposed outfall pipeline route (marine section) (including the proposed marine diffuser):

- Ireland's Eye SPA, 1km south;
- Howth Head Coast SPA, 2.6km south;
- Lambay Island SPA, 9.3km north-east;
- Skerries Island SPA, 16.7km north; and
- Rockabill SPA, 16.9km north.

The closest SPAs with seabirds listed as Natura 2000 species or species of SCI are the Ireland's Eye and Howth Head Coast SPAs. Details associated with these SPAs, which were taken from conservation objectives and Natura 2000 forms, are presented in Table 10.8, along with the peak VP survey count from a single survey.

Table 10.8: Species Included on Citations of Ireland's Eye and Howth Head Coast Special Protection Areas and Single Peak Vantage Point Survey Counts Recorded During Baseline Surveys

Species	Common Name	Listed on Annex I of Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds	Ireland's Eye Special Protection Area		Howth Head Coast Special Protection Area		Single Survey Peak Count
			Special Conservation Interest?	Special Protection Area Population at Citation	Special Conservation Interest?	Special Protection Area Population at Citation	
<i>Rissa tridactyla</i>	Kittiwake	No	Yes	941 pairs	Yes	2,329 pairs	557
<i>Uria aalge</i>	Common guillemot	No	Yes	2,191 individuals	-	995 individuals	1,513
<i>Alca torda</i>	Razorbill	No	Yes	522 individuals	-	416 individuals	1,038
<i>Phalacrocorax carbo</i>	Cormorant	No	Yes	306 pairs	-	-	69
<i>Larus argentatus</i>	Herring gull	No	Yes	250 pairs	-	-	239
<i>Falco peregrinus</i>	Peregrine	Yes	-	1 pair	-	1 pair	4
<i>Fulmarus glacialis</i>	Fulmar	No	-	70 pairs	-	33 pairs	159
<i>Morus bassanus</i>	Gannet	No	-	142 pairs	-	-	225
<i>Fratercula arctica</i>	Puffin	No	-	10–20 individuals	-	-	173
<i>Phalacrocorax aristotelis</i>	Shag	No	-	32 pairs	-	-	129

Species	Common Name	Listed on Annex I of Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds	Ireland's Eye Special Protection Area		Howth Head Coast Special Protection Area		Single Survey Peak Count
			Special Conservation Interest?	Special Protection Area Population at Citation	Special Conservation Interest?	Special Protection Area Population at Citation	
<i>Larus marinus</i>	Great black-backed gull	No	-	100 pairs	-	-	97
<i>Cephus grylle</i>	Black guillemot	No	-	15 individuals	-	-	22

During the breeding season, the distribution of foraging seabirds at sea is likely influenced by the location of their breeding colonies and competition with other birds (from both the same and other colonies). In addition, the characteristics of the marine environment which denote productivity, including water depth, surface salinity and temperature, the location of tidal fronts and areas of upwelling may also influence the distribution of foraging seabirds (Wakefield et al. 2017).

10.3.5 Marine Birds Ornithological Baseline

Sources of Information

Tables A10.6 and A10.10 in Appendix A10.1 provide information on the bird species of the Ireland's Eye and Howth Head Coast SPAs recorded during VP surveys for the breeding season (April to August) (Table A10.10, Appendix A10.1) and wintering season (September to March) (Table A10.6, Appendix A10.1), respectively. Presented is the number of observations of each species (i.e. a measure of how often a species was recorded), the total number of each species recorded in flight and on the sea, the peak count of each species recorded in flight and on the sea during a single survey, and an overall peak count (i.e. the maximum number of individuals seen during a single survey). In addition, graphs are presented in Appendix A10.1 which illustrate a range of temporal patterns for each species that are important.

The distribution of SPA qualifying marine bird species from the Ireland's Eye VP during the breeding season is presented in Figure A10.54 to Figure A10.65 of Appendix A10.1. The figures focus on birds recorded on the water. Findings are discussed by species below, but in general, birds were recorded in most VP viewing arc sectors.

Tables A10.7 and A10.11 in Appendix A10.1 provide information on Baldoyle Bay SPA qualifying species recorded during VP surveys for the breeding (April to August) (Table A10.11, Appendix A10.1) and wintering (September to March) (Table A10.7, Appendix A10.1) seasons respectively. Presented is the number of observations of each species (i.e. a measure of how often a species was recorded), the total number of each species recorded in flight and on the sea, the peak count of each species recorded in flight and on the sea during a single survey, and an overall peak count (i.e. the maximum number of individuals seen during a single survey). In addition, graphs are presented in Appendix A10.1 which illustrate a range of temporal patterns that are

considered to be important. Graphs have been produced for species where greater than 50 birds were observed on the sea during either the breeding or the wintering season.

Appendix A10.1 provides information on non-designated marine bird species recorded during VP surveys for the breeding (April to August) (Table A10.12, Appendix A10.1) and wintering (September to March) (Table A10.8/9, Appendix A10.1) seasons respectively. Presented is the number of observations of each species (i.e. a measure of how often a species was recorded), the total number of each species recorded in flight and on the sea, the peak count of each species recorded in flight and on the sea during a single survey, and an overall peak count (i.e. the maximum number of individuals seen during a single survey). In addition, graphs are presented in Appendix A10.1 which illustrate a range of temporal patterns that are important. Graphs have been produced for species where greater than 50 birds were observed on the sea during either the breeding or the wintering season. Although Canada goose met these criteria (peak count of 207 birds), a graph was excluded on the grounds that it was only observed in January (Table A10.8, Appendix A10.1).

Tables A10.13 to A10.40 in Appendix A10.1 provide details on the distribution of birds recorded during VP surveys between March and October of all survey years. Records are split by VP, distance from the observer, and the behaviour code assigned to each record. These tables do not contain records of birds in flight.

Where time periods describe when a species was present, this refers to all years unless otherwise stated.

[Special Conservation Interests of the Ireland's Eye Special Protection Area and/or Howth Head Coast Special Protection Area](#)

Kittiwake is the only species named as an SCI at both the Ireland's Eye and Howth Head Coast SPAs. Kittiwakes were observed throughout the breeding season, but in highest numbers in May (Table A10.10, Appendix A10.1). The peak single survey count was 557 birds (Table A10.10, Appendix A10.1). In all survey years, a substantial decrease in numbers of birds was observed in August (Graph A10.2, Appendix A10.1). Numbers then remained low until around February, before increasing again in March. Of the 4,195 kittiwakes observed on the sea between March and October, 3,627 (86.5%) were recorded from VP2 on Ireland's Eye (Table A10.13, Appendix A10.1). Of these, 2,812 birds (77.5%) were recorded loafing. Records of kittiwakes on the water were distributed more to the east of the Ireland's Eye VP viewing arc, and in general, the sectors in which most birds were recorded were situated further away from Ireland's Eye (Figure A10.62, Appendix A10.1).

During the breeding season, the species that were recorded in the highest numbers were guillemot and razorbill. Both species are SCIs of the Ireland's Eye SPA, and Natura 2000 species of the Howth Head Coast SPA. Peak numbers of both species were observed in May, with high numbers of records in June and July. The peak single survey count was 1,513 for guillemot and 1,038 for razorbill (Table A10.10, Appendix A10.1). In total, around 80% of birds from both species that were recorded during VP surveys were observed during these months (Graph A10.1, Appendix A10.1). By August, observations of these species had substantially reduced which remained the case during the winter. Numbers began to increase in March and April, with a slight increase in razorbill observations in February (Graph A10.1, Appendix A10.1). In addition, substantial numbers of guillemots or razorbills that were not identified to species level were also recorded (Table A10.10, Appendix A10.1). This is because, at the edge of the viewing arc (i.e. nearly 2km from the observer), birds were routinely detected, but identification was more difficult than when birds were closer (Figure A10.60, Appendix A10.1).

The vast majority of guillemots (Table A10.14, Appendix A10.1) and razorbills (Table A10.15, Appendix A10.1) were recorded on the sea between March and October from VP2 on Ireland's Eye (8,186 of 8,966 (91.3%))

guillemots and 7,449 of 8,240 (90.4%) razorbills). Of these observations, 80.1% of guillemots and 79.6% of razorbills were observed loafing. Feeding behaviour accounted for only 14.0% of guillemots and 13.1% of razorbills recorded on the sea from the Ireland's Eye VP. Both guillemots (Figure A10.59, Appendix A10.1) and razorbills (Figure A10.64, Appendix A10.1) were recorded in the main within 500m of the Ireland's Eye VP, but also in relatively large numbers between 500m and 1,000m away from the VP. The most frequently recorded behaviour of both species were non-feeding (generally loafing) birds most often recorded within 500m of the Ireland's Eye VP (Figure 10.5 Distribution of Non-Feeding Guillemot Records from Ireland's Eye Vantage Point during Breeding Season (March to October) for guillemot and Figure 10.7 Distribution of Non-Feeding Razorbill Records from Ireland's Eye Vantage Point during Breeding Season (March to October) for razorbill). The distribution of feeding guillemot and razorbill records are illustrated in Figure 10.4 Distribution of Feeding Guillemot Records from Ireland's Eye Vantage Point during Breeding Season (March to October) and Figure 10.6 Distribution of Feeding Razorbill Records from Ireland's Eye Vantage Point during Breeding Season (March to October).

Boat based surveys in July of 2016 and 2017 revealed that fledged chicks were present on cliffs and not in the water until mid-July. At this point, numbers of guillemots and razorbills on nests on the cliffs rapidly declined; however, no rafts of fledged chicks (or adults) were observed on the water around Ireland's Eye at any time. By the final week of July, most guillemots and razorbills had left the area without massing of large numbers of birds in the water being recorded. Survey observations suggest that, rather than spending time on the water around the island, guillemots and razorbills leave the nest only when they intend to leave the area, and leave in small groups. Based on the lack of movements of large rafts of birds recorded, it is possible that some movements occur at night.

Herring gulls are an SCI of the Ireland's Eye SPA. They were observed throughout the breeding season, with numbers peaking in July (Graph A10.2, Appendix A10.1), though numbers in May and June were also high (the peak number of birds recorded in a single survey occurred in June). Lower numbers of birds were present in the area for much of the year (Graph A10.2, Appendix A10.1). The peak single monthly count was 185 birds during the breeding season (Table A10.10, Appendix A10.1), and 239 birds overall (Table A10.6, Appendix A10.1). Both VPs recorded a similar number of birds on the water between March and October, with the majority of birds recorded either roosting on the water or loafing (Table A10.16, Appendix A10.1). Birds on the water were distributed quite evenly throughout the VP viewing arcs, though the most birds occurred within 0m to 500m of Ireland's Eye. Records on the water from VP2 (Ireland's Eye) were quite heavily restricted to western VP sectors within 1,000m of the VP (Figure A10.61, Appendix A10.1).

Cormorants are an SCI of the Ireland's Eye SPA and were recorded most frequently during the breeding season (Graph A10.4, Appendix A10.1). Cormorant records during the breeding season were the most numerous in May, June and July, with a single monthly peak of 63 birds (Table A10.10, Appendix A10.1). The maximum winter peak was 69 birds (Table A10.6, Appendix A10.1). Between March and October, birds were recorded on the water most frequently in distances bands 1 and 2 from both VPs (Table A10.17, Appendix A10.1). Birds were recorded behaving in a variety of ways (feeding, preening, loafing and roosting) across the entire VP survey area. Birds were observed most frequently in VP1 sectors ending with the letter F, indicating a preference for remaining close to the shore to the south of the Velvet Strand VP. At VP2, birds showed a strong preference for inshore areas between Ireland's Eye and Velvet Strand (Figure A10.55, Appendix A10.1).

Other Named Qualifying Species of the Ireland's Eye Special Protection Area and Howth Head Coast Special Protection Area

Great black-backed gull is a Natura 2000 species of the Ireland's Eye SPA. This species was present all year round, with a slight peak in numbers during the breeding season observed between May and July (Graph A10.2 and Table A10.10, Appendix A10.1). Great black-backed gulls on the water were evenly distributed across most of the sectors in the Ireland's Eye VP viewing arc (Figure A10.58, Appendix A10.1). Birds on the sea between March and October were recorded more frequently loafing in distance bands further from the VPs (Table A10.18, Appendix A10.1). Of all birds on the sea recorded between March and October, 77.2% were either loafing or roosting.

Fulmar, a Natura 2000 species of the Ireland's Eye and Howth Head Coast SPAs, were observed in relatively small and consistent numbers for much of the year (Graph A10.3, Appendix A10.1). The breeding season peak was 63 birds (Table A10.10, Appendix A10.1), and the winter peak was 159 birds (Table A10.6, Appendix A10.1). Except for the westernmost sectors of the Ireland's Eye VP viewing arc, fulmar observations were quite evenly distributed (Figure A10.56, Appendix A10.1). Between March and October, most fulmars observed on the water (479 birds, or 89.8%) were recorded at VP2 on Ireland's Eye (Table A10.19, Appendix A10.1). Of these observations, 470 birds (98.1%) were recorded either loafing, feeding or roosting.

Shag is a Natura 2000 species of the Ireland's Eye SPA. This species was recorded most frequently during the breeding season (Graph A10.4, Appendix A10.1), most frequently in May, June and July, with a single monthly peak of 129 birds (Table A10.10, Appendix A10.1). Of the 1,991 birds recorded on the water between March and October of all survey years, 1,301 (65.3%) were seen from VP2. Of these birds, 808 (62.1%) were feeding, most frequently between 0m and 1,000m from the VP (74.1% of feeding birds at VP2) (Table A10.20, Appendix A10.1). Feeding behaviour was also the most commonly encountered activity for this species from VP1 (623 birds, or 90.2% of the total number of birds recorded from VP1). From VP2, shags showed a preference for inshore waters between Ireland's Eye and Velvet Strand (Figure A10.65, Appendix A10.1). Throughout the breeding season, the number of shags recorded was approximately double the number of cormorants recorded across the entire survey programme. The winter peak for shag was 47 birds (Table A10.6, Appendix A10.1).

Gannet is a Natura 2000 species of the Ireland's Eye SPA. Just over 70% of all gannets recorded were observed during May, June and July (Graph A10.5, Appendix A10.1). The peak count of gannets in a single survey was 225 birds (Table A10.10, Appendix A10.1). Of 1,332 gannets recorded on the sea between March and October, 1,195 were observed from VP2 (89.7%) (Table A10.21, Appendix A10.1). Around two-thirds of these birds were recorded loafing or preening, and 409 (34.2%) were recorded plunge diving. Most of these records were located over 1,000m from the VP. Except for the westernmost sectors, gannet observations were quite evenly distributed throughout the viewing arc (Figure A10.57, Appendix A10.1). In winter, the peak count was 60 birds (Table A10.6, Appendix A10.1).

Puffin is a species listed as a Natura 2000 species of the Ireland's Eye SPA. Puffins were only recorded between March and July, with over 80% of records made in May to July (Graph A10.6, Appendix A10.1). The peak single VP survey count for puffin was 173 birds (Table A10.10, Appendix A10.1). Puffins were predominantly recorded within 500m of Ireland's Eye (75.2% of records), and in smaller numbers between 500m and 1,000m away from Ireland's Eye (Figure A10.63, Appendix A10.1). In total, 727 of 742 records on the water (97.9%) were recorded from VP2 (Table A10.22, Appendix A10.1). Of these birds, 700 were recorded loafing or preening (96.3%), and only 19 feeding.

Black guillemot, a Natura 2000 species of the Ireland's Eye SPA, was present throughout much of the year in low numbers (Graph A10.6, Appendix A10.1). Records were more numerous between March and July. The peak single monthly breeding season count was 14 (Table A10.10, Appendix A10.1), with the corresponding winter count being 22 (Table A10.6, Appendix A10.1). Black guillemots were most frequently recorded in the western count sectors of VP2 (Figure A10.54, Appendix A10.1). They were recorded in similar numbers from both VPs, favouring the more distant areas of the VP1 viewing arc from the VP, and areas of sea within 1,000m of the Ireland's Eye VP (Table A10.23, Appendix A10.1). The most common behaviour recorded was feeding, accounting for 375 of 412 records (91.0%).

Although not a marine species, peregrine is a Natura 2000 species of the Ireland's Eye and Howth Head Coast SPAs. Birds were observed in very low numbers though were present throughout the year (Graph A10.7, Appendix A10.1). The peak single monthly count was two during the breeding season (Table A10.10, Appendix A10.1), and four during the wintering period (Table A10.6, Appendix A10.1).

Other Bird Species

Great-crested grebes were regularly recorded in the marine environment between October and April (Graph A10.8, Appendix A10.1). The peak single survey count was 255 birds (Table A10.7, Appendix A10.1). In general, numbers of this species recorded were much lower than the occasional peaks that were observed. Birds recorded from the VPs were located mainly within 1,500m of VP1 (1,574 of 1,901; 82.8%) (Table A10.24, Appendix A10.1). Of these, 910 birds (57.8%) were recorded either feeding or loafing between 500m and 1,000m from VP1.

Oystercatchers were present in fairly consistent numbers during the VP surveys all year round (Graph A10.8, Appendix A10.1), and the most frequently recorded species of the Baldoyle Bay SPA citation during VP surveys (Tables A10.7 and A10.11, Appendix A10.1). The peak single survey count was 210 birds during the winter (Table A10.7, Appendix A10.1), and 145 birds during the breeding season (Table A10.11, Appendix A10.1). Most commonly, birds were recorded within 500m of VP1 (Table A10.25, Appendix A10.1) and in distance band 4 (1,500m to 2,000m) from VP1. These birds were recorded in sectors A and F from VP1, meaning the vast majority of records were located in the intertidal area. Roosting on water was the most commonly recorded behaviour.

Sanderlings were recorded in the marine environment between November and March (Graph A10.8, Appendix A10.1). All observations of this species were made from VP1. The peak single monthly count was 105 birds (Table A10.7, Appendix A10.1). In March (the only month between March and October that they were recorded), sanderlings were recorded most frequently within 500m of Velvet Strand. Observations made in distance band 4 occurred in sectors A and F, meaning they were located in the intertidal areas north and south of VP1 (Table A10.26, Appendix A10.1).

Dunlins were present in the marine environment throughout most of the year (Graph A10.9, Appendix A10.1), with the largest numbers recorded in December and January. Noteworthy numbers of observations were also made in June and July. The peak single survey count was 100 birds in winter (Table A10.7, Appendix A10.1), and 40 birds during the breeding season (Table A10.11, Appendix A10.1). Between March and October, dunlins were recorded feeding and roosting in distance bands 1 and 4 (sectors A and F) of VP1, albeit in fairly small numbers (Table A10.27, Appendix A10.1). Birds were not recorded from VP2.

Red-breasted mergansers were present in the marine environment in low numbers throughout much of the year (Graph A10.9, Appendix A10.1). Peak numbers were recorded in March, with much lower numbers recorded between April and October. The peak single survey count was 90 birds (Table A10.7, Appendix A10.1), and 44

birds during the breeding season (Table A10.11, Appendix A10.1). Of the 573 birds recorded between March and October during VP surveys, 560 were from VP1 (Table A10.28, Appendix A10.1). Birds were most frequently recorded feeding in distance band 2.

The temporal pattern of turnstone presence in the marine environment was relatively similar to dunlin and red-breasted merganser, but with lower overall abundance and a more obvious absence during most of the breeding season (Graph A10.9, Appendix A10.1). The peak single survey count was 44 birds during the winter (Table A10.7, Appendix A10.1), and 12 birds during the breeding season (Table A10.11, Appendix A10.1). All 59 observations of this species during VP surveys between March and October occurred in March, April and July. Of the observations, 88.1% were made from VP1 (Table A10.29, Appendix A10.1).

Small numbers of redshanks were recorded in March, April, June and October, as well as between December and April (Graph A10.10, Appendix A10.1). Numbers recorded were modest. The peak single monthly count was 36 birds during the winter (Table A10.7, Appendix A10.1), and 16 birds during the breeding season (Table A10.11, Appendix A10.1). Of the birds observed from VPs (all of which were from VP1), 87 were located in sector F. This means they were located in the intertidal area to the south of the VP (Table A10.30, Appendix A10.1).

The temporal pattern of ringed plover observation was unusual amongst the wading birds recorded in the marine environment (and was also noted in the estuarine surveys (Section 10.3.3)). Birds were recorded in the breeding and passage periods only. The peak single monthly count was 70 birds (Table A10.11, Appendix A10.1). Ringed plovers were recorded only from VP1, with 78 of the 136 total observations made within 500m of VP1 (Table A10.31, Appendix A10.1). Approximately double the number of birds were recorded roosting than feeding.

Additional bird species listed in Table 10.6 can be grouped into three broad categories of temporal distribution in the area covered by the marine VP surveys:

- Species that were recorded in the wintering and breeding periods in the marine environment, in low or very low numbers, or predominantly in flight: light-bellied brent goose, curlew, bar-tailed godwit, black-tailed godwit, grey heron and shelduck;
- Species that were recorded in the wintering period only in the marine environment, in low or very low numbers, or predominantly in flight: lapwing and mallard; and
- Species that were not recorded in the marine environment: golden plover, grey plover, greenshank, knot, pintail and teal.

Black-headed gulls were recorded throughout the year (Graph A10.11, Appendix A10.1) and were the most numerous non-SPA gull species recorded in the marine environment. The month in which the most gull records were made was October, whilst during the breeding season birds were present in relatively consistent numbers, with June having slightly more records than other months. The peak winter count was 223 (Table A10.8, Appendix A10.1), and 156 during the breeding season (Table A10.12, Appendix A10.1). In total, 2,516 black-headed gulls were recorded on the water between March and October, of which 2,340 (93.0%) were observed from VP1 (Table A10.32, Appendix A10.1). Of these, 2,035 (87.0%) birds were recorded loafing or roosting on water.

Common gulls were recorded all year round (Graph A10.11, Appendix A10.1), but in much lower numbers than black-headed gulls. Recorded numbers were slightly higher during the breeding season, with a peak count of 40 (Table A10.12, Appendix A10.1). In winter, the peak count was 23 (Table A10.8, Appendix A10.1). Between March and October, most records of birds on the water (77.1%) were made at VP1 (Table A10.33, Appendix

A10.1). Roosting was the most frequently recorded behaviour, followed by loafing. The most commonly recorded behaviour from VP2 was loafing, with small numbers of birds recorded surface feeding between 1,000m and 2,000m from Ireland's Eye.

Lesser black-backed gulls were present only in low numbers (Graph A10.11, Appendix A10.1). As with common gull, the breeding season saw the highest number of individuals recorded, with a peak of 14 (Table A10.12, Appendix A10.1). In winter, the peak was 25 (Table A10.8, Appendix A10.1). Spatial distribution of records on the sea between March and October was quite equal over the entire VP survey area, though numbers recorded from VP1 were greater (Table A10.34, Appendix A10.1). Overall numbers were low, and almost all birds were recorded roosting or loafing.

Red-throated divers were present throughout the winter and passage periods, being present between January and April and from September to December (Graph A10.12, Appendix A10.1). Between May and July, birds were absent, and were present in August and September in very low numbers. The peak survey count was 112 birds in March (Table A10.8, Appendix A10.1), and in April the peak had halved to 52 birds (Table A10.12, Appendix A10.1). Birds observed on the water were predominantly recorded from VP1: 599 of 739 birds (Table A10.35, Appendix A10.1). Most records were located in distance bands 2, 3 and 4 of VP1, with the most common behaviours feeding and loafing. Birds were also seen more frequently in distance bands 3 and 4 from VP2 in open water.

Great northern divers were recorded in small numbers (Graph A10.12, Appendix A10.1). They were recorded during most winter surveys, though the peak single survey count was just nine birds (Table A10.8, Appendix A10.1). Of the 10 birds recorded during March VP surveys, seven were recorded in distance band 1 of VP1, and three in distance band 4 of VP2 (Table A10.36, Appendix A10.1). This species was largely absent between April and October, with a single bird recorded in August.

Common scoters were the most abundant non-SPA marine bird species during the winter months (Table A10.8, Appendix A10.1). During the breeding season, common scoters were completely absent in June and July, and present in low numbers during other months (Graph A10.13, Appendix A10.1). The peak winter count was 478 birds (Table A10.8, Appendix A10.1), and 128 during the breeding season (Table A10.12, Appendix A10.1). Of 6,061 common scoters recorded on the water during VP surveys between March and October, 4,129 (68.1%) were recorded loafing, whilst 1,892 birds (31.2%) were recorded feeding (Table A10.37, Appendix A10.1). Records were the most numerous in bands and sectors away from coastlines and in open water.

Several tern species were relatively abundant in the marine environment during the breeding season (Graph A10.14, Appendix A10.1). The most commonly occurring species was common tern. The peak count was 109 birds (Table A10.12, Appendix A10.1). Between March and October of all survey years, 125 birds were recorded on the water during VP surveys (Table A10.38, Appendix A10.1). Of these, 99 were observed from VP1 (79.2%). Birds were most frequently seen plunge diving in distance band 2. The next most abundant species was Sandwich tern, which was recorded between March and September. It was recorded on the water more frequently than the common tern, with 372 records between March and October in all survey years (Table A10.39, Appendix A10.1). The highest numbers were recorded in September (peak count of 58; Table A10.8, Appendix A10.1). Sandwich terns were evenly distributed throughout the viewing arcs of both VPs, though like common tern, the highest number of birds occurred in distance band 2 of VP1. Common terns were less likely to be observed within 500m of VPs compared with the rest of the VPs. The third most commonly recorded tern was not identified to

species level and was either common or Arctic terns; based on numbers of positively identified birds, it is likely but unconfirmed that the majority of these birds would have been common terns.

Manx shearwaters were an abundantly recorded species during the breeding season (Graph A10.15, Appendix A10.1). Numbers recorded increased from April, with a peak in July/August. The peak count was 128 birds (Table A10.12, Appendix A10.1). Between March and October, 318 birds were recorded on the water (Table A10.40, Appendix A10.1). Of these, 264 birds were recorded in distance bands 3 and 4 of VP2 (83.0%). Roosting and surface feeding were the most commonly recorded behaviours.

Additional bird species recorded during the marine VP surveys can be grouped into three broad categories of temporal distribution:

- Species that were recorded in the wintering and breeding periods in the marine environment, in low or very low numbers, or predominantly in flight: Arctic skua, blackbird, long-tailed duck, Mediterranean gull, ring-billed gull and whimbrel;
- Species that were recorded in the wintering period only in the marine environment, in low or very low numbers, or predominantly in flight: black-necked grebe, black-throated diver, common or Arctic tern, goldcrest, little grebe, pink-footed goose, purple sandpiper, Slavonian grebe and swallow; and
- Species that were recorded in the breeding period only in the marine environment, in low or very low numbers, or predominantly in flight: Arctic tern, eider, feral pigeon, great skua, greenfinch, kestrel, little stint, little tern, mute swan, roseate tern, sparrowhawk, storm petrel and tufted duck.

10.3.6 Ecological Value of Estuarine and Marine Birds

Using the criteria in Table 10.1 and the information in Section 10.3, an ecological value has been assigned to each species encountered during the baseline estuarine and marine surveys. These are presented, sorted by ecological value. Only species that have been scoped into further assessment have been included.

Table 10.9: Ecological Value of Birds Recorded During Estuarine and Marine Ornithological Survey

Species	Ecological Value	Ecological Value Justification
Bar-tailed godwit	Very High	SCI of Baldoyle Bay SPA, Fingal LBAP
Black guillemot	Very High	Natura species of Ireland's Eye SPA, Fingal LBAP
Black-tailed godwit	Very High	Natura species of Baldoyle Bay SPA, Fingal LBAP
Brent goose	Very High	SCI of Baldoyle Bay SPA, population >1% international threshold, Fingal LBAP
Common guillemot	Very High	SCI of Ireland's Eye SPA, Natura species of Howth Head Coast SPA, Fingal LBAP
Cormorant	Very High	SCI of Ireland's Eye SPA, Fingal LBAP
Curlew	Very High	Natura species of Baldoyle Bay SPA, Fingal LBAP
Dunlin	Very High	Natura species of Baldoyle Bay SPA, Fingal LBAP
Golden plover	Very High	SCI of Baldoyle Bay SPA, Fingal LBAP
Great-crested grebe	Very High	Natura species of Baldoyle Bay SPA, Fingal LBAP
Greenshank	Very High	Natura species of Baldoyle Bay SPA, Fingal LBAP
Grey plover	Very High	SCI of Baldoyle Bay SPA, Fingal LBAP
Great black-backed gull	Very High	Natura species of Ireland's Eye SPA
Herring gull	Very High	SCI of Ireland's Eye SPA, Natura species of Howth Head Coast SPA, Fingal LBAP
Kittiwake	Very High	SCI of Ireland's Eye SPA and Howth Head Coast SPA, Fingal LBAP

Species	Ecological Value	Ecological Value Justification
Knot	Very High	Natura species of Baldoyle Bay SPA, Fingal LBAP
Lapwing	Very High	Natura species of Baldoyle Bay SPA, Fingal LBAP
Mallard	Very High	Natura species of Baldoyle Bay SPA
Oystercatcher	Very High	Natura species of Baldoyle Bay SPA, Fingal LBAP
Peregrine	Very High	Natura species of Howth Head Coast SPA, (also listed on Annex I of Birds Directive), Fingal LBAP
Pintail	Very High	Natura species of Baldoyle Bay SPA, Fingal LBAP
Puffin	Very High	Natura species of Ireland's Eye SPA
Razorbill	Very High	SCI of Ireland's Eye SPA, Natura species of Howth Head Coast SPA, Fingal LBAP
Red-breasted merganser	Very High	Natura species of Baldoyle Bay SPA, Fingal LBAP
Redshank	Very High	Natura species of Baldoyle Bay SPA, Fingal LBAP
Ringed plover	Very High	SCI of Baldoyle Bay SPA, Fingal LBAP
Turnstone	Very High	Natura species of Baldoyle Bay SPA
Sanderling	Very High	Natura species of Baldoyle Bay SPA
Shag	Very High	Natura species of Ireland's Eye SPA, Fingal LBAP
Shelduck	Very High	SCI of Baldoyle Bay SPA, Fingal LBAP
Teal	Very High	Natura species of Baldoyle Bay SPA, Fingal LBAP
Fulmar	Very High	Natura species of Ireland's Eye SPA and Howth Head Coast SPA
Gannet	Very High	Natura species of Ireland's Eye SPA, Fingal LBAP
Arctic tern	High	Listed on Annex I of Birds Directive, Fingal LBAP
Black tern	High	Listed on Annex I of Birds Directive
Black-headed gull	High	Listed on BoCCI Red List, 1% national threshold not available, Fingal LBAP
Common gull	High	Listed on BoCCI Red List, 1% national threshold not available, Fingal LBAP
Common scoter	High	Listed on BoCCI Red List, population >1% national threshold, Fingal LBAP
Common tern	High	Listed on Annex I of Birds Directive, Fingal LBAP
Great northern diver	High	Listed on Annex I of Birds Directive, Fingal LBAP
Grey heron	High	Species that contribute to the integrity of Baldoyle Bay SPA but which are not cited as a species for which the site is designated
Red-throated diver	High	Listed on Annex I of Birds Directive, Fingal LBAP
Roseate tern	High	Listed on Annex I of Birds Directive, Fingal LBAP
Ruff	High	Listed on Annex I of Birds Directive, Fingal LBAP
Sandwich tern	High	Listed on Annex I of Birds Directive
Great skua	High	Listed on BoCCI Amber List
Lesser black-backed gull	Medium	Listed on BoCCI Amber List, 1% national threshold not available, Fingal LBAP
Little egret	Medium	Listed on BoCCI Green List, Fingal LBAP
Wigeon	Medium	Listed on BoCCI Red List, population <1% national threshold, Fingal LBAP
Manx shearwater	Medium	Listed on BoCCI Amber List, population peaks high
Mute swan	Low	Listed on BoCCI Amber List, population <1% national threshold
Whimbrel	Low	Listed on BoCCI Green List

10.4 Parameters for Assessment

10.4.1 Overview of the Proposed Project Works and Magnitude of Potential Impacts

The construction of the proposed outfall pipeline route (marine section) will be undertaken using a combination of microtunnelling and subsea pipe laying techniques. The following sections provide an overview of the key parameters considered in this EIAR Chapter, which have been taken from the detailed project description provided in Chapter 4 Description of the Proposed Project. From this information, a magnitude of impact for each activity is assigned (Table 10.2), which is combined with the ecological value of receptors identified in the baseline (Table 10.1) to determine an impact significance (

Table 10.4).

10.4.2 Parameters Included in Assessment (Construction Phase)

[Disturbance/Displacement due to Land-Take of Proposed Microtunnelling Compounds](#)

Two microtunnelling compounds will be constructed, which will be situated on the eastern (proposed temporary construction compound no. 10) and western (proposed temporary construction compound no. 9) sides of Baldoyle Bay (Figure 10.1 Location and Extent of Marine, Coastal and Estuarine Ornithological Surveys). Their construction will result in direct habitat loss, a negative ecological impact that will be limited to the compound footprint and access track. Effects would be temporary (24 hour working, 18 months duration). On completion of the construction works, proposed temporary construction compounds no. 9 and no. 10 will be dismantled and the ground will be reinstated to its original condition, meaning that land-take is a fully reversible impact.

[Disturbance/Displacement due to Visual Impacts of Proposed Microtunnelling Compounds](#)

Within each microtunnelling compound, a range of construction activities will occur. These will be in direct line of sight to birds within the Baldoyle Bay SPA and surrounding habitats. This will be the case for the duration of the construction period, which is expected to be approximately 18 months. The extent of this effect is species-specific. Whilst the presence of a busy road within this area means that many birds in the area will be habituated to some activity, the presence of construction workers and vehicles could result in disturbance responses from birds that could be considered as relatively habituated to particular activities.

[Disturbance/Displacement due to Construction Noise \(Piling\) at Proposed Microtunnelling Compounds](#)

Within each microtunnelling compound, a jacking shaft will be constructed using impact piling. This peak noise will be temporary, occurring for the initial setup phase during construction, which is estimated to be a maximum of two weeks duration, and impacts would be reversible. Piling noise would occur intermittently throughout this period and would be restricted to daytime, with peak noise falling into the $>65\text{dB}$ to $\leq 75\text{dB } L_{A\text{max}}$ range. Noise experts have confirmed that noise levels resulting in substantial disturbance impacts to birds would result in minor impacts up to 90m from source. However, the presence of a busy road within this area means that any birds in the area will be habituated to relatively high noise levels to some degree.

[Disturbance/Displacement due to Vessel Traffic in Proposed Subsea Section](#)

A negative ecological impact could occur through disturbance and/or displacement of birds due to the presence of vessels carrying out dredging, pipeline positioning and installation. The maximum adverse impact is expected to be localised around each vessel or group of vessels. These impacts will be temporary and reversible.

The subsea section of the proposed outfall pipeline route (marine section) will involve the excavation of a trench approximately 4.9km long. Its westernmost point is the microtunnelling/subsea interface and it terminates at the proposed marine diffuser. Excavated material from trench preparation will be temporarily stored in barges within the proposed construction corridor. The proposed construction corridor for the subsea dredged section of the proposed outfall pipeline route (marine section) is estimated to be 250m wide. It is likely that a backhoe dredger will be used in shallower water and a trailer suction hopper dredger in deeper water. These operations would be supported by split bottom barges or similar, a survey vessel and a support vessel for crew transfer. It is possible that two groups of vessels could be working on the subsea section at any one time. The spread of the sediment plume created by this activity will involve the controlled release of spoil material by hopper barge every seven hours (refer to Chapter 9 Biodiversity (Marine)). This will produce a northerly plume drifting away from Ireland's Eye. The highest concentrations of suspended sediments (>10g/l) were recorded at bed level within 50m to 100m of the discharge point. The granular nature of these sediments results in a fast settlement of material to the bottom, with seabed and mid-depth concentrations generally falling to below 1g/l within 200m from the discharge.

The subsea section of the proposed outfall pipeline route (marine section) will be installed using a 'float and sink' method. The pipes are manufactured and welded at the factory into long lengths and towed to site. Pipeline stringing assembly and ballasting activities will be carried out at a location in Dublin Port or at adjacent river berths of the Liffey River.

Marine construction is expected to take approximately three months in total, with dredging occurring for 12 hours per day and pipe assembly occurring at the same time (refer to Chapter 8 Marine Water Quality). Construction of this section of the Proposed Project will occur between March and October. The exact timing of the works will depend on the availability of a suitable weather window.

The subsea section does not include the proposed marine diffuser, which is described below.

[Disturbance/Displacement due to Vessel Traffic and Construction Noise at Proposed Marine Diffuser](#)

The construction of a marine diffuser is required to make the hydraulic connection between the proposed outfall pipeline route (marine section) and the seabed and is necessary to discharge the treated wastewater from the proposed outfall pipeline route (marine section) at the discharge point. A negative ecological impact could occur through the presence of a number of vessels, leading to disturbance and displacement of birds.

The proposed marine diffuser will be installed by use of the concrete ballasts. Once the pipeline is sunk, a team of divers will install the diffuser valves. It has been assumed that dredging and construction occurring at the closest point to the Ireland's Eye SPA (i.e. at the proposed marine diffuser) is likely to occur for a maximum of three weeks.

[Indirect Impacts on Baldoyle Bay](#)

Chapter 9 Biodiversity (Marine) discusses the impact of a sediment plume from the dredging of the subsea dredged section of the proposed outfall pipeline route (marine section). It is concluded that impacts associated with the plume will be temporary and highly localised and will not reach Baldoyle Bay. The impact significance is therefore Negligible. The area of the proposed outfall pipeline route (marine section) is considered a low intensity spawning and nursery ground for sandeel, which is a common prey species of a number of seabirds present in the wider area. Sandeel populations in the immediate vicinity of the subsea dredged section of the proposed outfall pipeline route (marine section) would be affected by habitat loss and disturbance through sediment excavation and deposition during dredging and trenching activities. This could result in a negative ecological

impact to populations in the area to be dredged, and the immediate surrounding habitat out to approximately 50m to 100m from each discharge point.

10.4.3 Parameters Excluded from Assessment (Construction Phase)

[Disturbance/Displacement due to General Noise, Construction Activity and Vehicle Traffic at Proposed Microtunnelling Compounds](#)

The baseline environment around Baldoyle Bay contains numerous sources of potential disturbance stimuli for birds. The Baldoyle Bay Estuary lies on the approach to Dublin Airport's main runway. Observations made during ornithological surveys revealed that aircraft overfly the northern section of Baldoyle Bay very frequently. The R106 Coast Road, running down the western side of the bay, passes between the SPA boundary and the proposed temporary construction compound no. 9 for microtunnelling. A cycle path runs parallel to the road.

The Baldoyle residential area to the south-west of Baldoyle Bay, and the Portmarnock and Sutton Golf Clubs on the eastern and south-eastern sides of the bay are other sources of disturbance. Velvet Strand Beach to the east is also frequented by a range of recreational users.

In general, this suggests that many of the birds using the Baldoyle Bay SPA and surrounding area are habituated, to a degree, to a range of general visual and/or noise stimuli, including the presence of vehicles. In consultation with published advice on the typical types and magnitudes of visual and noise sources associated with construction activities (Cutts et al. 2013), it is considered that general construction activities, the presence of a crane and the presence of vehicle traffic associated with the microtunnelling compounds will result in a Negligible impact significance to all bird species.

For the construction or operation of the Proposed Project to result in disturbance to the birds in the area, the noise/visual stimuli would have to substantially exceed those that are already present in some way. For this reason, piling noise during the construction of jacking shafts in the microtunnelling compounds is considered in the assessment.

[General Pollution Incidents Upstream](#)

Regarding water quality and habitat deterioration, the mechanism by which impacts on estuarine and coastal waters could occur during construction is pollution incidents and elevated suspended sediments occurring upstream of Baldoyle Bay. It has been predicted that any impacts caused by upstream pollution incidents represent a negligible level of impact on the Baldoyle Bay, and consequently also on coastal waters.

[Pollution Caused by Air or Bentonite Breakout During Microtunnelling](#)

Chapter 9 Biodiversity (Marine) discusses the possibility of air or bentonite breakout during microtunnelling.

The depth of the microtunnelling route beneath the estuary means that the likelihood of a bentonite breakout making it to the surface of the estuary is very low; however, the result of a breakdown may result in a small discharge to the surface. If this occurs in the channel or open water environments, then this material will disperse harmlessly. If this occurs within the saltmarsh vegetation, then this material is unlikely to disperse quickly due to the lack of tidal flow in these areas, and may require some intervention to recover and disperse to avoid a smothering effect.

The impacts of increased turbidity are likely to be minimal in the overall context of Baldoyle Bay, as the water depth is extremely shallow and the natural suspended sediment very fine. Bentonite is naturally occurring and

non-toxic to marine benthic fauna. In the unlikely event of a bentonite breakout, a small quantity of this suspended clay escaping into the watercourse may produce a localised plume of limited size and duration which may induce some avoidance behaviour by some non-qualifying species (i.e. fish and seals) within the area. Because it is not considered that birds would be affected by the worst case scenario, it is considered to be of Negligible impact significance to all bird species.

[Use of Tunnel Boring Machine During Microtunnelling](#)

Chapter 9 Biodiversity (Marine) considers that the noise generated during microtunnelling is of negligible impact magnitude on fish, pinnipeds and harbour porpoise. This is because the predicted levels of noise in the sediments and water column are far below a minimum action level of where this vibration can be perceived by passing fauna. On this basis, it is considered that the impacts from microtunnelling will be Negligible and therefore not significant for birds.

[Disturbance/Displacement due to Construction \(Piling\) at Microtunnelling/Subsea Interface and Fibre Optic Cable Crossing](#)

The microtunnelled section of the proposed outfall pipeline route (marine section) will terminate approximately 1km north-east of Ireland's Eye.

The Tunnel Boring Machine used during microtunnelling will terminate into a temporary cofferdam (or pre-dredged reception pit). As the microtunnelled section is being progressed, cofferdam construction will commence with the aid of a jack-up platform and associated support vessels. The cofferdam construction will use a sheet piling methodology. Installation could utilise vibratory hammers, impact hammers or a hydraulic method. It is estimated that this piling could result in temporary disturbance and displacement of birds up to 90m from source, for a time period of up to two weeks, with peak noise falling into the $>65\text{dB}$ to $\leq 75\text{dB } L_{A\text{max}}$ range. Vessels will be present for approximately three months in total, of which a maximum of two weeks would overlap with dredging of the subsea section of the proposed outfall pipeline route (marine section).

The proposed outfall pipeline route (marine section) traverses a subsea fibre optic cable. This is located approximately 2.5km from the microtunnelling/subsea interface, and 0.9km from Ireland's Eye. Interlocking sheet piles will be driven to support the pipeline trench near the fibre optic cable. It is estimated that this piling could result in temporary disturbance and displacement of birds up to 90m from source, with peak noise falling into the $>65\text{dB}$ to $\leq 75\text{dB } L_{A\text{max}}$ range for a time period of up to two weeks. It is likely that vessels would be present at this location for a period of one month, and that vessels would be present at one location at once.

The 90m disturbance distance is considered to result in a negligible impact and is therefore considered not significant. The presence of vessels without this noise is considered to be of Negligible impact significance.

10.4.4 Parameters Included in Assessment (Operational Phase)

It is considered that there are no parameters associated with the operation of the Proposed Project that need to be included in the assessment.

10.4.5 Parameters Excluded from Assessment (Operational Phase)

Maintenance Activities

The normal operation of the Proposed Project and its constituent elements will be fully automated, which will be monitored, controlled and managed from a control centre located at the proposed WwTP.

The automated control systems will report through supervisory control and data acquisition (SCADA) and telemetry systems to the control centre. The proposed WwTP and SHC will be manned 24 hours a day, seven days a week. It is envisaged that between 30 and 40 operations staff will be employed, working in normal shift patterns, to ensure the continued and efficient operation of all elements of the Proposed Project. Maintenance activities would typically include the following:

- General maintenance (daily);
- Preventative maintenance (as scheduled by operator);
- Proposed Abbottstown pumping station inspections (weekly visit);
- Inspection chambers on pipelines (annual visit); and
- Inspection of multiport diffusers (annual dive survey).

The existing sources of disturbance in and around Baldoyle Bay and the subtidal habitats around Ireland's Eye mean that birds are habituated to a range of human activity. Therefore, any impacts arising from maintenance activities will not add to or be greater than any impacts already experienced by the birds.

Pollution

During operation, the operational plume could also result in impacts to estuarine and coastal waters.

Results of the effluent discharge qualities modelled during the Operational Phase indicate that the plume created by the effluent discharge will be subject to significant dispersion, with a 20-fold dilution obtained within 50m of the diffuser and between 33- and 100-fold dilution within 500m of the diffuser (see Chapter 9 Biodiversity (Marine)). As Baldoyle Bay is located approximately 5km from the marine diffuser, the effluent plume will therefore not affect prey species within estuarine waters. The level of dilution means that the impact on coastal waters will be of Negligible significance to estuarine and marine birds.

Plankton

Modelling shows that the discharge from the proposed marine diffuser will disperse and dissipate over a large area (see Chapter 9 Biodiversity (Marine)). The presence of organically enriched waters, through slightly elevated levels of dissolved inorganic nitrogen, may enhance plankton productivity over the larger area which itself may encourage feeding from prey species in the vicinity, but the impact of this is expected to be of Negligible significance with respect to estuarine and marine birds.

10.5 Potential Impacts on Ornithological Receptors

10.5.1 Disturbance and/or Displacement

Disturbance often implies a short-term or temporary impact that is unlikely to affect the individuals or populations of birds concerned. However, it is a term that covers a wide range of responses in birds. Disturbance is defined

here as any situation in which human activities cause a bird to behave differently from the behaviour it would be reasonably expected to exhibit without the presence of that activity.

In this Chapter, disturbance to birds is predicted to occur due to a number of activities. This includes piling noise during microtunnelling compound construction, microtunnelling/subsea interface construction and fibre optic cable crossing construction. Disturbance by vessels in the marine environment (dredged section of the proposed outfall pipeline route (marine section) and marine diffuser) is also predicted. These activities will result in evasive action being taken by birds.

In the estuarine environment, disturbance can manifest in a number of forms of varying severity depending on the nature, duration and intensity of the disturbance source:

- Birds looking up or heads raised, temporarily stopping feeding or roosting;
- Birds moving away from the cause of the disturbance by walking or swimming before resuming previous activity;
- Birds taking flight and landing somewhere in the same feeding area or mudflat; and
- Birds taking flight and leaving the survey area completely.

The resulting impacts of disturbance episodes for estuarine birds are variable. In general, each subsequent level of severity will result in a greater reduction in feeding time, and greater energy expenditure. Flushing (moving away in response to disturbance) is an energetically expensive activity that can result in decreases in the overall fitness of a population, which in turn can lead to reduced breeding success and increased mortality. Birds that are more tolerant than other individuals and remain in an area affected by disturbance may not forage efficiently, and if there are additional pressures on the birds (for example cold weather), then this may impact upon the survival of individual birds or their ability to breed later in the year. The term 'habituated' is used to describe birds that have become accustomed to particular sources of disturbance.

For birds on the sea, behavioural responses to the presence of vessels also involve flushing, either into flight or by diving in the case of species such as divers and auks. This reduces feeding time and increases energy expenditure, with knock on impacts to breeding success and mortality possible.

At seabird colonies such as Ireland's Eye, a range of disturbance responses is possible. This can be a moderate response such as a heads up or walking behaviour. The most extreme response is flushing. Flushing during incubation or chick-rearing periods can lead to egg or chick loss because of displacement from the breeding site, egg breakage or predation. The effects of flushing on birds that are not attending eggs or chicks include disruption of courtship, nest-site defence and prospecting activities.

Displacement, incorporating disturbance, is considered the Construction Phase only. The Operational Phase has been scoped out of further assessment. This is because it is considered that maintenance vessel traffic once a year is the only potential source of disturbance, and that the Proposed Project infrastructure does not possess the potential to cause a bird to behave differently from the behaviour it would be reasonably expected to exhibit without the presence of the Proposed project infrastructure.

A range of literature has been consulted to assist with the prediction of species-specific responses for the estuarine and marine environment. The approach to assessment makes use of previous indications of behaviour detailed in the literature above and the value/sensitivity of the population in question.

10.5.2 Indirect Impacts

Indirect impacts may occur through changes in abundance and distribution of prey. This is interpreted in terms of the species' flexibility in habitat use (Garthe and Hüppop 2004; Furness and Wade 2012), and the spatial and temporal extent of the potential change during construction.

10.6 Assessment of Significance

10.6.1 Construction Phase

A description of the potential changes on ornithological receptors caused by each identified impact is given below. In general, the impacts arising from the construction of the Proposed Project are temporary and reversible, as they only occur during the Construction Phase.

Due to weather constraints, the subsea pipeline, microtunnelling/subsea interface, fibre optic cable crossing and marine diffuser will only be constructed between March and October.

Whilst the proposed microtunnelling compounds (proposed temporary construction compounds no. 9 and no. 10) can be constructed at any time of year, the hoarding surrounding them can only be installed between April and August unless supervised by an ecologist. This also applies to its removal, which can only occur once all construction activities at the compounds have been completed.

Other embedded mitigation measures will be the presence of an Ecological Clerk of Works at the proposed microtunnelling compounds (proposed temporary construction compounds no. 9 and no. 10) and the production of a Construction Environmental Management Plan to ensure best practice measures are implemented.

Disturbance/Displacement due to Direct Land-Take of Proposed Microtunnelling Compounds

The species that will be affected by direct land-take are those that have been recorded within the footprints of the proposed microtunnelling compounds (proposed temporary construction compounds no. 9 and no. 10) during the ornithological surveys. However, it is accepted that other species of the Baldoyle Bay SPA, or non-designated species that were not recorded locally, may, from time to time, occur on the land. Table 10.10 presents bird records that were made within the footprint of proposed temporary construction compound no. 9 to the west of Baldoyle Bay. Table 10.11 presents the same data for the footprint of proposed temporary construction compound no. 10, to the east. Birds recorded in flight within the footprint of both compounds are excluded from these tables, as they were not considered to be utilising the habitat, only the airspace.

Table 10.10: Birds Recorded Within Footprint of Proposed Temporary Construction Compound No. 9 (West of Baldoyle Bay)

Species	Number of Birds	Survey Date	Behaviour
Curlew*	27	13/04/2015	Roosting/Loafing
Curlew*	6	30/06/2015	Roosting/Loafing
Herring gull**	2	12/10/2017	Roosting/Loafing
Notes			
*Named non-SCI species of Baldoyle Bay SPA			
**SCI species of Ireland's Eye SPA			

Table 10.11: Birds Recorded Within Footprint of Proposed Temporary Construction Compound No. 10 (East of Baldoyle Bay)

Species	Number of Birds	Survey Date	Behaviour
Black-headed gull	1	11/03/2015	Roosting/Loafing
Ringed plover*	1	13/04/2015	Roosting/Loafing
Herring gull***	3	27/05/2015	Scavenging
Black-headed gull	5	05/06/2015	Scavenging
Herring gull***	2	05/06/2015	Scavenging
Black-headed gull	4	30/06/2015	Scavenging
Herring gull***	5	15/07/2015	Scavenging
Lesser black-backed gull	1	15/07/2015	Scavenging
Black-headed gull	3	22/09/2015	Scavenging
Black-headed gull	2	07/01/2016	Scavenging
Black-headed gull	8	16/03/2016	Scavenging
Black-headed gull	4	01/04/2016	Scavenging
Black-headed gull	2	22/05/2016	Scavenging
Black-headed gull	2	26/04/2017	Scavenging
Herring gull***	3	26/04/2017	Scavenging
Lesser black-backed gull	2	17/05/2017	Scavenging
Black-headed gull	13	12/09/2017	Scavenging
Black-headed gull	3	12/10/2017	Scavenging
Black-headed gull	6	20/11/2017	Scavenging
Black-headed gull	6	11/12/2017	Scavenging
Black-headed gull	8	11/01/2018	Scavenging
Herring gull***	2	11/01/2018	Scavenging
Oystercatcher**	6	11/01/2018	Feeding
Notes			
*SCI species of Baldoyle Bay SPA			
**Named non-SCI species of Baldoyle Bay SPA			
***SCI bird species of Ireland's Eye SPA			

In 64 survey visits, a single record of two herring gulls and two records of groups of curlew were recorded using the habitat within the footprint of the proposed western microtunnelling compound. The former is an SCI of the Ireland's Eye SPA, and the latter is a named species of the Baldoyle Bay SPA. All birds recorded were roosting and loafing. In the same number of survey visits, observations of SPA-qualifying species utilising the site of the proposed eastern microtunnelling compound were limited to a single record of a roosting ringed plover (SCI of Baldoyle Bay SPA), a single record of feeding oystercatcher (named species of Baldoyle Bay SPA), and several records of scavenging herring gull (SCI of Ireland's Eye SPA). Black-headed gull were the most frequently recorded species, and lesser black-backed gull was also occasionally recorded. Gull species were recorded scavenging from the bins in the car park.

Although small numbers of birds occasionally utilise the area for roosting, loafing, scavenging or feeding, the relatively low frequency of observations and the low numbers of birds present suggests that the habitat in the footprint of the microtunnelling compounds is not critical for any bird species present in the local area. Based on the character of the land in its current state, it is considered that there is alternative habitat nearby for these species to conduct the behaviour recorded within the proposed microtunnelling compounds (proposed temporary construction compounds no. 9 and no. 10). Following the start of construction, any birds that may be using the land in question (which it should be noted is outside the Baldoyle Bay SPA boundary) will simply relocate and would not be lost to the population as a result of construction of the microtunnelling compounds.

The magnitude of impact of land-take of proposed temporary construction compounds no. 9 and no. 10 is considered to be negligible. This results in a Minor impact significance for any species of very high ecological value associated with the proposed microtunnelling compound sites (i.e. SCIs and Natura 2000 species of the Baldoyle Bay SPA and Ireland's Eye SPA) and a Negligible impact significance for all other species. This prediction is of near-certain confidence. There is no requirement for additional mitigation measures.

[Disturbance/Displacement due to Visual Impacts at Proposed Microtunnelling Compounds](#)

Visual disturbance resulting from the construction and presence of the microtunnelling compounds along with the activities associated with them could result in impacts within the Baldoyle Bay SPA and habitats outside the boundary. This is a reversible impact that would occur for the duration of the construction period. A generic visual disturbance distance of 300m recommended by Cutts et al. (2013) applies to other wading birds using the area.

This level of disturbance applies to work during daylight and darkness. Working at night would require artificial lighting, which has been shown to benefit estuarine birds by increasing foraging opportunity (Santos et al. 2010).

In habitats within 300m of proposed temporary construction compound no.9, 11,694 birds were recorded during the estuarine surveys. Of these, 2,843 records were SCI species of the Baldoyle Bay SPA (850 golden plover, 653 grey plover, 651 shelduck, 428 light-bellied brent geese, 207 bar-tailed godwit and 54 ringed plover). A further 6,703 records were named qualifying species of the Baldoyle Bay SPA. There were also 479 records of SCI species from the Ireland's Eye SPA (herring gull, guillemot and razorbill).

In habitats within 300m of proposed temporary construction compound no. 10, 5,350 birds were recorded during the estuarine surveys. Of these, 2,707 records were SCI species of the Baldoyle Bay SPA (1,800 golden plover, 512 light-bellied brent geese, 203 shelduck, 169 ringed plover, 20 grey plover and three bar-tailed godwit). A further 1,683 records were named qualifying species of the Baldoyle Bay SPA, and 207 records were birds named on the Ireland's Eye SPA citation.

The areas that could potentially be impacted by the visual disturbance impact pathway are large, and are frequently used by large numbers of SCIs of the Baldoyle Bay SPA, along with other named species of the SPA, and other waders and waterbirds. Whilst many birds will habituate to this activity over time, the size of these areas and the number of birds that could be disturbed and displaced could create knock on effects relating to competition and habitat availability, and could result in many birds being lost from the population.

The magnitude of impact of visual disturbance will be medium due to the relatively large spatial (between 50m and 500m from each compound, depending on the species in question) and temporal (duration of construction activities at microtunnelling compounds) extent of activities at the microtunnelling compounds. This results in a Major impact significance for any species of very high ecological value associated with these small areas of habitat (i.e. SCIs and Natura 2000 species of the Baldoyle Bay SPA and Ireland's Eye SPA) and a Moderate or

Minor impact significance for other species. This prediction is of near-certain confidence. Mitigation is required to reduce the impact significance for these species throughout the construction period, and is detailed in Section 10.9.

Disturbance/Displacement due to Construction Noise (Piling) at Proposed Microtunnelling Compounds

The species that will be affected by piling noise are those that have been recorded within the specified distance of the piling source during the ornithological surveys. This distance has been defined by noise experts to be approximately 90m based on the estimated maximum sound level anticipated during the piling (dB L_{Amax}). **Error! Reference source not found.** Figure 10.2 Bird Distribution within 90m of Proposed Temporary Construction Compound No. 9 (December 2014 to March 2018) and Figure 10.3 Bird Distribution within 90m of Proposed Temporary Construction Compound No. 10 (December 2014 to March 2018) illustrate the distribution of bird records relative to these areas for the western and eastern microtunnelling compounds respectively, along with the corresponding buffers. Piling will occur at least 50m from the Baldoyle Bay SPA boundary on the western side of the estuary, and at least 140m from the SPA boundary on the eastern side of the estuary. Table 10.12, Table 10.13 and Table 10.14 present the number and frequency of species records that have been scoped into the assessment within this distance of proposed temporary construction compounds no. 9 and no. 10, to the west and east of Baldoyle Bay, respectively. Birds recorded in flight within the footprint of both compounds are excluded from these tables, as they were not considered to be utilising the habitat, only the airspace.

Table 10.12: Birds Recorded Within 90m of Piling Location of Proposed Temporary Construction Compound No. 9 to the West of Baldoyle Bay and Inside Baldoyle Bay Special Protection Area

Species	Number of Birds	Frequency of Observation	Key Behaviour
Lapwing**	123	10	Roosting, loafing, non-continuous flight, feeding
Wigeon	83	6	Feeding, roosting, loafing
Redshank**	64	6	Loafing, roosting, feeding
Teal**	61	5	Roosting, feeding, loafing
Oystercatcher**	50	2	Loafing
Dunlin**	37	1	Roosting, loafing
Mallard**	34	7	Feeding, roosting, loafing
Snipe	12	5	Roosting, loafing
Curlew**	7	2	Loafing, feeding
Grey heron**	7	7	Feeding
Little egret	7	7	Loafing, feeding
Black-headed gull	6	1	Feeding
Herring gull***	1	1	Non-continuous flight
Pintail**	1	1	Loafing
Mute swan	1	1	Feeding
Greenshank**	1	1	Roosting/loafing
Shelduck*	1	1	Feeding

Species	Number of Birds	Frequency of Observation	Key Behaviour
Notes			
*SCI species of Baldoyle Bay SPA			
**Named non-SCI species of Baldoyle Bay SPA			
***SCI bird species of Ireland's Eye SPA			

Table 10.13: Birds Recorded Within 90m of Piling Location of Proposed Temporary Construction Compound No. 9 to the West of Baldoyle Bay and Outside Baldoyle Bay Special Protection Area

Species	Number of Birds	Frequency of Observation	Key Behaviour
Lapwing*	13	9	Non-continuous flight, roosting/loafing, feeding
Black-headed gull	11	1	Roosting/loafing
Herring gull**	2	1	Roosting/loafing
Buzzard	1	1	Non-continuous flight
Notes			
*Named non-SCI species of Baldoyle Bay SPA			
**SCI bird species of Ireland's Eye SPA			

Table 10.14: Birds Recorded Within 90m of Piling Location of Proposed Temporary Construction Compound No. 10 to the East of Baldoyle Bay

Species	Number of Birds	Frequency of Observation	Key Behaviour
Black-headed gull	129	23	Non-continuous flight, scavenging, loafing
Little grebe	40	32	Loafing, feeding
Mallard**	38	29	Feeding, loafing
Moorhen	37	29	Loafing, feeding
Herring gull***	25	9	Scavenging
Ringed plover*	23	4	Feeding, loafing
Oystercatcher**	22	8	Feeding
Light-bellied brent goose*	6	1	Feeding
Curlew**	5	2	Non-continuous flight, feeding
Grey heron**	3	3	Feeding
Lesser black-backed gull	3	2	Scavenging
Coot	2	2	Feeding, loafing
Common snipe	1	1	Non-continuous flight
Notes			
*SCI species of Baldoyle Bay SPA			
**Named non-SCI species of Baldoyle Bay SPA			
***SCI bird species of Ireland's Eye SPA			

Of the 64 survey visits, lapwing was observed in nine of them to be within 90m of the site of proposed temporary construction compound no. 9, outside the Baldoyle Bay SPA. Three other species were observed in this area on a single occasion: herring gull (an SCI of Ireland's Eye SPA), black-headed gull and buzzard. Within 90m and within the Baldoyle Bay SPA, a range of species were recorded. The SCI shelduck was recorded very infrequently. The most numerous and regularly recorded named SPA species in this area was lapwing, followed by redshank, teal and oystercatcher. Despite this, no species was recorded on more than 10 survey visits (16% total visits), with most being recorded more infrequently than this.

The 90m buffer around the piling areas within the footprint of proposed temporary construction compound no. 10 was populated with low numbers of Baldoyle Bay SPA SCIs, in this case ringed plover and light-bellied brent goose. Ringed plover were recorded on just over a third of visits in this area, in each case a single group consisting of between three and nine birds. Light-bellied brent goose was recorded once in this area during the survey programme. Other named SPA species regularly present in this area were mallard and oystercatcher, with curlew and grey heron present occasionally. Herring gull, an SCI of Ireland's Eye SPA, was occasionally present scavenging in this area. Other non-designated species regularly present were black-headed gull, little grebe and moorhen.

Although small numbers of birds occasionally utilise these areas, the low numbers and frequency of observations suggests that these habitats are not critical for any bird species present in the local area. Based on the character of the land in its current state, it is considered that there is alternative habitat nearby for these species to conduct the behaviour recorded within these habitats. Following the start of construction, any birds that may be using the land in question will simply relocate and would not be lost to the population as a result of construction of proposed temporary construction compounds no. 9 and no. 10.

The magnitude of impact of piling will be negligible due to the small spatial (90m from source of piling noise) and temporal (two weeks) extent of piling activities, coupled with the fact that pre-existing noise sources in the area mean that only birds that are habituated to noise use the area. This results in a Minor impact significance for any species of very high ecological value associated with these small areas of habitat (i.e. SCIs and Natura 2000 species of the Baldoyle Bay SPA and Ireland's Eye SPA), and Negligible impact significance for all other species. This prediction is of near-certain confidence. There is no requirement for additional mitigation measures.

The LAP 'quiet zone' is considered to be of low ecological value because of the very low numbers of birds recorded there between 2014 and 2018. The impact on the LAP zoned land as a result of piling will be low due to the small spatial (90m from source) and temporal (two weeks) extent of piling activities, resulting in a Negligible impact significance.

[Disturbance/Displacement due to Vessel Traffic in Proposed Outfall Pipeline Route \(Marine Section\)](#)

To assess the potential impacts of vessel disturbance and displacement on individual species in the dredged section of the proposed outfall pipeline route (marine section), an appreciation of their relative sensitivity to vessel traffic is required, in addition to understanding the nature of the works across the subtidal section and which elements will occur concurrently or in sequence (Section 10.4).

Of the very high ecological value species associated with the Ireland's Eye SPA and Howth Head Coast SPA, herring gull, kittiwake, fulmar, great black-backed gull and gannet are all highly mobile species that spend a significant amount of time in flight (Garthe and Hüppop 2004; Furness and Wade, 2012) and have large foraging ranges (Thaxter et al. 2012). Vessel traffic is considered to have a negligible impact magnitude on these species

resulting in a Minor impact significance. This can be reduced to Negligible due to the very low vulnerability of these species to boat traffic according to published literature (Garthe and Hüppop 2004; Furness and Wade 2012) and professional judgement. The same impact significance applies to peregrine, because this species does not use the sea in a way that is likely to render it sensitive to disturbance by vessel traffic.

Guillemot, razorbill and black guillemot are species of medium vulnerability to vessel traffic (Garthe and Hüppop 2004; Furness and Wade 2012). These species may illicit a degree of disturbance by vessel activity either by flushing from the sea surface or diving when a vessel approaches. Auk species have been shown to exhibit flushing behaviour of up to 600m (Bellefleur et al. 2009; Ronconi and Clair 2002), although these studies involved vessels travelling at relatively high speed. It is expected that this distance will be less for the Proposed Project, as it will involve vessels that are either stationary or travelling at low speed. During July and August, auks leave the Ireland's Eye area with their chicks to moult offshore. During the process of leaving, some birds may be flightless (Wright and Begg 1987) and more susceptible to disturbance. These birds are unlikely to occur in the dredged section of the proposed outfall pipeline route (marine section), and were not recorded in this location during the targeted surveys in 2016 and 2017, but their presence is conceivable during July and August.

Guillemot and razorbill were the most frequently recorded birds on the sea during the time of the year where vessels are likely to be active in the dredged section of the proposed outfall pipeline route (marine section). However, it is clear from the distribution of these species that the majority of the dredged section of the proposed outfall pipeline route (marine section) is of limited importance to them, and that the majority of these very high ecological value populations do not occur within the dredged section of the proposed outfall pipeline route (marine section), though they are present in the proposed construction corridor in lower numbers. Black guillemots were recorded in much lower numbers, with 232 of 412 birds (56.3%) recorded within 1km of Ireland's Eye. Within the dredged section of the proposed outfall pipeline route (marine section), guillemots, razorbills and black guillemots were recorded feeding and loafing. The sensitivity of the guillemot, razorbill and black guillemot population that is present within the dredged section of the proposed outfall pipeline route (marine section) is considered to be high. Some birds will be disturbed and displaced due to vessels operating within the dredged section of the proposed outfall pipeline route (marine section). Compared to the rest of the proposed outfall pipeline route (marine section), disturbance is particularly likely in the 1,300m of the proposed construction corridor prior to its termination at the marine diffuser, as this is the closest part of the diffuser to the Ireland's Eye SPA. Due to the relatively small area affected at any given time, with a maximum of three groups of vessels operating within the proposed outfall pipeline route (marine section), the temporary and reversible nature of the impact, and the high availability of alternative habitat in the area, this impact has been assigned a low impact magnitude. For guillemot, razorbill and black guillemot (high ecological sensitivity), a Minor impact significance as a result of disturbance and displacement by vessel traffic in the proposed outfall pipeline route (marine section) is predicted. For guillemot and razorbill in July and August, a very high ecological sensitivity has been assigned along with a low impact magnitude, resulting in a Moderate impact significance. Mitigation is required to reduce the impact significance for this species group during this time period.

Puffin are of below average sensitivity to vessel traffic (Garthe and Hüppop 2004; Furness and Wade 2012). Of the 742 records of birds on the water, 705 (95%) were recorded within 1km of Ireland's Eye, meaning that the majority of the dredged section of the proposed outfall pipeline route (marine section) is of very limited importance to this species. Activities in the dredged section of the proposed outfall pipeline route (marine section) resulting in disturbance to this species are more likely in the final 1,300m before the marine diffuser, as this is the closest section of the proposed construction corridor to the Ireland's Eye SPA. The sensitivity of puffins within the

dredged section of the proposed outfall pipeline route (marine section) is considered to be low. Due to the relatively small area affected at any given time, the temporary and reversible nature of the impact, and the high availability of alternative habitat in the area, this impact has been assigned a low impact magnitude. The impact significance of vessel traffic in the dredged section of the proposed outfall pipeline route (marine section) for puffin is therefore Negligible.

Both cormorant and shag are of above average sensitivity to vessel traffic (Garthe and Hüppop 2004; Furness and Wade 2012). Despite this, evidence from Burbo Bank (CMACS 2008) and Robin Rigg (E.ON/Natural Power 2012) offshore wind farms has shown that densities of cormorant increased during their construction phases. Both cormorant and shag are relatively flexible with respect to habitat use (Garthe and Hüppop 2004; Furness and Wade 2012). Both species were regularly recorded on the sea in the dredged section of the proposed outfall pipeline route (marine section) throughout the period where vessels associated with the Proposed Project would be expected to be present. Cormorants were recorded in greater numbers in nearshore locations. As both species are capable of utilising areas of sea that will be beyond the zone of influence (Zol) of vessel disturbance, and because of the relatively small area affected at one time, the temporary and reversible nature of the impact, and the high availability of alternative habitat in the area, the impact of disturbance through vessel activity is predicted to be negligible. Combined with the very high ecological value, this results in a Minor impact significance for these species.

None of the SCIs and all but three Natura 2000 species of the Baldoyle Bay SPA were present in sufficient numbers, or sufficiently frequently in the marine environment at the appropriate time of year, for vessel disturbance to be considered an issue (Negligible impact significance). The three species that were exceptions (oystercatcher, ringed plover and red-breasted merganser) have been investigated further. The vast majority of records of all species were made within 1km of Velvet Strand, largely outside the dredged section of the proposed outfall pipeline route (marine section) and the Zol for vessel disturbance. These species were associated primarily with the intertidal area of Velvet Strand and the shallow nearshore waters. They do not occur in sufficient numbers within the Zol to be considered sensitive receptors and are therefore considered to be of Negligible impact significance with respect to vessel traffic in the dredged section of the proposed outfall pipeline route (marine section).

Common scoter is a species of high ecological value and high sensitivity to disturbance from boat traffic (Garthe and Hüppop 2004; Maclean et al. 2009; Furness and Wade 2012). Studies have found that scoters may flush when vessels are within 1km to 2km (Kaiser et al. 2006). Another study found a median flush distance from ships of 804m and a maximum flush distance of 3.2km (Schwemmer et al. 2011). Although there is a large amount of sea nearby that is outside the Zol of the Proposed Project (which, based on the distribution of birds on the water from VPs, this species already favours), it is considered that the impact magnitude for common scoter is medium. Between March to October of all years surveys were carried out, 2,274 common scoters were recorded on the sea during VP surveys. Because 1,282 of these occurred in March (56.4%), it is considered that the ecological value of the population is high in March (giving a Moderate impact significance), and medium between April and October (resulting in a Minor impact significance). Mitigation is required to reduce the impact significance for this species during the month of March.

Red-throated diver is a species of high sensitivity to disturbance from boat traffic (Garthe and Hüppop 2004; Topping and Peterson 2011; Furness and Wade 2012). Red-throated divers are susceptible to flushing when a vessel approaches, and the distance of displacement may be substantial (Ruddock and Whitfield 2007). Like

common scoter, most birds were recorded in open sea to the north of the dredged section of the proposed outfall pipeline route (marine section). However, it is considered that, due to their elevated sensitivity to vessel disturbance, the impact magnitude for vessel disturbance for this species is medium. Between March and October, there were 523 records of red-throated divers on the sea near the dredged section of the proposed outfall pipeline route (marine section). Of these records, 301 (57.6%) were made in March, a month during which the red-throated diver population is judged to be of high ecological value, giving a Moderate impact significance. Between April and October, the population decreases in number and is considered to be of medium ecological value, giving a Minor impact significance. Mitigation is required to reduce the impact significance for this species during the month of March.

There are a number of species of high ecological value that were present in substantial enough numbers and/or sufficiently frequently to be considered in the assessment. Garthe and Hüppop (2004) and Furness and Wade (2012) have classified these species as possessing a negligible sensitivity to vessel traffic. These are Arctic tern, black tern, black-headed gull, common gull, common tern, roseate tern, Sandwich tern and great skua. This also applies to lesser black-backed gull (a species of medium ecological value). Disturbance and displacement by vessel traffic will have a Negligible impact significance on all of these species.

All other species that were recorded were not present in substantial numbers and/or sufficiently frequently or considered to be highly sensitive to vessel disturbance near the dredged section of the proposed outfall pipeline route (marine section). They are therefore considered to have a Negligible impact significance in relation to disturbance by vessel traffic.

The confidence in all the predictions in this section is near-certain. Because of the assessment above, two mitigation elements will be implemented. It will be required that the time of year when dredging and construction activity can occur is revised from March to October to April to October, to ensure that larger numbers of red-throated diver and common scoter are not potentially subjected to vessel disturbance and displacement impacts. In addition, a Vessel Management Plan (VMP) to reduce the sensitivity of potentially flightless guillemots and razorbills will be required to be in place for the duration of the construction period. Further information on these measures is provided in Section 10.9.

[Disturbance/Displacement due to Vessel Traffic and Construction Noise at Proposed Marine Diffuser](#)

Of primary concern are the qualifying species of the Ireland's Eye SPA, which breed on the cliffs of Ireland's Eye and are of very high ecological value. The assessment considers the breeding colony and birds using the sea away from the colony separately.

The proposed marine diffuser location is approximately 390m from the boundary of the Ireland's Eye SPA. With a 250m working area around the diffuser, there will be a minimum standoff distance of 140m between the closest part of the working area and the Ireland's Eye SPA boundary. This boundary is located approximately 500m from the island cliffs on the north and east coasts of Ireland's Eye, where the nests of breeding birds are located. Therefore, there is an estimated minimum horizontal standoff distance of 645m between the nearest edge of the proposed marine diffuser working area, where vessels may be operating, and the cliffs on Ireland's Eye where the nesting seabirds are located. In addition, there is a vertical component to this distance, likely to be of the order of several tens of metres, based on the approximate maximum cliff height of 67m on the island.

Published literature reports a wide range of disturbance and/or standoff distances for seabird colonies. Some examples include a standoff distance of 180m for mixed tern/skimmer colonies for pedestrians and boats

(Rodgers and Smith 1995), a maximum flight initiation distance of 78m for yellow-legged gull colonies to pedestrian approach (Martinez-Abraín et al. 2008), and a 100m standoff distance between tern colonies and motor boats (Burger 1998; Rodgers and Smith 1995), which suggested that double-crested cormorants in Florida could be approached to 100m without causing ill effects. A mixed colony of fulmars, shags, herring gulls, kittiwakes, guillemots, razorbills and puffins in Scotland demonstrated virtually no reaction behaviourally or reproductively to flights by fixed-wing aircraft within 100m of the colony (Dunnet 1977).

Rojek et al. (2007) studied in detail the disturbance responses of seabird (predominantly guillemot) colonies when approached by fishing vessels over a two-year period. Birds were typically not affected by vessels passing by at extended distances, but those approaching closely elicited a range of disturbance responses. Nearly all vessel disturbances to guillemots and cormorants occurred at vessel distances of less than 100m. At one colony, 23 vessel approaches were made within 500m, of which seven resulted in disturbance responses by guillemots. Four of these responses were a heads up and/or walking movement response (considered a moderate level response). The remaining three vessel approaches resulted in flushing (very severe response). Of recorded disturbances, 78% occurred when boats approached within 50m of the colony, and all flushing events occurred within 75m. On two occasions, heads up responses occurred when boats approached to within 200m, and a vessel with a loud engine elicited heads up responses when about 800m away.

The Canadian Government has published guidance relating to avoiding disturbance at seabird colonies (Canadian Government 2016). A general minimum 300m standoff distance between smaller vessels and seabird colonies is recommended, increasing to 500m for larger vessels such as cruise ships and 1km for 'high disturbance activities (e.g. drilling, blasting)'. It is also suggested that vessels travel at steady speeds when close to seabird and waterbird colonies, moving parallel to the shore rather than approaching the colony directly. When in proximity to colonies, it is recommended that sharp or loud noises should be avoided (e.g. horns) and that a constant engine noise level is maintained (Canadian Government 2016).

Work at the proposed marine diffuser is not expected to be noisy and will occur for only a short period of time. The literature referenced above, and the guidance issued by the Canadian Government, suggests that the works at the marine diffuser will have a negligible impact magnitude on birds at the colony due to the standoff distance of 645m. As these birds have a very high ecological value, this results in a Minor impact significance.

As well as the colony itself, there will be SPA qualifying birds present within designated waters that are closer to the proposed marine diffuser than the nests.

Herring gull, kittiwake, fulmar, great black-backed gull and gannet are all highly mobile species that spend a significant amount of time in flight. Garthe and Hüppop 2004 and Furness and Wade 2012 have classified these species as possessing a negligible impact magnitude to vessel traffic and activities at the proposed marine diffuser during construction, resulting in a Minor impact significance. This can be reduced to Negligible due to the very low vulnerability of these species to boat traffic according to published literature (Garthe and Hüppop 2004; Furness and Wade 2012) and professional judgement. The same impact significance applies to peregrine because this species does not use the sea in a way that is likely to render it sensitive to disturbance by vessel traffic.

Guillemot, razorbill and black guillemot are species of medium vulnerability to boat traffic (Garthe and Hüppop 2004; Furness and Wade 2012). These species may illicit a degree of disturbance by vessel activity either by flushing from the sea surface or diving when a vessel approaches. Auk species have been shown to exhibit flushing behaviour of up to 600m (Bellefleur et al. 2009; Ronconi and Clair 2002), although these studies involved

vessels travelling at relatively high speeds. It is expected that this distance will be less for the Proposed Project, as it will involve vessels that are either stationary or travelling at low speed. During July and August, auks leave the Ireland's Eye area to moult. In this period, some birds may be flightless (Wright and Begg 1987) and more susceptible to disturbance. Flightless birds were not recorded in large numbers during the targeted surveys in 2016 and 2017, but despite this, it is recognised that they will be present in the area in July and August.

Guillemot and razorbill were the most frequently recorded birds on the sea during the time of the year where vessels are likely to be active at the marine diffuser. The distribution of on-sea records shows that, of 8,186 guillemot recorded from the Ireland's Eye VP, 6,897 (84.3%) were loafing, preening/bathing or roosting (Table A10.14, Appendix A10.1). The number of razorbills recorded from the Ireland's Eye VP during the same time period was 7,449, of which 6,399 (86.0%) were recorded loafing, preening/bathing or roosting (Table A10.15, Appendix A10.1). These behaviours are activities that are not dependent on the birds being present at a specific location. It is highly likely that these activities could be undertaken at an alternative location on a temporary basis if required, without significant impacts on the population. Furthermore, the behaviours recorded indicate that the guillemot and razorbill population of the Ireland's Eye SPA rely on waters for feeding which are located away from the marine diffuser, and thus will be unaffected by works. This is supported by published mean foraging distances of 37.8km for guillemot and 23.7km for razorbill (Thaxter et al. 2012). It is considered that, whilst disturbance and displacement of these species will occur from waters near the proposed marine diffuser on a short-term, localised and reversible basis, these waters are not critical to these populations, and there is substantial alternative habitat beyond the Zol. Consequently, the impact magnitude is low. Because these populations can relocate if disturbed, they have been assigned a high ecological sensitivity, resulting in a Minor impact significance. For guillemot and razorbill in July and August, a very high ecological sensitivity has been assigned along with a low impact magnitude, resulting in a Moderate impact significance. Mitigation is required to reduce the impact significance for this species group during this time period.

Puffin are of below average sensitivity to vessel traffic (Garthe and Hüppop 2004; Furness and Wade 2012). Of the 742 birds recorded on the water during VP surveys, 727 (98%) were recorded from the Ireland's Eye VP, of which 700 (96.3%) were loafing or preening (Table A10.22, Appendix A10.1). These behaviours are not dependent on the birds being present at a specific location. It is highly likely that these activities could be undertaken at an alternative location on a temporary basis if required, without significant impacts on the population. Furthermore, it indicates that the puffin population of the Ireland's Eye SPA rely on waters for feeding which are located away from the marine diffuser, and thus will be unaffected by works. On this basis, the sensitivity of puffins to the works at the proposed marine diffuser is considered to be low, and the impact magnitude negligible. The impact significance of vessel traffic at the proposed marine diffuser for puffin is Negligible.

Black guillemots were recorded in much lower numbers than guillemot and razorbill, with 223 birds recorded on the sea from the Ireland's Eye VP (Table A10.23, Appendix A10.1). Of these birds, 211 (94.6%) were feeding. The foraging range of black guillemot is approximately 2km (Thaxter et al. 2012). This means that black guillemot is dependent on the waters immediately adjacent to Ireland's Eye for feeding. The Ireland's Eye SPA encompasses a large expanse of designated waters (approximately 182ha), of which only 28.81ha (15.83% of the total designated water area) occurs within 500m of the proposed marine diffuser location. It is proposed that 500m is a highly precautionary disturbance distance for black guillemot (Canadian Government, 2016), a species known to possess only a moderate sensitivity to vessel traffic (Garthe and Hüppop 2004; Furness and Wade 2012). It is presumed that the entire area of sea around Ireland's Eye was designated as part of the SPA due in part to its

high suitability for foraging by the bird species of the Ireland's Eye SPA, including black guillemot. Therefore, there remains a large proportion (84.17%) of alternative foraging/loafing/roosting habitat within the SPA boundary, all of which is within the foraging range of black guillemot. It is therefore considered that black guillemots, which could be temporarily displaced from waters directly adjacent to the proposed marine diffuser during construction, would be subject to a negligible impact magnitude, resulting in a Minor impact significance, due to activities at the proposed marine diffuser.

Both cormorant and shag are considered to be of above average sensitivity to vessel traffic (Garthe and Hüppop 2004; Furness and Wade 2012). Despite this, evidence from Burbo Bank (CMACS 2008) and Robin Rigg (E.ON/Natural Power 2012) offshore wind farms has shown that densities of cormorant increased during their construction phases. Both cormorant and shag are relatively flexible with respect to habitat use (Garthe and Hüppop 2004; Furness and Wade 2012). Both species were regularly recorded on the sea in the area around Ireland's Eye throughout the period where vessels associated with the Proposed Project would be expected to be present at the proposed marine diffuser. These species were most frequently recorded in sectors located a large distance from the proposed marine diffuser. Their flexible habitat usage and wide distribution throughout most VP count sectors (Table A10.17, Appendix A10.1 for cormorant, Table A10.20, Appendix A10.1 for shag) suggests that these species are capable of utilising areas of sea that will be beyond the Zol of vessel disturbance, and that they are not dependent on the area directly adjacent to the proposed marine diffuser. As a result, the impact of disturbance through vessel activity is predicted to be of negligible magnitude. Combined with the very high ecological value, this results in a Minor impact significance for these species.

In addition to the Ireland's Eye SPA species, a further three species were judged to be present in sufficient numbers or sufficiently frequently to require further examination.

Common scoter is a species of high ecological value and high sensitivity to disturbance from boat traffic (Garthe and Hüppop 2004; Maclean et al. 2009; Furness and Wade 2012). Scoters may flush upon vessels approaching at 1km to 2km distance (Kaiser et al. 2006), whilst Schwemmer et al. (2011) found a median flush distance from ships of 804m and a maximum flush distance of 3.2km. Although there is a large area of subtidal habitat nearby that is outside the Zol of activities at the proposed marine diffuser (which common scoter already utilise in preference to the water closer to the marine diffuser), it is considered that the impact magnitude for common scoter is medium due to the species' high sensitivity to vessel traffic. Between March to October of all years in which surveys were carried out, 402 common scoters were recorded on the sea near Ireland's Eye. Because 210 (52.2%) of these occurred in March, it is considered that the ecological value of the population is high in March, giving a Moderate impact significance, and medium between April and October, resulting in a Minor impact significance. Mitigation is required to reduce the impact significance for this species during the month of March.

The other two species requiring consideration are Sandwich tern and black-headed gull. Garthe and Hüppop (2004) and Furness and Wade (2012) have classified both species as possessing a negligible sensitivity to vessel traffic. The impact significance for these species as a result of construction of the proposed marine diffuser is therefore Negligible.

All other species were not present in substantial numbers and/or sufficient frequently or considered to be highly sensitive to vessel disturbance near Ireland's Eye and the proposed marine diffuser. They are therefore considered to have a Negligible impact significance in relation to disturbance by the construction of the proposed marine diffuser.

The confidence in all the predictions in this section is near-certain. The exception is the impacts on the Ireland's Eye SPA seabird colony and the sensitive qualifying species away from the colony (guillemot, razorbill, black guillemot, cormorant and shag), which are of probable certainty.

It is proposed that two mitigation elements will be required. Firstly, a temporal restriction to prevent dredging and construction activity in March is required to ensure that large numbers of common scoter are not subjected to vessel disturbance and displacement impacts. The second requirement is that a VMP will be implemented to reduce the sensitivity of potentially flightless guillemots and razorbills during July and August. The VMP will also increase the certainty of impact predictions on the Ireland's Eye SPA seabird colony and sensitive qualifying species away from the colony to near-certain by imposing restrictions on vessel movement. Further information on these measures is provided in Section 10.9.

[Impacts on Prey of Birds by Suspended Sediments Caused by Dredging of the Proposed Outfall Pipeline Route \(Marine Section\)](#)

Chapter 9 Biodiversity (Marine) discusses the impact of sediment plumes from the dredging of the proposed outfall pipeline route (marine section) on fish. It is concluded that the impacts associated with the plume will be short-term and of negligible to no magnitude on fish. Therefore, the impact significance on all ornithological species is Negligible.

10.6.2 Operational Phase

Because of the nature of the Proposed Project and its operation, which does not require the routine presence of significant surface activities in or near Baldoyle Bay or Ireland's Eye, there are no impacts predicted on ornithological interests during the Operational Phase. Therefore, the impact significance on all ornithological species is Negligible.

10.7 'Do Nothing' Impact

The impact to the current ecological status based on a 'do nothing' scenario is likely to be of Negligible significance.

10.8 Cumulative Impacts

The list of other projects considered in Chapter 23 Cumulative Impacts and Environmental Interactions in Volume 3 Part A of this EIAR has been reviewed, and it is concluded that none of them will result in cumulative impacts on estuarine or marine ornithological interests in combination with the Proposed Project.

10.9 Mitigation Measures

10.9.1 Construction Phase – Estuarine Ornithology

A summary of mitigation measures for estuarine ornithology is presented in Table 10.15.

Table 10.15: Summary of Proposed Impacts and Mitigation Requirements for Estuarine Ornithology

Operation	Area at Risk	Sensitive Receptor and Impact Significance	Measures Required
Construction of proposed temporary construction compound no. 9 and no. 10	Habitats within and adjacent to Baldoyle Bay SPA within 50m to 500m of each microtunnelling compound, depending on species	All SCIs and named qualifying species of the Baldoyle Bay SPA, in addition to other waders and waterbirds using these habitats	Installation of hoarding at both proposed temporary construction compounds for duration of Construction Phase.

Installation of Hoarding

A 2.4m high hoarding will be used for the duration of the construction works at both microtunnelling compounds (proposed temporary construction compounds no. 9 and 10). Compound construction will not proceed without the installation of hoarding around the entire perimeter of each compound and any associated access track. The deployment of this hoarding will mean that works within the microtunnelling compounds will occur out of sight of birds in the Baldoyle Bay SPA, meaning that disturbance impacts on birds are reduced to a very low level (Cutts et al. 2013). Ikuta and Blumstein (2003) found that protective barriers allow birds to behave as they would in an undisturbed environment. To avoid disturbance to wintering birds, the hoarding will only be erected and uninstalled between April and August under supervision by a professional ecologist.

10.9.2 Construction Phase – Marine Ornithology

A summary of mitigation measures for marine ornithology is presented in Table 10.16.

Table 10.16: Summary of Proposed Impacts and Mitigation Requirements for Marine Ornithology

Operation	Area at Risk	Sensitive Receptor and Impact Significance	Measures Required
Construction of microtunnelling / subsea interface of the proposed outfall pipeline route (marine section) and fibre optic cable crossing	Extent of sea around microtunnelled section/subsea section interface and fibre optic cable crossing	Seabirds near microtunnelled section/subsea section interface	Adherence to VMP (see Appendix A10.2 in Volume 3 Part B of this EIAR), including withdrawing from area in event of large-scale auk movement towards vessels
Construction of subsea section of the proposed outfall pipeline route (marine section)	Extent of sea in the dredged section of the proposed outfall pipeline route (marine section) in which construction vessels are operating	Guillemot and razorbill (July and August only): Moderate Red-throated diver (March only): Moderate Common scoter (March only): Moderate	Adherence to VMP (see Appendix A10.2 in Volume 3 Part B of this EIAR), including withdrawing from area in event of large-scale auk movement towards vessels Ensuring construction activities are not carried out in March, instead taking place from April to October only.

Operation	Area at Risk	Sensitive Receptor and Impact Significance	Measures Required
Construction of proposed marine diffuser	Extent of sea around marine diffuser location, including section of Ireland's Eye SPA	Guillemot and razorbill (July and August only): Moderate Common scoter (March only): Moderate	Adherence to VMP (see Appendix A10.2 in Volume 3 Part B of this EIAR), including use of bird observer during July and August and withdrawing from area in event of large-scale auk movement towards vessels Adjustment to temporal restriction of marine construction activities from March to October, to April to October

Vessel Management Plan

It should be noted that the VMP has been prepared by the Proposed Project ornithologist.

Due to the potential presence of large numbers of birds with very high ecological value and also the sensitivity of breeding seabirds within and near the Ireland's Eye SPA, it will be necessary to put in place a VMP (see Appendix A10.2 in Volume 3 Part B of this EIAR). The VMP will have two key functions.

The first is to ensure that the Ireland's Eye SPA boundary is not unnecessarily approached or crossed by construction vessels working on the proposed marine diffuser and subsea section of the proposed outfall pipeline route (marine section) at any time during the Construction Phase. This will also increase the certainty that the impact significance on the breeding colony itself during construction will be Negligible. Every vessel used on the Proposed Project will have a copy of the VMP and the crews will be acquainted with the boundary of Ireland's Eye SPA and the ornithological importance of these waters.

The second is to ensure the protection of rafting auks leaving the Ireland's Eye colony in July to mid-August. These birds are flightless, and thus particularly susceptible to disturbance by vessels. Whilst such rafts tend to immediately leave the area to moult in locations far from the shore, unfavourable winds can result in them being unable to control the direction in which they are travelling when leaving their colony. A bird observer (present either on the island or a vessel) will keep watch in July to mid-August only, noting wind direction and monitoring whether any auks that may be on the water are drifting out towards the proposed marine diffuser.

In the event of a sighting of rafting auks between Ireland's Eye and the proposed marine diffuser construction area, vessels on-site will be informed. All vessels will be obliged to immediately report the sightings to the other Proposed Project vessels with exact position of sighting, and reduce speed to less than 10 knots if within 1km of the reported sighting. Vessels should thereafter avoid coming closer than 1km to any rafting auks, and keep extra lookout for rafting auks. This may result in vessels having to temporarily leave the work area until rafting auks are no longer present. If this does occur, it is not expected that such birds would persist in the area.

Adjustment of Temporal Restrictions to Marine Construction

To avoid disturbance to high ecological value populations of red-throated diver and common scoter, the time period in which marine construction activities can occur will be revised from March to October to April to October.

10.9.3 Operational Phase – Estuarine Ornithology

No impacts are predicted on estuarine ornithological interests during the Operational Phase. As a result, no mitigation measures are proposed.

10.9.4 Operational Phase – Marine Ornithology

No impacts are predicted on marine ornithological interests during the Operational Phase. As a result, no mitigation measures are proposed.

10.10 Residual Impacts

10.10.1 Estuarine Ornithology

The installation of appropriate hoarding will mitigate the Major impact significance for any species of very high ecological value and Moderate impact significance for a range of other species. The impact magnitude will be reduced from medium to negligible. This results in an impact significance of Minor for species of very high ecological value and Negligible for all other species. In both cases, the residual level of impact significance is considered not significant.

10.10.2 Marine Ornithology

The provision of an appropriate VMP will mitigate the Moderate impact significance currently predicted for guillemot and razorbill in July and August in the dredged section of the proposed outfall pipeline route (marine section) and at the marine diffuser. The impact magnitude will be reduced from low to negligible if this mitigation is incorporated. The impact significance will change from a pre-mitigation value of Moderate to a residual value of Minor. The residual level of impact significance is considered not significant.

The alteration of the time period during which marine construction can occur results in the majority of common scoter and red-throated divers in the area leaving before construction commences. This reduces the ecological value of the populations that can be impacted from high value to medium value. Upon acceptance of this restriction, the pre-mitigation impact significance of Moderate will change to a residual value of Minor. The residual level of impact significance is considered not significant.

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