3.5 Survey Limitations

Breeding Bird Surveys:

Strict application of CBS methodology, which is undertaken for long-term population monitoring and for high levels of accuracy in mapping breeding distribution, requires a minimum of 10 visits between March and July, conducted at intervals of at least 10 days apart.

Given the nature and location of the proposed works, it was considered that this level of detail was not required for this project and three visits conducted from May to June in 2019, as detailed above in **Section 3.4.1**, were deemed sufficient.

Breeding Seabird Surveys:

It was acknowledged that the April survey window had been missed for the 2019 breeding season when Woodrow were commissioned to work on this project, and although an April visit was preferable, an early May visit was conducted instead. As outlined above, the early May breeding bird survey included a count of adult black guillemots associated with breeding sites within and adjacent to the harbour, as detailed in seabird survey methods above, which is considered acceptable (Walsh *et al.* 1995). In addition, further observations suggested that 2019 was a late breeding season for black guillemots at this Howth Harbour colony.

Seabird surveys were conducted which identified nesting sites for this particular species (see **Section 3.4.3** above).

It must be noted that for Seabird 2000, the extent of the count sections used for surveying black guillemots differed slightly from those employed to survey cliff and island nesting seabirds. The black guillemot counts reported in Seabird 2000 were undertaken in 1988-89 as part of a national census. The count sections surveyed for black guillemots are different for those employed for other seabird species and the area of interest is encompassed by three count sections including: Howth Harbour, Ireland's Eye and all the rocky shore of the Howth Head peninsula from Sutton to Howth Harbour.

Given the extensive suite of breeding bird, bird usage and seabird surveys that were conducted by Woodrow across the proposed site throughout summer 2019 and winter 2019 / 2020, the above limitations are not considered to reduce the robustness of the results presented within this bird survey report in respect of the proposed Howth Harbour FHC dredging and Reclamation works. As such, general recommendations are provided within this report, and a full detailed ornithological assessment is provided within the EIAR (MWP, 2020).

4 RESULTS

4.1 Results of desktop survey

Table 2 below displays the NBDC records of birds within close proximity of the proposed Howth Harbour works.

Table 2 - Notable or protected bird species with potential to occur at the site, resulting from the desk study review

(Source: 10km grid square O23 NBDC Database) *Key to likelihood of species presence: 1 = Confirmed; 2 = Likely; 3 = Possible; 4 = Unlikely*

Species	Scientific Name	Birds Dir. (Annex I)	Wildlife Acts (as amended)	Birds of Conservation Concern (2014 – 2019)	Likelihood on site	Likelihood within 2 km	Most recent record	Record Source
Artic Tern	*Sterna paradisaea*	Y	Y	Amber	2	2	2014	NBDC
Atlantic Puffin	*Fratercula arctica*	-	Y	Amber	4	4	1999	NBDC
Barn Owl	*Tyto alba*	-	Y	Red	4	4	1984	NBDC
Barn Swallow	*Hirundo rustica*	-	Y	Amber	2	2	2015	NBDC
Bar-tailed Godwit	*Limosa lapponica*	Y	Y	Amber	2	2	2015	NBDC
Black Guillemot	*Cepphus grille*	-	Y	Amber	2	2	2016	NBDC
Black Tern	*Chlidonias niger*	-	Y	Not Listed	3	3	2012	NBDC
Black-headed Gull	*Larus ridibundus*	-	Y	Red	2	2	2017	NBDC
Black-legged Kittiwake	*Rissa tridactyla*	-	Y	Amber	2	2	2017	NBDC
Black-tailed Godwit	*Limosa limosa*	-	Y	Amber	2	2	2015	NBDC
Black-throated Diver	*Gavia artica*	Y	Y	Amber	2	2	2016	NBDC
Brent Goose	*Branta bernicla*	-	Y	Amber	2	2	2017	NBDC
Common Coot	*Fulica atra*	-	Y	Amber	3	3	2001	NBDC
Common Goldeneye	*Bucephala clangula*	-	Y	Red	2	3	2011	NBDC
Common Grasshopper Warbler	*Locustella naevia*	-	Y	Green	4	4	1972	NBDC
Common Greenshank	*Tringa nebularia*	-	Y	Green	2	2	2016	NBDC
Common Kestrel	*Falco tinnunculus*	-	Y	Amber	2	2	2015	NBDC
Common Kingfisher	*Alcedo atthis*	Y	Y	Amber	3	2	2011	NBDC
Common Linnet	*Carduelis cannabina*	-	Y	Amber	2	2	2015	NBDC
Common Pheasant	*Phasianus colchicus*	-	Y	Not Listed	2	2	2014	NBDC
Common Pochard	*Aythya ferina*	-	Y	Red	3	3	2011	NBDC
Common Redshank	*Tringa totanus*	-	Y	Red	2	2	2016	NBDC
Common Sandpiper	*Actitis hypoleucos*	-	Y	Amber	3	3	2011	NBDC
Common Scoter	*Melanitta nigra*	-	Y	Red	3	3	2011	NBDC
Common Shelduck	*Tadorna tadorna*	-	Y	Amber	2	2	2016	NBDC
Common Snipe	*Gallinago gallinago*	-	Y	Amber	2	2	2016	NBDC
Common Starling	*Sturnus vulgaris*	-	Y	Amber	2	2	2015	NBDC
Common Swift	*Apus apus*	-	Y	Amber	2	2	2014	NBDC
Common Tern	*Sterna hirundo*	Y	Y	Amber	2	2	2015	NBDC
Common Woodpigeon	*Columba palumbus*	-	Y	Green	2	2	2015	NBDC

Species	Scientific Name	Birds Dir. (Annex I)	Wildlife Acts (as amended)	Birds of Conservation Concern (2014 – 2019)	Likelihood on site	Likelihood within 2 km	Most recent record	Record Source
Corn Crake	*Crex crex*	Y	Y	Red	4	4	1972	NBDC
Dunlin	*Calidris alpina (Unknown if this is C. alpina alpina or C. alpina shinzii; the latter is Annex I).*	Y	Y	Amber	2	2	2016	NBDC
Eurasian Curlew	*Numenius arquata*	-	Y	Red	2	2	2016	NPWS
Eurasian Oystercatcher	*Haematopus ostralegus*	-	Y	Amber	2	2	2017	NBDC
Eurasian Teal	*Anas crecca*	-	Y	Amber	2	2	2016	NBDC
Eurasian Tree Sparrow	*Passer montanus*	-	Y	Amber	3	3	2011	NBDC
Eurasian Wigeon	*Mareca Penelope*	-	Y	Red	2	2	2016	NBDC
Eurasian Woodcock	*Scolopax rusticola*	-	Y	Red	3	3	2011	NBDC
European Golden Plover	*Pluvialis apricaria*	Y	Y	Red	3	3	2016	NBDC
European Shag	*Phalacrocorax aristotelis*	-	Y	Amber	2	2	2014	NBDC
Gadwall	*Mareca Strepera*	-	Y	Amber	3	3	2011	NBDC
Great Black-backed Gull	*Larus marinus*	-	Y	Amber	2	2	2016	NBDC
Great Cormorant	*Phalacrocorax carbo*	-	Y	Amber	2	2	2014	NBDC
Great Crested Grebe	*Podiceps cristatus*	-	Y	Amber	2	2	2011	NBDC
Greater Scaup	*Aythya marila*	-	Y	Amber	3	3	2011	NBDC
Great Northern Diver	*Gavia immer*	Y	Y	Amber	3	3	2011	NBDC
Grey Plover	*Pluvialis squatarola*	-	Y	Amber	2	2	2016	NBDC
Hen Harrier	*Circus cyaneus*	Y	Y	Amber	3	3	2011	NBDC
Herring Gull	*Larus argentatus*	-	Y	Red	2	2	2015	NBDC
House Martin	*Delichon urbicum*	-	Y	Amber	2	2	2016	NBDC
House Sparrow	*Passer domesticus*	-	Y	Amber	2	2	2015	NBDC
Jack Snipe	*Lymnocryptes minimus*	-	Y	Amber	3	3	2011	NBDC
Kentish Plover	*Charadrius alexandrines*	-	Y	Not Listed	4	4	1846	NBDC
Lesser Black-backed Gull	*Larus fuscus*	-	Y	Amber	2	2	2016	NBDC
Little Egret	*Egretta garzetta*	Y	Y	Green	2	2	2016	NBDC
Little Grebe	*Tachybaptus ruficollis*	-	Y	Amber	2	2	2011	NBDC
Little Gull	*Hydrocoloeus minutus (Larus minutus)*	Y	Y	Amber	3	2	2017	NBDC
Little Tern	*Sternula albifrons*	Y	Y	Amber	3	3	2001	NBDC
Long-tailed Duck	*Clangula hyemalis*	-	Y	Red	3	2	2011	NBDC
Mallard	*Anas platyrhynchos*	-	Y	Green	2	2	2014	NBDC
Manx Shearwater	*Puffinus puffinus*	-	Y	Amber	2	2	2012	NBDC

Species	Scientific Name	Birds Dir. (Annex I)	Wildlife Acts (as amended)	Birds of Conservation Concern (2014 – 2019)	Likelihood on site	Likelihood within 2 km	Most recent record	Record Source
Mediterranean Gull	*Larus melanocephalus*	Y	Y	Amber	2	2	2012	NBDC
Merlin	*Falco columbarius*	Y	Y	Amber	3	2	2011	NBDC
Mew (Common) Gull	*Larus canus*	-	Y	Amber	2	2	2016	NBDC
Mute Swan	*Cygnus olor*	-	Y	Amber	2	2	2015	NBDC
Northern Gannet	*Morus bassanus*	-	Y	Amber	2	2	2014	NBDC
Northern Lapwing	*Vanellus vanellus*	-	Y	Red	3	3	2011	NBDC
Northern Pintail	*Anas acuta*	-	Y	Red	2	2	2016	NBDC
Northern Shoveler	*Spatula clypeata (previously Anas clypeata)*	-	Y	Red	2	2	2016	NBDC
Northern Wheatear	*Oenanthe Oenanthe*	-	Y	Amber	3	2	2015	NBDC
Peregrine Falcon	*Falco peregrinus*	Y	Y	Green	2	2	2015	NBDC
Razorbill	*Alca torda*	-	Y	Amber	2	2	2017	NBDC
Red Knot	*Calidris canutus*	-	Y	Amber	2	2	2016	NBDC
Red-breasted Merganser	*Mergus serrator*	-	Y	Green	2	2	2014	NBDC
Red-necked Phalarope	*Phalaropus lobatus*	Y	Y	Red	4	4	1957	NBDC
Red-throated Diver	*Gavia stellata*	Y	Y	Amber	3	2	2011	NBDC
Ringed Plover	*Charadrius hiaticula*	-	Y	Green	2	2	2012	NBDC
Rock Pigeon / Rock Dove	*Columba livia*	-	Y	Green	2	2	2014	NBDC
Roseate Tern	*Sterna dougallii*	Y	Y	Amber	2	2	2012	NBDC
Sand Martin	*Riparia riparia*	-	Y	Amber	2	2	2016	NBDC
Sandwich Tern	*Thalasseus sandvicensis (Sterna sandvicensis)*	Y	Y	Amber	2	2	2014	NBDC
Short-eared Owl	*Asio flammeus*	Y	Y	Amber	3	3	2016	NBDC
Skylark	*Alauda arvensis*	-	Y	Amber	2	2	2015	NBDC
Snowy Owl	*Bubo scandiaca*	Y	Y	Not Listed	4	4	1880	NBDC
Spotted Flycatcher	*Muscicapa striata*	-	Y	Amber	3	2	2010	NBDC
Stock Pigeon / Stock Dove	*Columba oenas*	-	Y	Amber	2	2	2015	NBDC
Tufted Duck	*Aythya fuligula*	Y	Y	Red	3	3	2011	NBDC
Twite	*Linaria flavirostris*	-	Y	Red	3	3	2016	NBDC
Water Rail	*Rallus aquaticus*	-	Y	Green	3	3	2011	NBDC
Whooper Swan	*Cygnus Cygnus*	Y	Y	Amber	3	3	2011	NBDC
Yellow Wagtail	*Motacilla flava*	-	Y	Amber	4	4	1991	NBDC
Yellowhammer	*Emberiza citrinella*	-	Y	Red	3	3	2011	NBDC

4.2 Results of field survey

4.2.1 Breeding bird surveys

The distribution of breeding birds recorded during morning walkovers is shown in **Appendix III**. There were three species confirmed as breeding within the harbour, including black guillemot (see account below), pied wagtail (1 pair) and rock pipit (1 pair). Starlings were recorded nesting in buildings next to the harbour. All other breeding species noted were recorded away from the harbour and therefore would not be affected by proposed dredging or Reclamation works.

4.2.2 Breeding seabirds

Table 3 and **Table 4** below provide comparative count data for the census conducted in 1999 (Seabird 2000) at seabird colonies on Ireland's Eye and Howth Head, respectively. Note that for Howth Head, only count data for counts sections HH1a, HH1 and HH2 are provided.

The following sections provide accounts for the species of seabirds breeding in the environs of Howth Harbour. † indicates species listed as a Qualifying Interest (Special Conservation Interests) of the Howth Head SPA and ¥ indicates species listed as a Qualifying Interest of Ireland's Eye SPA.

4.2.2.1 Fulmar

Only a small number of fulmars nest on the Howth Head cliffs. Ireland's Eye holds sections where breeding densities are slightly higher, and these are closer to the site where dredging works are proposed. On Ireland's Eye the 2007 fulmar counts (55 AOS[10]s) indicated a 21 % decline since 1999 (70 AOS in Seabird 2000). However, counts in 2007 were judged to be a slight underestimate and the population is actually thought to have remained relatively stable. A count in 2016 generated an estimate of 91 AOS. The 2019 count (of 49 to 56 AOS) provides similar numbers to those recorded in 2007. This suggests that the numbers attending breeding sites on Ireland's Eye fluctuates between 50 and 100 AOS.

The fulmar populations on Ireland's Eye are distributed on the cliffs from Rowan Rocks to Seal's Cave, *c.* 1.6 km from Howth Harbour, and therefore their breeding sites will not be directly impacted by disturbance factors resulting from proposed dredging works within the harbour.

4.2.2.2 Cormorant ¥

There is a well-documented colony on Thulla (the islet off the south coast of Ireland's Eye) and more recently (over the 2000s) colonies have become established on the northern coastal slope of the island. Between 1999 and 2007 the numbers of cormorants breeding on Ireland's Eye increased rapidly from 309 AONs to 641 AONs, which equates to 110 % increase and an average growth rate of about 14 % per annum. Interestingly, the *SCR Census* (1987) only recorded 19 AONs suggesting a huge influx of birds from 1987 to 1999. Merne & Madden (1999) indicate that increases on Ireland's Eye reflect decreases on the nearby colony on Lambay over the same time period and breeding birds are suspected of moving between these two colonies and the one on St. Patrick's Island. The core cormorant colony on Ireland's Eye was originally located on the sparsely vegetated islet of Thulla, which supported 545-555 AONs in 2007, similar to numbers in 2005, when 571 AONs were recorded. During the count in 2007 there were an additional 96 AONs recorded on the northern slopes of Ireland's Eye (in addition to those recorded on Thulla).

[10] AOS = Apparently occupied site, AON = Apparently occupied nest, AOT = Apparently occupied territory

Surveys in 2015 detected a shift in breeding activity away from Thulla, where boat-based counts estimated that numbers had declined to *c.* 86 AONs, which is comparable to counts conducted in 2019 when *c.* 127 AONs were recorded here (Note: counts prior to 2015 and 2019 were undertaken during bird ringing expedition that accessed the islet directly and would have recorded more nests. While the exact magnitude of the declines on Thulla is difficult to determine there is a noticeable decrease in breeding density). The declines on Thulla have been compensated for, in part, by increased breeding activity on the northern slopes (328 AONs in 2015 and 255 AONs in 2019) and new activity was detected on the eastern side of Ireland's Eye (102 AONs in 2015, 44 AONs in 2019). Therefore, recent population estimates for Ireland's Eye (424 AONs in 2015 and 426 AONs in 2019) suggest a degree of stability, after a period of decline from 2007 (641 AONs).

The cormorant colony on Thulla is *c.* 0.9 km from Howth Harbour and therefore the location of this breeding colony will not be directly impacted by disturbance factors resulting from proposed dredging works within the harbour.

4.2.2.3 Shag

Shag breed in small colonies or isolated nests around the coast of the Ireland's Eye and Howth Head. There are far fewer birds nesting on the Howth Head cliffs than on Ireland's Eye, and surveys from Seabird 2000 through to 2019 have not recorded any breeding pairs in Section 1 or 1a, the closest sections to the harbour. They are a challenging species to census, especially on Ireland's Eye, as breeding sites are obscured under boulder fields just south of the stack on the northeast side of the island and sub-colonies on the north coast are situated low on the cliffs. As such, interpreting population trends based on the count data is problematic, which combined with the tendency for breeding shags to be susceptible to wrecks, adds to the uncertainty. Nevertheless, it appears that breeding numbers on Ireland's Eye have been increasing since 2007 (64 AONs), with 106 to 133 AONs (plus 20 hidden nests) recorded in 2019.

The closest shag breeding site to Howth Harbour is on Ireland's Eye at a distance of *c.* 1.6 km, and therefore, breeding sites for this species will not be directly impacted by disturbance factors resulting from proposed dredging works within the harbour.

4.2.2.4 Gannet

Ireland's Eye supported the east coast's only gannetry until 2007, when breeding was confirmed on Lambay, and is now one of only six gannet colonies in Ireland. Gannets colonised the sea stack in the late 1980s and numbers expanded rapidly, with 142 AONs recorded in 1999. By 2001 the colony had swelled to 202 AONs and a count in 2005 recorded further increases with the recruitment of an additional 111 AONs. The population increase for this colony was exceptionally high between 1999 (149 AONs) and 2005 (313 AONs) exhibiting an averaged growth rate of 18 % per annum. To sustain this rate of growth birds must be recruiting to Ireland's Eye from other colonies (see discussion in Mitchell *et al.* 2004). The 375 AONs recorded in 2007 represented a slowing in the average growth rate for this colony to about 10 % per annum. In the early 2000's gannets started breeding on the cliffs of the main island adjacent to the stack, and the colonisation of Lambay by gannets in 2006 may have been facilitated by the Ireland's Eye gannetry nearing carrying capacity in terms of space for new nest sites. The counts for this project conducted in 2019 continued to demonstrate significant growth at this colony with 809 AONs and 849 AONs recorded on dates on 28-May-19 and 05-Jul-19 respectively. There was a large number of birds recorded on the mainland cliff and a proportion of these could possibly have been holding trace nests (possibly young birds) rather than AONs; however, from boat-based counts (looking up) it was not always easy to determine the status of nests. Interestingly, counts from 2015 (Seabird 4 - national seabird monitoring programme) place breeding numbers remarkably similar to those recorded in 2007, with 350 AONs recorded.

The gannetry on Ireland's Eye is *c.* 1.7 km from Howth Harbour and therefore this breeding colony will not be directly impacted by disturbance factoring resulting from proposed dredging works within the harbour.

4.2.2.5 Herring gull ¥

Relatively few herring gulls nest on the Howth Head cliffs, with significantly higher numbers recorded on Ireland's Eye. The island's herring gull colony recorded drastic reductions in numbers between *Operation Seafarer 1969-70* (*c.*1,250 pairs) and the *SCR Census 1985-88* (540 AOTs), with further declines observed by *Seabird 2000* when 246 AOTs were recorded in 1999. Due to the severe decline of Irish herring gulls over this period the population was added to the Red list as a Bird of Conservation Concern in Ireland (Newton *et al.*, 1999 and Lynas *et al.*, 2007)[11, 12] and has remained Red listed (Colhoun & Cummins, 2013)[13]. Since *Seabird 2000* and up until 2006, a combination of flush counts and rapid assessments generated estimates of between *c.*135 and 150 pairs. The 2007 census recorded 217 AOTs suggesting that the number of herring gulls breeding on Ireland's Eye has increased slightly since the period of decline from 1969-70 to 2006. Counts in 2015 (318 AOTs) and 2019 (484 AOTs) show continued population increase.

Interestingly, no roof nesting gulls were recorded during surveys of the harbour in 2019 and the closest herring gull breeding site to Howth Harbour is on Thulla (Ireland's Eye) at a distance of *c.* 0.9 km, therefore breeding sites for this species will not be directly impacted by disturbance factors resulting from proposed dredging works within the harbour.

4.2.2.6 Lesser black-backed gull

There have never been any breeding attempts by lesser black-backed gulls documented for Howth Head. In the past, breeding pairs have been more numerous on Ireland's Eye, with 21 pairs and 12 pairs recorded in 1986 and 1991 respectively. In 1999 only one pair was recorded, so the four AOTs recorded in 2007 represented a slight increase from the last available records. Only 2 AOT were recorded in 2015, however in 2019 there was a higher count with 7 AOT recorded. Because lesser black-backed gulls prefer to nest in areas adjacent to dense cover or areas with longer swards, the thick stands of bracken on Ireland's Eye do not offer any open spaces and this may be limiting the availability of nesting areas for this species. Merne & Madden (2000) also suggest that the large lesser black-backed gull colony on Lambay may be attracting potential recruits away from Ireland's Eye.

The closest lesser black-backed breeding site to Howth Harbour is on Ireland's Eye at a distance of *c.* 1.2 km and, therefore breeding sites for this species will not be directly impacted by disturbance factors resulting from proposed dredging works within the harbour.

4.2.2.7 Great black-backed gull

The great black-backed gull population on Ireland's Eye grew between 1986 when the *SCR Census* recorded 65 AONs and *Seabird 2000* when 90 AONs were reported (Mitchell *et al.* 2004). Counts in 2001 give an estimate of 110 pairs and by 2004 151 pairs were recorded. Further increases were detected in 2007 when the island was estimated to hold 189 pairs. More recent counts in 2016 (154 AOT) and 2019 (134 AOT) suggest that numbers are declining. It is interesting to note that numbers of breeding great black-backed gull may mirror those of cormorants on Ireland's Eye, especially the colony on Thulla, with the gulls likely to benefit from valuable food sources provided by nesting cormorants including: eggs, chicks, general nest detritus, pirated food items and carcasses.

---

[11] Newton, S., Donaghy, A., Allen, D. & Gibbons, D. 1999. Birds of conservation concern in Ireland. *Irish Birds* 6: 333-344

[12] Lynas, P., Newton, S.F. & Robinson, J.A. 2007. The status of birds in Ireland: an analysis of conservation concern. *Irish Birds* 8: 149- 166.

[13] Colhoun K. & Cummins, S. 2013 Birds of Conservation Concern in Ireland 2014-19. *Irish Birds* 9:523-544

Breeding great black-backed gulls on Ireland's Eye are distributed over the northern third of the island from The Steer to the eastern cliffs where they were more abundant that herring gulls. Great black-backed gulls tended to show a preference for the rocky outcrops and areas with short vegetation, with single territories being held on the Martello Tower and the ruined church. Particularly high breeding density was noted on the most north-easterly rocky outcrop. No breeding was recorded from south of Samper Hole to the narrow inlet on the northern side of the promontory leading to the Thulla Rock. A few pairs nest around Thulla Rock with good numbers recorded on Thulla. Therefore, the closest great black-blacked breeding sites on Thulla are *c.* 0.9 km from Howth Harbour and will not be directly impacted by disturbance factors resulting from proposed dredging works within the harbour.

4.2.2.8 Kittiwake ¥ †

Kittiwake are the only species listed as a Qualifying Interest (QI) of the Howth Head SPA and are also a QI for Ireland's Eye SPA.

In 2019 a whole colony count was not conducted for all the count sections covering the Howth Head peninsula, as it was considered appropriate to only survey the count sections closest to the proposed development, including Count Sections HH1a, HH1 and HH2. As shown in Figure 5, these count sections cover the northern coast of the peninsula, around the Nose of Howth to Casana Rocks and **Table 4** provides comparative data for the 2019 counts, with survey data from 1999, 2007 and 2015. The most recent whole colony count for the Howth Head SPA was undertaken in 2015, as part of the national seabird monitoring programme (*Seabird 4*). Combined land-based and boat-based counts conducted in 2015 provided a population estimate of 1,683 AONs (trace: 74), with land-based counts alone generating 1,773 AONs. Interestingly, this count places the numbers at a similar level to the 1,770 AONs recorded during the *SCR Census 1985-88*. However, the 2015 counts represent a significant drop in breeding numbers since *Seabird 2000* (2,269 AONs in 1999) and an interim colony count conducted in 2007 (2,612 AONs, trace: 253, hidden: 120).

For kittiwakes breeding on Ireland's Eye the interim colony census in 2007 counted a total of 533 AONs (plus *c.* 80-100 hidden). This represented a decline in numbers from the 1990's, when counts ranged from 938 to 1,136 AONs and the breeding population appeared to be relatively stable (Merne & Madden, 2000). Numbers remained high up to 2004, when 1,016 AONs were recorded and the 2007 count represented a decline of approximately 38 % since 2004. The reason for this decline is unknown; but it may result from the interchange of birds with nearby colonies on Howth Head and Lambay. Counts in 2015 (459 AONs) and 2019 (475 AONs, plus Trace: 39) are suggestive of further population decline post-2007, however this appears to have bottomed out, with similar numbers recorded in 2015 and 2019.

The closest kittwake colony to the proposed development is located on Howth Head and is *c.* 0.7 km from the harbour, with the closest colonies on Ireland's Eye located *c.* 1.6 km away. Therefore, kittiwake breeding colony sites will not be directly impacted by disturbance factors resulting from proposed dredging works within the harbour.

4.2.2.9 Common guillemot ¥

Common guillemot is listed as a Qualifying Interest of the Ireland's Eye SPA and sub-colonies are distributed from the cliffs west of Seal's Cave on the north coast to the inlet north of Rowan Rocks on the east coast of the island. Numbers appear to have increased substantially since a count of 700 individuals was recorded in 1969 during Operation Seafarer and have consistently exceeded 2,000 individuals since 1995, with a range over the 1990's of 1,498 to 2,468 individuals recorded (Merne & Madden, 2000). The population peaked in 2004 when 3,568 individuals were recorded and the interim census in 2007 represented for this species on Ireland's Eye with 2,341 individuals recorded (- 34 %). The drop in numbers may have resulted from adult mortality prior to the 2007 breeding season caused by an oil spill

off the Dorset coast (the Napoli January 2007 – see Grantham & Newson, 2007). Common guillemots, as a species that forms large congregation over the winter is a species that is particularly susceptible to mass 'wrecks' (Grantham 2004 & Mitchell *et al.* 2004). Counts in 2015 (4,410 ind.) represent an all-time peak count for the colony; however, counts in 2019 (1,194 to 2,116 ind.) saw numbers return to levels more regularly recorded by previous surveys.

Guillemot numbers are relatively low for the count sections on Howth Head surveyed in 2019 (HH1a, HH1 and HH2), with numbers ranging from 410 ind. (1999) to 371 ind. (2015). However, in 2019 counts detected significantly higher numbers (1,216 ind.) and birds were recorded in Section HH1a, where previously no birds had been recorded.

In 2019 the closest common guillemot breeding sites to the proposed dredging works were on Howth Head and are *c.* 0.7 km from the harbour, with the closest colonies on Ireland's Eye located *c.* 1.6 km away. Therefore, the locations where breeding common guillemot are found will not be impacted by disturbance factors resulting from proposed dredging works within the harbour.

4.2.2.10 Razorbill ¥

The razorbills on Ireland's Eye have a similar distribution to common guillemots and interestingly both species appeared to show parallel trends in population growth and decline. Razorbill numbers on Ireland's Eye, like common guillemots, also increased substantially from 1969 (175 ind.) to 1999 (522 ind.); with the increase continuing until 2004 when numbers peaked at 810 individuals (Merne & Madden, 2000). The 2007 count recorded a decline of 33 %, with numbers dropping to 546 individuals. Counts in 2015 (1,600 ind.) represented a substantial increase in numbers and an all-time peak count for the colony; however, counts in 2019 (686 to 774 ind.) saw number fall again; but still staying above previously recorded levels.

Numbers of razorbills are relatively low for the count sections on Howth Head surveyed in 2019 (HH1a, HH1 and HH2), with numbers ranging from 198 ind. (1999) to 145 ind. (2015). However, as documented for common guillemots (see above), in 2019 counts detected significantly higher numbers (240 and 277 ind.) and birds were recorded in Section HH1a, where previously no birds had been recorded.

In 2019 the closest razorbill breeding sites to the proposed dredging works were on Howth Head and are *c.* 0.7 km from the harbour, with the closest colonies on Ireland's Eye being located *c.* 1.6 km away. Therefore, breeding razorbill will not be directly impacted by disturbance factors resulting from proposed dredging works within the harbour.

Black guillemot

Large scale black guillemot surveys typically rely on counts of individuals in April that are recorded adjacent to suitable breeding habitat. These counts are conducted prior to the nesting period when birds are more conspicuous. Counts later in the breeding season, once birds are incubating, are likely to underestimate the numbers of birds. A count of individuals was conducted at Howth harbour in early May, which was considered acceptable, as further observations suggested that 2019 was a late breeding season for black guillemots at this colony. The 2019 pre-breeding season surveys generated a count of 10 individuals, which is slightly higher than the 7 individuals recorded in 1998. Counts for Ireland's Eye and the Howth Head peninsula in 1998, recorded 15 and 46 individuals respectively. Prior to 2019, comparative pre-breeding season counts were undertaken for these sections in 2017/18; however, results have not been published to date, as counts for some stretches of coastline are still ongoing (up until 2020).

Given the nature of the works within the harbour, further surveys were conducted through the 2019 breeding season to pin point nest sites and these surveys found 3 to 4 pairs within the harbour walls and

1 to 2 pairs in buildings facing onto the proposed spoil deposition area. The locations of these sites are shown in **Appendix IV**. Further consideration must be given within the phasing of this project to avoid these nest sites while the birds are actively nesting.

4.2.2.11 Puffin

The puffin colony on Ireland's Eye, although small, is one of a very few breeding locations for this species on the east coast. In 1939 the breeding population was estimated at *c.* 1,000 pairs and this estimate is considerably higher than any recorded since the 1960's when counts never recorded more than 17 individuals (Merne & Madden 2000), until after 2000 when up to 24 birds have been observed. In 2007 Oscar Merne located a compact colony of at least 20 pairs (possibly up to 30) at the bottom of a steep vegetated slope below the highest cliff on the north side of the island and counted several more isolated sites along on the north cliffs. Merne estimated that 25-35 pairs of puffins bred on Ireland's Eye in 2007; but acknowledges that population estimates would be improved by evening counts. Merne & Madden (2000) suggest that puffin numbers on Ireland's Eye are probably affected by brown rats and great black-backed gull predation. In 2015 dusk counts recorded 131 individuals and this remains the best contemporary measure of puffin activity at this colony. No dusk counts were undertaken in 2019 and only 3 individuals were recorded.

The puffin colonies on the north coast of Ireland's Eye are *c.* 1.6 km from Howth Harbour and therefore this will not be directly impacted by disturbance resulting from the proposed dredging works within the harbour.

Table 3 Breeding seabird numbers for Island's Eye

Species	Count unit	Seabird 2000 1999	2004	2005	2007	Seabird 4 2015	2019
Northern fulmar ***Fulmarus glacialis***	AOS	70			55	91	49 to 56
Northern gannet ***Morus bassanus***	AON	188		313	375	350	809 to 845
Great cormorant ¥ ***Phalacrocorax carbo***	AON	306		571	651	424	426
European shag ***Phalacrocorax aristotelis***	AON	32	65		64	81	106 to 133 (+20 hidden)
Lesser back-backed gull ***Larus fuscus***	AOT	1			4	2	7
Herring gull ¥ ***Larus argentatus***	AOT	*c.* 250	*c.* 135 to 150		217	318	484
Great black-backed gull ***Larus marinus***	AOT	*c.* 100	*c.* 151		185	154	134
Black-legged kittiwake ¥ ***Rissa tridactyla***	AON	941	1,016		633	459	475 (+39 trace)
Common guillemot ¥ ***Uria aalge***	Ind.	2,191	3,568		2,341	4,410	1,994 to 2,116
Razorbill ¥ ***Alca torda***	Ind.	522	818		546	1,600	628 to 774
Black guillemot* ***Cepphus grylle***	Ind.	15			10	2	3
Atlantic puffin ***Fratercula arctica***	Ind.	4			25 to 35	131	3

AOS = Apparently occupied site AON = Apparently occupied nest AOT = Apparently occupied territory
Ind.= Individuals
Tr. = Trace = trace nest = bird/ pair holding territory but nest poorly built
Hidden = oov (out of view) = estimate of the number of birds/ territories/ sites/ nests hidden from view
¥ = Qualifying Interest of Ireland's Eye SPA
*Note: Black guillemot counts reported in Seabird 2000 were undertaken for Ireland's Eye in April 1998 and these represent the only count conducted within the prescribed pre-breeding season survey window, until the national Black Guillemot Census was repeated in 2017/18 (final report pending). The 2007, 2015 and 2019 black guillemot counts reported were not generated by pre-breeding season surveys.

Table 4 Breeding seabird number for selected count sections covering Howth Head

Species	Count unit	Count section	Seabird 2000 1999	2007	Seabird 4 2015	2019
Northern fulmar ***Fulmarus glacialis***	AOS	HH1a			1	
		HH1	3		2	4
		HH2	2	10	4	10
European shag ***Phalacrocorax aristotelis***	AON	HH1a				
		HH1				1
		HH2		1	5	9
Herring gull ***Larus argentatus***	AOT	HH1a				
		HH1	4	2		
		HH2	1	3		
Great black-backed gull ***Larus marinus***	AOT	HH1a				
		HH1	1	0		
		HH2	1	1		
Black-legged kittiwake † ***Rissa tridactyla***	AON	HH1a		*	168	412
		HH1	176	279 Tr.27, oov.10	301	330
		HH2	1,113 oov.20	1,347 Tr.101, oov.35	823 to 870 Tr.35	467
Common guillemot ***Uria aalge***	Ind.	HH1a		*		33 to 88
		HH1	8	14	??	261
		HH2	402	376 oov.50	284 to 371	867
Razorbill ***Alca torda***	Ind.	HH1a		*		53 to 90
		HH1	20	28	28	103
		HH2	178	106 oov.50	63 to 117	84

AOS = Apparently occupied site, AON = Apparently occupied nest, AOT = Apparently occupied territory, Ind.= Individuals
Tr. = Trace = trace nest = bird/ pair holding territory but nest poorly built
Hidden = oov (out of view) = estimate of the number of birds/ territories/ sites/ nests hidden from view
*combined count for Section HH1a and Section HH1
Note counts in for Section HH1a and Section HH1a in Seabird 2000, 2007 and Seabird 4 were land-based counts; therefore, numbers of would be considered underestimates. Counts for this section in 2019 were boat-based and therefore would have covered area not visible for land. FOR BLACK GUILLEMOT counts see species account
† = Qualifying interest of the Howth Head SPA

4.2.3 Breeding season HT/LT bird usage

Numbers of birds foraging and roosting within the study area were not considered to be significant over the breeding season (i.e. no nationally / internationally important numbers of birds were recorded within the study area during the breeding season). Annex I bird species and those which are considered to be Birds of Conservation Concern (Colhoun K. & Cummins, S. 2013) are shown in **Table 5** and **Table 6** below.

4.2.3.1 Breeding seabirds

Typically, species of breeding seabirds noted as QIs of the nearby SPAs – Howth Head SPA (kittiwake) and Ireland's Eye (cormorant, herring gull, kittiwake, common guillemot and razorbill) were recorded in association with breeding colonies removed from the harbour. The exception was herring gulls, which foraged around the harbour with up to c. 300 birds recorded. While many of these birds were sub-adult, some would be linked to breeding sites on Ireland's Eye. Likewise, great black-backed gulls (not a QI species) were also consistently recorded utilising the harbour for foraging and loafing, with some these birds probably linked to nest sites on Ireland's Eye.

The other QI gull species recorded, included kittiwakes which were occasionally recorded foraging off the harbour. However, the majority of the records were dominated by birds returning to breeding colonies or actually counted on colonies, including the stack of Ireland's Eye or the cliffs of sub-section HH1a on Howth Head. Small numbers of black-headed gulls (< 5 birds) were recorded in the area during the August counts.

Cormorant and shag were recorded foraging around the harbour in small numbers, with very small numbers recorded within the harbour (occasional 1 or 2 birds) and these were usually birds roosting on the harbour walls.

No tern species were recorded breeding in the vicinity of the harbour and usage was correspondingly low. There was a small peak in usage detected in August when sandwich terns were recorded roosting and foraging offshore. A distant flock, thought to be sandwich terns was recorded as unidentified tern species.

As noted above, any of the larger numbers of razorbills and common guillemots recorded were associating with colonies on Ireland's Eye and Howth Head. Likewise, most of the gannet records were associated with the breeding colony on Ireland's Eye, with only small numbers (< 50 birds) occasionally recorded foraging around the harbour, which would be considered as exceptionally low usage considering that *c.* 800 AONs were recorded on the island.

Black guillemots were the only seabird breeding within the harbour, and foraging and loafing birds were recorded during all of the breeding season counts, except for August. The highest numbers were recorded within Section 1 (harbour) were up to six birds were recorded.

4.2.3.2 Waders

No wader species were recorded nesting in the vicinity of Howth Harbour during the 2019 breeding season. The closest breeding wader sites are oystercatchers and ring plovers attempting to breed on Ireland's Eye. Oystercatchers were the only wader species recorded in the vicinity of harbour throughout the breeding season and these were recorded in very small numbers, with counts of only 8 birds, until August when 16 birds were recorded. As shown in **Table 5** and **Table 6**, only small numbers of other wading species were recorded including: curlew (8 birds in August), greenshank (1 bird in May), purple sandpiper (2 birds in August), redshank (2 birds in August), turnstone (2 birds in August). All were recorded early in the breeding season (06-May) or later in the season post-breeding (19-Aug).

4.2.3.3 Other waterbirds

Herons were recorded (1 to 4 birds) within and adjacent to the harbour throughout the breeding season and it is likely that there was a small heronry in the general area (probably at the nearby Deerpark woodlands). Shelduck and mallard were also recoded in small numbers, with shelduck thought to breeding on Ireland's Eye.

Table 5 LOW TIDE waterbird counts conducted at Howth Harbour and surrounding area - BREEDING SEASON 2019

Date		06-May-2019				27-May-2019				17-Jun-2019				19-Aug-2019			
Section		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
BTO (Annex I)	Common Name																
BH	Black-headed gull													3	2	1	
CA	Cormorant		1	2	78	1	5		19				14				
CU	Curlew														8		
F.	Fulmar								3				6				
GB	Great black-backed gull	11	14		2		51	6	22	37	11	2	10	15	109	2	5
GU	Common Guillemot			5	193			1	70			4	60				
GU/RA	Common Guillemot / Razorbill						0										20
GX	Gannet		1	2	24		11		42				7		22	2	0
H.	Grey heron	4				1	1			1				2	3		
HG	Herring gull	86	125	3	64	8	85	17	91	115	32	2	29	102	314		3
KI	Kittiwake				182		20		212				217				
LB	Lesser black-backed gull						4										
MA	Mallard	2					2			2							
OC	Oystercatcher		2				5		2		8	1		1	16		
PS	Purple sandpiper													2			
RA	Razorbill				9				51				25		8	2	
RK	Redshank													2			
SA	Shag		3		15				6		2		10		56	3	9
SU	Shelduck						2										
TE (A1)	Sandwich tern						1							1	21	3	2
Tern spp. (A1)	Tern species														95		0
TT	Turnstone													2			
TY	Black guillemot		1	1		5		5		4	1	1	1				

Table 6 HIGH TIDE waterbird counts conducted at Howth Harbour and surrounding area - BREEDING SEASON 2019

Date		06-May-2019				27-May-2019				17-Jun-2019			
Section		1	2	3	4	1	2	3	4	1	2	3	4
BTO (Annex I)	Common Name												
CA (A1)	Cormorant		3		4				18			2	18
CN	Common Tern		1										
CS	Common Sandpiper		1										
F.	Fulmar				8				7				6
GB	Great black-backed gull	22	1		2	22	5	1	5	38	1	16	43
GK	Greenshank		1										
GU	Common Guillemot		1	1	155		2	3	39				159
GX	Gannet				47		1		18				14
H.	Grey heron	2				2				2			
HG	Herring gull	78	3		52	105	22	4	24	180	1	3	22
KI	Kittiwake				266			2	218				209
MA	Mallard					1							
RA	Razorbill				4				13				42
SA	Shag		1	4	11	1	1	1	4			1	20
TE (A1)	Sandwich tern		3							2			
TY	Black guillemot		6	3	1	4	1	1	1	6	2	1	

4.2.4 Non-breeding season HT/LT bird usage

The following sections highlight the main findings for the low tide and high tide counts recorded in the two counts sections (Section 1 and Section 2) where works could potentially impact on bird distribution through short-term disturbance/ displacement and habitat alteration/ loss. For results from all four count sections please refer to **Table V-I** and **V-II** in **Appendix V. Figure V–I** in **Appendix V** illustrates notable winter roosts that were recorded at Howth Harbour in 2019 / 2020.

4.2.4.1 Divers

ND: Great northern diver
Single birds were recorded twice during separate high tide counts in January 2020, with one bird located offshore in Section 3 (off the SW of Ireland's Eye) and the other recorded foraging over the proposed deposition area in Section 2.

RH: Red-throated diver
Small numbers of red-throated divers (1 to 4 birds) were recorded during some high tide counts (x4 counts), with 2 birds recorded within the harbour (Section 1) during the count in early January and another single bird recorded at the harbour mouth in February. Foraging birds (up to 4 birds) were also recorded utilising the proposed deposition area in Section 2.

4.2.4.2 Grebes

GG: Great created grebes
Great crested grebes were recorded on both low and high tide counts in Section 2, with single birds recorded over the early winter and numbers increasing slightly over February (up to 5 birds). Great crested grebes were recorded foraging over the proposed spoil deposition area in Section 2 on two counts, with a single bird also recorded foraging at the mouth of the harbour in February.

LG: Little grebes
Little grebes were recorded within the harbour on five high tide counts over the full season, with numbers ranging from 1 to 5 birds. All records were from Section 1, with birds recorded on the western side of the inner harbour.

4.2.4.3 GX: Gannets

Gannets were not commonly recorded during surveys; however, there were periodic influxes of birds recorded at the colony on Ireland's Eye, with the most notable increases picked up during both low and high tide counts in early February, when flocks numbering 150 to 175 birds were recorded, and 70 birds were recorded in January.

4.2.4.4 CA: Cormorants and SA: Shags

The numbers of cormorants (CA) and shag (SA) recorded during HT/LT counts dropped off after October, when higher numbers were recorded on Thulla (Islet off Ireland's Eye). As some of the observations were relatively distant, especially those on Thulla, a combined CA/SA category was used to count cormorants or shags that could not be distinguished. In terms of the proposed development, activity of shags and cormorants was low within the harbour (Section 1), with only up to 5 birds recorded, and birds were typically recorded loafing on harbour walls. Likewise, recorded usage of Section 2 was low with only up to 5 birds. Occasionally birds were recorded foraging over the proposed spoil deposition area.

4.2.4.5 Herons

ET: Little egret
Little egret was only recorded on 26-Nov-19 during a low tide count, with a single bird picked up in Section 1, foraging along the eastern harbour wall in the Moorings.

H: Grey heron
Heron were regularly recorded throughout winter with a maximum number of 11 birds recorded. Birds were often loafing around the fish processing plant in Section 1 on the roofs of building and were also recorded foraging or roosting with the harbour. In Section 2 herons were occasionally recorded loafing at the southwest tip of the proposed spoil deposition area.

4.2.4.6 Swan, geese, ducks and sawbills

MS: Mute swan
Mute swans have only been recorded once during the winter, when 10 birds were recorded in early February in Section 1 (5 birds) and Section 3 (5 birds). However, this was likely to be the same 5 birds, initially picked up commuting through Section 3 and then later recorded foraging in Section 1, just off the Marina.

PB: Pale-bellied brent goose
Small numbers of brent geese (5 to 50 birds) were recorded within Section 1, with a flock regularly foraging on the small triangle of amenity grassland adjacent to the eastern seawall. Birds were also recorded within the Moorings, Marina and along the harbour wall of the Marina approach channel. In Section 2, small numbers of brent geese were occasionally recorded forging at the southwestern tip of the proposed spoil deposition area. All the records attributed to Section 3 were birds foraging on Ireland's Eye or the islet of Thulla.

SU: Shelduck
On the second January visit (21-Jan-2020) a small flock of shelduck (13 to 14 birds) were recorded in Section 3 on both low and high tide counts, with 9 birds, then 3 birds recorded on the subsequent visits in February. Shelduck records were all attributed to birds recorded on Ireland's Eye.

MA: Mallard
Mallard were only recorded once (2 birds) during HT/LT counts in 2019-20.

RM: Red-breasted merganser
Red-breasted merganser were only recorded twice during the HT/LT counts, with all records generated from Section 2 where between 2 and 8 birds were foraging. The foraging areas were directly adjacent to the proposed spoil deposition area.

4.2.4.7 Waders

BA: Bar-tailed godwit
Only a single bird recorded once in Section 2.

CU: Curlew
Small flocks (1 to 26 birds) of curlew were recorded during low tide counts in Section 2. Foraging birds were recorded on intertidal sands west of the harbour wall, with records ranging from 30 m to 700 m from the proposed deposition area adjacent to the western harbour wall. There was only a single bird recorded once during high tide counts, roosting on southwestern corner of the proposed spoil deposition area.

DN: Dunlin

Only a small number of dunlin were recorded (2 to 10 birds) during four high tide counts, twice roosting with ringed plover on western harbour wall (x 2 birds on both occasions) and twice roosting in Section 3 on the outer part of the seawall. The roost on the western seawall is located on the northern tip of the proposed spoil deposition area.

GK: Greenshank

Generally, this species is recorded in small numbers, and therefore, frequency of use for an area can provide a better measure of relative importance rather than the numbers birds recorded. At Howth Harbour, single greenshanks were only recorded four times during high tide counts. All four observations were in Section 2 with birds roosting at the southwestern tip of the proposed deposition area.

OC: Oystercatcher

Oystercatchers were one of the more commonly recorded and widely distributed wading bird species observed during the 2019-20 HT/LT counts. They were recorded in all count sections, including Section 1 (inner harbour) although infrequently and only in small numbers (< 3 birds). Small numbers (1 to 5 birds) were also recorded in Section 4, although more consistently than in Section 1. While the largest flock was recorded in Section 3 (39 birds) these were birds recorded on Ireland's Eye. The most consistently utilised area was Section 2 with oystercatchers recorded during both high tide (5 to 22 birds) and low tide counts (3 to 18 birds). Oystercatchers recorded in Section 2 were recorded utilising the proposed deposition area to forage and were recorded roosting at the southwestern tip of the proposed spoil deposition area. Based on cumulative counts for all four count sections (although subject to the risk of birds being double counted) it is estimated that that Howth Harbour and environs support a maximum of 40 oystercatcher over the winter (including birds recorded on Ireland's Eye).

PS: Purple sandpiper

At Howth Harbour purple sandpiper are a species that utilise the outer seawalls of the harbour, foraging along the intertidal zone. Section 3 generated the most consistent numbers with 1 to 11 birds recorded (Note: Nationally important numbers for this species is 20+, so these numbers are significant). Purple sandpipers were only recorded in Section 2 and Section 4 once during the count period. In December a single purple sandpiper was recorded foraging amongst the roosting ringed plover at the northern tip of the proposed spoil deposition area.

RK: Redshank

Redshank were a commonly observed wader during the surveys. Utilisation of Section 1 (inner harbour) included small numbers of birds (2 to 6 birds) over low tide foraging on exposed mud in the southeast corner of the harbour and the area backing the Marina. During high tide there were several small redshank roosts in Section 1, including the inner harbour wall between the Marina and the approach channel, which supported up to 22 birds, and the mid-harbour wall, which supported up to 17 birds distributed along the wall. Usage of Section 2 was limited with only two observations of birds foraging on the intertidal sands, relatively far removed from the proposed deposition area. Low usage was also recorded in Section 3 and Section 4, with 2 to 3 birds recorded foraging along the outer seawall of the harbour.

RP: Ringed plover

Ringed plover was the most numerous species of wader recorded, with combined counts ranging from 20 to 157 birds (on 07-Dec-2020 counts of 157 and 115 birds in Section 1 and Section 3, respectively were considered to be same flock, likewise birds recorded in Section 1 and Section 2 on 26-Nov-2019 were duplicate counts). Ringed plovers were only recorded during the hightide period and this was related to birds utilising the outer walls of the harbour as high tide roost locations. One of the roosts was located on

the eastern seawall and is therefore removed from proposed works. The other roost location is on the western seawall near the mouth of the harbour and at the northern tip of the proposed spoil deposition area. The ring plover utilising these roosts are likely to be associated with the nearby Baldoyle Bay SPA for which this species is a Qualifying Interest (QI).

SS: Sanderling
There was only one record of sanderling during the surveys, with a single bird picked up roosting with ringed plover on the western seawall in Section 2, just north of the proposed spoil deposition area.

TT: Turnstone
Turnstone are a species that specialises in foraging over rocky shores in the intertidal zone, including rock armouring on harbours like those available at Howth. As would be expected with high tides pushing birds up on the tideline, more turnstones were recorded during high tide counts (3 to 66 birds), than during low tide counts (1 to 8 birds). Elevated numbers during high tide was mainly as a result of birds being detected at several small roosts, including: the southwest and northern tip of the proposed spoil deposition area (Section 2), the mid-harbour wall, and the low inner harbour wall between the marina and the approach channel (Section 1). The outer harbour walls/ rock armour of Section 3 and Section 4 recorded less usage, with turnstone only being recorded twice in Section 4 (3 to 4 birds). Overall it is estimated that Howth Harbour supports up to 70 turnstones over the winter period (Note: Nationally important numbers for this species are 95+ and it is listed as a QI for North Bull Island SPA).

4.2.4.8 Gulls

HG: Herring gulls
Herring gulls were the most numerous bird species recorded in the environs of Howth Harbour and it was estimated that at times during the winter up to 700 birds were present, if including birds recorded offshore and on Ireland's Eye, although c. 400 birds would be more common. During high tide counts, the highest numbers were consistently recorded in Section 1 (92 to 245 birds) and this was associated with birds flying around the harbour, roosting on the roofs of buildings within the harbour, and utilising the amenity grasslands adjacent to the harbour. Birds are attracted to the fish landing and processing activities in the area, with the roofs providing a convenient roosting spot with commanding views over the harbour and surrounding waters. This is a red listed species and it is listed as a QI for Ireland's Eye SPA.

GB: Great black-backed gulls
Great black-backed gull showed similar distributional habitats to herring gulls with the main attraction being the activities associated with the commercial fishery at Howth. As would be expected great black-backed gull counts were lower than those for herring gulls, with numbers ranging from 3 to 79 birds during high tide counts and 3 to 142 birds during low tide counts.

CM: Common gulls
Common gulls were only noted four times during HT/LT counts over winter 2019-20, with only 1 or 2 birds recorded by each observation.

BH: Black-headed gulls
Generally, high tide and low tide usage of the area by black-headed gulls appeared to be broadly similar with relatively small numbers (< 30 birds) being picked up across all the count sections and birds appeared to be foraging and roosting opportunistically. The highest count of 42 birds was recorded in Section 4 during the October count and was a flock roosting to the south of the harbour, just before the start of the Howth cliffs.

4.2.4.9 Auks

TY: Black guillemots

Over winter 2019-20 (October to February inclusive – March results pending) no black guillemots were recorded during the low tide counts in any of the count sections (Sections 1 to 4); and while birds were recorded over the high tide counts in late October, there were no black guillemots recorded over subsequent counts until late January. These counts indicate that black guillemots are dispersing away from Howth Harbour for extended periods during the winter and there is a period between early November and mid-January when no birds were recorded. Black guillemots are reported to remain close to breeding colonies over the winter and it is possible that Howth birds maintain a contact with the harbour throughout the winter, possibly returning to these more sheltered, intertidal waters during rougher sea conditions. The HT/LT counts typically targeted survey days offering calmer sea conditions when black guillemots would be able to forage further afield.

Other auk species

Small numbers (< 4 birds) of common guillemot (GU) and razorbill (RA) were recorded offshore and occasionally within the harbour (Section 1) throughout the LT/HT counts. The count in early February 2020 detected an influx of auk species (GU/RA) in the waters off Ireland's Eye during both low and high tide counts, with c. 260 birds recorded mainly in Section 3, and a high proportion of these birds were associated with the nest cliffs on the island.

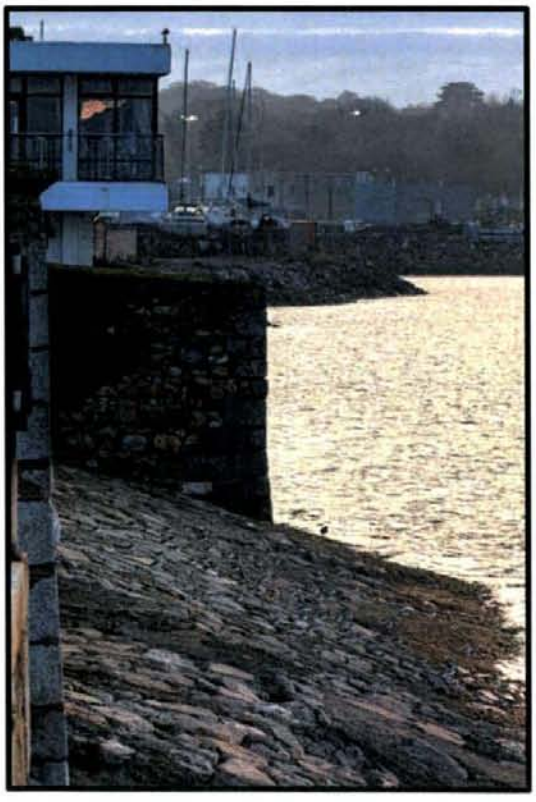


Plate 5a: The ringed plover *Charadrius hiaticula* roost on West Pier (Photo courtesy of John Fox)

Table 7: Winter bird usage mapping - species list, max count per section, average number of birds counted per section: LOW TIDE

Low tide		Max no of birds present				Mean			
Species code	**Species name**	**Section 1**	**Section 2**	**Section 3**	**Section 4**	**Section 1**	**Section 2**	**Section 3**	**Section 4**
BA	Bar-tailed Godwit		1				1		
BH	Black-headed Gull	7	23		2	3.5	11.25		1.33
CA	Cormorant	5	5	13	14	2.25	5	15	6.8
CA/SA	Cormorant/Shag			7				6.5	
CM	Common Gull	1	3			1	2		
CU	Curlew		26				7.9		
GB	Great Black-backed Gull	26	62	52	19	11	23.1	28.25	6.8
GG	Great Crested Grebe	1	2			1	1.25		
GU/RA	Guillemot/Razorbill			250				250	
GU	Common Guillemot			1	12			1	6.5
GX	Northern Gannet			175				125	
H	Grey Heron	16	3	1	2	5.1	1.8	1	1.33
HG	Herring Gull	139	456	326	61	87.5	182.2	167.5	30.6
LE	Little Egret	1				1			
MA	Mallard	2				2			
MS	Mute Swan	5		5		5		5	
OC	Oystercatcher	13	18	9	5	3.8	11.2	3.5	2.9
PB	Brent Goose	50	18	16		17.1	18	16	
PS	Purple Sandpiper			4				2.5	
RA	Razorbill	1			51	1			51
RH	Red-throated Diver	2	2			1.5	2		
RK	Redshank	30	2	3	5	9.4	2	2	3
RM	Red-breasted Merganser		2				2		
RP	Ringed Plover	157				84			
SA	Shag	2	4	13	10	1.5	3	5.75	5.7
SU	Shelduck			13				11	
TT	Turnstone	63		9		19.3		4.75	
TY	Black Guillemot	5				2.8			

Table 8: Winter bird usage mapping - species list, max count per section, average number of birds counted per section: HIGH TIDE

High tide		Max no of birds present				Mean			
Species code	**Species name**	**Section 1**	**Section 2**	**Section 3**	**Section 4**	**Section 1**	**Section 2**	**Section 3**	**Section 4**
BH	Black-headed Gull	14	13		42	3.9	7.4		13.17
CA	Cormorant	5	2	63	6	2.3	1.33	19.2	2
CA/SA	Cormorant/Shag		2	43	12		2	20.25	11
CM	Common Gull		2	1			2	1	
CU	Curlew		1				1		
DN	Dunlin	2	2	10		2	2	6.5	
GB	Great Black-backed Gull	45	6	45	13	26.7	4.4	23.1	6.75
GG	Great Crested Grebe		4				2.33		
GK	Greenshank		1				1		
GU/RA	Guillemot/Razorbill			200				200	
GU	Common Guillemot	4	1	38	1	2.5	1	13.7	1
GX	Gannet			150	1			84	1
H	Grey Heron	14	5	1		6.5	5	1	
HG	Herring Gull	245	87	130	109	172.7	26.8	81.5	36.9
LG	Little Grebe	5				2.6			
MA	Mallard	2				2			
ND	Great Northern Diver		1	1			1	1	
OC	Oystercatcher	13	22	39	2	8	10.9	9.3	2
PB	Brent Goose	50	8	61		20.5	5.5	21	
PE	Peregrine Falcon			1				1	
PS	Purple Sandpiper		1	11**	5		1	9	5
RA	Razorbill	1		41	1	1		41	1
RH	Red-throated Diver	2	4	1		1.5	2	1	
RK	Redshank	30			3	15.9			2.5
RM	Red-breasted Merganser		8				8		
RP	Ringed Plover*	157*	133*	115		84*	72.3*	76	
SA	Shag	2	1	6	3	2	1	2.4	1.8
SS	Sanderling		1				1		

SU	Shelduck			14				8.7	
TT	Turnstone	63	33	7	2	26	10.5	4.25	2
TY	Black Guillemot	5		4		3.25		4	

*Note: ringed plover roost is at the boundary between section 1 and 2, hence counted the same birds in each section. The roost in section 3 is different from the section 1/2 roost, however was thought to support the same birds. **Nationally important numbers for this species is 120.**

**Note: Nationally important numbers for this species is 20.

Plate 6: The ringed plover *Charadrius hiaticula* roost on West Pier – includes small numbers of dunlin *Calidris alpina* (Photo courtesy of John Fox)

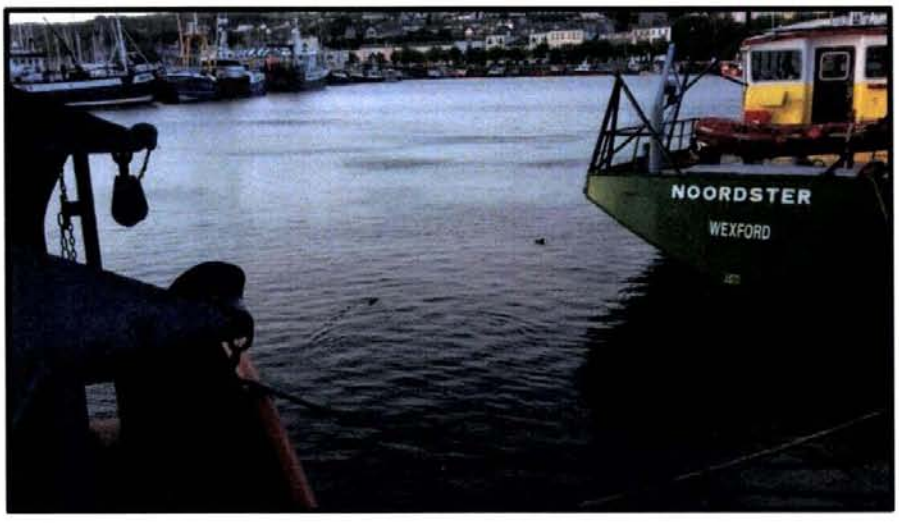


Plate 7: A pair of black guillemot *Cepphus grylle* in Howth harbour

Plate 8: A grey heron *Ardea cinerea* roosting on a building on West Pier

Plate 9: A sand martin *Riparia riparia* breeding colony to the south of East Pier

Plate 10: A sea bird colony at Howth Head SPA including kittiwake *Rissa tridactyla* and black guillemot

5 CONCLUSIONS AND GENERAL RECOMMENDATIONS

5.1 Potential impacts

The following sources of potential impacts on avian receptors were considered in relation to observed and measured bird usage of the Application Site:

- Short-term (18-24 months) disturbance factors resulting from dredging works within the harbour affecting birds and/ or prey species potentially resulting in the displacement of foraging, roosting and breeding birds;
- Short-term (18-24 months) disturbance factors resulting from spoil deposition and associated works along the outer part of the western seawall affecting birds and/ or prey species potentially resulting in the displacement of foraging, roosting and breeding birds;
- Alteration in foraging or roosting habitat within the harbour as a result of dredging works, and may have a positive impact for some species, while other species maybe displaced;
- Permanent loss of foraging and roosting habitats along the existing western seawall as a result of reclamation;
- Dredging works will result in increased sediment loads within the harbour and agitation of the substrate will release pollutants trapped in sediment. Sedimentation and pollution have the potential to impact on food sources for foraging birds and depending on toxicity, ingestion of pollutants has the potential to directly impact birds;
- Certain species (e.g. gulls and oystercatchers) will be attracted to short-term foraging opportunities provided by the works, especially the newly excavated and deposited spoil. Again, the potential toxicity of pollutants within the spoil should be considered.

Note: Structural works, such as re-pointing of masonry of harbour walls is not considered as part of this preliminary assessment for the proposed project.

5.2 Main findings

5.2.1 Bird breeding distribution within the Application Site

The general breeding bird surveys conducted throughout Howth Harbour detected notably few breeding species, which was indicative of the poor nesting cover available in this urban setting. Aside from black guillemot the only breeding species recorded within the harbour were pied wagtail (PW) - recorded as holding a territory at the mouth of the harbour and a rock pipit (RC) - recorded as holding a territory along the eastern seawall, adjacent to the Moorings. Given the existing level of activity within the harbour it is considered that the cumulative effect of disturbance resulting from dredging works will not have an effect on these two species. All the other breeding species detected including goldfinch, robin and starling, (as well as likely breeding species including blackbird and wren) were removed from the proposed works area and are highly unlikely to be impacted by the Proposal. An Irish stoat *Mustela erminea hibernica* was noted on West Pier hunting starling chicks from a nest in a building on 27th May 2020. Breeding bird locations are illustrated in **Appendix III** and **Appendix IV**.

5.2.2 Breeding seabirds

Based on breeding season surveys it was confirmed that breeding seabird colonies are sufficiently distant from the proposed dredging works, so as not to be impacted by disturbance factors emanating during the project. The closest colony on Howth Head is 0.5 km from the harbour and the closest part of the colony

on Ireland's Eye is Thulla, which is 0.9 km from the harbour. The habituation of breeding seabirds to an already busy harbour had an obvious bearing in reaching this conclusion.

The exception is black guillemots nesting within the harbour walls (3 to 4 pairs) and in buildings facing onto the proposed spoil deposition area (2 pairs). Inappropriately timed dredging and deposition works has the potential to disturb breeding black guillemots and works conducted during the breeding season could result in abandonment, depending on the phasing and intensity of the works.

In terms of nest locations, black guillemots are adaptable and if suitable alternative sites are provided as part of the reclamation works, these are likely to be colonised and therefore provide compensatory nesting habitat. There may even be positive outcomes for the species if several nesting options are provided.

5.2.3 Breeding season bird usage

Numbers of birds foraging and roosting within the study area were not considered to be significant over the breeding season (i.e. no nationally / internationally important numbers of birds were recorded within the study area during the breeding season). The issue of black guillemots breeding within the harbour and adjacent to the area of reclamation are discussed above.

5.2.4 Non-breeding season bird usage

The 12 high and low tide waterbird counts conducted over the non-breeding season (2019-20) and covering Howth Harbour and surrounding area recorded a range of species utilising habitats within the proposed dredging areas in the harbour (Section 1) and spoil deposition area (Section 2). For most species the numbers recorded and frequency of use were notably low. Given the short-term nature of the works and considering that birds currently utilising the area are already habituated to human activity within the Application Site, potential disturbance from the works was considered to have a negligible impact on foraging birds which short-term.

Dredging will deepen the harbour and as a result there will be less exposed substrate at low tide and this has the potential to displace any birds, waders in particular, that forage in this type of intertidal habitat. While there were gulls, brent geese, redshanks, turnstones and the occasional oystercatcher utilising intertidal mud within the harbour, numbers were low. Any alteration in habitat availability will not have an impact beyond displacement of a very small number of birds and would not be considered significant at anything more than a local level. In addition, the areas within the harbour recorded as being used by birds foraging at low tide will be not be directly targeted by the dredging works, specifically the south-eastern corner of the harbour (backing the Marina).

Similarly, the loss of potential foraging habitat for waterbirds that would occur as a result of reclamation along the outer section of the western pier, was considered to be of local significance, with small numbers of foraging birds permanently displaced. Over time the rock armouring would provide similar intertidal foraging habitats, both in terms of function and area. The loss of open water at high tide would be permanent, however recorded usage of this area by species of divers, grebes and sawbills was periodic and by small numbers and therefore any displacement effect of foraging birds would not be considered significant.

The 12 HT/LT waterbird counts conducted over the non-breeding season (2019-20) also identified that black guillemots are present in the harbour from February to October inclusive. The onset of the black guillemot breeding season would be considered late March, when birds start actively prospecting for nest sites and are engaged in breeding displays. Peak egg laying in black guillemot is typically around early

May, and chicks fledge around mid-July; however, breeding season phenology is known to vary between different black guillemot colonies and timing of breeding for birds at Howth Harbour has not been documented.

The magnitude of potential impact was elevated for two high tide roost sites located on the outer part of the western seawall. These roosts form at or directly adjacent to locations where spoil deposition will occur, which will result in loss of roosting features or is likely to cause the displacement of roosting birds, through short-term construction disturbance. If roosting features remain intact following dredging works, once Reclamation is completed, any inappropriate design of sea defences may result in elevated levels of disturbance to these roost locations. One high tide roost regularly forms at the northern end of the proposed spoil deposition area (moving from West Pier to East Pier as required) and the other forms around the southwestern extent of the deposition area – see **Figure V–I** in **Appendix V** which illustrates notable winter roosts that were recorded at Howth Harbour in 2019 / 2020.

The northern roost regularly supports nationally important numbers of ringed plover (> 120 birds) and these birds come specifically to roost on the harbour wall at high tide, dispersing again as soon as the tide recedes to allow foraging to resume. Ringed plovers are a Qualifying Interest of the nearby Baldoyle Bay SPA and it likely that these birds are ecologically linked to this SPA. This leads to an evaluation of this roost as nationally/ internationally important. It appears that this roost location is inter-changeable with another roost on the East Pier; however, based on occupancy levels the location on the West Pier appears to be a favoured option. The roost on the East Pier will not be impacted by disturbance from the dredging works, as the pier wall provides a barrier screening the roost from any activities within the harbour. The eastern roost was noted as being susceptible to occasional disturbance from people accessing the wall above the roost.

The high tide roost at the southwestern tip of the proposed spoil deposition area is noted as a roost location in the supporting information for the Baldoyle Bay SPA and was categorised as a roost supporting between 50 to 99 birds (NPWS, 2012). Counts over 2019-20 confirmed the occupation of this roost at high tide and found that the roost was less fixed in terms of location and birds sometimes gathered further south or actually spread more in the deposition area. This area receives periodic disturbance from walkers and dogs, which limits usage on occasion. A wider range of species utilised this roost than the one further north, although attendance was by relatively small numbers and included (max. counts reported): brent geese (10 birds - foraging), heron (2 bird), oystercatcher (22 birds), greenshank (1 bird), turnstone (33 birds), curlew (1 bird), great black-backed gull (4 birds), herring gull (72 birds), black-headed gull (10 birds). In addition, the assemblage of species at the roost was highly variable across all the counts.

6 REFERENCES

- Cairns, D.K. (1980). Nesting density, habitat structure and human disturbance as factors in black guillemot reproduction. *Wilson Bulletin*, 92, 352-361.
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. September 2018. Available at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1.pdf (Updated in September 2019).
- Colhoun, K. & Cummins, S. (2013) *Birds of Conservation Concern in Ireland 2014-19.* In: Irish Birds 9: 523-544. An updated list of priority bird species for conservation action on the Island of Ireland (RSPB NI and BirdWatch Ireland).
  Available at: https://www.birdwatchireland.ie/LinkClick.aspx?fileticket=WpxRLyul9cA%3d&tabid=178
- Furness, R.W., Wade, H.M. & Masden, E.A. (2013). Assessing vulnerability of marine bird populations to offshore wind farms. *Journal of Environmental Management*, 119, 56-66.
- Gilbert, G., Gibbons, D.W. & Evans, J. (1998). *Bird Monitoring Methods*. RSPB
- Goodship, N. & Furness, R.W. 2019. Seaweed hand-harvesting: literature review of disturbance distances and vulnerabilities of marine and coastal birds. Scottish Natural Heritage Research Report No. 1096.
- Greenwood, J.G. (2002). Nest cavity choice by black guillemots *Cepphus grylle*. *Atlantic Seabirds*, 4, 119-122.
- Jarrett, D., Cook, A.S.C.P., Woodward, I., Ross, K., Horswill, C., Dadam, D. & Humphreys, E.M. (2018). Short-term behavioural responses of wintering waterbirds to marine activity. *Scottish Marine and Freshwater Science*, 9 (7).
- Johnston, D.T., Furness, R.W., Robbins, A.M.C., Tyler, G., Taggart, M.A. & Masden, E.A. (2018). Black guillemot ecology in relation to tidal stream energy generation: an evaluation of current knowledge and information gaps. *Marine Environmental Research*, 134, 121-129.
- Lewis, L. J. & Tierney, T. D. (2014) Low tide waterbird surveys: Survey methods and guidance notes. *Irish Wildlife Manuals*. 80 NPWS, Department of Arts, Heritage and the Gaeltacht, Ireland.
- Grantham, M. J. (2004). Age structure and origins of British & Irish Guillemots *Uria aalge* recovered in recent European oil spills. *Atlantic Seabirds* 6(3/5.1.)
- Grantham, M. J. & Newson, S. E. (2007). Post-mortem analysis of bird corpses from the grounding of the *MSC Napoli*. *BTO Research Report* No 466
- Madden, B. & Merne, O.J. (2006). An Annotated List of the Birds of Ireland's Eye. *Irish East Coast Bird Report* 2002: 106-117.
- Malachy Walsh and Partners (MWP) (2020a) *Howth Harbour FHC Proposed Dredging and Reclamation Works - Natura Impact Statement.*
- Malachy Walsh and Partners (MWP) (2020b) *Howth FHC – Harbour Dredge Environmental Impact Assessment Report (EIAR).*
- Marchant, J.H. (1983). *BTO Common Bird Census Instructions*. BTO, Tring
- Marchant, J.H., Hudson, R., Carter, S.P. & Whittington, P. (1990). *Population Trends in British Breeding Birds*. BTO, Tring.
- Mendel, B., Sonntag, N., Wahl, J., Schwemmer, P., Dries, H., Guse, N., Müller, S. & Garthe, S. (2008). *Profiles of seabirds and waterbirds of the German North and Baltic Seas: Distribution, ecology and sensitivities to human activities within the marine environment*. Bundesamt für Naturschutz, Bonn - Bad Godesberg.

- Merne, O.J. & Madden, B. (2000). Breeding seabirds of Ireland's Eye, Co. Dublin. *Irish Birds* 6:495-506.
- Mitchell, I., Newton, S., Norman Ratcliffe, N. & Dunn, T.E. eds. (2004). *Seabird Populations of Britain and Ireland*. T & AD Poyser.
- National Biodiversity Data Centre 'NBDC' Biodiversity Maps – Map Viewer. Available Online at: http://maps.biodiversityireland.ie/Map
- National Roads Authority 'NRA' (Unknown) Guidelines for the Assessment of Ecological Impacts. Available Online at: http://www.tii.ie/technical-services/environment/planning/Guidelines-for-Assessment-of-Ecological-Impacts-of-National-Road-Schemes.pdf
- NPWS (2011a) Ireland's Eye Site Synopsis [Site Code: 004117] Available at: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004117.pdf
- NPWS (2011b) Howth Head Coast SPA [Site Code: 004113] Available at: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004113.pdf
- NPWS (2012) Baldoyle Bay SPA (Site Code 4016) Supporting Document – December 2012. Available at: https://www.npws.ie/sites/default/files/publications/pdf/004016_Baldoyle%20Bay%20SPA%20Supporting%20Doc_V1.pdf
- NPWS (2014a) Baldoyle Bay SPA [Site Code: 004016] Available at: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004016.pdf
- NPWS (2014b) North Bull Island SPA [Site Code: 004006] Available at: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004006.pdf
- Ronconi, R.A. & St. Clair, C.C. (2002). Management options to reduce boat disturbance on foraging black guillemots (*Cepphus grylle*) in the Bay of Fundy. *Biological Conservation*, 108, 265-271.
- Smith *et al.*, 2011. Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council, Kilkenny, Ireland. Available Online at: http://www.heritagecouncil.ie/fileadmin/user_upload/Publications/Wildlife/Habitat_Survey_Guidance/Habitat_Survey_Guidance_Hyperlinked_2.pdf
- Walsh, P.M., Halley, D.J., Harris, M.P., del Nevo, A., Sim, I.M.W., & Tasker, M.L. (1995). Seabird monitoring handbook for Britain and Ireland: A compilation of methods for survey and monitoring of breeding seabirds. Published by JNCC / RSPB / ITE / Seabird Group, Peterborough.
- Woodrow (2020) *Howth Harbour FHC Proposed Dredging and Reclamation Works – Terrestrial Habitat, Otter and Bat Survey Report 2019.*
- Valente, J.J. & Fischer, R.A. (2011). Reducing Human Disturbance to Waterbird Communities Near Corps of Engineers Projects. *DOER Technical Notes Collection*.

APPENDIX I – Baldoyle Bay SPA Roost Location Map

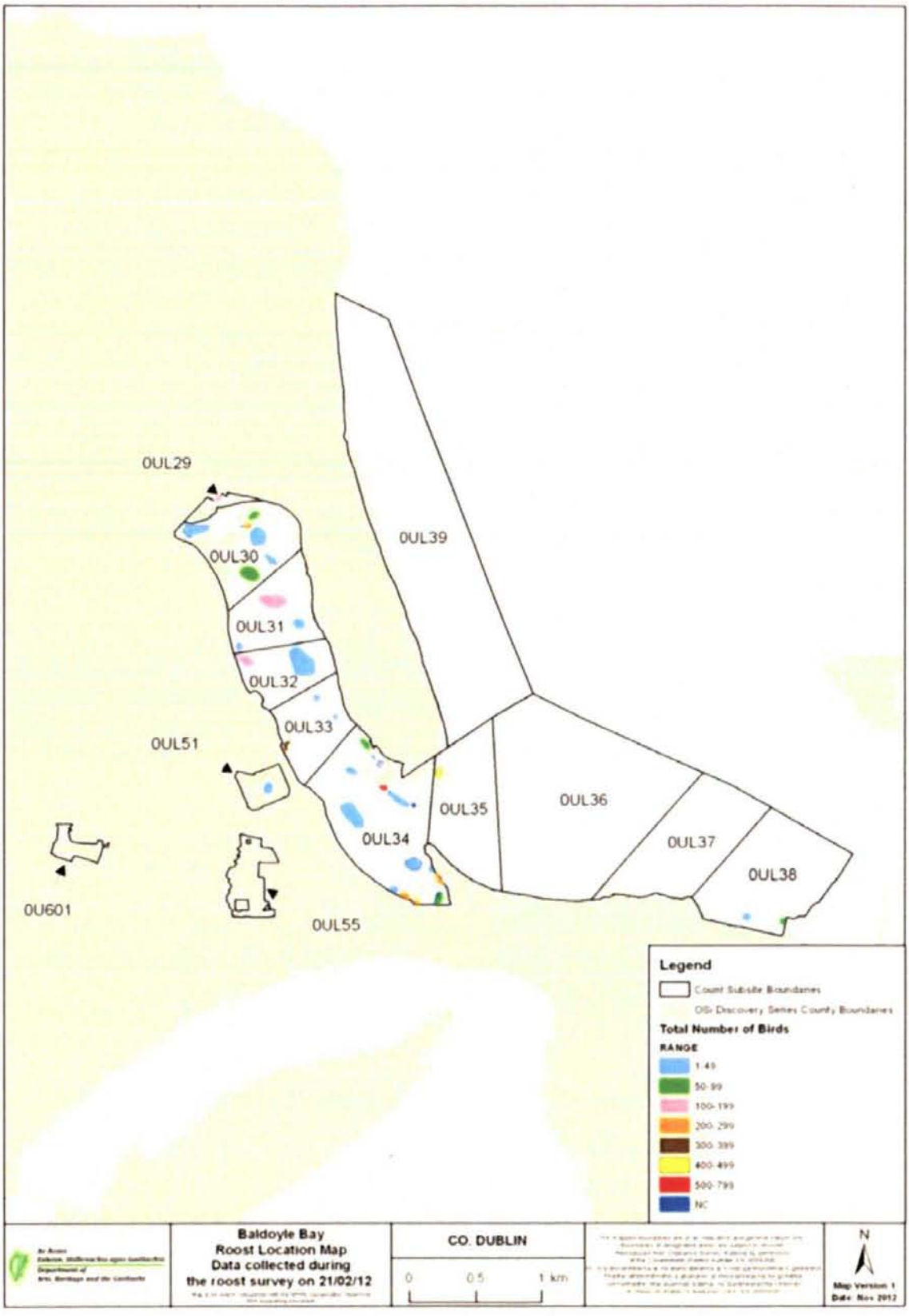


Figure V-I Roost Locations 21/02/2012 (Source: NPWS 2012)

Appendix II – I-WeBs Summary Data

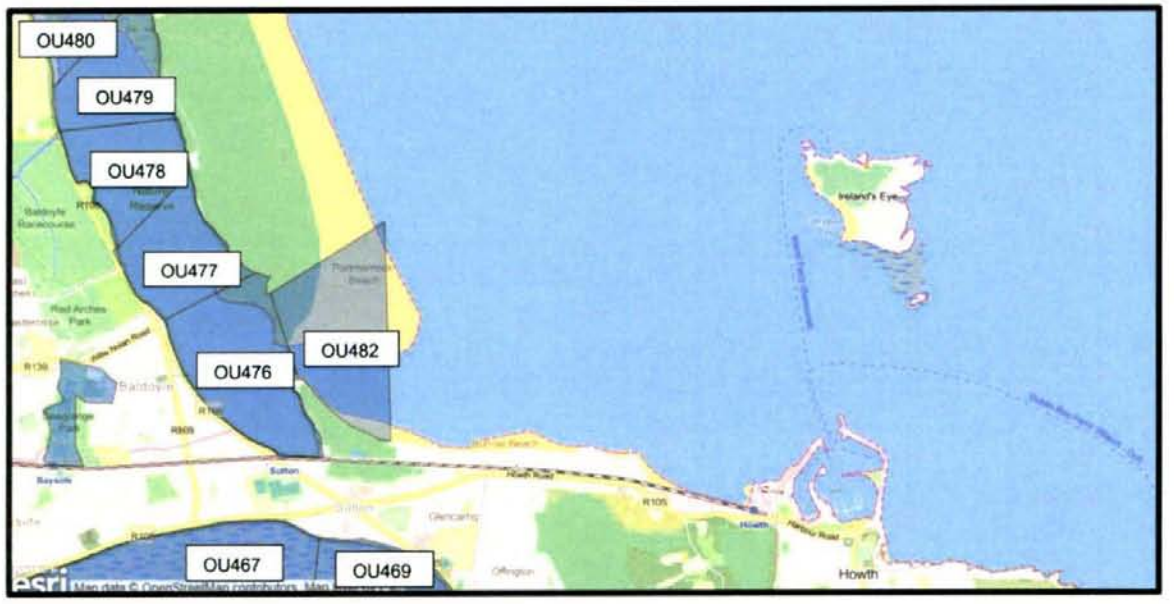


Figure VI-I – I-WeBs Coverage near Howth Harbour

(Source: https://bwi.maps.arcgis.com/apps/View/index.html?appid=1043ba01fcb74c78bc75e306eda48d3a)

Site	Species Name *QI of SPA	1% National Importance [14]	1% International Importance [15]	Year				Mean
				2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	
BALDOYLE BAY	**Bar-tailed Godwit***	170	1500	162	150	48	59	105
	Black-headed Gull			242	281	52	120	174
	Black-tailed Godwit	200	1100	389	139	296	172	249
	Common Gull			64	11	4	61	35
	Common Scoter	110	7500	16	7			6
	Cormorant	110	1200	10	4	3	4	5
	Curlew	350	7600	90	61	106	49	77
	Dunlin	460	13300	750	233	300	403	422
	Egyptian Goose					1		0
	Golden Plover*	920	9300	2500	450	2000	1200	1538
	Great Black-backed Gull			7	15	10	9	10
	Great Crested Grebe	30	6300	124	189			78
	Great Northern Diver	20	50	1	2			1
	Greenshank	20	3300	6	11	3	6	7
	Grey Heron	25	5000	5	7	7	4	6
	Grey Plover*	30	2000	55	28	8	25	29
	Herring Gull			47	91	58	112	77
	Knot	160	5300	553		19	600	293
	Lapwing	850	72300	372	300	137	392	300
	Lesser Black-backed Gull			4	18	1	1	6
	Light-bellied Brent Goose*	350	400	580	588	342	753	566
	Little Egret	20	1100	18	3	7	21	12
	Little Grebe	20	4700	1				0
	Mallard	280	53000	67	102	106	71	87
	Mute Swan	90	100			2		1
	Oystercatcher	610	8200	277	1113	219	117	432

[14] 1% of the all-Ireland population, based on the most recent estimates for Ireland, namely Burke, B., Lewis, L. J., Fitzgerald, N., Frost, T., Austin, G. & Tierney, T. D. (2018) Estimates of waterbird numbers wintering in Ireland, 2011/12 – 2015/16. Irish Birds 11, 1-12.

[15] 1% of flyway population based on AEWA (2018) AEWA Conservation Status Review 7 (CSR7) Report on the conservation status of migratory waterbirds in the agreement area. Seventh Edition. Agreement on the Conservation of African-Eurasian Migratory Waterbirds, May 2018.

Note: 1% levels have not been derived for introduced or escaped species since these are not included in the legislation regarding site designation. Sites may also be of importance if, while not supporting important concentrations of individual species, they hold large numbers of total waterbirds, e.g. a site regularly holding 20,000 or more waterbirds qualifies as internationally important by virtue of absolute.

Site	Species Name *QI of SPA	1% National Importance [14]	1% International Importance [15]	Year				Mean
				2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	
	Pintail	20	600	4	4			2
	Red-breasted Merganser	25	860	6	5	2	4	4
	Redshank	240	2400	144	152	125	96	129
	Red-throated Diver	20	3000	14	64			20
	Ringed Plover*	120	540	34	59	123	4	55
	Sanderling	85	2000	6				2
	Shag			7			1	2
	Shelduck*	100	2500	52	97	88	127	91
	Shoveler	20	650				1	0
	Teal	360	5000	145	160	108	131	136
	Turnstone	95	1400	17	12	13	10	13
	Wigeon	560	14000	54	54	32	266	102

Site	Species Name *QI of SPA	1% National Importance [16]	1% International Importance [17]	Year (based on three counts conducted over the winter season)			Mean
				2013/ 2014	2014/ 2015	2015/ 2016	
IRELANDS EYE	Black-headed Gull			50		6	19
	Common Gull			60			20
	Cormorant*	110	1200	200		150	117
	Curlew	350	7600	30	6	5	14
	Dunlin	460	13300	10			3
	Great Black-backed Gull			250	200	200	217
	Greenshank	20	3300	1		2	1
	Grey Heron	25	5000	1		1	1
	Herring Gull*			300	200	300	267
	Light-bellied Brent Goose	350	400	100		200	100
	Little Egret	20	1100			1	0
	Mallard	280	53000	5			2
	Mediterranean Gull				1		0
	Oystercatcher	610	8200	200	150	100	150
	Purple Sandpiper	20	110	10		15	8
	Redshank	240	2400	25	10	25	20
	Red-throated Diver	20	3000	2			1
	Ringed Plover	120	540	10	5	4	6
	Sanderling	85	2000	60			20
	Sandwich Tern				15		5
	Shag			150		60	70
	Shelduck	100	2500			20	7
	Turnstone	95	1400	80	20	150	83
	Whimbrel					1	0

[16] *1% of the all-Ireland population, based on the most recent estimates for Ireland, namely Burke, B., Lewis, L. J., Fitzgerald, N., Frost, T., Austin, G. & Tierney, T. D. (2018) Estimates of waterbird numbers wintering in Ireland, 2011/12 – 2015/16. Irish Birds 11, 1-12.*

[17] *1% of flyway population based on AEWA (2018) AEWA Conservation Status Review 7 (CSR7) Report on the conservation status of migratory waterbirds in the agreement area. Seventh Edition. Agreement on the Conservation of African-Eurasian Migratory Waterbirds, May 2018.*

Note: 1% levels have not been derived for introduced or escaped species since these are not included in the legislation regarding site designation. Sites may also be of importance if, while not supporting important concentrations of individual species, they hold large numbers of total waterbirds, e.g. a site regularly holding 20,000 or more waterbirds qualifies as internationally important by virtue of absolute.

Site	Species Name *QI of SPA	1% National Importance [18]	1% International Importance [19]	Year					Mean
				2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	
DUBLIN BAY	**Bar-tailed Godwit***	170	1500	1710	1658	2173	2653	1599	1959
	Black-headed Gull*			2649	1259	2768	2731	3802	2642
	Black-tailed Godwit	200	1100	1768	873	2185	1274	1479	1516
	Common Gull			985	272	890	213	304	533
	Common Scoter	110	7500	42		40	19	60	32
	Common Tern*			39		1	2	2	9
	Common/ Arctic Tern						105		21
	Cormorant	110	1200	198	41	71	170	199	136
	Curlew	350	7600	932	1424	567	834	521	856
	Curlew Sandpiper								0
	Dunlin*	460	13300	5907	3603	3376	8280	6310	5495
	Gadwall	20	1200	2	2				1
	Golden Plover	920	9300	1080	742	1155	1010	2210	1239
	Goldeneye	40	11400		2	1	1		1
	Goosander							2	0
	Great Black-backed Gull			190	52	263	151	115	154
	Great Crested Grebe	30	6300	755	143	307	193	60	292
	Great Northern Diver	20	50	3		5	1	2	2
	Greenshank	20	3300	34	47	78	35	47	48
	Grey Heron	25	5000	68	40	44	30	35	43
	Grey Plover*	30	2000	310	452	240	245	241	298
	Herring Gull			490	261	538	461	607	471
	Iceland Gull						1		0
	Kingfisher			1		1			0
	Kittiwake							40	8

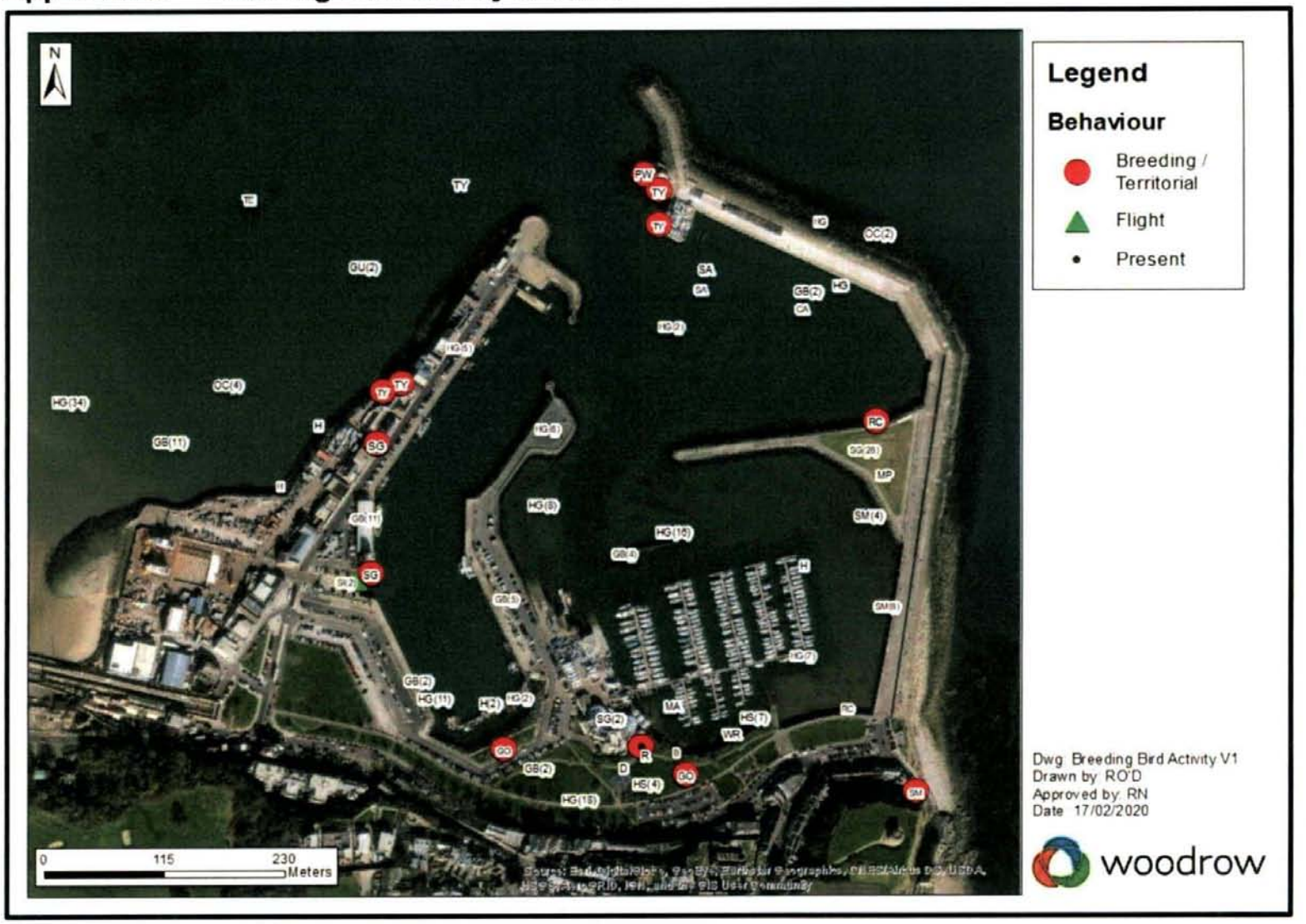
[18] 1% of the all-Ireland population, based on the most recent estimates for Ireland, namely Burke, B., Lewis, L. J., Fitzgerald, N., Frost, T., Austin, G. & Tierney, T. D. (2018) Estimates of waterbird numbers wintering in Ireland, 2011/12 – 2015/16. Irish Birds 11, 1-12.

[19] 1% of flyway population based on AEWA (2018) AEWA Conservation Status Review 7 (CSR7) Report on the conservation status of migratory waterbirds in the agreement area. Seventh Edition. Agreement on the Conservation of African-Eurasian Migratory Waterbirds, May 2018.

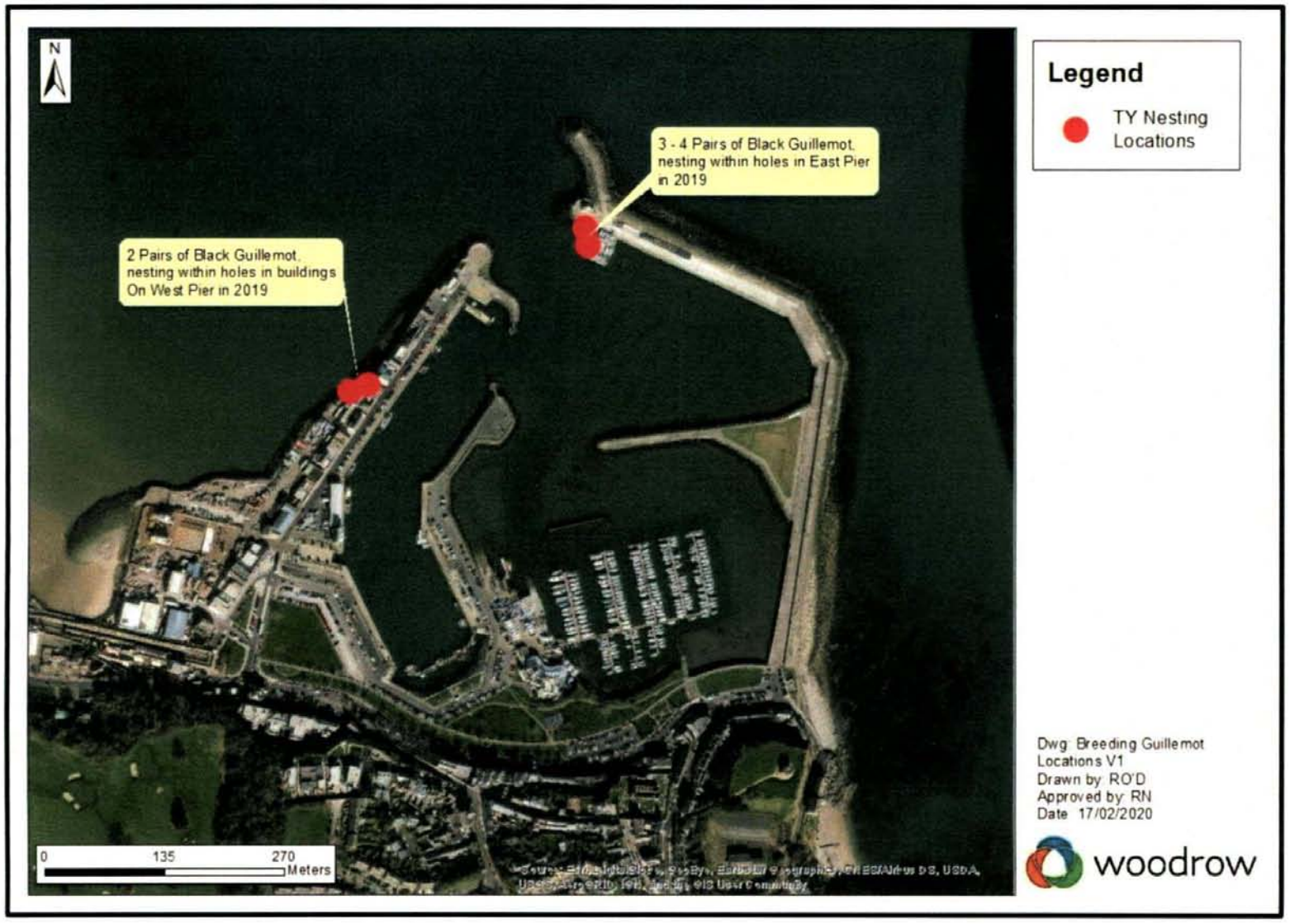
Note: 1% levels have not been derived for introduced or escaped species since these are not included in the legislation regarding site designation. Sites may also be of importance if, while not supporting important concentrations of individual species, they hold large numbers of total waterbirds, e.g. a site regularly holding 20,000 or more waterbirds qualifies as internationally important by virtue of absolute.

Site	Species Name *QI of SPA	1% National Importance [18]	1% International Importance [19]	Year					Mean
				2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	
	Knot*	160	5300	4547	4950	2495	5850	6555	4879
	Lapwing	850	72300	52	54	143	25	32	61
	Lesser Black-backed Gull			5	20	16	5	14	12
	Light-bellied Brent Goose*	350	400	3717	4862	4195	4420	3331	4105
	Little Egret	20	1100	59	69	59	71	96	71
	Little Grebe	20	4700	1	5		4	4	3
	Long-tailed Duck			1			2		1
	Mallard	280	53000	97	106	120	70	111	101
	Mediterranean Gull			39	27	64	68	6	41
	Moorhen			5		5	3	2	3
	Mute Swan	90	100	5	6	9	6	12	8
	Oystercatcher*	610	8200	3074	3315	3588	4042	3588	3521
	Pintail	20	600	200	150	124	190	222	177
	Purple Sandpiper	20	110	2	1	2			1
	Red-breasted Merganser	25	860	60	57	69	80	78	69
	Redshank*	240	2400	2460	1889	1648	1430	2561	1998
	Red-throated Diver	20	3000	7	2	7	6	5	5
	Ring-billed Gull						1		0
	Ringed Plover*	120	540	139	121	109	208	285	172
	Sanderling*	85	2000	510	266	841	374	440	486
	Sandwich Tern			52		8		9	14
	Shag			36	3	71	19	22	30
	Shelduck	100	2500	961	2927	744	1811	1611	1611
	Shoveler	20	650	126	97	115	116	144	120
	Snipe			20		31	53	57	32
	Spotted Redshank			1		3			1
	Teal	360	5000	1378	1233	1291	1654	1092	1330
	Turnstone	95	1400	466	250	584	286	334	384
	Whimbrel			2	4				1
	Wigeon	560	14000	691	2201	1106	1839	918	1351
	Yellow-legged Gull			1		2	1		1

Appendix III – Breeding Bird Survey Results



Appendix IV – Breeding Black Guillemot



Appendix V – Non-breeding season HT/LT bird usage

Figure V–I Notable Winter Roosts at Howth Harbour in 2019 / 2020

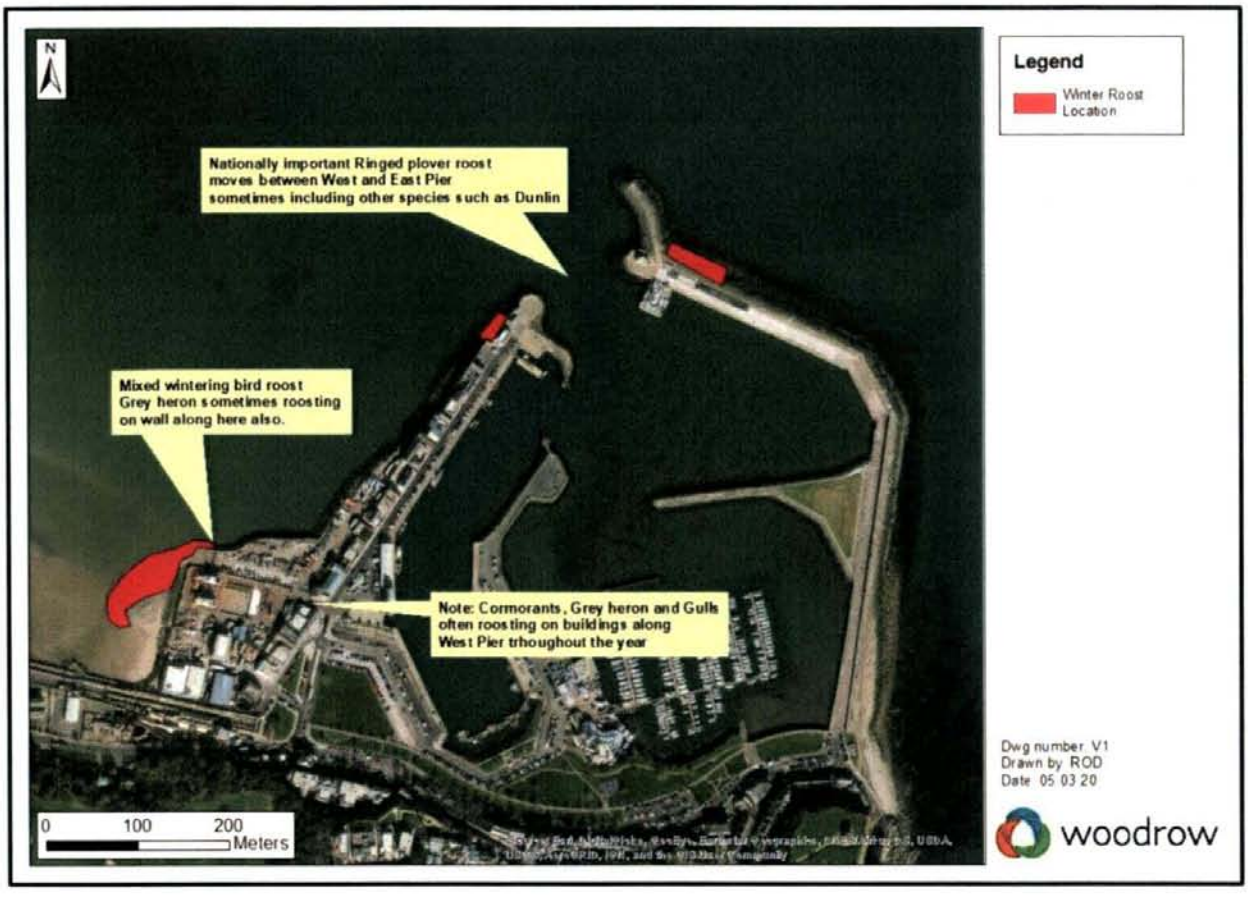


Table V-I. LOW TIDE waterbird counts conducted at Howth Harbour and surrounding area - NON-BREEDING SEASON 2019-20

Date	01/10/2019				23/10/2019				06/11/2019				17/11/2019				26/11/2019				09/12/2019				06/01/2020				21/01/2020				06/02/2020				17/02/2020				10/03/2020				23/03/2020			
Sect.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
BTO																																																
BA										1																																							
BH						6				14		2	1	11				23		1	7	19				2	1			5				4	3			2	12		1	6							
CA			3		1				1	5	13		5	5	1	10	1			6	3			3	1			14			1		4		2		2			1	2					17	2
CA/SA																							6												7													
CM	1													1																								3										
CU		3				2								17				4				26								1				2						1				1			
ET																	1																														
GB	5	6				3			2	20	3	8		10	11		13	12	21	2	26	45	52	19	21	23	49	1	3	29	12		7	21	31	3	12	62	47		8	14	40	2	3	19	44	6
GG						1				1																1											1	2									
GU																															1	1				12											
GU/RA																																			250												
GX																																			175					75				155			260	
H	1	1		1	6	1		2	8		1		5	2			3	2			16	3	1		4		1		4		1	1	1		1		3				3			1		1	
HG	84	27	150	34	139	125	100	39	92	83	126	55	77	120	87	8	108	214	128	9	100	103	183	21	80	105	145	12	59	304	121	61	75	285	309	37	59	456	318	30	175	206	597	89	62	91	450	82
KI																																											52				90
MA													2																								2											
MS																																	5		5												
OC		4		5		17		3		15	9	2		18	3	1	1	11	1	4	1	16		2	1	3		3		15	1	5		5		2		8		2		9		2		2	1	1
PB																		18			5				13				8		16		16				30				34	4	5		14		52	
PS											2								3												4				1											2	6
RA																																				51											15	
RH																																							2					1				
RK	4				6					2	3	3	2				8				6	2		5	2			3	5		1		4			1	3				14	3			6			
RM														2																																		
SA	2				1		5	10	1	4	13	6	2		1	4	2		9	3					1	1	1	2			1	7			13	8	1	4	3		1		4	1				1
SU																															13				9								7					
TT											3	4			2		2			3	8								1		9				5						2					3	2
TY																																					1											

Sect. = Count Section BTO = BTO Species Code

BA = Bar-tailed godwit, BH = Black-head gull, CA = Cormorant, CM = Common gull, CU = Curlew, DN = Dunlin, ET = Little egret, GB = Great black-backed gull, GG =Great-crested grebe, GU = Common guillemot, GX = Gannet, H. = Grey heron,

HG = Herring gull, KI = Kittiwake, LG = Little grebe, MA = Mallard, MS = Mute swan, ND = Great northern diver, OC = Oystercatcher, PB = Pale-bellied brent goose, PS = Purple sandpiper, RA = Razorbill, RH = Red-throated diver, RK = Redshank,

RM = Red-breasted merganser, RP = Ring plover, SA = Shag, SS = Sanderling, SU = Shelduck, TT = Turnstone, TY = Black guillemot (Tystie)

Table V-II. HIGH TIDE waterbird counts conducted at Howth Harbour and surrounding area - NON-BREEDING SEASON 2019-20

Date	01/10/2019				02/10/2019				22/10/2019				23/10/2019				03/11/2019				17/11/2019				26/11/2019				09/12/2019				07/01/2020				21/01/2020				06/02/2020				20/02/2020				10/03/2020				23/03/2020			
Sect.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
BTO																																																							
BH				42	14	8		8						3		3	4						6		4	1			18	1	13		4	2				3	3			2	8			1	11						9					
CA					1	1	63	2			47					6	1		1			3			1			2	2		1	1	1	2		2		1	1	1	3		2		5			1				1		21	2
CA/SA											41												43				36			2	7				2	10			7				18			8	8	12			8				4
CM																			1																						2															
CU														1																																									
DN																		2																2		10										3			12							
GB		3			25		19	1					28	4			12		14	9	8		8		31	6	30		29	5	45		45	5	13	4	25	3	31	13	19	5	27		45		21		11		73		40	1	28	
GG																																		1				2				4									1			
GK																					1				1																	1			1										
GU					1													2		4			1								1	1		1						1			38										25	
GU/RA																																											200										18	16
GX								1																														70				150			32			140				230	11
H					5								6	5			5				3		1		5		1		10				10				14				5			2						2			
HG	245	17		109	211	25	65	13					243	60		25	129	4	114	75	172		45	1	207	2	82	16	130	48	87		92	5	36	17	150	87	130	39	104	18	114		227	2	61		135	19	415	81	82	6	175	
KI																																																		36				
LG																	2								2				1				3				5																	
MA																																													2									
ND																																			1			1															
OC											4			22					39	1			9			15	9			13			3	5			6	2	1		14	2		13	23			5							
PB																							8						6		24		13	8	6		13		20				61		51	10	7		5	4	8		5	9	66	
PS																														1								8	5			11				9								
RA					1															1					1																	41										1			4
RH																											1				1		2	1			4						1										
RK																2	22				20				25				9				3				2		3				30								21			
RM																																										8												
RP											74							133				84			11	16	43			122			157		135			20				56				75	72									
SA							6												1	3	2						1	2		1		1					1		1			1			3	3	1			2				2
SS																		1																																						
SU																																						14				9				3							7	
TT						12	7				4			7			6				42				33	33			12	1			63	7			3			16		2		10		4	3					2	1	
TY											4		2																								5				3			3							4			

Sect = Section BTO = BTO Species Code

BA = Bar-tailed godwit, BH = Black-head gull, CA = Cormorant, CM = Common gull, CU = Curlew, DN = Dunlin, ET = Little egret, GB = Great black-backed gull, GG =Great-crested grebe, GU = Common guillemot, GX = Gannet, H. = Grey heron,

HG = Herring gull, KI = Kittiwake, LG = Little grebe, MA = Mallard, MS = Mute swan, ND = Great northern diver, OC = Oystercatcher, PB = Pale-bellied brent goose, PS = Purple sandpiper, RA = Razorbill, RH = Red-throated diver, RK = Redshank,

RM = Red-breasted merganser, RP = Ring plover, SA = Shag, SS = Sanderling, SU = Shelduck, TT = Turnstone, TY = Black guillemot (Tystie)

Appendix VI – Survey Effort

Table VI-I Low tide winter bird use mapping: survey effort and weather conditions

LOW TIDE												
Date	Section	Start time	Duration (mins)	Wind force	Wind direction	Temp (°C)	Rain	Visibility	Factors affecting vis.	Sea state	Swell	Swell direction
Visit 1. 01/10/2019	1	0715	60	3-4	NE	12-15	showers	mod	very dull	2		NW
	2	0630	45	2	NE	12.5	showers		low light	3		not visible
	3	0815	5	5-6	NE	12.5	drizzle	mod	low light levels, wind	0-0.1m	low, long	NE
	4	0820	15	5	NE	12.5	drizzle	poor	drizzle, strong wind, poor light	0.1-0.5m	long	NE
Visit 2 23/10/2019	1	1211	49	1-3	S	13.5	none	good		1, 0-0.1m	none	none
	2	1350	25	1-2	S	13.5	none	good		1, 0-0.1m	none	none
	3	1325	15	3-5	S	13.5	none	good		3, 0.1-0.5m	low, short	E
	4	1300	25	2-4	S	13.5	none	good		3, 0.1-0.5	low, short	E
Visit 3 06/11/20190	1	1210	100	0-1	SW	8	none	good		1, 0m	none	none
	2	1245	20	1	SW	9	none	good		1, 0-0.1m	none	none
	3	1140	30	0	none	8	none	good		1, 0-0.1m	none	none
	4	1120	20	0	none	8	none	good		0, 0m	none	none
Visit 4 17/11/2019	1	0805	40	1-2	NW	3.5	none	good		1, 0-0.1m	none	none
	2	0820	45	0	none	0	none	mod	low light levels	1, 0-0.1m	none	none
	3	0830	25	1-2	NW	3	none	good		2, 0.1-0.5m	low, average	NE
	4	0815	15	1-2	NW	3	none	good		1, 0.1-0.5	low, average	NE
Visit 5 26/11/2019	1	1450	65	3-4	S	10	none	good	wind	2, 0-0.1m	none	none
	2	1600	30	3	S	10	none	good	breezy, light fading	2, 0.1-0.5m	low, average	S
	3	1430	15	3-4	S	10	none	good	mist/haze at distance	3, 0.1-0.5m	low, average	SW
	4	1415	15	3	SE	10	none	good		3, 0.1-0.5m	low, average	NE
Visit 6 09/12/2019	1	1345	115	3	W	7	none	good	low sun	2, 0-0.1m	none	none
	2	1510	20	1-2	W	8	none	good		1, 0-0.1m	none	none
	3	1355	20	3	W	7	none	good	low sun	2, 0.1-0.5m	low, average	NE
	4	1340	15	3	W	7	none	good	low sun	3, 0.1-0.5m	low, average	NE

LOW TIDE												
Date	Section	Start time	Duration (mins)	Wind force	Wind direction	Temp (°C)	Rain	Visibility	Factors affecting vis.	Sea state	Swell	Swell direction
Visit 7 06/01/2020	1	1305	85	3-4	WSW	9	none	good	glare at times, strong winds	3, 0-0.1m	none	none
	2	1400	20	4-5	WSW	9	none	good	windy	3, 0.1-0.5m	moderate, long	NE
	3	1240	25	3-4	WSW	9	none	good	windy	3, 0.5-1.25m	moderate, long	NE
	4	1230	10	3-4	W	9	none	good	strong winds	3, 0.1-0.5m	moderate, long	NE
Visit 8 21/01/2020	1	1320	90	2-3	WSW	8	none	good		1, 0-0.1m	none	none
	2	1440	15	2-3	WSW	8	none	good		3, 0.5-1.25m	none	none
	3	1320	30	2-3	WSW	8	none	good		2, 0.1-0.5m	none	none
	4	1300	20	2-3	WSW	9	none	good		2, 0.1-0.5m	none	none
Visit 9 06/02/2020	1	1345	60	1-2	SSE	8	none	good		1, 0-0.1m	none	none
	2	1455	30	1-2	SSE	9	none	good		2, 0.1-0.5m	low, average	E
	3	1315	30	1-2	SSE	8	none	good		2, 0.1-0.5m	low, average	E
	4	1300	15	0-1	SSE	8	none	good		1, 0-0.1m	low, long	E
Visit 10 17/02/2020	1	1150	60	4-5	W	9	none	good	wind strong at times	3, 0.1-0.5m	none	none
	2	1120	28	3-4	W	9	none	good		3, 0.1-0.5m	none	none
	3	1320	30	4-5	W	9	none	good	strong wind	3, 0.5-1.25m	moderate, average	N
	4	1250	20	3-5	W	8	none	good	strong wind	3, 0.1-0.5m		N
Visit 11 10/03/2020	1	1540	60	4-5	WSW	12	none	mod/ good	wind	3, 0.5-1.25m	none	none
	2	1730	25	3-4	WSW	11	none	good	wind	3, 0.5-1.25m	none	none
	3	1555	30	4-5	WSW	12	none	moderate	wind	3, 0.5-1.25m	moderate, short	W
	4	1540	15	3-4	WSW	12	none	good	wind	3, 0.5-1.25m	none	none
Visit 12 23/03/2020	1	1510	60	3-4	SSW	12	none	good		2, 0.1-0.5m	none	none
	2	1710	25	2-3	SSW	13	none	good		2, 0.1-0.5m	none	none
	3	1540	35	3-4	SSW	12	none	good		2, 0.1-0.5m	none	none
	4	1515	25	3	SSW	12	none	good		2, 0.1-0.5m	none	none

Table VI-II High tide winter bird use mapping: survey effort and weather conditions

HIGH TIDE												
Date	Section	Start time	Duration (mins)	Wind force	Wind direction	Temp (°C)	Rain	Visibility	Factors affecting vis.	Sea state	Swell	Swell direction
Visit 1.1 01/10/2019	1	1305	10	5-6	NE	11	drizzle	poor	drizzle, waves, wind	0.5-1.25m	long	NE
	2	1325	5	5-6	NE	11	drizzle	poor	waves over sea wall, drizzle, wind	0.5-1.25m	long	NE
	3	1300	5	5-6	NE	11	heavy	poor	no access to pier - waves etc.	0.5-1.25m	long	NE
	4	1242	13	5-6	NE	11	drizzle	poor	drizzle, strong wind, poor light	0.5-1.25m	long	NE
Visit 1.2 02/10/2019	1	1400	45	2	NE	13	none	good		3	low, short	NE
	2	1445	25	1	N		none	good		1, 0m	low	N
	3	1335	25	2	NE		none	good		0-0.1m	long	NE
	4	1315	17	2	NE	13	none	good		0-0.1m	long	NE
Visit 2 23/10/2019	3	0800	30	3-4	S	8	none	good		3, 0.1-0.5m	low, average	E
	1	0905	60	2-3	S	13	none	good		1, 0-0.1m	none	none
	2	0845	20	1-2	S	10	none	good		1, 0-0.1m	none	none
	4	0730	30	2-4	S	8	none	mod	low light	2, 0.1-0.5m	mod	E
Visit 3 03/11/2019	1	1455	50	1-2	W	10	none	good		1, 0-0.1m	low, short	N
	2	1450	30	0	none	10	none	good	glare to SE (setting sun)	1, 0-0.1m	none	none
	3	1435	20	1-2	W	10	none	good		1, 0-0.1m	low, average	N
	4	1420	15	1	W	10	none	good		1, 0-0.1m	low, average	N
Visit 4 17/11/2019	1	1330	60	2-3	NW	4	none	good	some glare	2	none	none
	2	1430	15	2	NW		none	good		3	low, short	N
	3	1310	20	2-3	NW	4	none	good	breezy	3	moderate	NE
	4	1300	10	2-3	NW	4	none	good		3	low, average	NE
Visit 5 26/11/2019	1	1045	120							2, 0-0.1m	none	none
	2	1045	35	6	E	9	heavy	poor	rain, wind, wet optics	3, 0.1-0.5m	moderate, average	NE
	3	1230	15	4	E	9	none	mod	misty, windy	3, 0.5-1.25m	moderate, average	NE
	4	1210	20	3-4	E	9	none	mod	wind, low cloud, misty	3, 0.5-1.25m	average	NE
Visit 6 09/12/2019	1	0900	135	3-4	W	6	none	good	low sun	2, 0-0.1m	none	none
	2	0920	20	3	W	5	none	good	low sun	3, 0.1-0.5m	none	none
	3	1015	35	3-4	W	6	none	good		3, 0.1-0.5m	mod, long	N
	4	1000	15	3-4	W	7	none	good		3, 0.1-0.5m	mod, long	N

HIGH TIDE												
Date	Section	Start time	Duration (mins)	Wind force	Wind direction	Temp (°C)	Rain	Visibility	Factors affecting vis.	Sea state	Swell	Swell direction
Visit 7 07/01/2020	1	0900	125	2-3	S	11	none	good		2, 0-0.1m	none	none
	2	0830	30	2-3	S	11	none	good	light level low	2, 0-0.1m	none	none
	3	1020	20	3-4	S	11	none	good	strong winds	3, 0.1-0.5m	moderate, long	E
	4	1005	15	2-3	S	11	none	good	strong winds	3, 0.1-0.5m	moderate, long	E
Visit 8 21/01/2020	1	0845	105	2-3	WSW	7				1, 0.1m	none	none
	2	0825	35	1			light drizzle	good	light drizzle	2, 0-0.1m	none	none
	3	1005	25	2-3	WSW	7	none	good		2	none	none
	4	0940	25	2-3	WSW	7	none	good		2, 0.1-0.5m	none	none
Visit 9 06/02/2020	1	0800	135	1-2	ESE	4	none	good		1, 0m	none	none
	2	0800	30	1	ESE	1	none	good		1, 0m	none	none
	3	0915	45	2	ESE	4	none	good		2, 0.1-0.5m	low, average	E
	4	0900	15	0-1	ESE	4.5	none	good		1, 0-0.1m	low, average	E
Visit 10 20/02/2020	1	0850	40	4-5	W	5-6	none	good	wind	3		NE
	2	0930	30	3	W	6	none	good	wind, rough sea	3, 0.1-0.5m	moderate, short	NW
	3	0815	35	3-4	W	4	none		wind	2	moderate, long	NE
	4	0800	15	3-4	W	4	drizzle	good	wind/rain	2	low, long	NE
Visit 11 Xx/03/2020	1	1100	30	4-6	WSW	12	none	moderate	wind, waves	3, 0.5-1.25m	low, short	NW
	2	1155	20	3-4	WSW	12	none	moderate	wind, waves, swell	3, 0.5-1.25m	low, short	NW
	3	1108	37	4-5	WSW	11	none	moderate	wind, waves, swell	3, 0.5-1.25m	low, short	W
	4	1050	11	3-4	WSW	11	none	moderate	wind, waves, swell	3, 0.5-1.25m	moderate, short	W
Visit 12 23/03/2020	1	1020	70	3-5	S	11	none	good	strong wing	2, 0.1-0.5m	none	none
	2	1130	15	2-3	S	11	none	good	wind	2, 0.1-0.5m	none	none
	3	1035	30	3-5	S	11	none	good	wind	2, 0.1-0.5m	none	none
	4	1020	15	3-4	S	11	none	good	wind	2, 0.1-0.5m	moderate, long	S

Appendix 8

Prelim CEMP

Malachy Walsh and Partners
Engineering and Environmental Consultants

Howth FHC Harbour Dredging and Reclamation Project

Construction and Environmental Management Plan (CEMP)

ISSUE FORM	
Project number	19934
Document number	
Document revision	A
Document title	Preliminary Construction and Environmental Management Plan
Document status	Final
Document prepared by	Eimear Donoghue (MWP)
Document checked by	Graeme Thornton (MWP)

TABLE OF CONTENTS

List of appendices

Appendix 1 - Construction Phase Roles and Responsibilities

1. INTRODUCTION

The Department of Agriculture, Food and the Marine (DAFM), are proposing to dredge Howth Fishery Harbour Centre (FHC) and re-use the treated material to reclaim land area to the west of the West pier.

This Construction Environmental Management Plan (CEMP) has been prepared by Malachy Walsh and Partners to address the proposed site enabling works.

1.1 Construction Environmental Management Plan (CEMP) Purpose and Objectives

The purpose of this CEMP is to outline the environmental management framework that will be adhered to during the construction works. The CEMP describes the proposed enabling works and identifies the environmental considerations associated with these activities. Furthermore, the CEMP outlines proposed work practices, management, mitigation and monitoring strategies to ensure that contractual, regulatory, and statutory environmental requirements, mitigation measures and planning conditions are satisfied. The CEMP will provide the client and the main contractor with a practical guide to ensure environmental and planning compliance by all parties.

This CEMP is an outline document which will be updated should the project be granted consent to proceed. At that point, the CEMP will be updated to include more site specific information once the Construction Management Team is appointed and will include any additional requirements set out in planning conditions.

All site personnel will be required to familiarise themselves with the plan's requirements. There will be a requirement on the appointed contractor that details are updated with progress, including the roles and responsibilities of those appointed on the site for the construction of the project.

2. PROJECT OVERVIEW

2.1 Summary of Proposed Works

The Department of Agriculture, Food and the Marine (DAFM), are proposing to dredge circa 240,000m³ of material within Howth Fishery Harbour Centre (FHC) and re-use the treated material in an environmentally sensitive and cost effective manner to create an additional circa 4.8Ha of land area to the west of the West pier.

The proposed development involves the following main elements:

- Dredging the harbour;
- Reclaiming land on the west side of the west pier using dredge material;
- Coastal protection works to the perimeter of the reclaimed area;
- Landscaping on the reclaimed area;
- Pavements e.g. footways, roadways and parking areas;
- Slipway for access to the water;
- Storage areas for harbour activities;

- Provision of services.

2.2 Proposed Programme duration

The overall construction works programme is estimated at 24 months.

2.3 Working Hours

Dredging and processing activities will be carried out as follows;

Monday-Friday	07:00 – 21:00
Saturday	07:00 – 17:00
Sunday	No work

All other activities such as construction of the embankment, rock revetment, landscaping and drainage will be undertaken as follows;

Monday-Friday	07:00 – 19:00
Sataturday	07:00 – 17:00
Sunday	No work

Any works required outside these stipulated hours will be agreed in writing with the Local Authority with not less than 10 working days' notice. These works would be to undertake some necessary works at low spring tides that occur in the early morning (5am GMT) and later in the afternoon (5pm GMT).

2.4 Methodology

The proposed works can be divided into four key elements as follows:

- Element 1: Construction of a perimeter embankment and rock armour revetment to the seawards edge of the reclaimed land area;
- Element 2: Dredging of the Inner Harbour;
- Element 3: Land Reclamation;
- Element 4: Finishing's.

2.5 Temporary Construction Compound

A temporary construction compound will be established within the proposed development site and will be appropriately secured. It will be located on the western side of the west pier. The construction compound will accommodate all personnel and include portacabins for site offices, WC and welfare facilities, storage containers and material lay down areas. The compound will facilitate staff and visitor parking and it will be removed upon completion of the works.

There will also be construction compounds/facilities on the Middle Pier where it is proposed that the majority of the treatment of the dredge material will take place. There will also be a construction compound on the eastern side of the West Pier to act as a pump station to get the treated sediments to

the reclamation area. Treated dredge material will be pumped via a pipe rack set up on the West Pier across from the facility on the Middle Pier.

3. MANAGEMENT ORGANISATIONAL STRUCTURE AND RESPONSIBILITIES

3.1 Organisational Structure

An example of an Organisational Structure for the Contractor's Project Team is included below, see **Figure 1**. This structure will be defined by the Contractor and will include the names of the assigned personnel with the appropriate responsibility and reporting structure reflected.

The appointed Contractor will be required to finalise the Organisational Structure for the project to oversee this CEMP and to outline the specific responsibilities for the roles required.

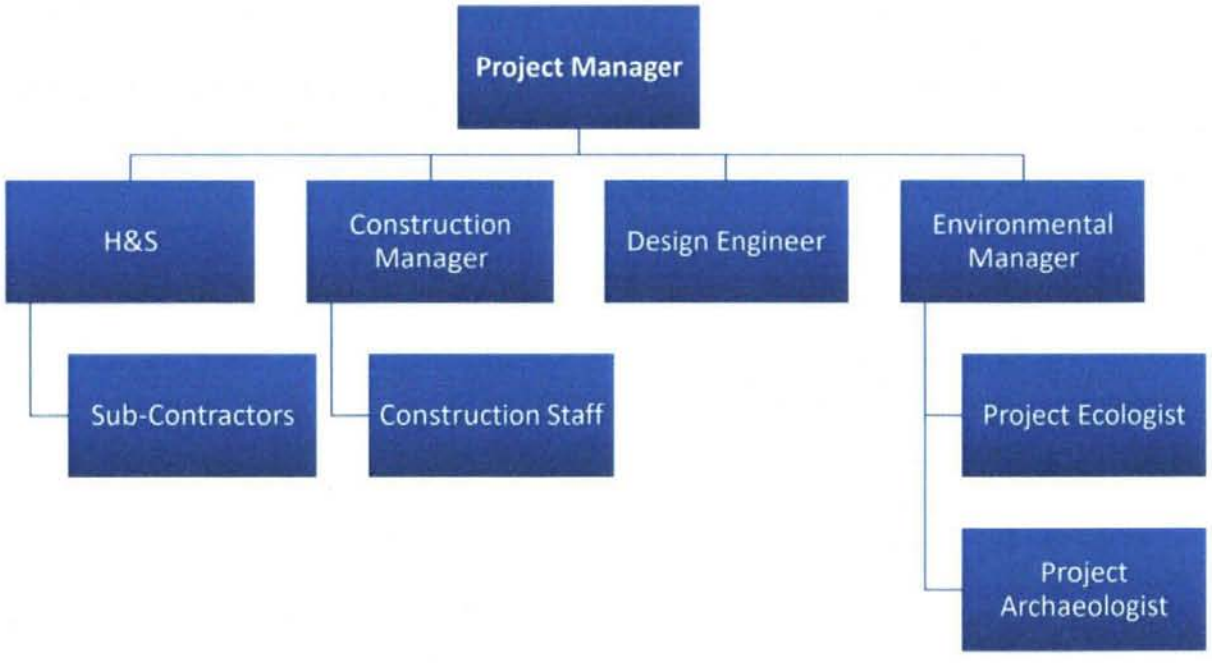


Figure 1 Sample Organisation Structure

3.2 Responsibilities

The general role of key people on site implementing the CEMP will be;

- The Project Manager - liaises with the Project Team in assigning duties and responsibilities in relation to the CEMP to individual members of the main contractor's project team.
- The Construction Manager - liaises with the Environmental Manager when preparing site works where there is a risk of environmental damage and manages the construction personnel and general works.

- The Design Engineer - undertakes and certifies the Design and supervises the standard of works for the contractor,
- The Environmental Manager - ensures that the CEMP is developed, implemented and maintained.
- The Environmental Clerk of Works (EnCoW) – ensures the day to day implementation of the CEMP. The EnCoW will have the authority to review method statements, oversee works and instruct action, as appropriate, including the authority to require the temporary cessation of works, where necessary.

Other roles may be outlined as follows;

- Health and Safety (report to the project manager)
- Project Ecologist (report to the Environmental Manager)
- Project Archaeologist (report to the Environmental Manager)
- Geotechnical Engineer (as required by Design Engineer)

The roles and responsibilities outlined above are indicative and will be updated on the appointment of the main contractor (Contractor). Details of the personnel and their responsibilities must be added to the CEMP. An outline of potential roles is provided in **Appendix 1** but will require revision.

4. ENVIRONMENTAL COMMITMENTS AND BEST PRACTICE MEASURES

The Environmental Commitments and Best Practices Measures to be implemented during the construction phase are outlined in the following sections.

Once appointed, it will be the Contractor's responsibility, to update and add (where required) project specific control measures relevant to the environmental management plans and procedures. The Contractor will ensure that plans/procedures are communicated to all site staff, including sub-contractors, through induction, training and at relevant meetings.

The following is an outline of the typical environmental management procedures and details are outlined in the sections to follow.

Ref:	Procedure:-
EMP-1	Waste Management
EMP-2	Fuel and Oil Management
EMP-3	Concrete Management
EMP-4	Air Pollution Control
EMP-5	Noise and Vibration
EMP-6	Biodiversity Management
EMP-7	Water Management
EMP-8	Surface Water Management
EMP-9	Heritage Management
EMP-10	Site Environmental Training and Awareness
EMP-11	Environmental Emergency Response
EMP-12	Monitoring and Auditing Procedure
EMP-13	Environmental Accidents, Incidents and Corrective Actions Procedure
EMP-14	Environmental Complaints Procedure

4.1 Waste Management

The waste management goal for the project is to manage all waste in accordance with the relevant statutory provisions and the water hierarchy. The waste management strategy for the project will follow the accepted waste hierarchy. See **Figure 2,** below.

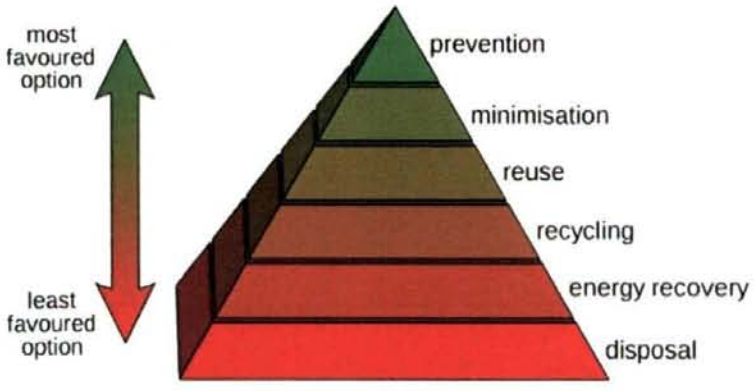


Figure 2: Waste Hierarchy

A Waste Management Plan will be agreed by DAFM and instituted during the works and the waste management measures for the project will include:

- Waste management targets
- The potential waste materials produced during the project;
- Waste handling procedures;
- Waste Permits where required;
- Waste reuse, recycling and disposal techniques; and
- A map showing designated waste handling areas.

The Waste Management Plan will also cover the handling and disposal of hazardous wastes such as fuels and used absorbent materials.

Contractors working on site during the works will be responsible for the collection, control and disposal of all wastes generated by the works.

Any wastes such as tyres, trolleys, traffic cones found in the dredge material will be collected in site skips and removed to a licenced/ permitted waste facility by an appropriately permitted waste contractor. These wastes will be identified when loading onto the dredging barge or at the waste treatment area. In either situation, the waste will be manually separated from the dredge material and placed in quarantine area prior to removal offsite.

All wastes will be segregated materials will be segregated and removed off-site to an appropriately licensed waste or recycling facility. Wash out from trucks will also be disposed of off-site at an approved location.

Any necessary permits or licences required will be sought from Fingal County Council or the Environmental Protection Agency (EPA) for the recovery/disposal of waste as necessary.

General Waste Measures to be employed

- The work areas will be kept neat and tidy. Access to materials will be controlled. A dedicated storage area will be provided for, sheet piles, precast concrete elements, steel reinforcement, timber formworks, geotexiles, rock anchors, tools, and equipment etc.
- Access to stored materials will be restricted;
- The site compound will be securely fenced from the outset and will be locked when there are no site personnel present;
- To contain and manage construction phase waste, multiple skips will be provided at the storage compound; one for recyclable waste and others for various construction waste. These skips will be emptied when required by a licensed waste management company. Waste oil and waste oil drums will be collected and stored in containers and on a bunded tray within the storage container;
- Excess materials, if they occur, such as excess back fill/gravels /etc, will be removed off site immediately, and disposed of at an appropriate licensed landfill.
- The Contractor shall consider the potential to re-use existing materials on site in so far as is possible;
- During the construction phase, staff facilities will be provided at the site compound/designated area. The waste water tank, and sewage tank will be emptied as required by a vacuum tanker, and removed from site to a licensed facility. These staff facilities will be removed at the end of the construction phase.

Responsibility

The Environmental Manager will be responsible for creating and updating the Waste Management Plan. They will also identify a waste contractor to remove waste that can be recycled or re-used.

The Environmental Manager should keep records provided by waste contractors of all waste being removed from site. The Environmental Manager should record waste removed from site regularly. This information should be recorded in a standard format.

It will be the construction manager's responsibility to organise the removal of skips from their area when they are full.

Regard should be had for the Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (DoEHLG, July 2006) in preparing and maintaining this plan.

4.2 Fuel Management Measures

Vessels & Barges

It is recommended that appropriate fuel management measures are put in place, and agreed with the Harbour Master prior to the works commencing, to ensure that no significant negative impacts occur to water quality.

Potential leaks from vessels/boats will be mitigated by contractually requiring the contractors to only operate/supply vessels/boats that are in good working order, up to date in servicing etc., and free of leaks.

Fuel Management Measures that will be employed during the Construction phase include:

Machinery & Equipment

- The potential for hydrocarbons getting into Howth Harbour will be mitigated by only refuelling construction machinery and vehicles in designated refuelling areas using a prescribed re-fuelling procedure;
- Refuelling will be carried out using 110% capacity double bunded mobile bowsers. The refuelling bowser will be operated by trained personnel. The bowser will have spill containment equipment which the operators will be fully trained in using;
- Only designated trained operators should be authorised to refuel plant on site;
- Fuel containers should be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores;
- To reduce the potential for oil leaks, only vehicles and machinery will be allowed onto the site that are mechanically sound. An up to date service record will be required from the main contractor;
- Potential leaks from delivery vehicles will be reduced by visually inspecting all delivery vehicles for major leaks. Contractors supplying concrete and crushed stone to the site will be contractually required to supply their products using roadworthy vehicles;
- Procedures and contingency plans should be set up to deal with an emergency accidents or spills;
- An emergency spill kit with oil boom and absorbers is to be kept on site in the event of an accidental spill;
- Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound and also in site vehicles and machinery;
- Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits; any nearby drains/outfalls (if they occur), will be blocked with an oil absorbent boom until the fuel/oil spill has been cleaned up, and all oil and any contaminated material removed from the area. This contaminated material will be properly disposed of in an appropriate licensed facility.
- The Environmental Manager will be immediately informed of the oil leak/spill, and will assess the cause and the management of the clean-up of the leak or spill. They will inspect nearby drains for the presence of oil, and initiate the clean-up if necessary;
- Correct action in the event of a leak or spill will be facilitated by training all vehicle/machinery operators in the use of the spill kits and the correct containment and cleaning up of oil spills or

leaks. This training will be provided by the Environmental Clerk of Works or Environmental Manager at site induction;

- In the event of a major oil spill, a company who provide a rapid response emergency service for major fuel spills will be immediately called for assistance, their contact details will be kept in the site office and in the spill kits kept in site vehicles and machinery.

Oil Storage

- The scale of potential impacts on water quality will be reduced by only storing the required volume of oils for the works taking place at the time.
- Oil and fuel stored in bunded areas shall be stores an appropriate distance from any watercourse/discharge point etc, as to prevent accidental spills entering the harbour.
- Access to oil stores will be controlled by the storage of oils/fuels within a locked steel container/designated area, and cannot be accessed when there are no site personnel present.
- Collision with oil stores will be prevented by highly visible signs/posted.
- Leakages of oil from oil stores will be prevented by storing these oils in bunded tanks which have a capacity of 110% of the total volume of the stored oil. Ancillary equipment such as hoses and pipes will be contained within the bunded storage container. Taps, nozzles, or valves will be fitted with a lock system.
- The volume of leakages will be prevented through monitoring oil storage tanks/drums for leaks and signs of damage. This will be carried out daily/regularly by the Environmental Clerk of Works.
- Long term storage of waste oils will not be allowed on site. These waste oils will be collected in leak-proof containers, and removed from the site for disposal, or re-cycling by an approved service provider.

Responsibilities

The Construction Manager and Environmental Manager are responsible for ensuring Fuel and Oils are managed in line with this procedure. The Appointed Contractor, in updating the CEMP, must designate personnel to the tasks relating to Fuels and Oil, as outlined below.

4.3 Concrete Management

It is important to prevent concrete from entering waterways. Among other things, concrete will be used for construction of the reclamation area, and during the treatment of contaminated dredge.

The following measures will be implemented during the use of concrete:

Concrete pours / use of concrete (reclamation area)

Concrete for the reclamation area works will be poured *in situ*.

- To reduce the potential for cementitious material entering watercourses/Bay/Harbour pre-cast concrete should be used where possible, alternately concrete pours will be supervised by the suitably qualified suitably qualified Engineer and the Environmental Clerk of Works.
- The Site Engineer will ensure that the formwork for the concrete slab/s, which will provide for the extension to the pier, are completely sealed prior to concrete pour, and there is no potential for concrete to enter watercourses.
- Weather conditions will be monitored, as to allow sufficient time for the concrete to cure, preventing runoff.
- In the event of a spillage on site, the Environmental Clerk of Works / Environmental Manager /Site Engineer will shut down the supply of concrete immediately, temporarily seal off the area. Any spillage will be collected immediately, before entering marine waters, and deposited in appropriate manner/area/removed off site to an appropriate licensed landfill.
- If dewatering is required, all contaminated water will be pumped to suitably sized settlement area/tank/bowser and treated, in order to prevent solids/contaminants escaping to the bay.
- pH will be monitored continuously in the Water Quality Management Plan.

Concrete Washout

- Concrete truck wash out will not take place on the site; it will take place in the off site concrete batching plant. Only chutes will be cleaned out in the designated wash out area prior to leaving the site. The contents of the wash out area will be removed on a regular basis and disposed of appropriately.

Use of cementious material for the treatment of contaminated dredge

The following measures will be in place, to ensure no significant water quality impacts during the treatment/handling of contaminated dredge.

- The holding/treatment cells/areas for the contaminated dredge will be lined with Geo textile-low permeability membrane to prevent significant escapement of contaminants to the Harbour.
- Appropriate stabilisation of dredge spoil will be undertaken following best international practice.
- The treatment locations will be continuously monitored by the Site Engineer and/or Environmental Clerk of Works.
- A cement/ GGBS mix will be used as a binder in the treatment process. Treatment will be carried out if there is a requirement that all high-alkaline water draining from the facilities must be neutralised in a settlement area (it can be treated with CO2), before being discharged, after settlement, back into Howth Harbour, preferably toward the inner end of the harbour. This will prevent leaching of heavy metals, avoid the adverse impacts of highly alkaline discharges, and minimise of the discharge of suspends solids.
- Prior to dredging activities the contractor may complete further testing of the dredge sediments, to quantify the optimum percentage of binder to be used in the treatment process, and leachability testing of the trial mixes will be carried out, so that the optimum treatment process for the required

engineering/environmental objectives will be achieved. Considerable sampling and testing of binder effectiveness has already been undertaken as part of the EIAR.

- The contaminated dredge will be stored at an area where there is low risk of significant runoff to the harbour/watercourses as a result of heavy rainfall/tidal influx.
- The treatment of the contaminated dredge material with cement will be carried out in contained cells, with no potential of significant runoff/tidal influx to Howth Harbour.
- During the treatment of the contaminated dredge with binder, this mixing procedure will be monitored by the Site Engineer and/or Environmental Clerk of Works. If there is any spillage/leakage this procedure will be stopped immediately and the leakage will be contained and immediately cleaned up and removed from area/reused.
- It is anticipated that due to the large volumes involved and the distance from the treatment area to the reclamation area, that dredge spoil will be pumped from the barge to a contained mixing unit where it will be mixed with binder. The fluid mix will then be pumped via a pipeline to the reclamation area.

Responsibility

The site engineer and the Environmental Clerk of Works will supervise all concrete pours and the dredging, treatment and placement processes.

The Environmental Clerk of Works is responsible for ensuring that appropriate water pollution prevention measures are put in place and that water sampling is carried out. Where standards are breached he/she should carry out an investigation and in conjunction with the Construction Manager, he/she should ensure remedial action is taken and further samples taken to verify that the situation has returned to normal. The Environmental Clerk of Works will also be responsible for ensuring spill kits are readily available in vulnerable locations and that booms for watercourses are long enough and have adequate anchorage.

4.4 Air Pollution Control

The main types of air pollution that will result from the works are dust and exhaust emissions from combustion engines, and plant machinery and vehicles. Activities with the potential to produce to dust are:

- Plant and vehicle movement;
- Bulk materials handling;
- Stockpiles;
- Vehicle movement off site.

Dust Minimisation Plan

The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether

the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and any impacts from dust deposition will typically be within several hundred metres of the construction area.

The dust minimisation plan will be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures.

Dust and fine particulate emissions (PM_{10}) arising during the construction phase will be reduced and controlled via the following measures:

- Dampening of exposed earthwork activities and site access route during dry weather;
- Covering of stockpiles and/or dampened during dry weather;
- Control of vehicle speeds, speed restrictions and vehicle access; and
- Sweeping of hard surface roads.
- Internal and public roads will be inspected regularly for cleanliness and cleaned as necessary;
- Daily site inspections should take place to examine dust measures and their effectiveness.

In addition, the following measures will be implemented during the construction phase:

- Generators will be located away from sensitive receptors.
- Stockpiles will be located as far as possible from sensitive receptors and covered and/or dampened during dry weather.
- Exposed surfaces and entrances to the site should be dampened during dry windy conditions in the interest of controlling fugitive dust;
- Protective hoarding screens shall be erected around construction activities where necessary to reduce dust-blow from the site;
- Ensure there is access to a water source in close proximity to each area on site where dust is deemed most likely to occur;
- Material handling system and site stockpiling of materials shall be designed and laid out to minimise exposure to wind.
- Periodic maintenance of the public road surface near the entrance will be undertaken. This will include the removal of any spillages so as to prevent the dispersion of dust along the road, which is likely to be re-suspended by passing vehicles. A mechanical vacuum road sweeper will be used if necessary;
- Any spillage of material from vehicles departing the site will be removed to prevent re-suspension of silt from the road surface by passing vehicles;
- Dust control measures will be active on equipment used for drilling or pavement cutting, grinding of block surfaces and similar types of stone finishing is taking place as significant fine particulate emissions can be generated which may cause a local nuisance;
- Loose, fine aggregates and other similar sized building materials that can be easily re-suspended by the wind will be stored in sheltered stockpiles in designated areas of the site;
- Vehicles and plant machinery operating on-site will be properly maintained to prevent excessive emissions of particulates and other pollutants from the exhaust pipes;

- Daily visual dust monitoring will take place on site.

Other Air Quality Control Measures

- All plant machinery and vehicles will comply with European Union (EU) emission limits for their vehicle class as a minimum and will be regularly maintained. A programme of maintenance checks will be developed for plant on site and adhered to. Any plant and equipment emitting black smoke will be taken out of service immediately and the defect rectified. Plant will be located a maximum distance from sensitive receptors;
- Burning of waste will be prohibited.
- Mitigation measures to minimise Carbon Dioxide emissions from transport will include;
- Implementation of a Traffic Management Plan;
    - Implementation of an Efficient Material Handling Plan;
    - Restrictions on idling vehicular engines;
    - Regular maintenance of plant and equipment.

Responsibility

The Environmental Manager is responsible for developing and reviewing the site Dust Minimisation Plan. The Construction Manager is responsible for organising dust suppression through use of bowsers and cleaners.

4.5 Noise and Vibration

No national noise or vibration guidance documents have been issued specifically with respect to construction and demolition projects in Ireland. Noise emissions arising from such projects are typically assessed by reference to *British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise* (2014). This standard is considered the most relevant standard available with respect to the proposed development.

Table 1: Appropriate Noise Limits for the proposed construction works

Assessment category and threshold value period (T)	Threshold values, $L_{Aeq,T}$ dB
Night-time (23:00 to 07:00hrs)	50
Evening and Weekends [Note A]	55
Daytime (07:00 – 19:00hrs) and Saturdays (07:00 -13:00hrs)	65

Note A: 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

To address potential predicted exceedances of evening time noise limits on West Pier businesses and visitors, the mitigations are as follows;

- Onsite noise monitoring will be undertaken once the works have started. This will assess the level of noise impacting on the West Pier. This will occur at different times depending on the location of the dredging barge. The results of this monitoring will define a working area between the hours of 7pm and 9pm in order to comply with the evening time noise limit.
- Liaison with the businesses on the West Pier to let them know what works are taking place when and to get feed back on the noise impacts will take place.
- Solid hording will be put up around the pump compound on West Pier in order to reduce noise impact coming from equipment.

During the works, best practice noise reduction measures described in *British Standard 5228-12009+A1:2009, Code of Practice for Noise and Vibration Control on Construction and Open Sites* will be incorporated into the Construction and Environmental Management Plan.

Responsibility

The Construction Manager will be familiar with the noise sensitive receptors and alert the Environmental Manager in good time prior to work commencing in the areas closest to any noise sensitive receptors. The Environmental Manager will review any relevant planning conditions in updating this plan.

4.6 Biodiversity Management Plan

A suitable qualified project ecologist will be employed for the duration of the works to ensure that mitigation measures and relevant ecological planning conditions are implemented in full. The project ecologist will also have a role in reviewing and approving all work method statements. The project ecologist will have the authority to stop works should an unforeseen issue arise.

Habitats

To prevent incidental damage by machinery or by the deposition of spoil during the site clearance stage, any habitats earmarked for retention, particularly Annex I habitats in close proximity to site works, will be securely marked off early in the construction phase. The markings will be clearly visible to machine operators. Where possible fencing will be used to mark off areas. This will be less feasible in intertidal areas.

Habitat degradation will be prevented, by controlling the movement of construction vehicles and machinery. Construction vehicles and machinery will not encroach onto habitats beyond the proposed development footprint.

Any habitats earmarked for retention that are damaged and disturbed will be left to regenerate naturally or will be rehabilitated and landscaped, as appropriate, once construction is complete. Disturbed areas will be seeded or planted using appropriate native grass or species native to the areas where necessary.

Monitoring of Annex I habitats in close proximity to the proposed works will be carried out pre, during and post construction. In order to record any changes in these Annex I habitats, in the vicinity of the proposed development, a photographic record shall be made of these habitats. This record shall cover Claremont Beach and west to Quarry Bay Beach. All photographs shall be taken at low tide, every two months, beginning 6 months prior to commencement of construction and finishing 12 months after completion.

Marine Mammals

A soft start procedure should be used to allow any marine mammals present in the area to vacate prior to the full dredging operation commencing

A dedicated Marine Mammal Observer will conduct a 15-minute watch for marine mammals within 200m of the dredger prior to start up. If a seal or cetacean (or otter) is sighted within 100m of the dredger, start-up must be delayed until the animal(s) is/are observed to move outside the mitigation zone or the 15 minutes has passed without the animal being sighted within the mitigation zone.

Mitigation measures to be included as per the MMRA are as follows:

- All personnel will be appropriately trained about environmental issues prior to the start of the operation.
- All equipment will be in good condition to avoid spillage or discharge of oil, smoke and excessive noise.
- Refuelling will be carried out by competent and trained people away from any environmentally sensitive areas; and sea-going craft to be moored up securely.
- An appropriate waste container will be placed to collect waste before the final disposal by authorised company and hazardous material storage areas will be identified, labelled, and properly marked and fitted with spill containment systems;
- Excavators and barges will be checked for any fuel / oil leaks on a regular basis by the crew.
- Any spills we be reported immediately to the site agent/authorities
- In the event of a major spill due to damage to the sea-going craft. Locate and isolate, inform harbour authorities, Project Manager and environmental agency.
- A dedicated Marine Mammal Observer will conduct a 15 minute watch for marine mammals within 200m of the dredger prior to start up. If a seal or cetacean (or otter) is sighted within 100m of the dredger, start-up must be delayed until the animal(s) is/are observed to move outside the mitigation zone or the 15 minutes has passed without the animal being sighted within the mitigation zone.
- The long reach excavator will be started at lowest revs and increased over a 5 minute period to allow wildlife an opportunity to move further away from the excavator reaching full power.

Birds

Works will be supervised by a project ecologist/ornithologist. Bird monitoring will be undertaken prior to commencement of construction, during construction works and following completion of the construction works. Monitoring will follow a similar methodology to that employed by Woodrow (see **Appendix 7 *'Howth Harbour FHC Proposed Dredging and Reclamation Works; Bird Surveys 2019 / 2020***

Report'), using similar techniques and point count locations with a particular focus on the Harbour itself and mudflat/sandflats and waters around Claremont beach. Surveys conducted will be as follows:

- Breeding Bird Surveys / Black Guillemot Surveys – April to August
- High Tide / Low Tide Summer Surveys – May to August
- Winter Bird Surveys – October to March

This will allow for comparative analysis with the findings of the Woodrow surveys.

All vegetation removal required to accommodate the works will be done outside of the bird breeding period, March to August, inclusive.

Lighting will be provided with the minimum luminosity sufficient for safety and security purposes both during the construction phase and operational phase of the project. Lights will be focused away from the intertidal areas which support feeding birds. Lights will be as low as possible and light spillage will be minimised. Designs to luminaires to help reduce light spillage and to direct light to the intended area only, particularly along the northern boundary, is by using accessories such as hoods, cowls, louvres and shields.

It is important to maintain Dark Zones for roosting intertidal bird species in areas where lighting is not necessary. However, where lighting is required, this lighting should be placed at a minimum height using the lowest lux value permitted for health and safety.

Construction works in the reclamation area will mean the loss of the winter bird roost on the end of the east pier for the duration of the works. The wintering birds will move to alternative roosts. The short term loss of the west pier winter roost will be mitigated by reducing disturbance on the other two identified winter roosts. To reduce disturbance on the remaining two identified winter roosts, screening will be erected along the southern boundary of the reclamation area. This will reduce disturbance on the southern winter roost near Claremont Beach. Screening or fencing will be erected around the winter roost at the end of the East Pier. The screening or fencing on the East Pier will happen over the period of time that the winter roosts are used by the birds (generally autumn and winter). The type of screening or fencing best suited and the requirement to close the walkway on the top of the pier wall at this location, will be agreed with the project ecologist before construction starts.

During the operational phase of the proposed development a permanent winter roost area will be established on the newly constructed revetment pier. This will provide a continuation of the existing winter roost area on the West Pier. The roost area will be fenced or screened off to reduce disturbance as agreed with the project ecologist.

Exclusion zones will be established during the wintering bird period. These will be focused around the Claremont Beach to the southwest of the proposed reclamation area i.e. outside the proposed development boundary. Site personnel will avoid this area during rest periods e.g. breaks, as not to introduce a potential disturbance factor to foraging birds. This will allow for the continuance of exposed mudflat habitat, particularly during low tide, to be utilised as feeding ground for wading birds.

To mitigate the impact on the Black Guillemot and enhance breeding bird habitat on the site for Black Guillemot, 4 nesting tunnels / nest boxes will be incorporated into the proposed reclamation area and/or existing pier structures, at appropriate locations to encourage increased numbers of breeding pairs in the harbour. A qualified ecologist will be engaged to choose appropriate locations for nest boxes and supervise installation. Once the new nest boxes are in position a preconstruction survey will take place to ensure that the nest locations on the west pier are not in use before construction starts. Under licence and with agreement of the NPWS the black guillemot nests in the holes within structures on the west pier will be blocked. The purpose of this is to stop possible nesting that may be abandoned later due to construction works. It is expected that the Black Guillemots will find more suitable nesting locations within the new nest boxes.

No night time dredging works will be permitted at any stage within the approach channel in order to avoid disturbance of Black Guillemot during the breeding season or roosting Ringed Plover during the wintering period. It is noted that illumination at night can increase the risk of predation.

Non-native invasive species

Invasive species were document during the ecological walkover of the site as part of the EIAR process. The presences of some invasive species were identified during this survey; these included Japanese rose (*Rosa rugosa*) and Butterfly Bush (*Buddleja davidii)*. These invasive species have been identified in adjacent habitats where works will not take place. The main risk to the project from invasive species is the introduction of species through the large importation of rock and later soils required for the construction works. No invasive species were identified during surveys within the proposed red line construction area

Bio -security

Bio-security measures need to be implemented at the site in order to ensure the risk from invasive species is kept negligible. The following measures are proposed:

- The construction personnel involved in works will be trained in basic relevant invasive species prevention and management. This includes species identification and decontamination methods.
- Due to the presence of invasive species in adjacent habitats, works will remain within the proposed red line and the works area fenced or demarcated in order to stop machinery entering the adjacent habitats.
- Materials brought to site will be ensured to come from a known source and be inspected upon arrival. Any invasive species seen at this point are to be stopped and the loads rejected.
- Machinery used on site is to be clean off site and brought to site clean.
- Invasive species management methodologies and plans outlining Best Available Techniques (BAT) will be sourced from current best practice/TII (The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads).

4.7 Water Management Plan

The Construction Industry Research and Information Association (CIRIA) provide guidance on the control and management of water pollution from construction sites in their publication Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (Masters – Williams et al, 2001).

Should any monitoring or inspections indicate that pollution of Howth Harbour has occurred then the site management team shall immediately inspect the dredge material treatment area and sediment control facilities to ascertain whether they are operating effectively. All operations may be stopped and/or additional control measures installed to prevent further pollution to the harbour. Appropriate action shall be taken in consultation with the relevant authorities. Water sampling with additional parameters will be tested to ensure all pollutants are identified. All incidents will be reported to the EPA and other relevant authorities immediately.

The potential for the construction and dredging works to have an impact on the water quality in the harbour shall be minimised through the implementation of the following control measures;

Dredging

During the dredging works, loss of suspended sediments will be controlled with the use of environmental buckets. A Water Quality Management Programme (WQMP) will be prepared by the contractor and implemented to incorporate the mitigation measures outlined in this section. Mitigations are as follows;

- Environmental buckets to be fitted to the dredge excavator;
- Silt curtains to be placed around the dredge as it is working;
- Monitoring of the waters outside the harbour in line with agreed parameters and limits from the licencing authority; and
- If monitoring indicates exceedances of agreed limits further management of the dredging methods will be undertaken to bring concentrations below the exceedance limits.

Processing of dredge material will be carried out in an enclosed and controlled material processing facility. The facility consisting of the mixing plant, binder silos, storage areas and pumps will be fully bunded. Any loss of dredge material within the bunded area will be collected and fed through the processing facility again for disposal within the reclaimed area.

A Water Quality Management Programme (WQMP) will be prepared and implemented to incorporate the mitigation measures outlined in this section. Monitoring of water quality (i.e. suspended sediments, dissolved oxygen and turbidity) will be carried out on the outside of the dredge site at selected locations. Limits will be set based on background levels recorded prior to the works and those agreed with the relevant authority. Contingency plans will be in place for when the limits are exceeded by dredging activities. These will include ceasing works until the source is identified and adjustment of methodology until levels can be reduced below the limit levels. Weather conditions and vessel traffic should also form part of the monitoring regime.

The proposed dredging and reclamation works will be subject to the conditions and monitoring requirements of either an Industrial Emissions licence or a waste licence from the EPA. Limits on turbidity or suspended solids in the harbour during the construction phase will be agreed with the relevant authority prior to commencement of works. The water quality will be monitored during works by the following methods:

1. Fixed station in situ water quality monitoring
2. Boat-based in situ water quality monitoring
3. Visual water quality monitoring
4. Laboratory water quality monitoring

Fixed station in situ water quality monitoring

Turbidity sensors will be used to determine turbidity during the dredging operation using in-situ readings. Continuous, real-time, in situ water quality data will be collected through the use of sensors deployed on a buoy near the construction site. High-frequency data is averaged at regular intervals and uploaded via telemetry to a website.

Fixed locations for turbidity sensors will be identified and agreed with the relevant authority.

Boat-based in situ water quality monitoring

Monthly mobile manual monitoring will also take place by boat-based water quality monitoring, the frequency of which will be approved by the relevant authority. The manual monitoring will be a combination of in situ testing and/or lab testing as agreed with the relevant authority.

Visual water quality monitoring

Daily visual monitoring will also be carried out from the shore and dredging vessel by the Contractor and Resident Engineer. The visual monitoring will include:

- Visual monitoring for suspended solids within and outside of the harbour.
- Daily inspection of surface water management systems including the stockpile drainage locations and any authorised discharge locations.
- A log will be kept of all visual monitoring.

Laboratory water quality testing

Samples will be collected at agreed regular intervals and locations to test for suspended solids. The plan will be approved by the relevant authority.

Dewatering of saltwater ponds created by construction of the revetment embankment.

Dewatering of this seawater will occur under appropriate discharge authorisations and will be monitored to ensure limit parameters are followed. It is expected that this water will be clean and clear

and will flow or be pumped directly into the sea. Where this water does not meet agreed limits for discharge it will be treated until it does meet the discharge limits required. Treatment is expected to be by triple interceptor tank if required for hydrocarbons and/or by settlement tank to reduce suspended solids.

Excess water (supernatant) from reclamation area.

- Once stabilised dredge material is pumped into the reclamation area, excess water (supernatant) will form on the surface. Excess water (supernatant) will be collected from the surface of deposits and returned to the treatment plant for reuse to fluidise the dredge spoil as necessary to make it pumpable. In cases where there is a higher amount of excess water then is required for reuse, then the excess water or trade effluent will be appropriately treated to remove sediment and discharged to the sewer system or storm water system or tankered off site, as appropriate and authorised under the EPA licence.
- The treatment locations will be supervised by either the Site Engineer/ Environmental Clerk of Works / Environmental Manager.
- As cement will be used in the treatment process, all high-alkaline water draining from the facilities will be neutralised in a settlement area (by dosing with CO^2), before being discharged under authorisation, after settlement, back into Howth Harbour, preferably toward the inner end of the harbour.

4.8 Surface Water Management Plan

The surface water management will involve minimising the volume of water requiring treatment, intercepting and treating construction surface water runoff prior to discharge to the Irish Sea. The main source of "dirty" surface water will be runoff from stockpiles of dredge material (such as coarser material that does not require treatment) and any other surface areas that contain dredge material. The main source of "clean" surface water will from existing roads and tarmac areas within the compounds.

Design Philosophy

The following sections present the construction phase surface water management plan to ensure the site enabling works construction phase will not deteriorate water quality and will safeguard the existing water quality status of the adjacent Irish Sea.

The risks to water quality associated with construction works of this nature include sediment runoff and contamination by fuels and oils from machinery.

A construction phase surface water management plan, once implemented, must be managed properly and will be subject to construction phase environmental auditing. The drainage infrastructure must be monitored at all times, particularly after a heavy rainfall event. A detailed textual account of the management plan design is presented below.

The design rationale is that of an integrated approach where each element of the infrastructure is assessed for its potential contribution to sediment suspension and the appropriate mitigation measures integrated into the layout design. The design principles are as follows: