MWP

Dingle Small Craft Harbour Dumping at Sea Application

Attachment E.2 – Dumping Site General Information

Client: Department of Agriculture, Food and the Marine

30/06/2022

Contents

1 Distance From Nearest Shore

The proposed disposal site is located 250m south of the rocky cliffs of Dunshean Head, 350m from Beenbane Point, 1770m from Bull's Head and 1540m from Reenbeg Point.

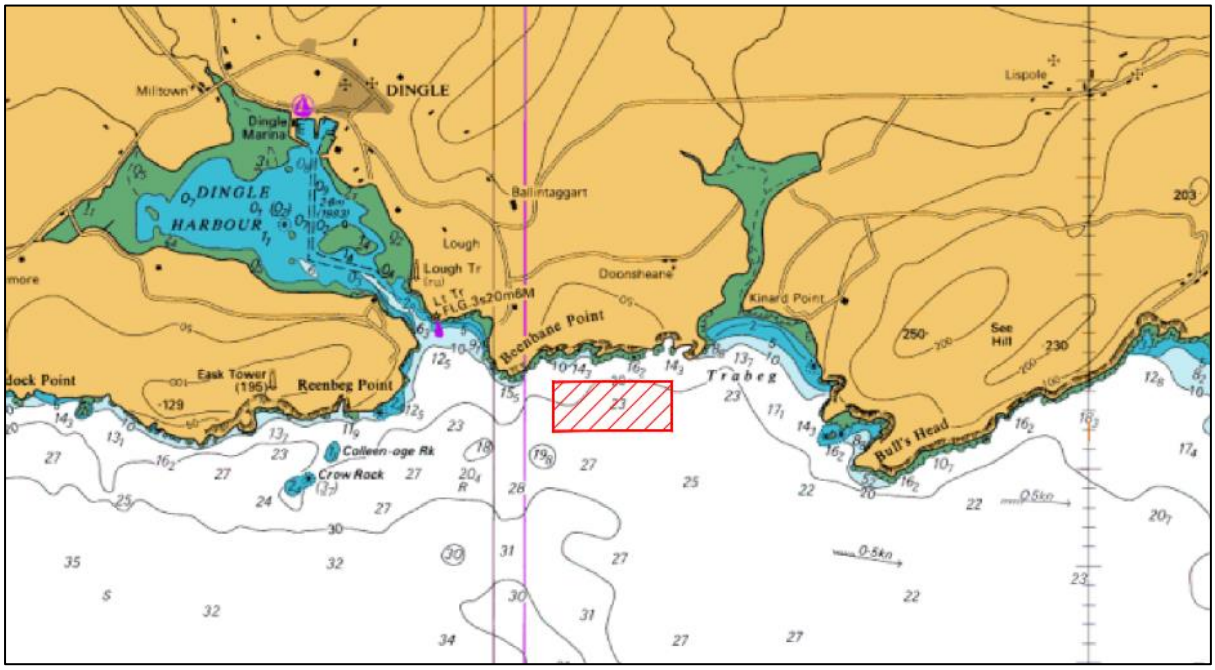
Refer to Dwg Appendix E.2.(II).

2 Average, Minimum and Maximum Depths of Water

Please refer to below excerpt from Admiralty Chart No. 2789.

Water depths are in the range of 20-25m below Chart Datum.

Also refer to Dwg Appendix E.2.(II).



3 Sediment Characteristics.

Refer to Benthic Ecological Report by Aquatic Services Unit UCC and Ecological Survey Report by Goldcrest Environmental Services.

4 Nature of Seabed Habitats

Refer to Benthic Ecological Report by Aquatic Services Unit UCC and Ecological Survey Report by Goldcrest Environmental Services.

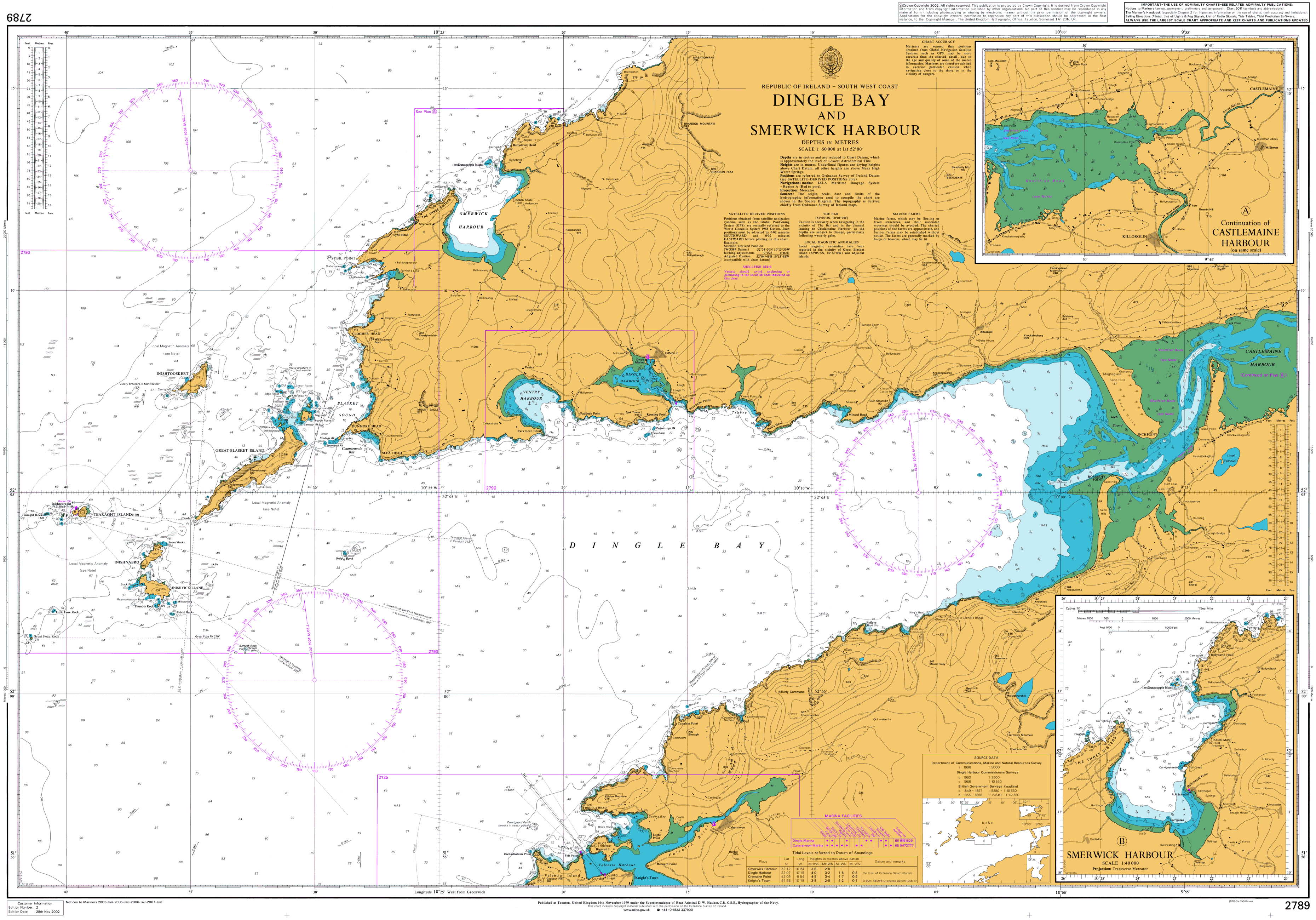
5 Current/Flow/Tidal Regime

Refer to Numerical Modelling Report by UCC.

Tidal current numerical modelling has been undertaken are the proposed disposal site. This modelling indicates that:

- Tidal currents in the vicinity of the disposal site are low in the range 0.04 to0.09m/s.
- Suspended sediment concentrations due to dumping operations over the disposal area are low, less than 30mg/l approximately 3 hours after the last disposal operation at the end of the dredge campaign.
- The depth of material on the disposal site is approximately 0.14m maximum at the end of the dredging campaign.
- Suspended sediment concentrations in the immediate vicinity of the dredging operation are high but they are a number of orders of magnitude lower at the harbour mouth, less than 8mg/l.

Chart Number: 2789
Title: Dingle Bay and Smerwick Harbour
Scale: 1:60000
Datum: Ordnance Survey of Ireland
Print Date: 22 Oct 2021



Dingle Harbour Marina Development
&
Dredge Spoil Disposal

Benthic Ecological Report

Commissioned by: Malachy Walsh & Partners
Carried out by: Aquatic Service Unit (UCC)
(August, 2021)

1 Introduction & Brief

Aquatic Services Unit were commissioned by Malachy Walsh & Partners to undertake a marine benthic assessment of the subtidal communities within the area of a proposed marina development in Dingle Harbour and the site located approximately 2km from the mouth of Dingle Harbour where the dredge spoil from the proposed marina site will be disposed.

2 Methodology

2.1 Sub-tidal Soft Benthos Survey

2.1.1 Subtidal Grab Sampling

A total of 15 sub-tidal grab samples were collected during the present survey; 5 samples were collected within the footprint of the proposed marina development (G_31 – G_35), with 10 samples collected from within and adjacent to the disposal site (G_01 – G_10). All samples were collected on the 17th June 2021 and were sampled using a 0.1m^2 stainless steel Van-Veen Grab. Pre-determined sampling positions were navigated to using the vessels own GPS system. Once on site, the precise location of each sampling station was collected using a Garmin eTrex 32x GPS. A full list of the stations sampled are presented in Table I and these stations are displayed on a map (Figure 1).

Notes on field Sampling

Grab samples taken in the area of the proposed marina presented no problems as the substrate was uniformly soft. However, collection at a number of sites proved difficult due to the coarse nature of the seabed at several locations within the footprint of the disposal area adjoining areas.

	Easting (m)	Northing (m)		Northing (m)	Easting (m)
G_01	47236.46	97740.35	G_31	43984.34	100684.43
G_02	47093.61	97725.44	G_32	44123.48	100619.93
G_03	47364.75	97809.90	G_33	43939.25	100776.05
G_04	47526.91	97866.17	G_34	44141.67	100479.04
G_05	47547.98	97770.87	G_35	44142.89	100517.98
G_06	47502.19	97440.43			
G_07	47062.82	97445.03			
G_08	47695.43	96809.80			
G_09	48766.76	97108.93			
G_10	45489.01	98299.94			

Table I: Positions of sub-tidal soft sediment sampling stations. All positions are provided in Irish Map Grid.

At each grab station:

A single 0.1m^2 Van-Veen grab was taken for benthic faunal analysis from which a small sub-sample was removed for Particle Size and Loss on Ignition analyses (15 Stations).

Figure 1: Map showing the positions of sub-tidal grab samples (Red Circles); (a) Proposed Marina Area, (b) Dredge Disposal Area.

All samples grab samples were processed within 24 hours of collection. Samples were sieved through a 1mm mesh sieve and preserved in 4% formalin (buffered with sea water). All fauna were identified to the lowest taxonomic level possible using standard keys to north-west European fauna by specialist taxonomists from Thomson Environmental Consultants.

A number of biotic indices were calculated from the species / abundance matrix from the grab samples. These indices included Simpson's Dominance Index (where values range from low dominance [0] to high dominance [1]), Shannon-Wiener Diversity Index (Values ranging from low diversity [0] to high diversity [4]) and Pielou's Evenness Index (values ranging from low i.e. dominated by a few species [0] to high evenness i.e. a more even spread of species [1]).

Granulometric Analysis

Grain size analysis was carried out on oven dried sediment from each station using the protocols described by Holme & McIntyre (1984). After the specified chemical pre-treatments, the dried sediment was passed through a series of nested brass test sieves with the aid of a mechanical shaker. The brass sieves chosen were 4mm, 2mm, 1mm, 500µm, 250µm, 125µm and 63µm. The sediments

were then divided into three fractions: % Gravel (>2mm), % Sand (<2.0mm >63µm) and % Silt-Clay (<63µm). Further analysis of the sediment data was undertaken using the Gradistat package (Blott & Pye, 2001).

Organic Matter Analysis

Organic matter was estimated using the Loss on Ignition (LOI) method. One gram of untreated dried sediment was ashed at 450˚C for 6 hours and organic matter was calculated as % sediment weight loss.

2.1.2 Subtidal Video Survey

Fieldwork was carried out on the 17th & 18th June 2021. Pre-determined sampling positions were navigated to using the vessels own GPS system. Once on site, the precise location of each sampling station was collected using a Garmin eTrex 32x GPS. A list of stations sampled is presented in Table II and these stations are displayed on the map in Figure 2.

Station	Co-ordinates (Irish National Grid) Easting (m) Northing (m) Video Locations		Station	Co-ordinates (Irish National Grid) Easting (m) Northing (m) Video Locations	
Video_01	43972.42	100719.33	Video_18	47022.77	98148.92
Video_02	44002.36	100712.82	Video_19	47982.97	97803.20
Video_03	44028.16	100639.65	Video_20	48083.28	97675.42
Video_04	44069.49	100559.26	Video_21	48310.44	97839.97
Video_05	44142.63	100531.35	Video_22	48192.94	97270.07
Video_06	46722.41	97790.70	Video_23	48328.12	98082.18
Video_07	46949.82	97716.88	Video_24	47756.04	97355.81
Video_08	47079.53	97720.68	Video_25	47983.65	97152.86
Video_09	47439.63	97702.93	Video_26	47826.56	96993.97
Video_10	47505.55	97773.29	Video_27	47158.29	97071.27
Video_11	47620.22	97711.86	Video_28	47326.8	97377.89
Video_12	47625.68	97889.87	Video_29	46939.10	97390.93
Video_13	47418.65	97846.11	Video_30	45598.50	97807.67
Video_14	47224.33	97881.03	Video_31	46585.11	97829.46
Video_15	46971.88	97898.61	Video_32	46301.95	97652.24
Video_16	47404.19	98022.50	Video_33	45503.75	98332.89
Video_17	47718.49	98121.99			

Table II: Positions of shallow water sub-tidal video survey stations. All locations given in Irish National Grid.

A total of 33 stations were surveyed using a drop-down video camera system; 5 video drops were collected within and adjacent to the proposed marina area and 28 video drops were collected from within and adjacent to the disposal area. Data was recorded as MPEG4 format files directly to a portable DV recorder. At each station a single recording was taken of sufficient duration to enable a representative record the seabed character at each location. The video camera was lowered to above the sediment surface, and video imagery was recorded. Technical issues at drop V-20 resulted in no video being recorded, although field notes indicated the presence of mixed ground in this area (cobble and gravelly sands)

Figure 2: Map showing locations of sub-tidal video sampling positions – June 2021; (a) Proposed Marina Area, (b) Dredge Disposal Area.

3 Results

3.1 Particle Size and Loss on Ignition Assessment

Sediment located within and adjacent to the proposed marina in Dingle Harbour consists of muddy sands and sandy muds. The video survey of the disposal site indicates a mosaic of seabed types, ranging from bedrock and cobble to muddy sands. Results from the granulometric assessment indicates the presence of muddy sands across large parts of the soft sediment sections of the survey area (Table III, Figures 3 & 4, Appendix 2). Results from the video survey indicate the presence of occasional mixed sediments (gravels and large cobble areas) in addition to bedrock and boulders across large parts of the survey area in and around the disposal site. Loss on Ignition values reflect the nature of the soft sediment areas of the site with higher values present at the muddier sites (Table III).

	G_01	G_02	G_03	G_04	G_05
% Gravel	0.2%	0%	0%	0.1%	0%
% Sand	82.6%	78.9%	61.3%	50.0%	87.7%
% Mud	17.2%	21.1%	38.7%	49.9%	12.3%
% LOI	0.86%	1.21%	3.12%	2.41%	1.25%
Textural Group	Slightly gravelly muddy sand	Muddy sand	Muddy sand	Slightly gravelly muddy sand	Muddy sand
	G_06	G_07	G_08	G_09	G_10
% Gravel	0%	0%	0%	0.1%	0.4%
% Sand	48.3%	57.0%	86.2%	81.7%	96.4%
% Mud	51.7%	43.0%	13.8%	18.2%	3.2%
% LOI	2.99%	1.60%	1.06%	2.06%	0.7%
Textural Group	Sandy mud	Muddy sand	Muddy sand	Slightly gravelly muddy sand	Slightly gravelly sand
	G_31	G_32	G_33	G_34	G_35
% Gravel	0.1%	0%	0.1%	0.4%	0.2%
% Sand	79.2%	26.4%	91.3%	88.1%	43.2%
% Mud	20.7%	73.6%	8.6%	11.5%	56.6%
% LOI	1.71%	3.85%	0.93%	0.76%	3.89%
Textural Group	Slightly gravelly muddy sand	Sandy mud	Slightly gravelly sand	Slightly gravelly muddy sand	Slightly gravelly sandy mud

Table III Granulometric and Loss on Ignition results from samples taken within Dingle Harbour and Dingle Bay.

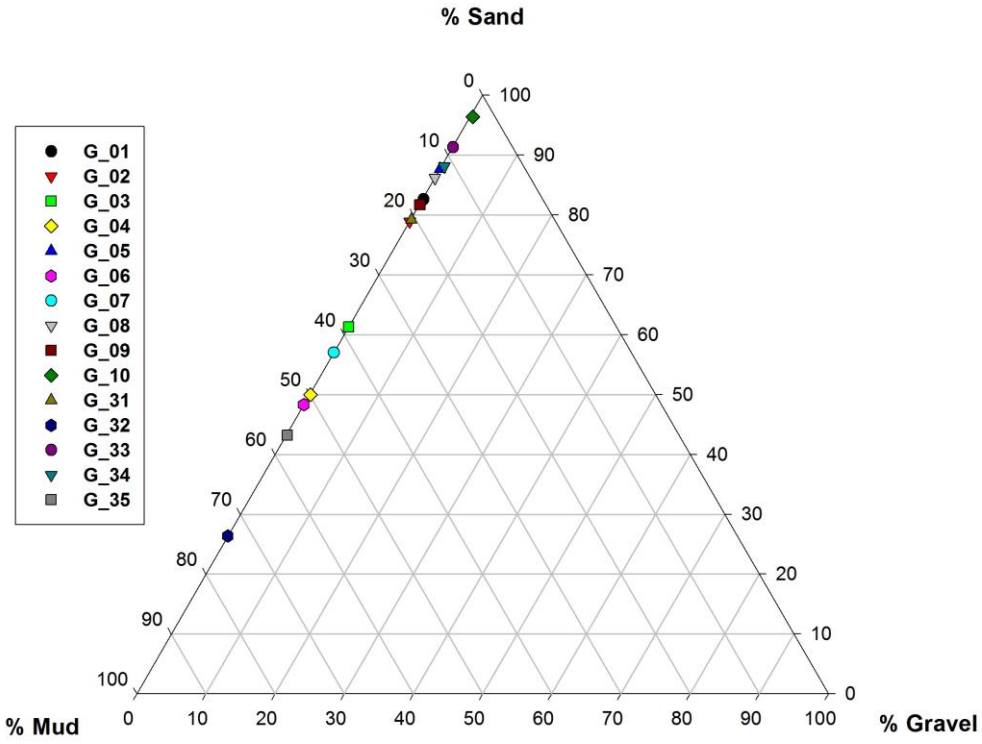


Figure 3: Ternary Plot of granulometric results from Dingle.

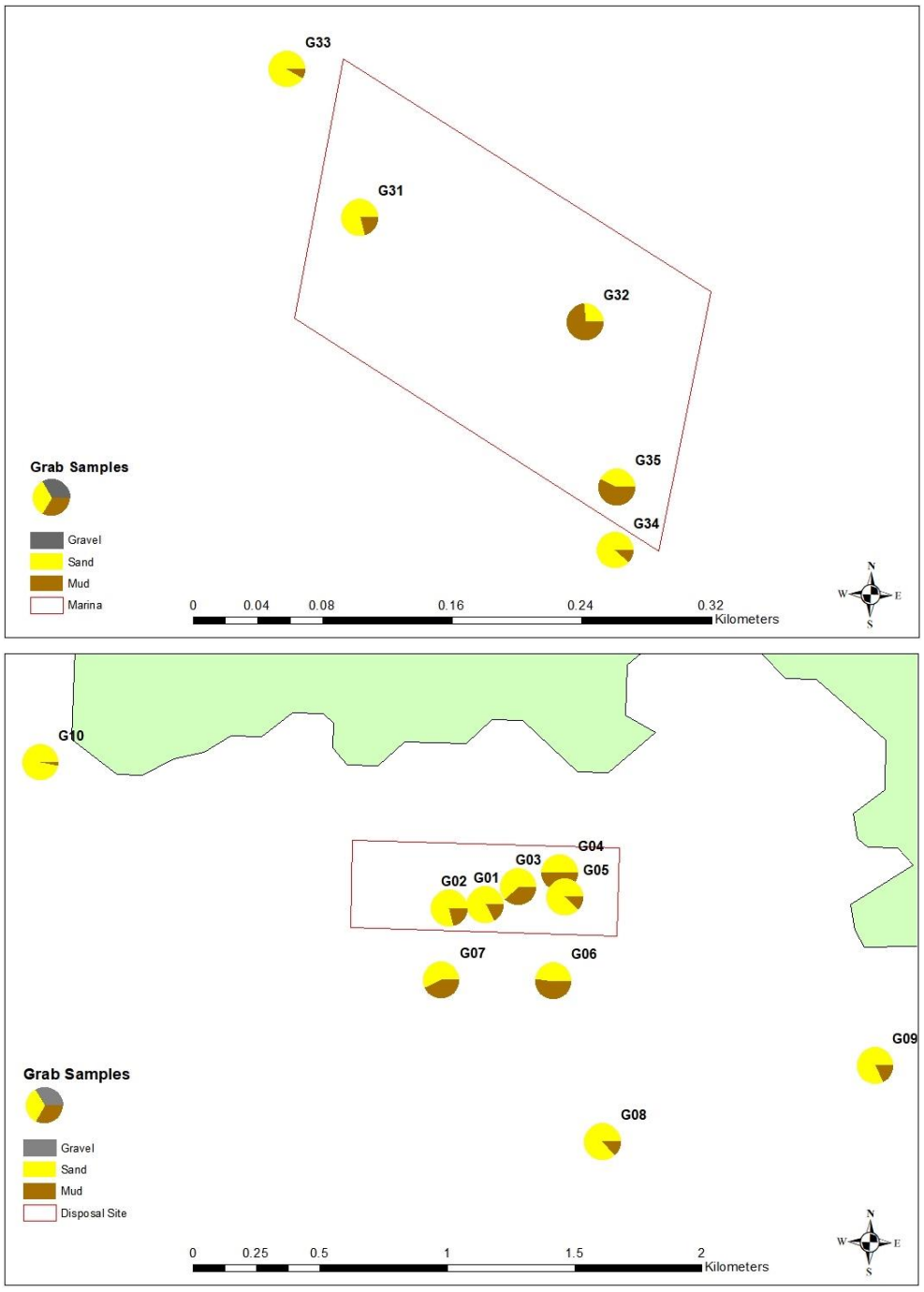


Figure 4: Distribution of PSA within the survey area at the proposed marina (a) and the disposal site (b). (Grey – Gravel; Yellow – Sand; Brown – Mud)

3.2 Infaunal Assessment

A total of 98 countable taxa were recorded in the infaunal grab samples collected from the survey areas of Dingle Harbour (G_31 – G_35) and Dingle Bay (G_01 – G_10) (Table V and Appendix 1).

A total of 38 countable taxa were recorded from the proposed marina in Dingle Harbour, with sites G_31 and G_32 recording the highest number of taxa (18 and 19 respectively) and G_35 recording the lowest (with only 5 taxa recorded). The polychaetes *Exogone naidina*, *Nephtys hombergii*, *Pygospio elegans & Leitoscoloplos mammosus* as well as the amphipod *Ampelisca brevicornis* were recorded at 4 of the 5 sites collected at the site of the proposed marina.

A total of 73 countable taxa were recorded in Dingle Bay within and adjacent to the disposal site, with sites G_07 and G_09 recording the highest number of taxa (26 & 27 respectively). Several taxa were encountered in 7 or more stations; polychaetes *Spiophanes bombyx* (9 stations) & *Glycera tridactyla* 8 stations), molluscs *Abra alba* (7 stations) & *Fabulina fabula* (7 stations), the echinoderm *Amphiura filiformis* (8 stations) and Nemerteans (7 stations).

	G_01	G_02	G_03	G_04	G_05	G_06	G_07	G_08	G_09	G_10
No. of Species	19	18	8	13	19	16	26	12	27	18
No. of Individuals	28	36	18	66	67	43	57	25	63	38
Shannon-Wiener	2.82	2.61	1.71	1.33	1.99	2.39	2.79	2.28	2.71	2.72
Pielou's Evenness	0.957	0.902	0.82	0.519	0.676	0.864	0.856	0.917	0.824	0.941
Simpson's Dominance	0.0689	0.0972	0.253	0.495	0.271	0.129	0.0988	0.12	0.124	0.0776

	G_31	G_32	G_33	G_34	G_35
No. of Species	18	8	12	19	5
No. of Individuals	49	34	36	70	18
Shannon-Wiener	2.32	1.63	1.87	2.32	1.12
Pielou's Evenness	0.801	0.782	0.753	0.79	0.694
Simpson's Dominance	0.18	0.244	0.258	0.147	0.432

Table IV Diversity indices derived from the infaunal grab data from the disposal site in Dingle Bay (G_01 – G_10) and the proposed marina development in Dingle Harbour (G_31 – G_35)

Results from the multivariate analysis on the infaunal grab data identify the presence of two distinct faunal groupings (Groups 1 and 2) within the survey area (Figures 5 & 6), with Group 2 further showing three sub-groups following further analysis.

All taxa identified in the present survey (Table VI) are typical of shallow subtidal and coastal soft-sediment communities, with the majority of species identified common in Irish coastal waters.

GROUP 1: (Average Similarity: 26.35)

Nephtys hombergii	*Ampelisca brevicornis*	*Pygospio elegans*
Leitoscoloplos mammosus	*Fabulina fabula*	*Exogene naidina*
Chaetozone gibber	*Nematoda*	

GROUP 2A: (Average Similarity: 39.38)

Chamelea striatula	*Spiophanes bombyx*	*Nephtys* sp.
Ophiura sp.	*Glycera tridactyla*	*Nemertea*

GROUP 2B: (Average Similarity: 49.92)

Amphiura filiformis	*Abra alba*	*Fabulina fabula*
Spiophanes bombyx	*Acrocnida brachiata*	*Glycera tridactyla*
Goniada maculata	*Phoronis*	*Phaxas pullucidus*

GROUP 2C: (Average Similarity: 43.98)

Spiophanes bombyx	*Prionospio fallax*	*Amphiura filiformis*
Magelona johnstoni	*Glycera tridactyla*	*Abra alba*
Magelona filiformis	*Nemertea*	*Owenia* sp.
Chamelea striatula	*Goniada maculata*	*Phaxas pellucidus*

Table V: Results from multivariate analysis of the fauna identified in each faunal group identified in the survey area.

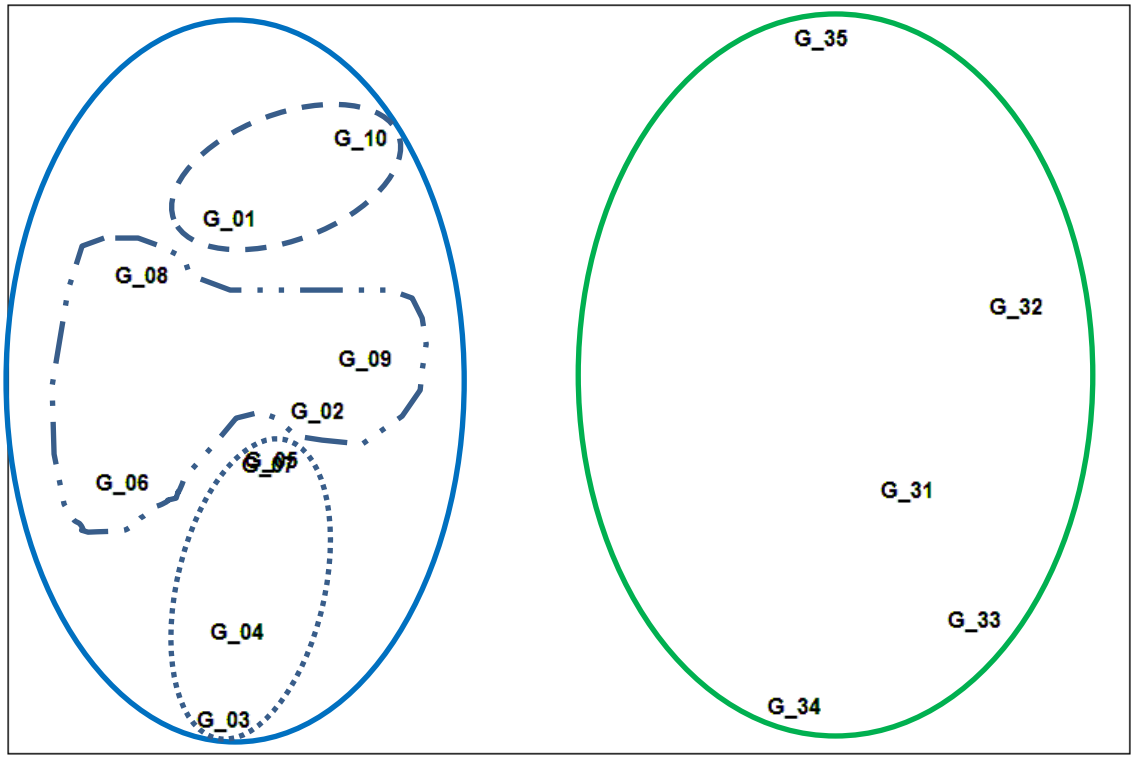


Figure 5: MDS plot of Dingle fauna (Stress = 0.10). Group 1 are coloured Green, Group 2 are coloured Blue (2A – blue dashes, 2B – Blue dots, 2C – Blue dots/dashes).

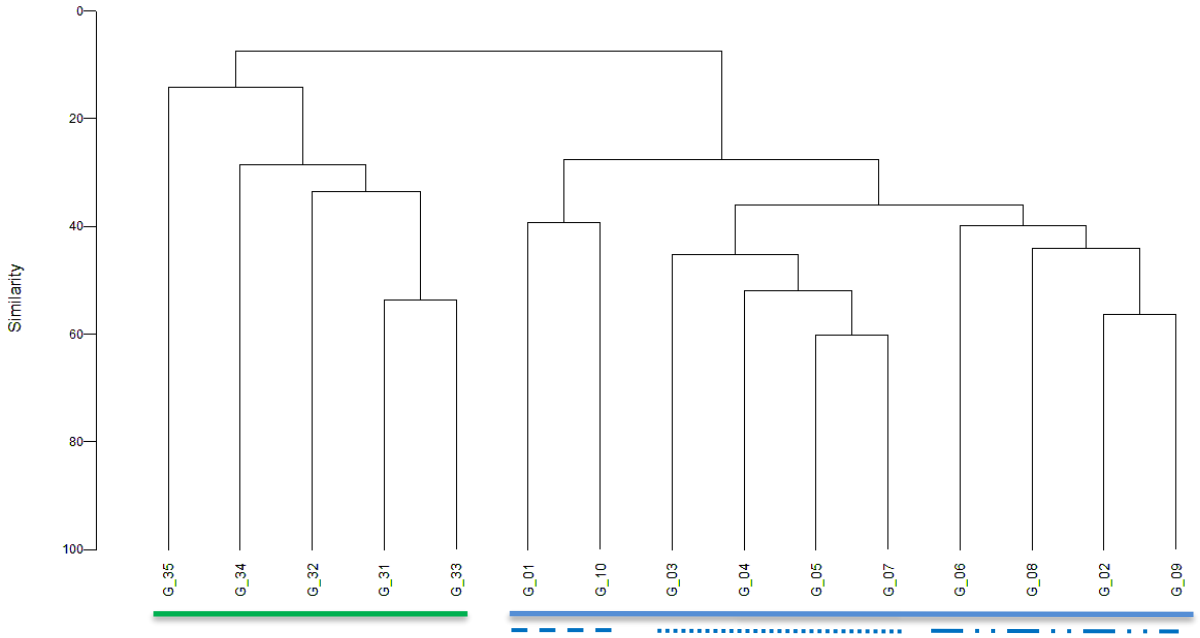


Figure 6: Cluster dendogram indicating the distribution of sites based on faunal distribution within the survey areas in Dingle Harbour and Dingle Bay. Group 1 is marked in green, Group 2 in blue (2A – blue dashes, 2B – Blue dots, 2C – Blue dots/dashes)

3.3 Video Assessment

Drop V_01:

The site consisted of muddy sands with large amounts of drift green and brown algae (including *Chorda filum*, *Ulva intestinalis* and occasional *Fucus serratus*, possibly drift) on the sediment surface. *Arenicola marina* casts were present in large numbers, with occasional *Lanice* tubes visible in parts of the transect. Occasional *Carcinus maenas* and *Liocarcinus* sp. were also identified across the site.

Plate 1: *Arenciola* casts in muddy sands with *C. maenas* and drift algae present on the sediment surface.

Drop V_02:

The site consisted of muddy sands with large numbers of *Arenicola* casts and occasional *Sabella* tubes present with diatoms and green / brown algae present on the sediment surface (including *C. filum*, *U. intestinalis* and occasional *Saccharina latissima*). Swimming crabs *Liocarcinus* sp. and common green crabs *C. maenas* were present, in addition to a single Butterfish (*Pholis gunnellus*) which was noted on site.

Plate 2: *Arenicola* casts with drift green algae and *Chorda filum* present on the sediment surface

Drop V_03:

Site consisted of muddy sands with large amounts of the lugworm *Arenicola marina* casts on the sediment surface. Large amounts of green and brown algae (similar to that identified in V02) were present on the sediment surface, with *Sabella* fans evident from tubes in the sediment.

Plate 3: *Arenicola* casts and algae on muddy sands at site V_03

Drop V_04:

As previous sites, with *Arenicola marina* casts, brown and green algae as well as *C. maenas*. *Sabella* fans were present on the sediment surface.

Plate 4: *Sabella* sp. and *Arenicola* casts on muddy sands with green algae at Drop V_04.

Drop V_05:

Sandy muds with reduced amounts of *Arenicola* casts. Occasional green weed (*Ulva intestinalis* and filamentous brown algae) present on the sediment surface at much reduced levels to previous transects.

Plate 5: *Arenicola* casts on muddy sand at site V_05.

Drop V_06:

The seabed across at this transect consisted of a mixed cobble and boulder seabed. The Spiny Starfish *Marthasterias glacialis* was identified on the boulder bed in addition to the common starfish *Asterias rubens*. Keelworms, *Pomatoceros* spp., were noted on the cobble across the seabed at this transect. A single flatfish, thought to be Lemon Sole (*Microstomus kitt*) was noted along the transect

Plate 6: Lemon Sole, *Microstomus kitt*, on cobble and gravel at site V_06.

Plate 7: Spiny starfish *M. glacialis* at site V_06.

Drop V_07:

The seabed along the start of this transect consisted of sand, with no visible fauna present. Further along the transect, starfish (*A rubens*) were identified with occasional boulders, highlighting the mixed nature of the seabed along this transect.

Plate 8: Common Starfish (*A. rubens*) present on sand at site V_07.

Drops V_08, V_09, V_10, V_11, V_12, V_13, V_14 & V_15:

The seabed along these transects consisted of rippled sands, with no obvious fauna visible on the sediment surface.

Plate 9: Sand at site V_09.

Plate 10: Rippled sand at siteV_12.

Plate 11: Rippled sand at site V_15.

Drop V_16:

The seabed in this area consisted of stone / gravel present in compacted sand. No obvious fauna in the seabed.

Plate 12: Mixed gravels and sands at site V_16.

Drop V_17:

The seabed in this area consisted of a mix of stone and gravel in compacted sand at the start of the transect, giving way to areas of bedrock and large cobble. Notable taxa identified along the site included anemones, sponge and keelworms (*Pomatoceros* sp.) in addition to encrusting red algae.

Plate 13: Keelworms and sponge on cobble and boulder at site V-17.

Plate 14: Anemone and sponge on hard benthos at site V_17.

Drop V_18:

This area consisted of mixed seabed with hard benthos interspersed with sandy sediment. Notable fauna included burrowing anemone and Devonshire cup-corals (*Caryophyllia smithii*). The mid to the latter part of the transect consisted primarily of rippled fine and medium sands.

Plate 15: Burrowing anemone in sand at site V_18.

Plate 16: Devonshire cup-corals (*C. smithii*) and bryozoan turf at site V_18.

Drop V_19:

The seabed in this area consisted of bedrock interspersed with cobble and gravels. Starfish (*A. rubens*) were present in large numbers on the cobble across the site. Scattered red algae and encrusting calcareous reds were present on the hard substrate. A number of notable fauna were identified during the transect, including the common sea urchin, *Echinus esculentus* and the sea cucumber *Aslia lefevrei*. Dead-man's fingers, *Alcyonium digitatum*, hydroids and bryozoa were also present on the hard benthos across the site.

Plate 17: Red algae with encrusting calcareous reds at site V_19.

Plate 18: Dark feeding tentacles of the sea-cucumber *Aslia lefevrei* from rock crevices at site V_19.

Plate 19: Dead-man's fingers (*A. digitatum*) at site V_19.

Drop V_21:

The seabed in the area consisted of gravelly sands and sandy gravels with no fauna visible.

Plate 20: Sand and gravel at site V_21.

Drop V_22:

The seabed in this area consisted of firm rippled sands, with scattered, unidentified burrows.

Plate 21: Faunal burrows present at site V_22.

Drop V_23:

The seabed in this area consisted of rippled gravelly sands. No fauna were visible on the seabed.

Plate 22: Gravels and coarse sand at site V_23.

Drop V_24:

Firm rippled sands with no fauna visible on the seabed.

Plate 23: Rippled sands at Site V_24.

Drop V_25:

The seabed along this transect consisted of bedrock interspersed with cobble / boulder with sponges, bryozoa and hydroids present on the hard benthos. In addition, notable mobile fauna identified at the site included the common sea urchin, *E. esculentus*, common starfish, *A. rubens*, the spiny starfish, *M. glacialis*, Devonshire cup-corals , *C. smithii*, and the keelworm, *Pomatoceros* sp. A single Goldsinny Wrasse (*Ctenolabrus rupestris*) was noted swimming over the bedrock.

Plate 24: Spiny starfish (*M. glacialis*) and common starfish (*A. rubens*) on boulder with a bryozoan turf Site V_25.

Plate 25: Keelworms, sponges, hydroids and bryozoa on bedrock at Site V_25.

Plate 26: Dark feeding tentacles of the sea-cucumber *Aslia lefevrei* from rock crevices at Site V_25. A Goldsinny Wrasse (*C. rupestris*) is visible to the left of the frame swimming adjacent to the boulders.

Drop V_26:

The seabed in the area consisted of bedrock interspersed with cobble and boulder. The common sea-urchin, *E. esculentus*, spiny starfish (*M. glacialis*) and common starfish (*A. rubens*) were present.

Plate 27: *E. esculentus* on boulders at Site V_26.

Plate 28: Spiny starfish (*M. glacialis*) and common starfish (*A. rubens*) on boulder with a bryozoan turf at site V_26.

Drop V_27:

The seabed consisted of firm rippled sands with *Ophiura* sp. noted at the site.

Plate 29: *Ophiura* sp. on fine sand at site V_27.

Drops V_28 & V_29:

These sites consisted of rippled muddy sands.

Plate 30: Muddy sand at site V_29.

Drop V_30:

The seabed in the area consisted of stone / gravel in compacted sand with no obvious fauna visible on the seabed.

Plate 31: Gravels in sand at site V_30.

Drop V_31:

The seabed in the area consisted of rock and cobble with Spiny starfish (*M. glacialis*) and common starfish (*A. rubens*) present across the site.

Plate 32: Spiny starfish (*M. glacialis*) on cobble sand at Site V_31.

Plate 33: Common starfish (*A. rubens*) on cobble sand at Site V_31.

Drop V_32:

Bedrock interspersed with cobble and boulder dominated the seabed in this area. Notable fauna present on the hard benthos include the common sea-urchin, *E. esculentus*, common starfish (*A. rubens*), the Devonshire cup-coral (*C. smithii*) and keelworms (*Pomatoceros* sp.). In addition, sponge (*Cliona* sp.) and encrusting red algae were present on the bedrock.

Plate 34: Common sea urchin (*E. esculentus*) and Devonshire cup-coral (*C. smithii*) on boulders at Site V_32.

Plate 35: Common starfish (*A. rubens*) and encrusting reds algae on cobble Site V_32.

Drop V_33:

The substrate at this site consisted of firm rippled sand with occasional drift algae present.

Plate 36: Drift algae on rippled sand at Site V_33.

3.4 Habitat Assessment

The fauna identified in the present survey were assigned biotopes based on the JNCC classification system of Connor *et al*. (2004). This allows for easier interpretation of the results and for comparisons to be made with other surveys in the area.

Proposed Marina Location

Results from both the video and grab survey in the area of the proposed marina identified the presence of a single biological community in the area. The sediment in the area consists of muddy sands and sandy muds. A distinct faunal group is present in the area, typical of Infralittoral Muddy Sands. The area is dominated by *Arenicola marina* casts, and the fauna identified from the grab survey confirm that the site is characterised as *Arenicola marina* in infralittoral fine sand or muddy sand (JNCC Code: SS.SSa.IMuSa.ArelSa). This biotope often appears quite faunally sparse and occurs in shallow fine sands and non-cohesive muddy sands in fully marine conditions (Connor *et al.*, 2004) such as occurs at the location of the proposed marina in Dingle Harbour.

Dumpsite Location

Sediment distribution, based on the video data, is presented in Figure 7. This mirrors the findings of the INFOMAR survey in 2010, which classified the area within and adjacent to the dumpsite as consisting of a mosaic of soft and hard benthos across the site. The dominant sediment types across the survey area are fine rippled sands and muddy sands, with extensive areas of mixed sediments containing sands and gravels, as well as areas of bedrock and exposed boulder and cobble.

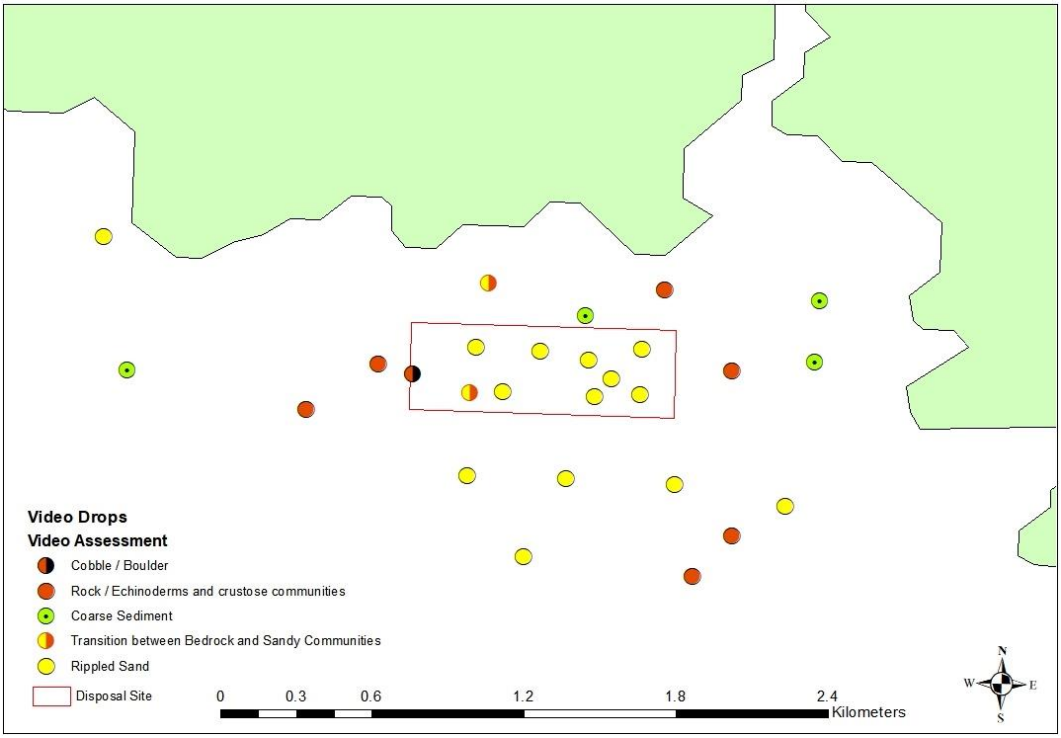


Figure 7: Sediment characterisation from video data across the seabed at the location of the disposal area

Classification of the hard benthos was made using the video data collected during the survey. Four distinct hard and coarse benthic habitats were identified (Figure 8). Sites from the survey area which contained bedrock and large boulder were consistent in terms of the fauna that was identified across these sites. They included encrusting algae and echinoderms, in addition to bryozoans and hydroids. These areas have been classified as Echinoderms and crustose communities (JNCC Code: CR.MCR.EcCr). Transition areas which contain cobble and boulder with reduced epifauna were more difficult to classify. A tentative classification of *Pomatoceros triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles (JNCC Code: SS.SCS.CCS.PomB) has been made at this site on the western edge of the disposal area. Sites which contained gravels in compacted sands have been classified as Circalittoral Coarse Sediment (JNCC Code: SS.SCS.CCS). A number of sites have been classified as transition zones between Circalittoral Muddy Sands (SS.SSa.CMuSa) and Echinoderms and crustose communities (CR.MCR.EcCr).

Analysis of faunal data identified the presence of a single biotope complex in the soft sediment parts of the disposal area and its vicinity (Figure 8), namely Circalittoral Muddy Sands (JNCC Code: SS.SSa.CMuSa). In addition, three discrete faunal assemblages were identified within this biotope complex, separated on the basis of the relative abundances of certain infauna at the sites. Groups 2B and 2C contain fauna which are typical of the biotope identified as *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (JNCC Code: SS.SSa.CMuSa.AlbNuc), although *Nucula nitidosa* were missing from the samples collected during the present survey. Connor *et al*. (2004) note that the epibiotic biotope CR.MCR.EcCr (Echinoderms and crustose communities) may overlap this community, which is the case at this site.

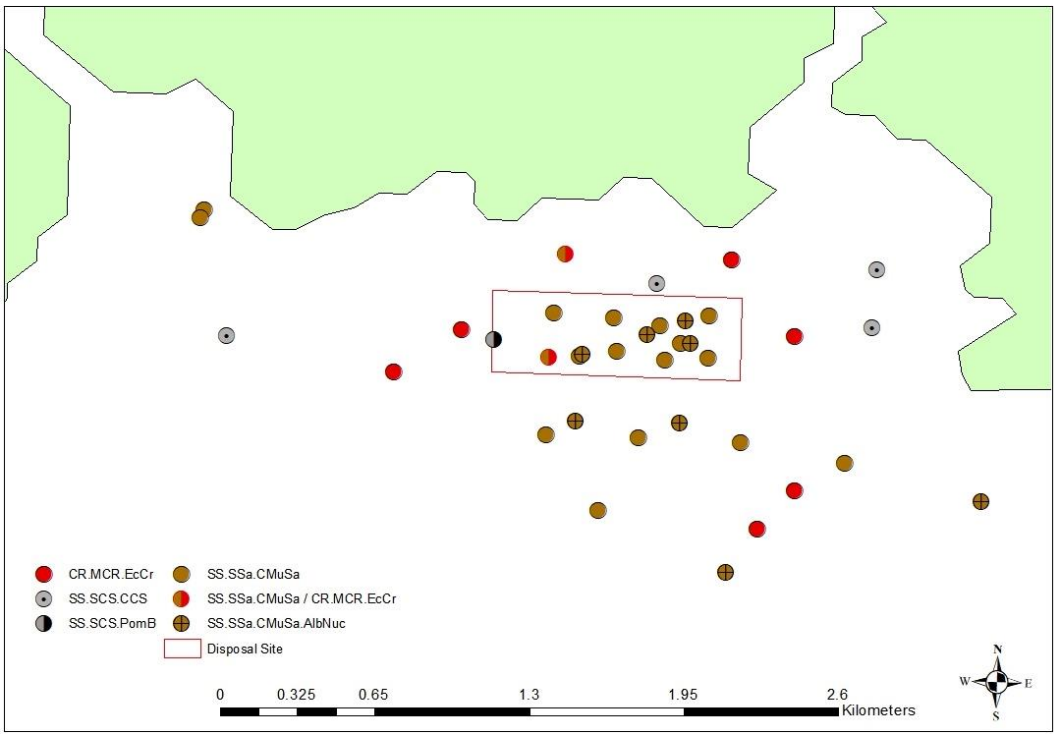


Figure 8: Spatial distribution of the habitats identified within and adjacent to the disposal site from benthic grab and video data.

4 Discussion

Results from the present survey mirror the findings of previous geological and biological surveys around the proposed disposal site. Geological surveys undertaken at the location of the dumpsite (INFOMAR, 2010), highlighted the varied nature of the seabed in the area with sediments ranging from bedrock to muddy sands and sandy muds (Fig. 9). The sediment within the disposal site contains a mix of coarse sediments and muddy to fine sands, with the coarser sediment identified along the northern extent of the disposal area.

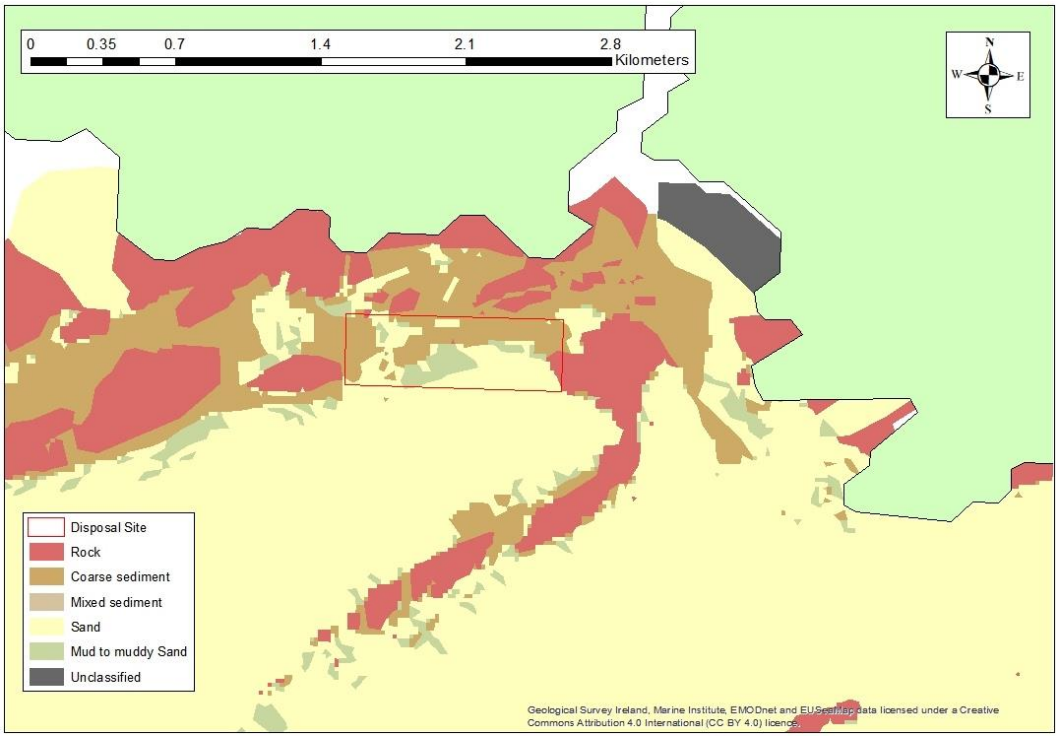


Figure 9: Sediment characterisation of the seabed in and adjacent to the dumpsite (Red Box). Data reproduced from INFOMAR (2010). (GSI, Esri, DeLorme, NaturalVue | INSS/INFOMAR | Geological Survey Ireland, Marine Institute, EMODnet and EUSeaMap data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence. | Esri, DeLorme, geonames.org)

A survey undertaken in November 2007 as part of a previous licence application also identified the same distribution of coarser sediment along the northern extent of the disposal area and finer sediments along the southern parts (Figure 10). The biological communities identified in the survey undertaken 2007 were similar to those identified in the present survey, with muddy sands dominated by the brittlestar, *Amphiura filiformis* present throughout the survey area at the disposal site. Although the number of countable taxa present during the current survey was higher than collected previously (73 taxa in 2021 compared to 38 taxa in 2007), the dominant species identified previously are also present in the current survey and the same habitat types are present, reflecting the stable nature of the benthos in the vicinity of the dumpsite in Dingle Bay.

Overall, the benthic habitats identified are common in Irish coastal waters. No protected species have been identified in the survey area.

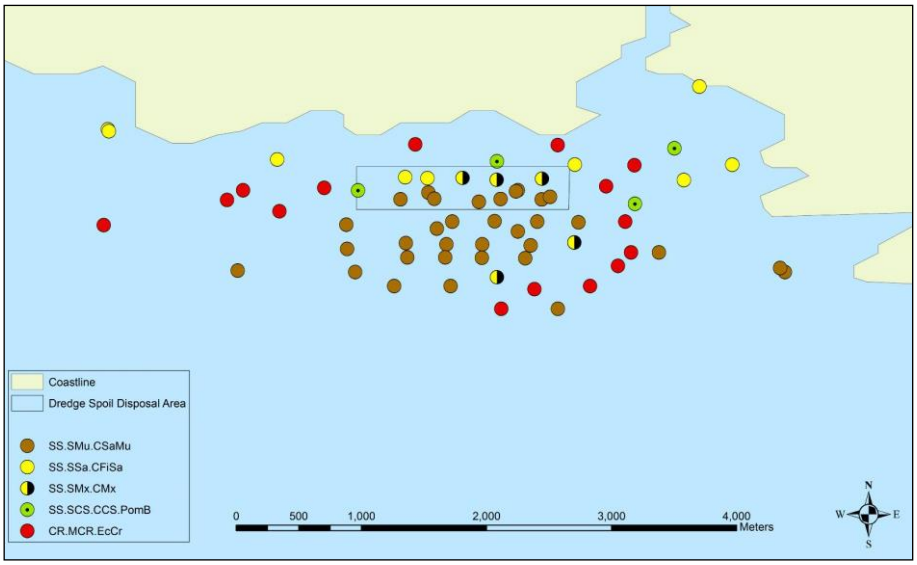


Figure 10: Locations of biological and sediment habitats identified from a previous survey undertaken in November 2007 (RPS, 2008).

The proposed works will involve the removal of 100,000m^3 of muddy sands and sandy muds from the area of the proposed marina and the deposition of this sediment at the disposal site located in Dingle Bay. A single biotope was identified from the area to be removed. This biotope is very common in Irish coastal waters.

The main impact associated with dredge spoil disposal is smothering of the benthos following the deposition of large volumes of sediment onto the seabed. Recovery at a disposal site follows a typical pattern. After deposition, macroinvertebrate species diversity, abundances and biomass will be much reduced within the immediate footprint of the smothered area. Recovery at the site occurs through vertical migration through the freshly deposited sediment if the sediment deposited is similar in nature to the native sediment, and the layer of deposition is <15cm (Wilbur *et al.*, 2007). This will be complimented by lateral migration of mobile fauna from adjacent areas and through larval settlement from the plankton. If the dredge spoil is different to the native sediment, then vertical migration would be reduced, and the primary mode of recovery would be through lateral migration of mobile species from unaffected areas and larval settlement from the plankton.

The nature of the disposal area is also important in determining recovery and potential impacts. Benthic communities which are subjected to episodic stress events (such as regular sedimentation from disposal events, storms or strong tidal movement) would result in a community which is adapted to recover from significant sedimentation. The disposal site in Dingle Bay has been used sporadically as a disposal area, including the deposition of 40,000m^3 of muds and sandy muds from dredging of the navigation channel in Dingle Harbour. This work was undertaken in 2018 and is the most recent disposal event at the dumpsite in the last 5 years. Results from the present survey indicate no evident residual effects from this level of sediment disposal at the site.

To mitigate against impacts associated with smothering from sediment disposal it is recommended to minimise the depth of the disposed sediment on the faunal communities by spreading the dredge spoil over as wide an area as is practicable during disposal. In addition, to assist with potential recovery by means of larval settlement, it is recommended that all dredging and deposition occur outside of the reproductive window of the infaunal communities. Disposal of dredge spoil in late autumn and winter is recommended to allow for larval settlement in spring and summer.

5 References

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6 Appendices

6.1 Appendix 1: Species / Abundance Matrix. Faunal numbers per 0.1m^2.

Taxon name	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G31	G32	G33	G34	G35
Edwardsia claparedii	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Nemertea indet.	3	1	-	-	1	1	1	-	1	1	-	-	-	1	-
Nematoda	-	-	-	-	1	-	-	-	-	-	2	-	-	-	1
Tubificoides sp.	-	-	-	-	-	-	-	-	-	-	1	-	3	-	-
Pholoe baltica	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Acholoe squamosa	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Harmothoe sp.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Sigalion mathildae juvenile	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Sthenelais limicola	-	-	-	1	1	2	-	-	-	-	-	-	-	-	-
Glycera tridactyla	1	6	-	2	2	-	2	5	2	1	-	-	-	-	-
Goniada maculata	-	-	2	-	1	-	2	1	2	-	-	-	-	-	-
Exogone naidina	-	-	-	-	-	-	-	-	-	-	3	1	1	1	-
Parexogone hebes	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-
Eumida sp.	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Phyllodoce sp.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Nephtys indet.	2	-	-	-	-	-	-	-	-	2	1	1	-	-	-
Nephtys assimilis	-	1	-	-	2	-	1	-	1	2	-	-	-	-	-
Nephtys cirrosa	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Nephtys hombergii	-	-	-	-	-	-	-	-	1	-	4	12	1	-	11
Protodorvillea kefersteini	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Lumbrineris aniara agg.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitella sp.	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Mediomastus fragilis	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
Leitoscoloplos mammosus	-	-	-	-	-	-	-	-	-	-	2	7	2	1	-
Scoloplos armiger	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-
Scalibregma inflatum	-	-	-	-	-	3	2	-	-	-	-	-	-	-	-
Malacoceros sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Prionospio cf. *multibranchiata*	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Prionospio fallax	-	1	-	-	1	12	2	3	7	-	-	-	-	1	-
Pseudopolydora pulchra	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Pygospio elegans	-	-	-	-	-	-	-	-	-	-	19	1	4	1	-

Spio martinensis	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
Spio symphyta	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Spiophanes bombyx	2	7	-	1	8	4	9	4	19	4	-	-	-	-	1
Aphelochaeta sp.	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
Caulleriella alata	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-
Chaetozone christiei	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-
Chaetozone gibber	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-
Diplocirrus glaucus	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-
Ampharete baltica	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Melinna palmata	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-
Amphictene auricoma	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Lagis koreni	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Lanice conchilega	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Galathowenia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	21	-
Owenia sp.	1	-	-	-	-	3	1	1	-	-	-	-	-	-	-
Magelona indet.	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-
Magelona alleni	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Magelona filiformis	-	2	-	-	-	1	-	-	1	-	-	-	-	-	-
Magelona johnstoni	-	2	-	-	-	1	-	3	1	-	-	-	-	-	-
Achelia echinata agg.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anoplodactylus petiolatus	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Copepoda	-	-	-	-	1	-	3	1	-	-	-	-	-	-	-
Bodotria scorpioides	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diastylis indet.	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-
Diastylis bradyi	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Diastylis rugosa	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Pseudocuma (Pseudocuma) longicorne	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-
Perioculodes longimanus	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-
Synchelidium maculatum	-	-	-	2	-	-	-	-	-	4	-	-	-	-	-
Nototropis falcatus	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nototropis swammerdamei	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
Ampelisca brevicornis	-	1	-	-	-	-	2	-	2	-	3	9	1	8	-
Acidostoma neglectum	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Gammarus sp.	-	-	-	-	-	-	-	-	-	-	2	-	17	-	-
Megaluropus agilis	-	3	-	-	-	-	-	-	1	2	-	-	-	-	-
Aoridae	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-

Microprotopus maculatus	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Siphonoecetes sp.	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-
Phtisica marina	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Tanaopsis graciloides	-	-	-	2	-	-	-	-	-	-	-	-	-	8	-
Gastrosaccus spinifer	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Decapoda	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Pisidia longicornis	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Liocarcinus sp. juvenile	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-
Cylichna cylindracea	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Philinidae	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
Philine quadripartita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Euspira nitida	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Sorgenfreispira brachystoma	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbonilla	1	-	-	-	-	-	-	1	1	-	-	-	-	-	-
Bivalvia	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-
Phaxas pellucidus	-	1	-	2	1	2	1	-	-	-	-	-	-	-	-
Abra alba	-	1	3	4	1	3	5	-	1	-	-	-	-	-	-
Abra nitida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Asbjornsenia pygmaea	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Fabulina fabula	-	3	1	1	5	-	1	-	1	2	4	-	1	6	-
Kurtiella bidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Thyasira flexuosa	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Mytilidae juvenile	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Chamelea striatula	4	-	-	-	-	-	1	3	2	6	-	-	-	-	-
Phoronis indet.	-	-	-	2	1	-	1	-	6	-	-	-	-	-	-
Astropecten irregularis	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Echinocyamus pusillus	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Ophiuroidae juvenile	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Acrocnida brachiata	1	1	1	-	4	-	1	-	-	-	-	-	-	-	-
Amphiura filiformis	2	2	8	46	33	6	13	P	2	-	-	-	-	-	-
Ophiura sp.	1	1	-	-	1	-	-	-	-	1	-	-	-	-	-

6.2 Appendix 2: Granulometric Results

		G01	G02	G03	G04	G05
	SAMPLE TYPE:	Polymodal, Poorly Sorted	Bimodal, Poorly Sorted	Bimodal, Poorly Sorted	Bimodal, Poorly Sorted	Bimodal, Moderately Sorted
	TEXTURAL GROUP:	Slightly Gravelly Muddy Sand	Muddy Sand	Muddy Sand	Slightly Gravelly Muddy Sand	Muddy Sand
FOLK AND WARD METHOD (DESCRIPTION)	MEAN:	Fine Sand	Very Fine Sand	Very Coarse Silt	Very Coarse Silt	Very Fine Sand
	SORTING:	Poorly Sorted	Poorly Sorted	Poorly Sorted	Poorly Sorted	Moderately Sorted
	SKEWNESS:	Fine Skewed	Fine Skewed	Very Fine Skewed	Very Fine Skewed	Symmetrical
	KURTOSIS:	Very Leptokurtic	Very Leptokurtic	Leptokurtic	Platykurtic	Extremely Leptokurtic
	% V FINE GRAVEL:	0.2%	0.0%	0.0%	0.1%	0.0%
	% V COARSE SAND:	1.0%	0.1%	0.5%	0.2%	0.2%
	% COARSE SAND:	6.7%	0.4%	1.9%	0.9%	1.3%
	% MEDIUM SAND:	14.0%	5.1%	2.8%	2.8%	2.9%
	% FINE SAND:	33.7%	29.6%	18.5%	9.9%	18.0%
	% V FINE SAND:	27.3%	43.7%	37.6%	36.2%	65.3%
	% MUD:	17.2%	21.1%	38.7%	49.9%	12.3%

		G06	G07	G08	G09	G10
	SAMPLE TYPE:	Unimodal, Poorly Sorted	Unimodal, Poorly Sorted	Unimodal, Moderately Well Sorted	Bimodal, Poorly Sorted	Bimodal, Moderately Well Sorted
	TEXTURAL GROUP:	Sandy Mud	Muddy Sand	Muddy Sand	Slightly Gravelly Muddy Sand	Slightly Gravelly Sand
FOLK AND WARD METHOD (DESCRIPTION)	MEAN:	Very Coarse Silt	Very Coarse Silt	Very Fine Sand	Very Fine Sand	Fine Sand
	SORTING:	Poorly Sorted	Poorly Sorted	Moderately Well Sorted	Poorly Sorted	Moderately Well Sorted
	SKEWNESS:	Very Fine Skewed	Very Fine Skewed	Fine Skewed	Symmetrical	Coarse Skewed
	KURTOSIS:	Platykurtic	Mesokurtic	Extremely Leptokurtic	Very Leptokurtic	Mesokurtic
	% V FINE GRAVEL:	0.0%	0.0%	0.0%	0.1%	0.4%
	% V COARSE SAND:	0.0%	0.1%	0.1%	0.5%	0.3%
	% COARSE SAND:	0.1%	0.3%	0.3%	1.4%	3.2%
	% MEDIUM SAND:	0.4%	1.3%	1.2%	4.7%	24.5%
	% FINE SAND:	1.6%	5.4%	6.5%	28.3%	60.4%
	% V FINE SAND:	46.1%	49.9%	78.0%	46.9%	8.1%
	% MUD:	51.7%	43.0%	13.8%	18.2%	3.2%

		G31	G32	G33	G34	G35
	SAMPLE TYPE:	Trimodal, Poorly Sorted	Unimodal, Poorly Sorted	Trimodal, Poorly Sorted	Bimodal, Poorly Sorted	Bimodal, Poorly Sorted
	TEXTURAL GROUP:	Slightly Gravelly Muddy Sand	Sandy Mud	Slightly Gravelly Sand	Slightly Gravelly Muddy Sand	Slightly Gravelly Sandy Mud
FOLK AND	MEAN:	Very Fine Sand	Coarse Silt	Fine Sand	Fine Sand	Very Coarse Silt
	SORTING:	Poorly Sorted	Poorly Sorted	Poorly Sorted	Poorly Sorted	Poorly Sorted
WARD METHOD	SKEWNESS:	Fine Skewed	Fine Skewed	Fine Skewed	Fine Skewed	Very Fine Skewed
(DESCRIPTION)	KURTOSIS:	Very Leptokurtic	Very Platykurtic	Mesokurtic	Very Leptokurtic	Platykurtic
	% V FINE GRAVEL:	0.1%	0.0%	0.1%	0.4%	0.2%
	% V COARSE SAND:	0.1%	0.0%	0.4%	0.9%	0.1%
	% COARSE SAND:	1.5%	0.1%	3.5%	4.2%	0.1%
	% MEDIUM SAND:	13.4%	0.6%	23.8%	39.6%	1.0%
	% FINE SAND:	30.6%	3.0%	45.1%	37.9%	6.6%
	% V FINE SAND:	33.5%	22.7%	18.4%	5.5%	35.5%
	% MUD:	20.7%	73.6%	8.6%	11.5%	56.5%

MWP

An Daingean Small Craft Harbour

Numerical Modelling Output of Tidal Currents, Dredge and Disposal Plumes, and Waves

As conducted by: MaREI, University College Cork

20th May 2022

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Figures

1. Introduction

Numerical modelling of tidal currents, dredging and disposal plumes and waves at the proposed small craft harbour site was undertaken by MaREI of UCC. This appendix contains the output from the model runs.

Runs were undertaken to:

- Estimate tidal currents at both the proposed dredge and disposal sites. The output given is for a spring tide when the currents would be larger and the extent of the spread of any plumes from the dredge or disposal site would be greater.
- Plumes at the dredge and disposal site were modelled and the output given relates to the concentrations of suspended sediments towards the end of the dredging campaign for the disposal site and on a flood and ebb tide for the inner harbour during the dredging campaign.
- Estimate the depth of sediment in the disposal area at the end of the dredging campaign.
- Estimate 50 year wave conditions within the inner harbour area for waves from approximately the south east that would be generated in part in Dingle Bay and propagate into the inner harbour.
- Estimate 50 year wave conditions generated within the inner harbour from a range of directions.

The total volume of material to be dredged is approximately 100,000m3 and the dredging is estimated to take 70 days to complete. The material consists of a mix of sand / silt and clay fractions with some gravel. The full breakdown is given in the preliminary report. The model details use settling velocities instead of grain size and are given below with the plume output.

The models were calibrated using wave and tidal current measurements taken at the proposed dredge site during March 2021.

2. Disposal Site Modelling

2.1 Dispersion of Sediment at Disposal Site

The existing licensed dumpsite coordinates are given in Figure 1.

A dispersed modelling of the dumpsites was used to give an accurate picture of the dumpsite operations, as shown in Figure 2 and Figure 3.

	WGS84/ETR89		ITM	
	LAT	LONG	E	N
(a)	52° 6.9'N	10°14.5'W	446478.8	598272.1
(b)	52° 6.9'N	10°13.5'W	447620.1	598237
(c)	52° 6.65'N	10°14.5'W	446464.5	597808.7
(d)	52° 6.65'N	10°13.5'W	447605.9	597773.5

Figure 1 Definition of dumpsite area

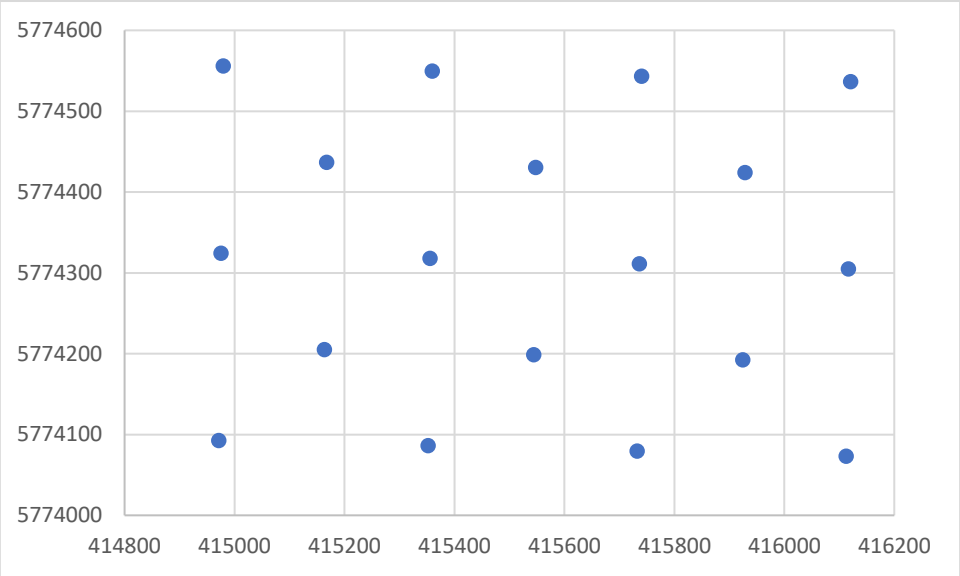


Figure 2 Dispersion of the Dumpsites within the rectangular area

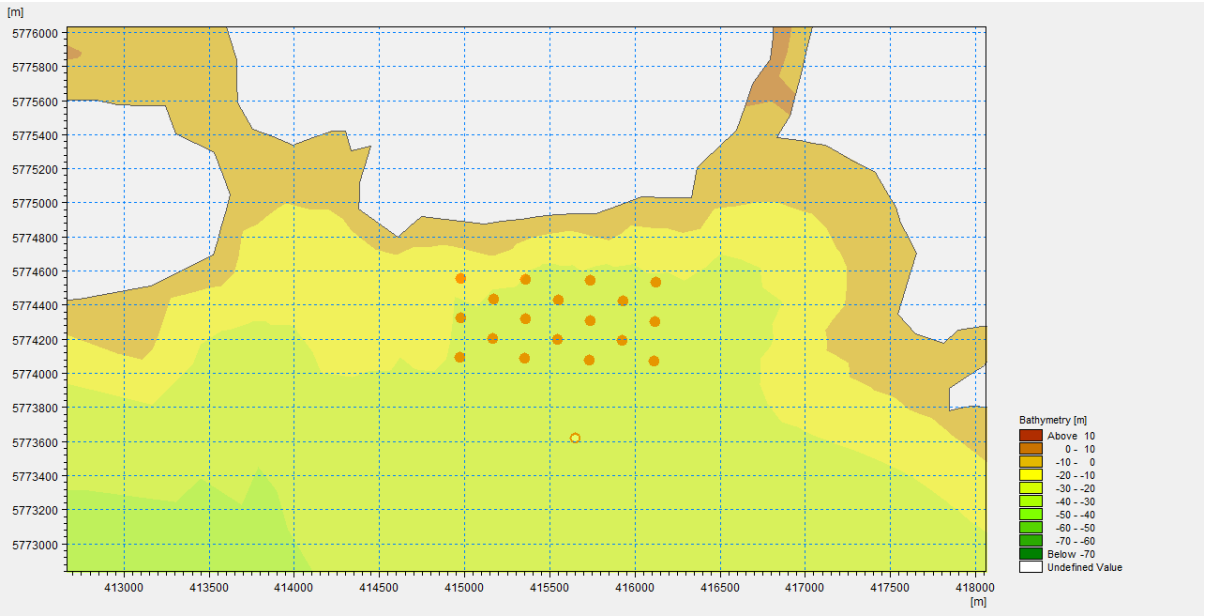


Figure 3 Mike 21 view of dumpsite locations

2.2 Model Details

The dumpsite model was run with two fractions, sand with fall velocity of 0.005m/s and silt/clay with a fall velocity of 0.00005m/s.

The deposition of the dredging material was distributed evenly throughout the 18 dispersed dumpsites. A load was dumped at one of the dumpsites every 6 hours. The dumping rate was 0.6m3/second continuously for a period of 10 minutes, over a 70-day dredging/dumping campaign.

The modelling of tidal currents and dispersion at the disposal site was undertaken using predicted astronomic tides for the period mid February to mid May 21. A sample of the current speed profile from the modelling period for the dumpsite point with greatest bed thickness change is shown in Figure 4.

Snapshots of tidal currents were taken on a spring tide mid-flood and mid-ebb states of the tide – when the tidal currents would be expected to be at their maximum. These snapshots of current speed are shown in Figure 5 and Figure 6.

2.3 Tidal Currents

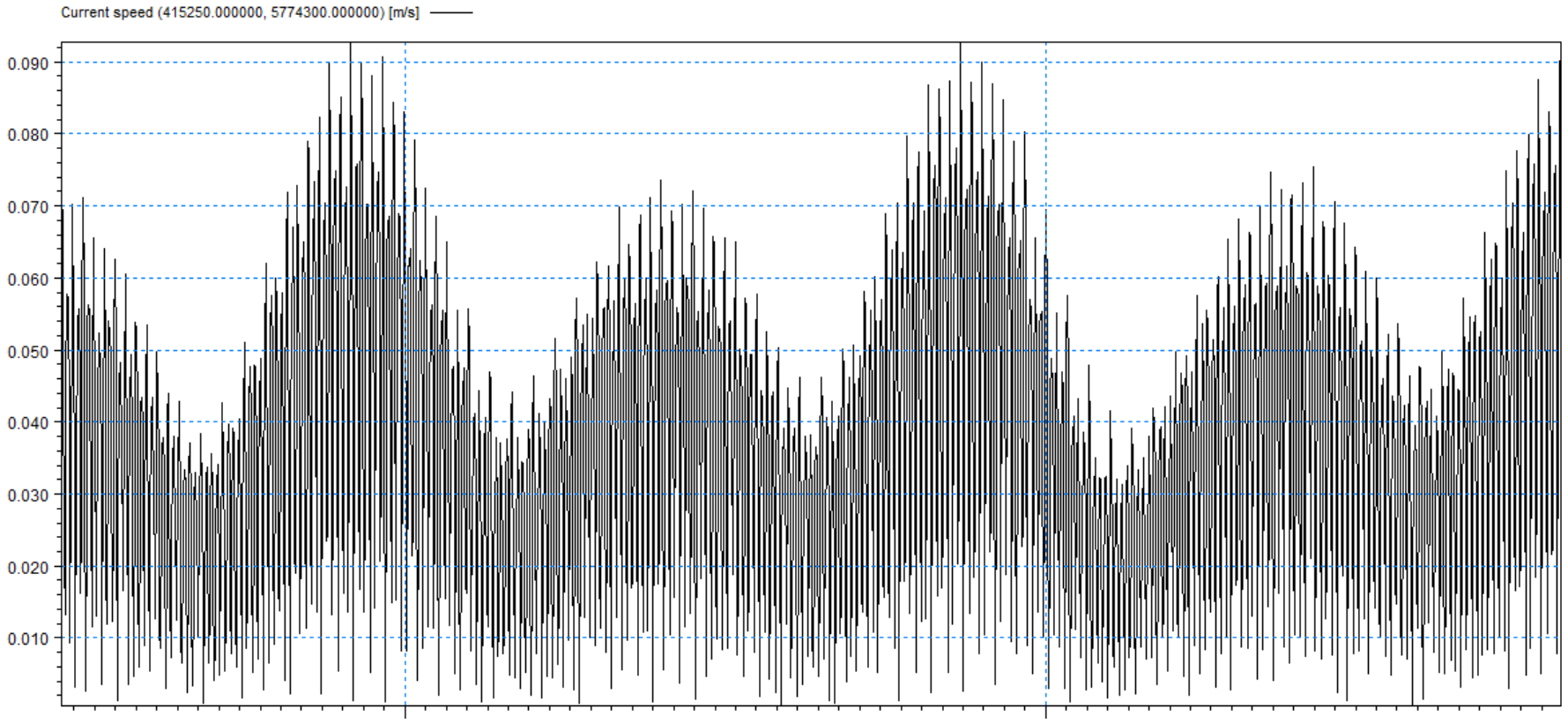


Figure 4 Profile of current speed at key dumpsite location (location of greatest bed thickness increase)

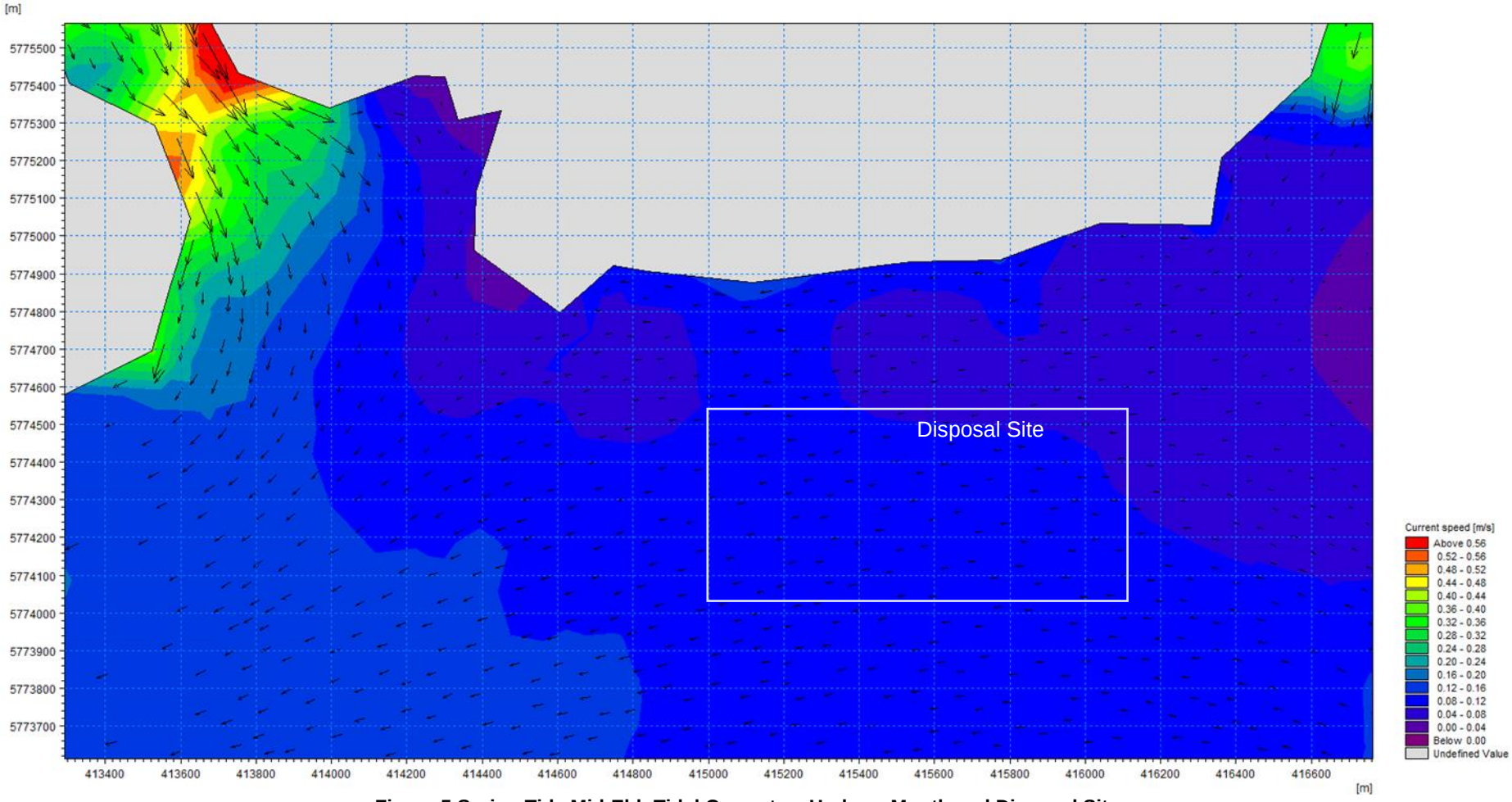


Figure 5 Spring Tide Mid-Ebb Tidal Currents – Harbour Mouth and Disposal Site

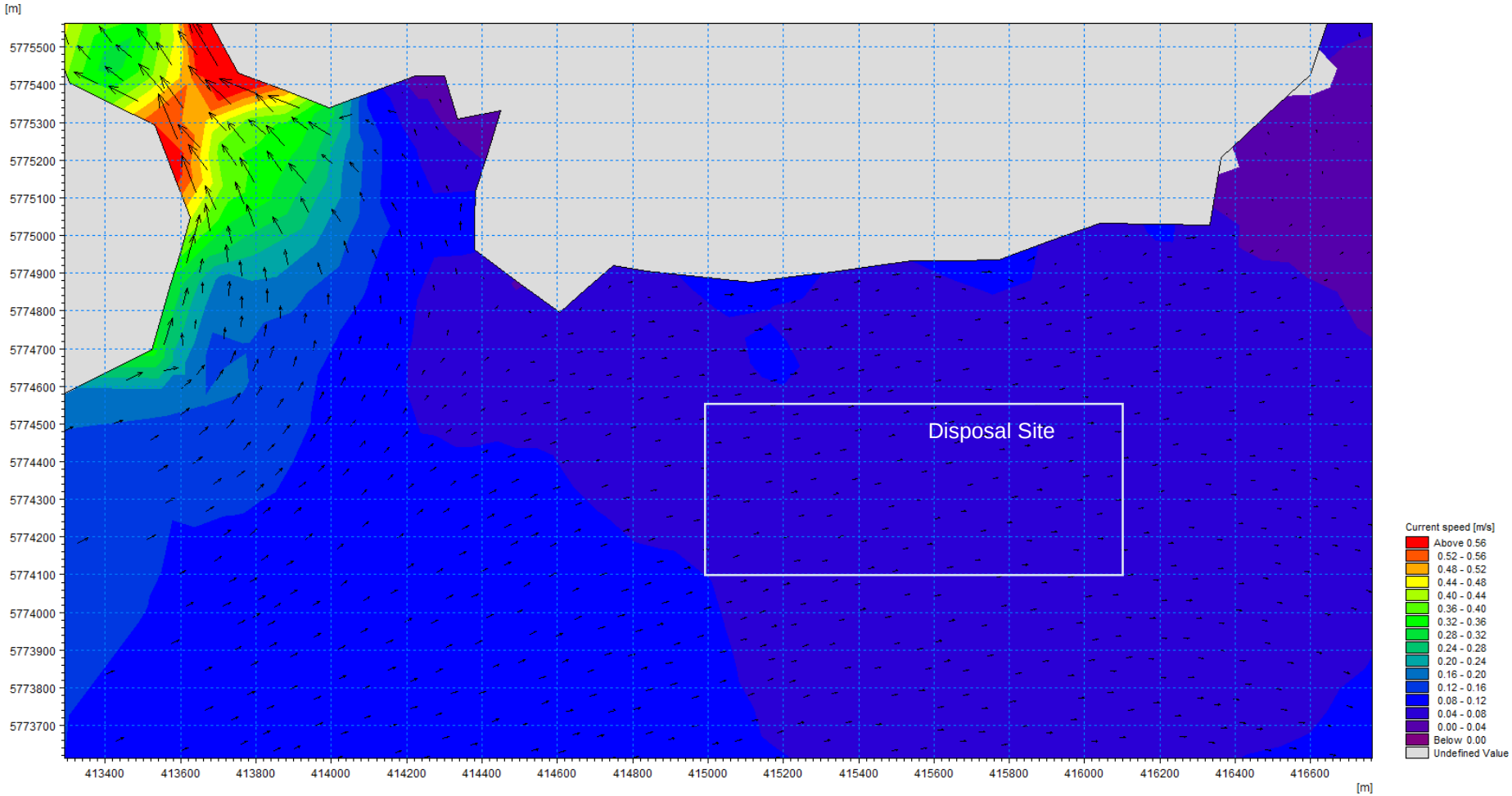


Figure 6 Spring Tide Mid-Flood Tidal Currents – Harbour Mouth and Disposal Site

2.4 Disposal Site Model Output

2.4.1 Suspended Sediment Concentration (SSC)

The increase in SSC only occurs in the immediate vicinity of the disposal site and does not persist beyond the cessation of disposal (see Figure 7 which shows geographic localisation of SSC increase at the end of the 70-day dumping operation).

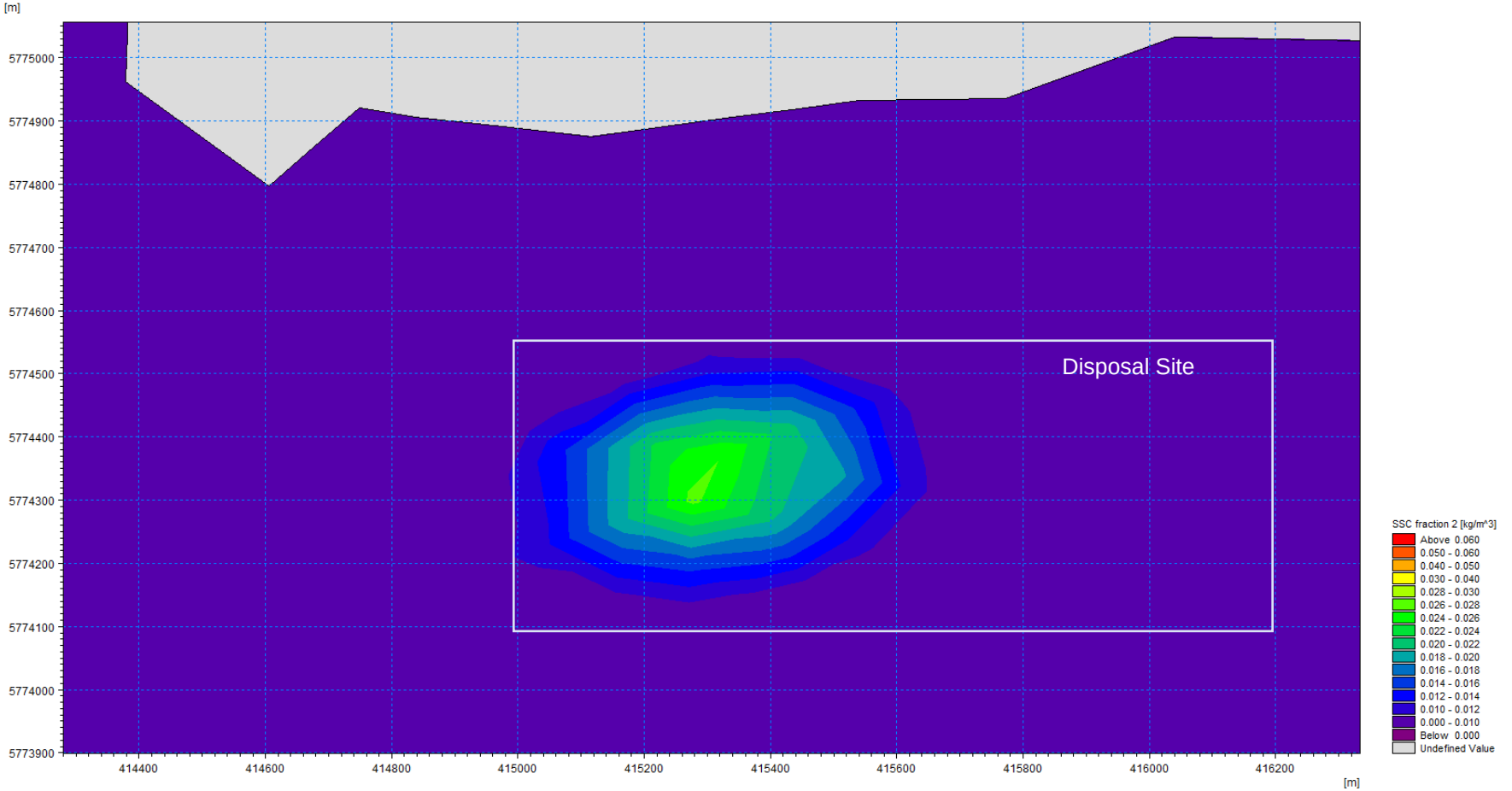


Figure 7 Dumpsite: SSC concentration localised at end of dumping operations (three hours after last dumping operation)

2.4.2 Bed Thickness Change

The build-up of bed thickness at the end of the dumping operations is shown in Figure 8.

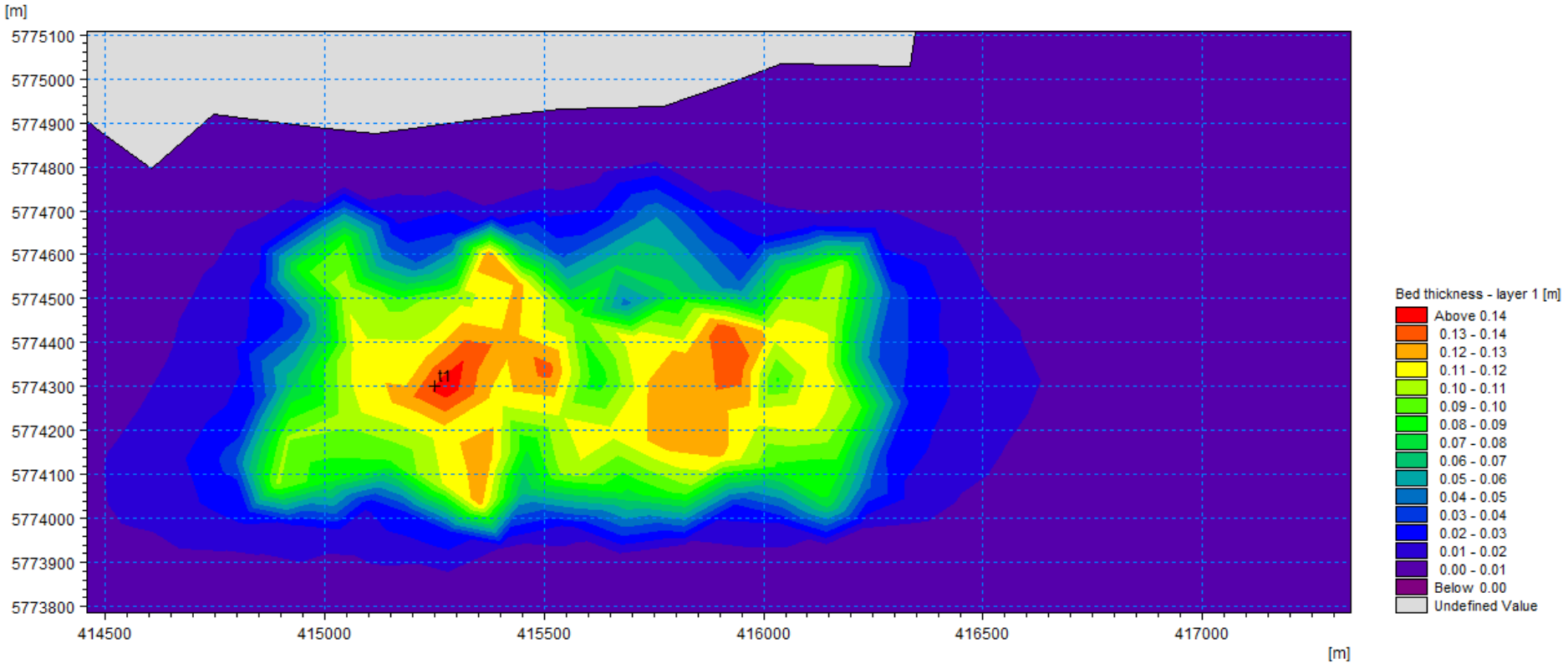


Figure 8 Dumpsite: Bed Thickness Change at end of dumping operations (day 70)

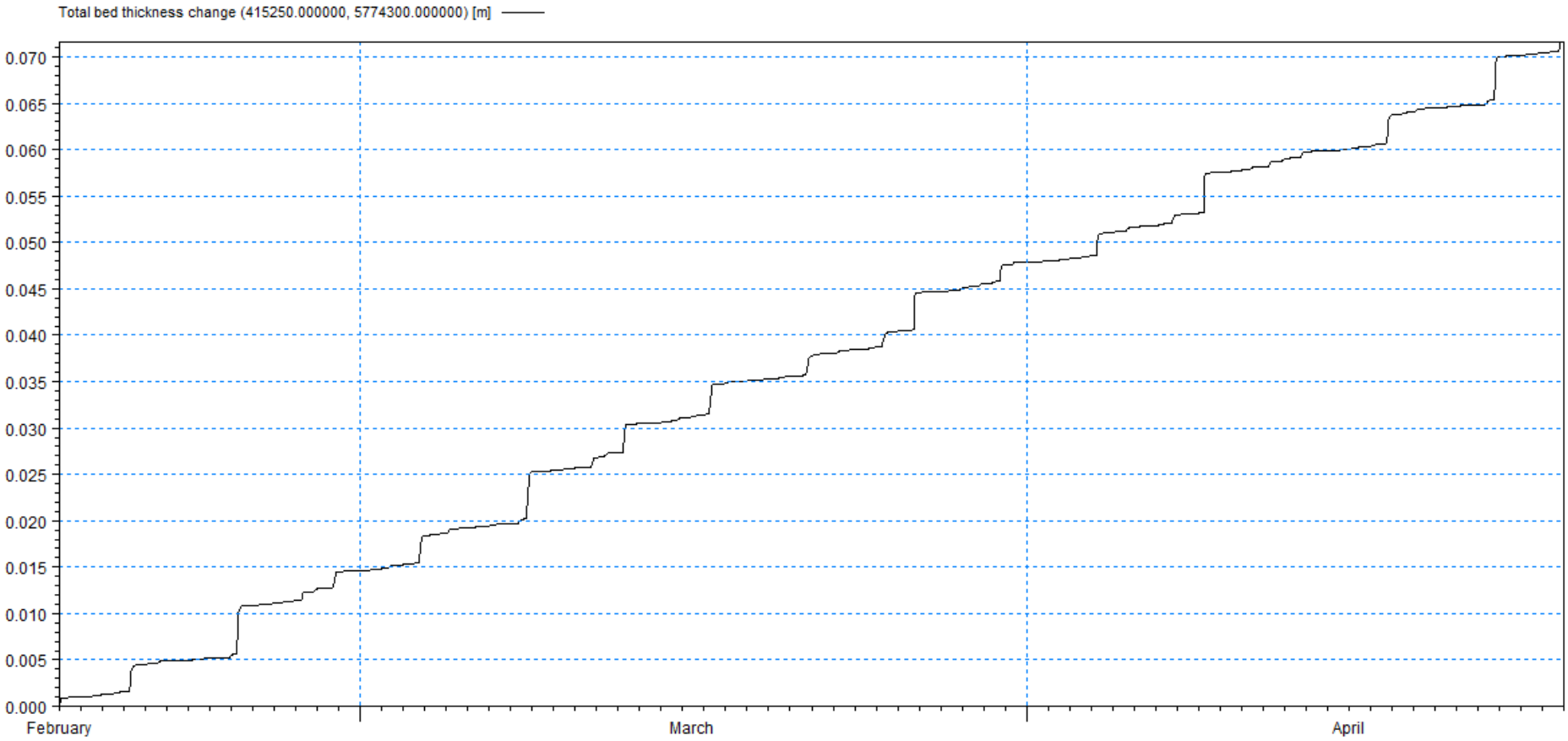


Figure 9 Total Bed Thickness at point of maximum build-up at dumpsite (location shown by t1 marker in Figure 8)

3. Dredge Site Model

3.1 Bathymetry and Surface Elevation

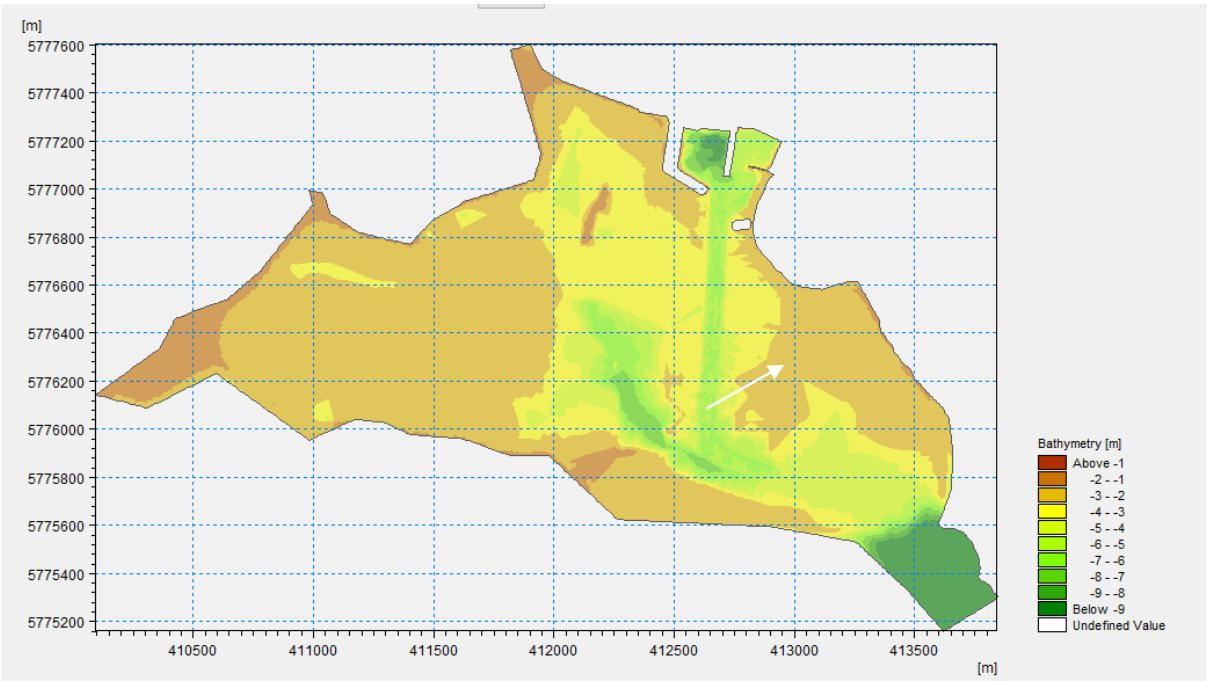


Figure 10 Bathymetry of Dingle Inner Harbour

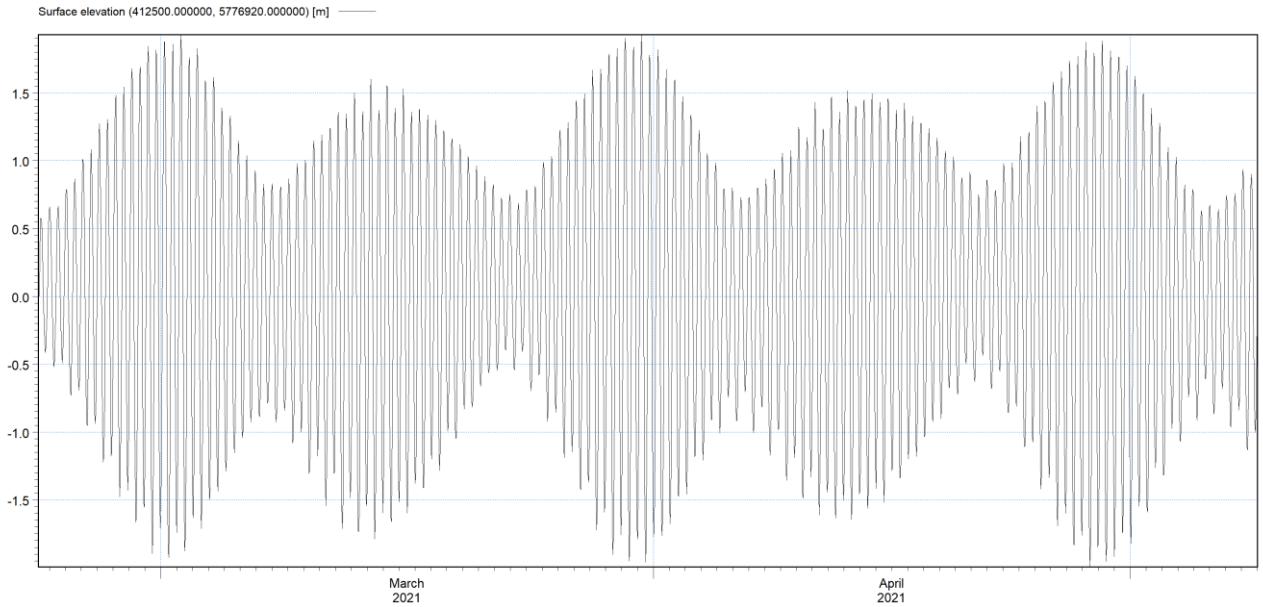


Figure 11 Surface Elevation at dredge site

3.2 Tidal Currents

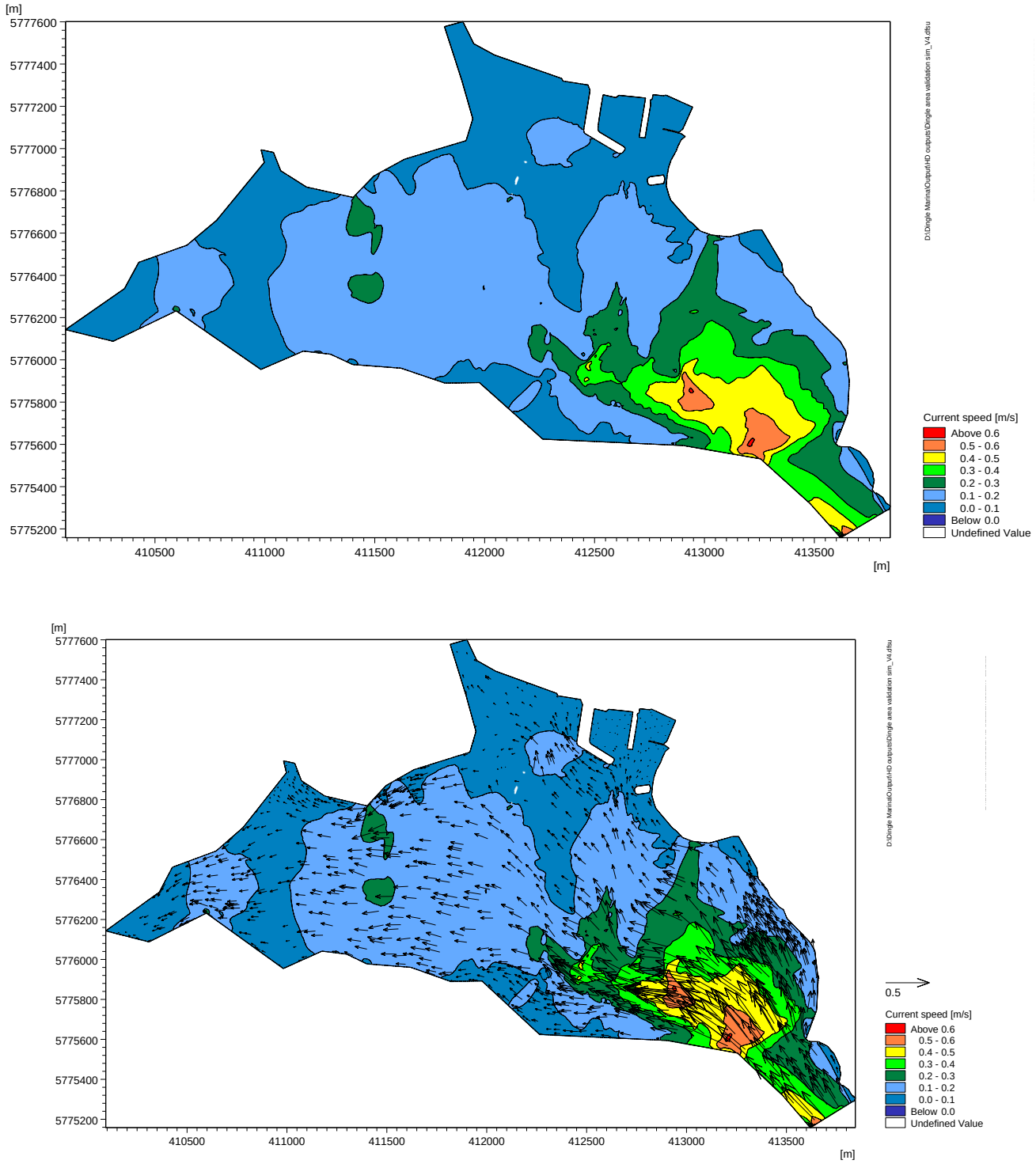


Figure 12 Inner Harbour: Spring Tide Mid Flood Tidal Currents

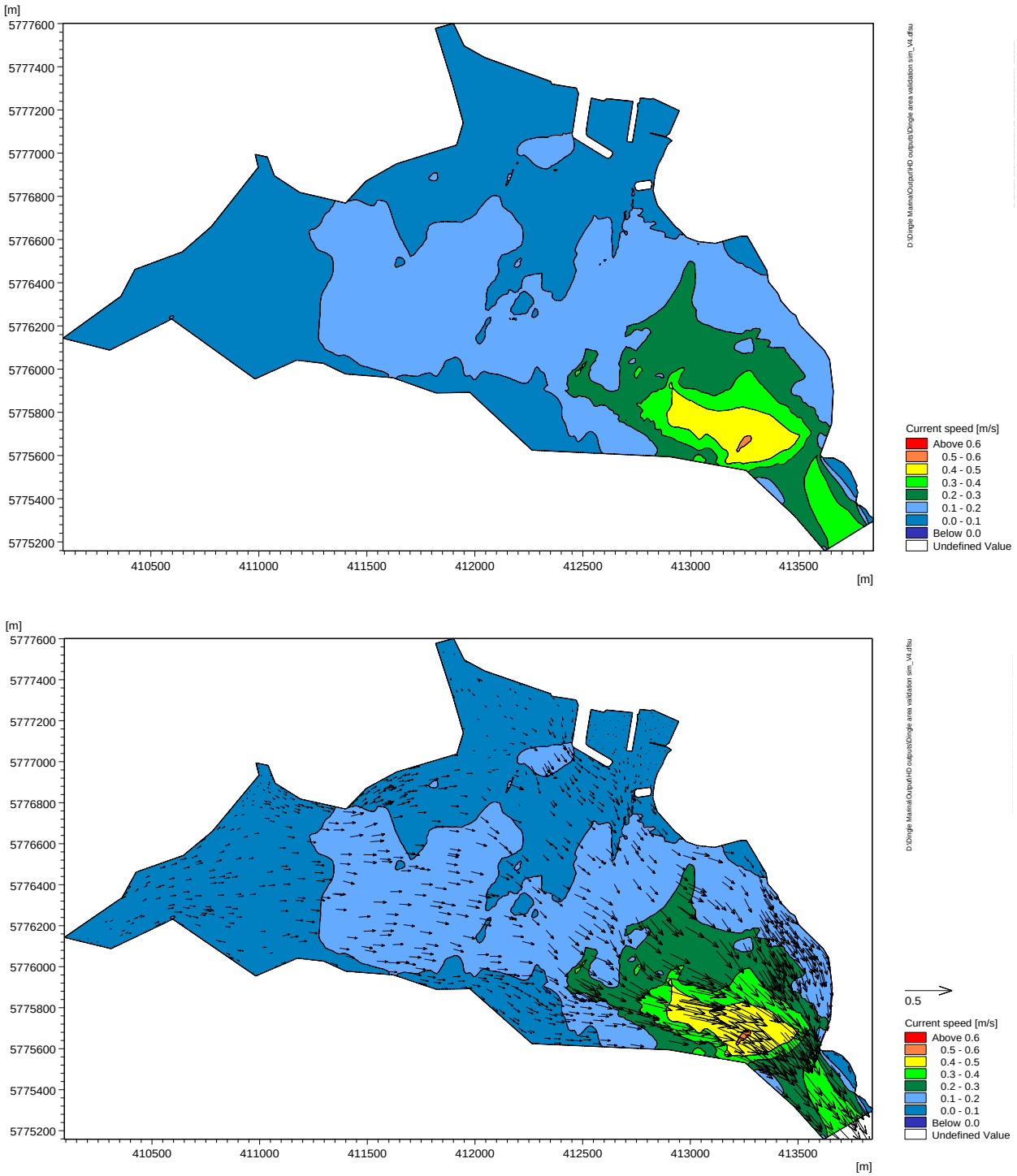


Figure 13 Inner Harbour Spring Tide Mid-Ebb Tidal Currents4.3 Suspended Sediment Concentration (SSC)

The dredge plume sediment disperses after each dredging operation. Figure 14 shows the typical pattern of dispersion when the tide is incoming (flooding), while Figure 16 shows the corresponding dispersion pattern for an outgoing (ebbing) tide.

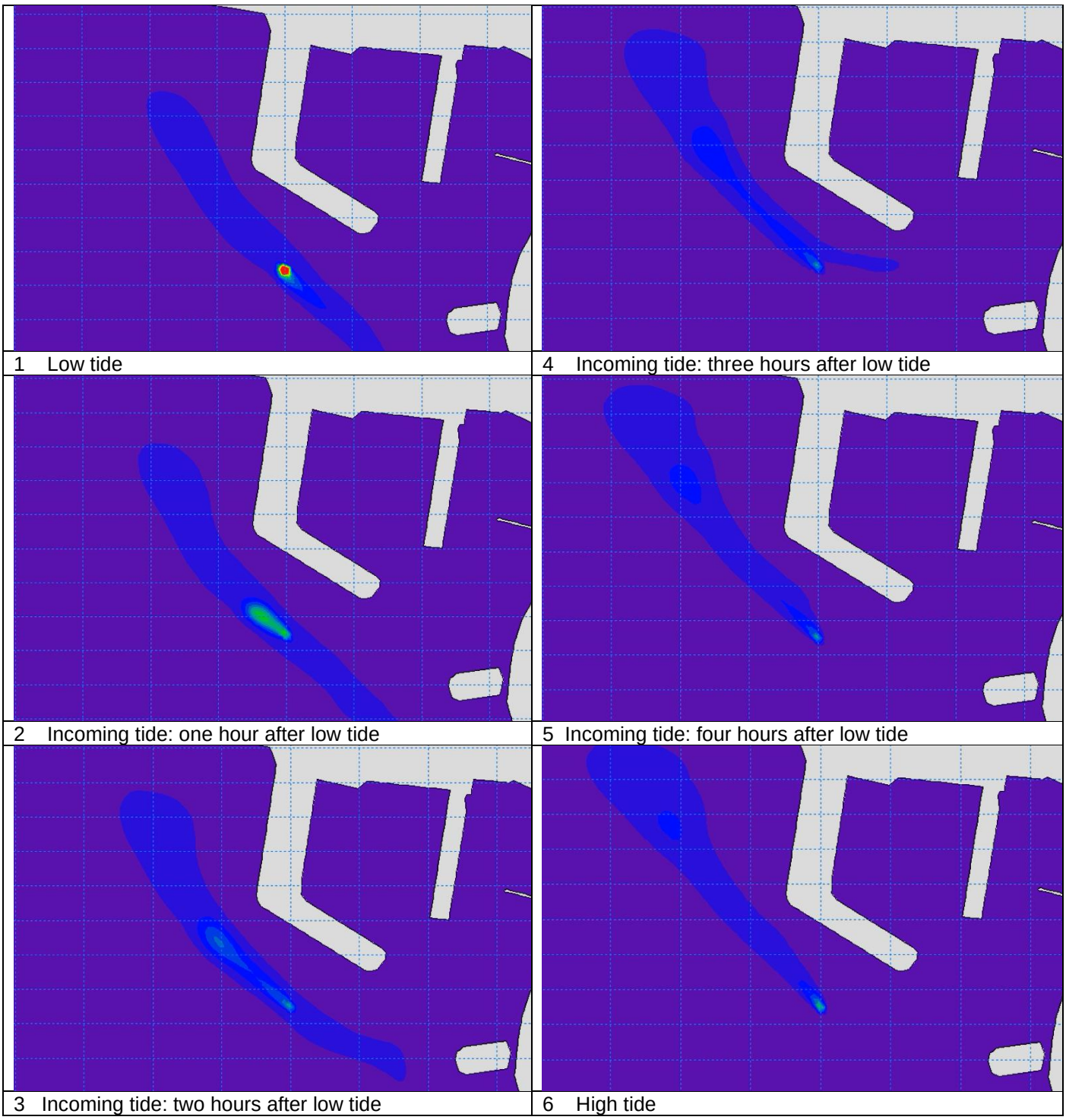


Figure 14 Inner Harbour: Dispersion Pattern of Dredge Plume Sediments with Flooding Tide

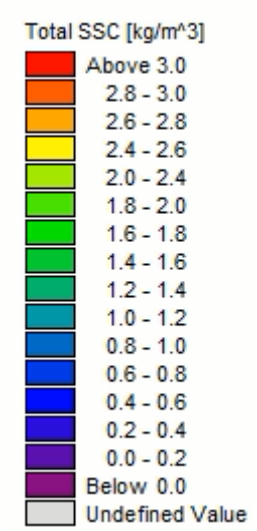


Figure 15 SSC Legend for Figure 14 and Figure 16

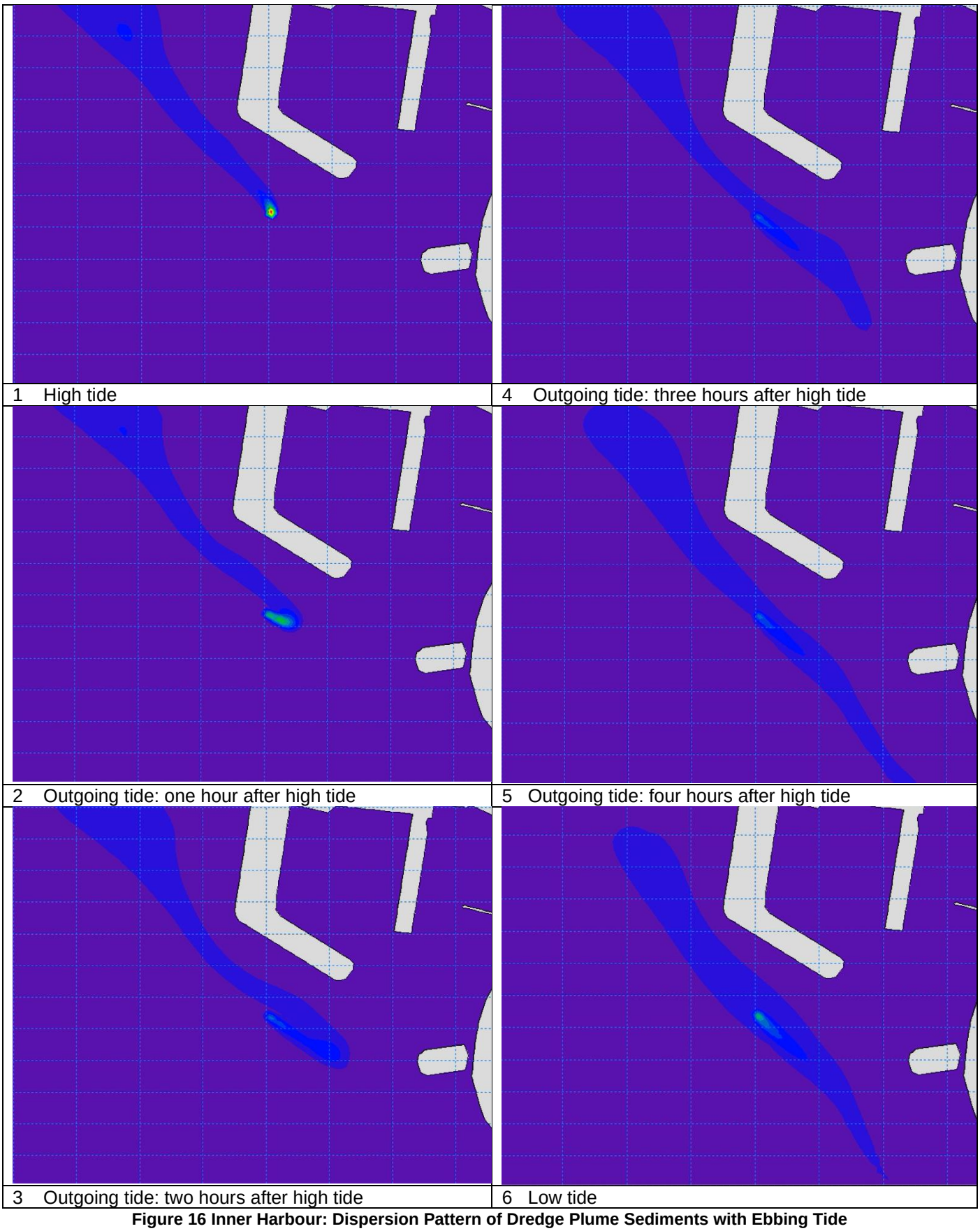


Figure 16 Inner Harbour: Dispersion Pattern of Dredge Plume Sediments with Ebbing Tide

Time series of SSC dispersion at two locations, namely the dredge site and at the mouth of the harbour, show the dispersion of the SSC at the end of the dredging campaign. The two locations are shown in Figure 17. Figure 18 and Figure 19 show SSC at these locations over a 20-day period at the end of the dredging campaign. This period includes the last ten days of the dredging campaign and ten days after the campaign ends.

The SSC values in figure 18 are high as they are taken immediately adjacent to the dredging operation and are more a measure of initial dilutions and quickly fall off away from this point, see Figures 14 and 16. Note that values taken at the harbour mouth, Figure 19, are several orders of magnitude lower.

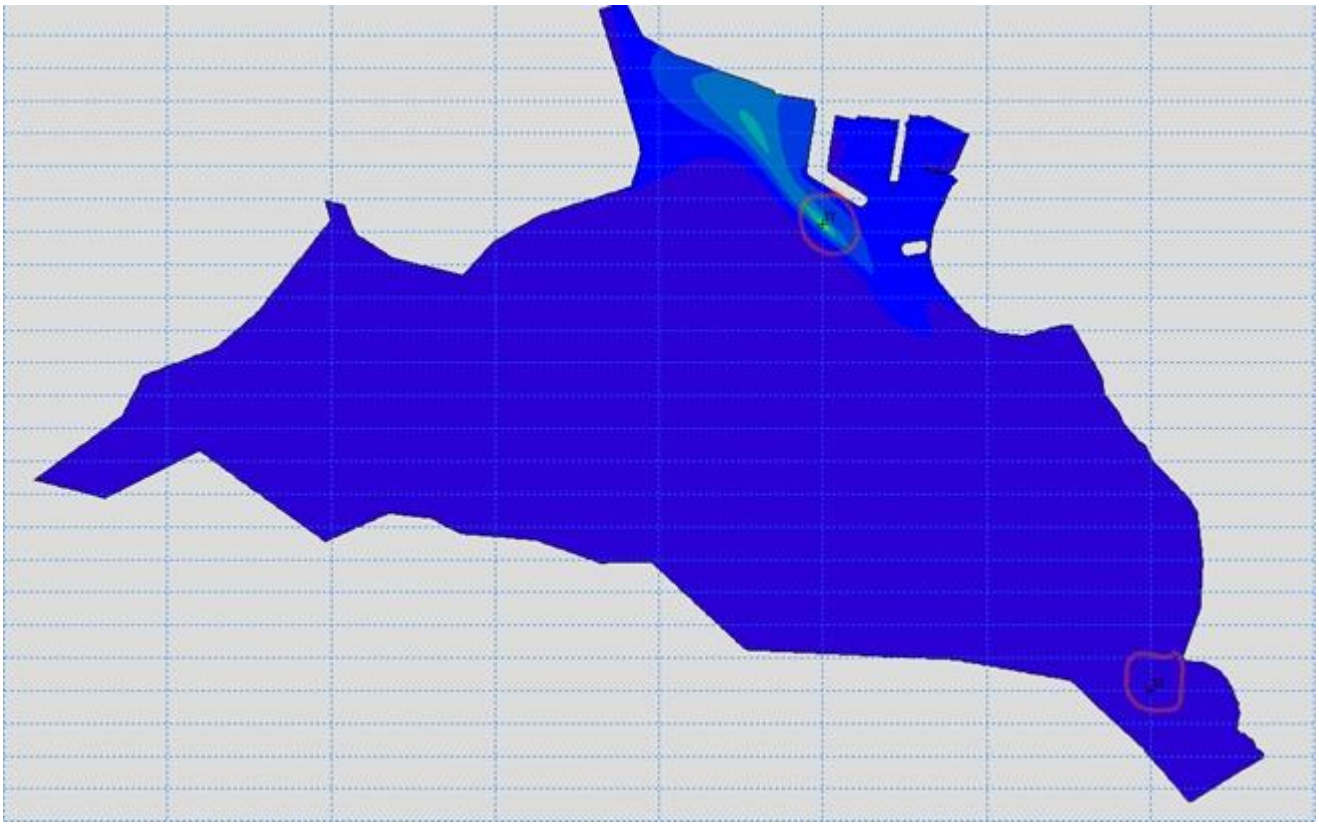


Figure 17 Dredging Analysis Time Series Locations – at dredging site and at mouth of harbour

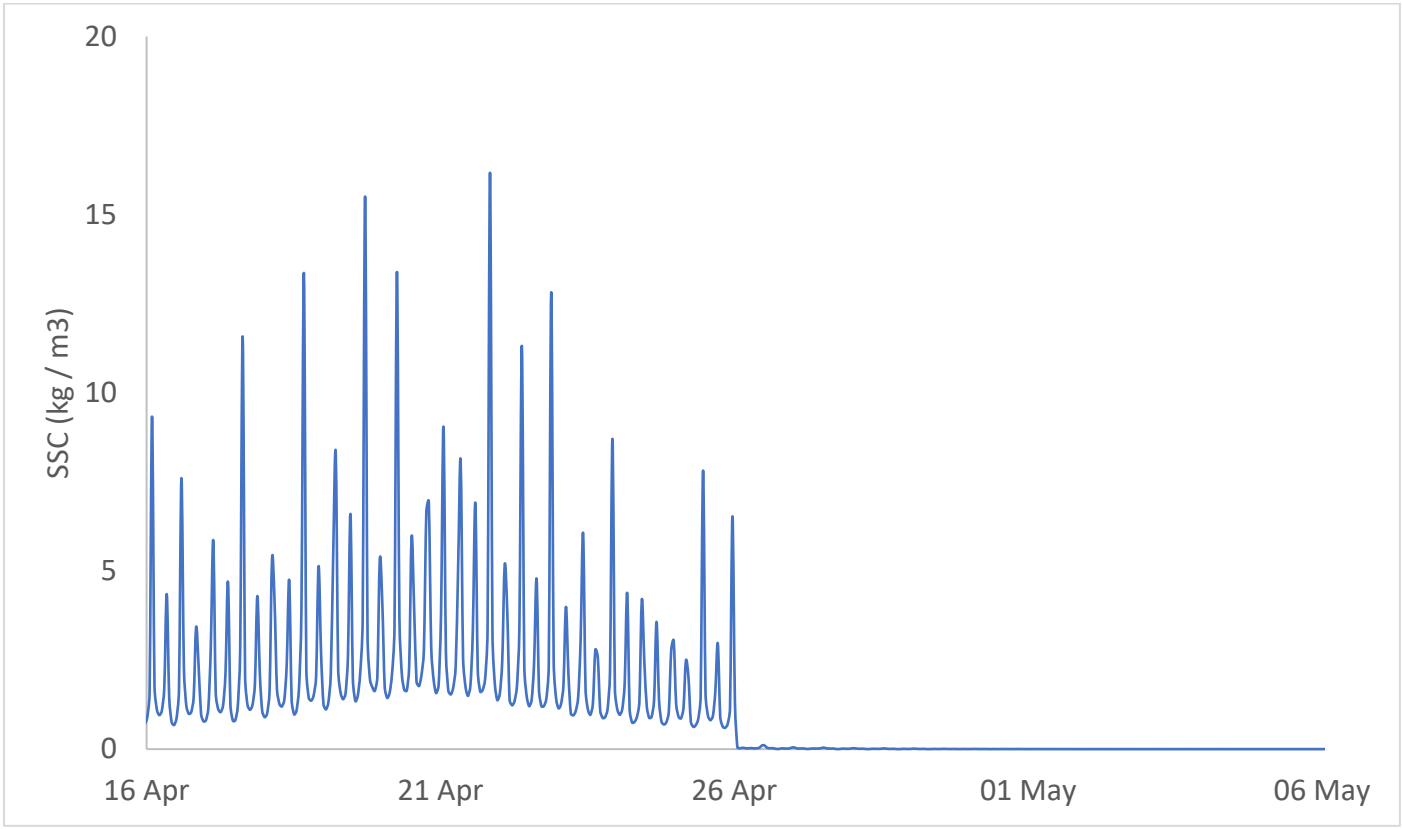


Figure 18 Inner Harbour: SSC at Dredge Site due to Dredge Plume (end of dredging operations)

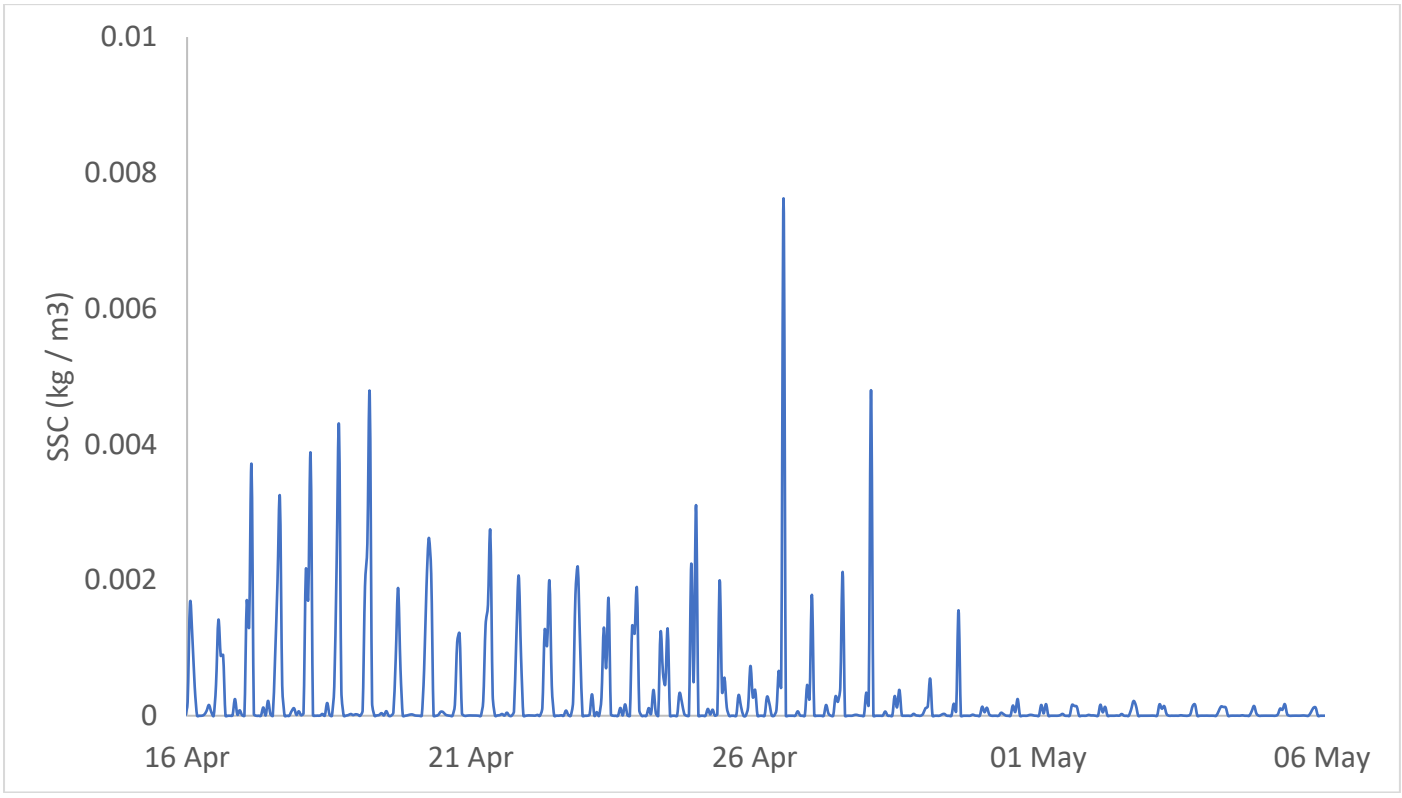


Figure 19 Inner Harbour: SSC at Harbour Mouth due to Dredge Plume (end of dredging operation

4. Wave Modelling

The 50-year 10min wind speed from 140 (SE) is estimated to be 22m/s. The all direction 10min 50-year wind speed is 27.5m/s and there is a reduction factor of 0.8 for the SE. Wave modelling output below was completed using both 22m/s and 27.5m/s wind speeds from 140 degrees (SE).

4.1 Wave One: South East 50-year 10min wind speed

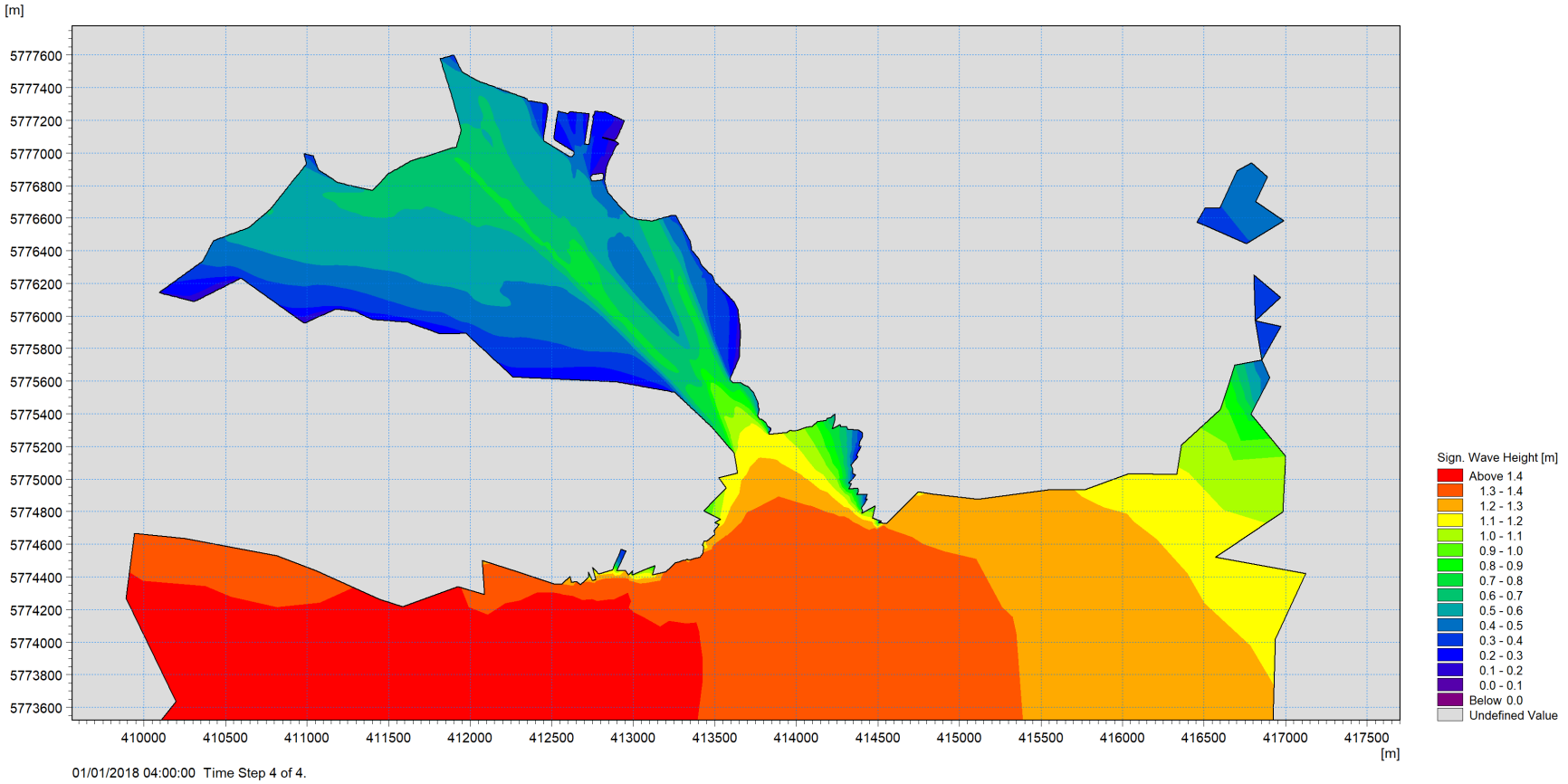


Figure 20 South East Waves: Significant Wave Height, Wind 22m/s at 140 degrees N

Table 1 Key Values for 22m/s wave at 140 degrees

Hs	Hmax	Tp	Dir P (rad)	Dir mean
0.58717	1.19327	3.36583	2.73127	147.108

4.2 Wave Two: All Direction 50-year 10min wind speed applied as SE wind

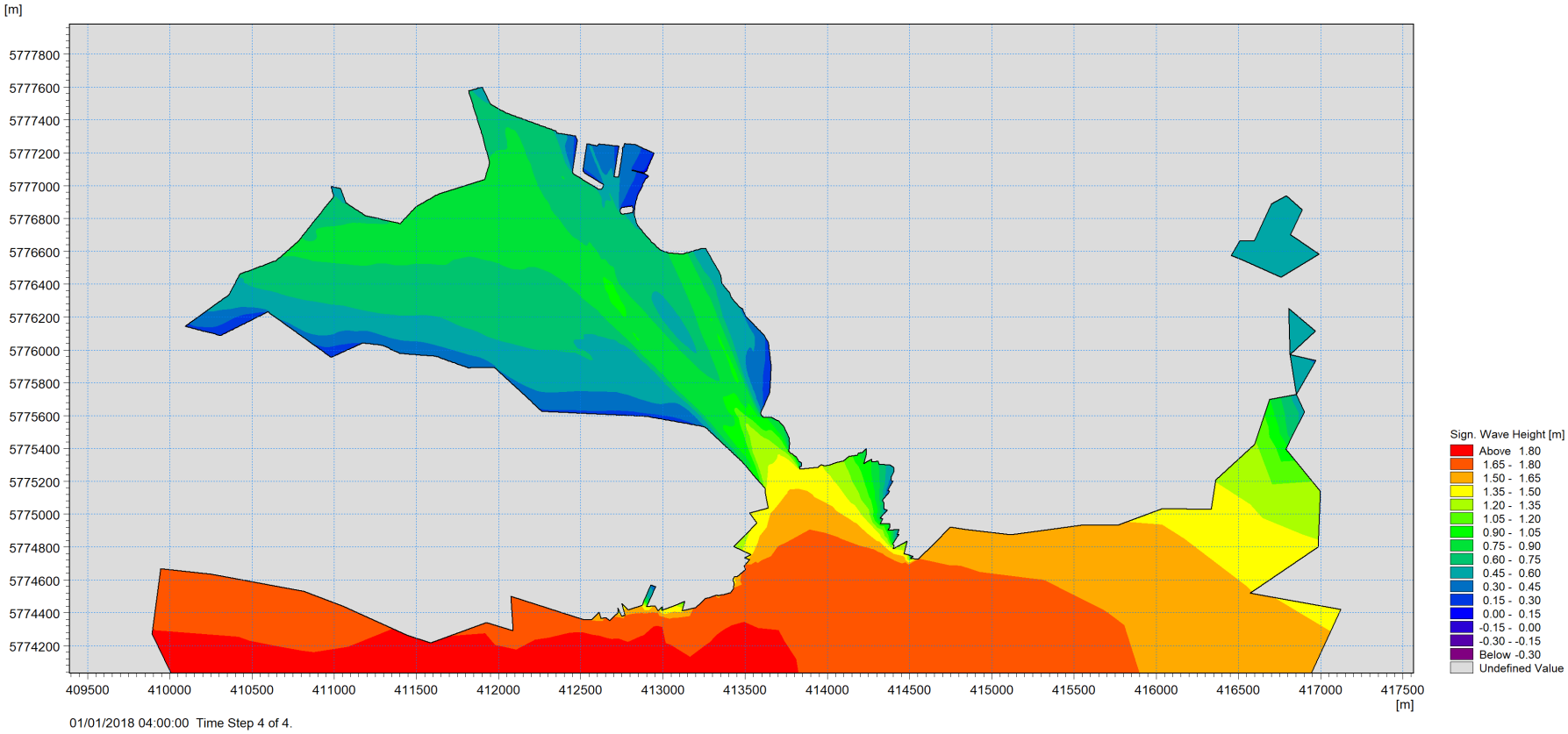


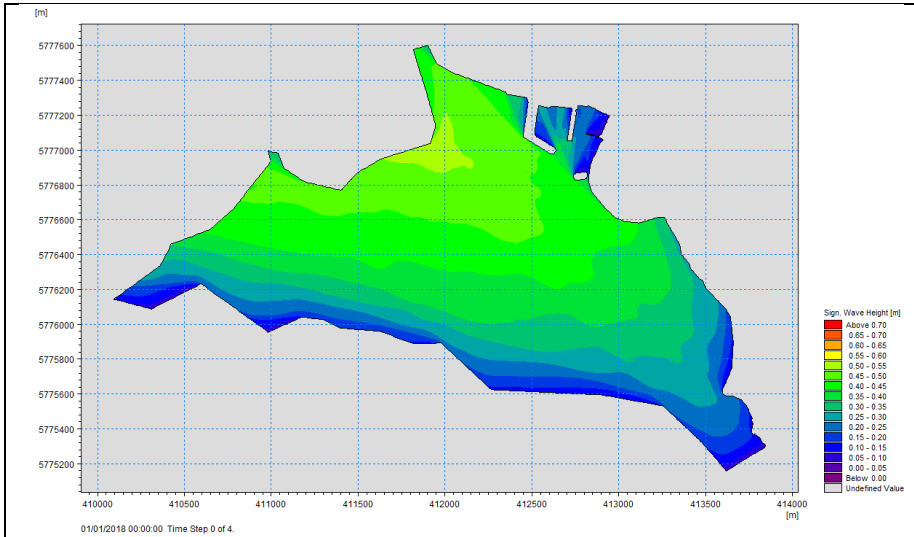
Figure 21 South East Waves, Significant Wave Height, Wave 27.5m/s at 140 degrees N

Table 2 Key Values for 27.5m/s wave at 140 degrees

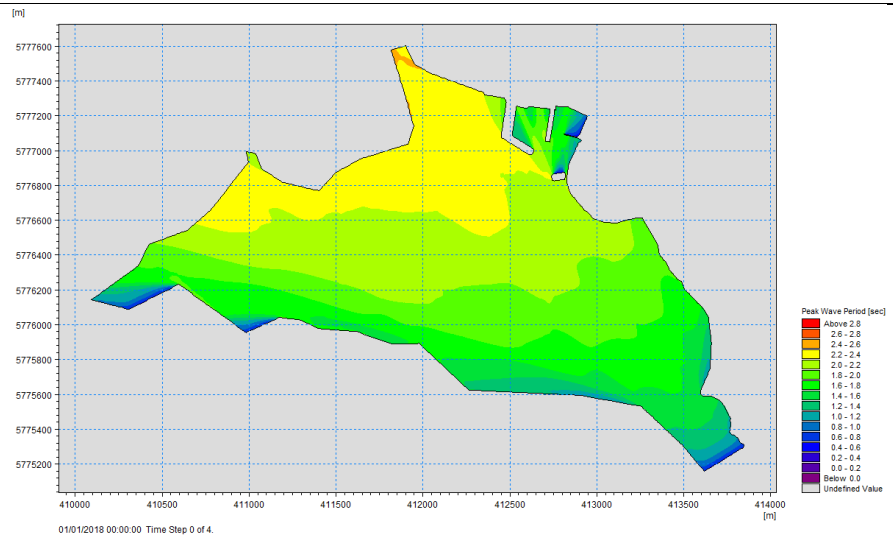
Hs	Hmax	Tp	Dir P (rad)	Dir mean
0.738832	1.49001	3.81654	2.73127	147.108

4.3 Inner Harbour: Locally Generated 50-year waves for varying wind directions

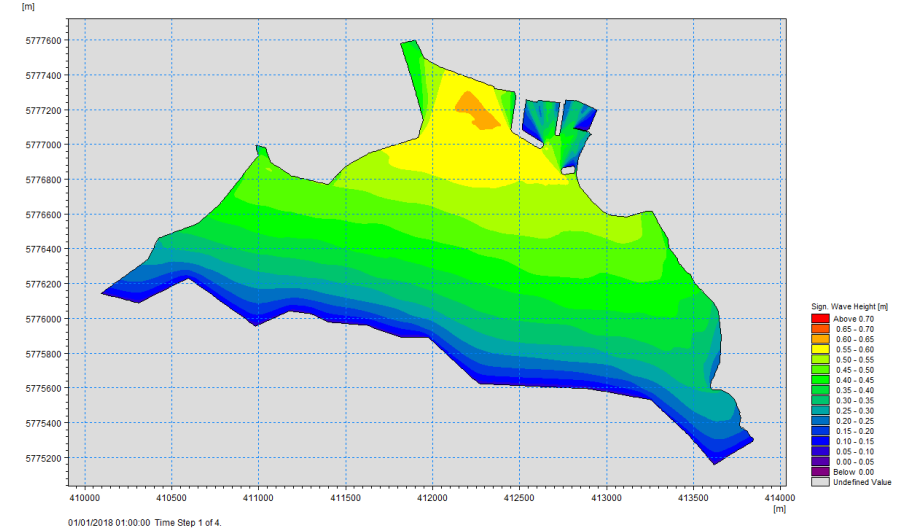
Figure 22 shows the locally generated 50-year significant wave heights and peak wave periods for various wind directions.



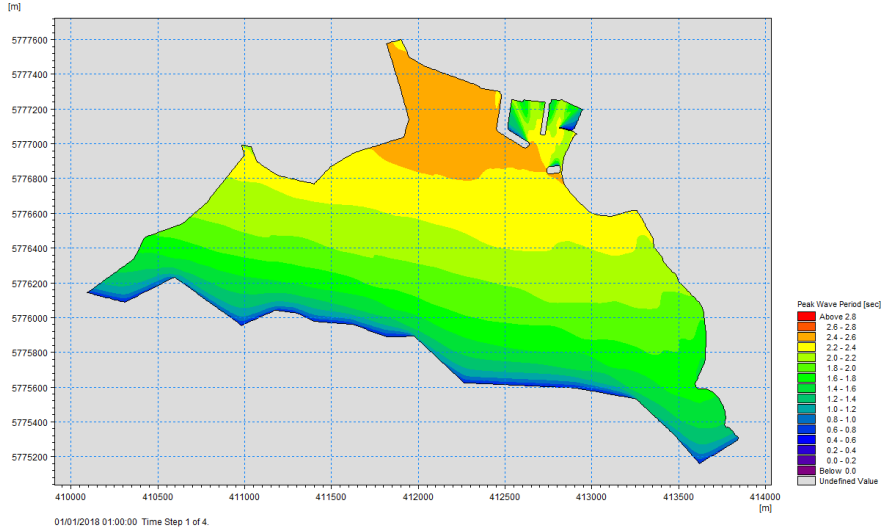
Hs 150 degrees (South East)



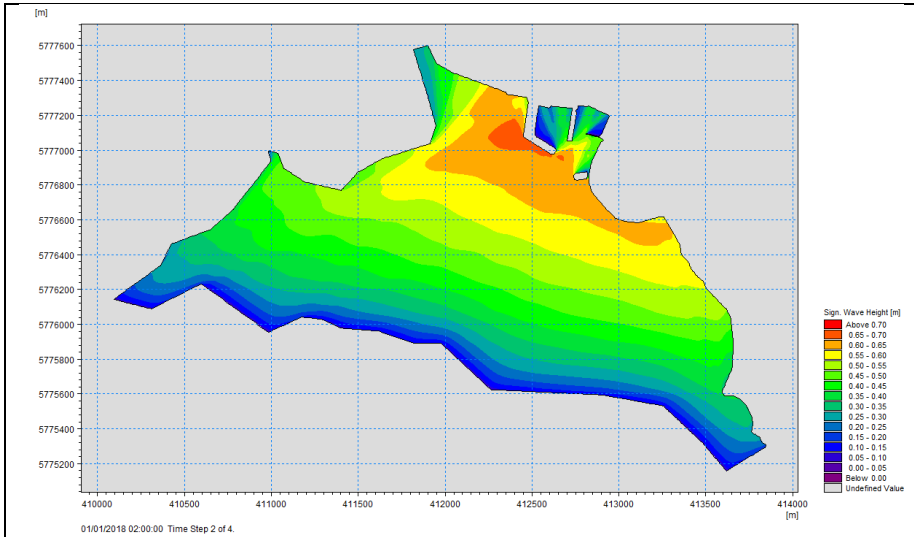
Tp 150 degrees (South East)



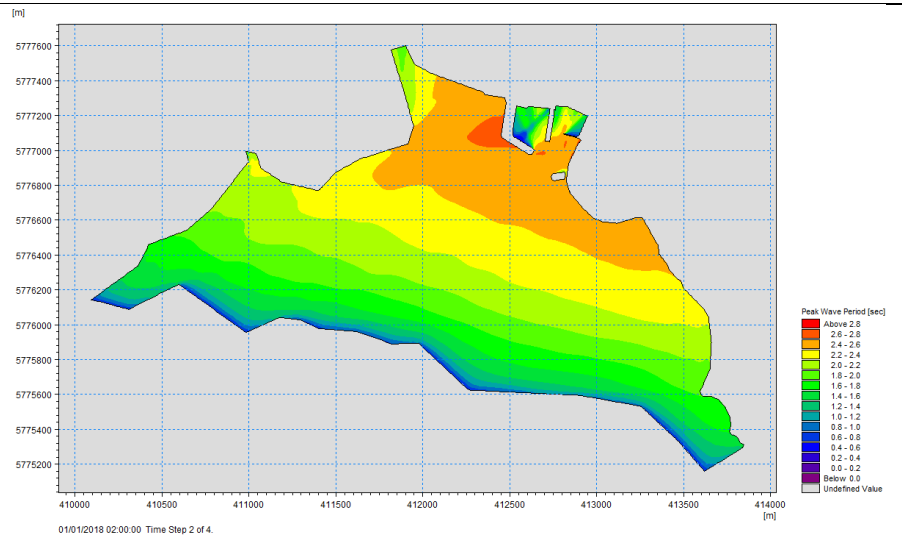
Hs 180 degrees (South)



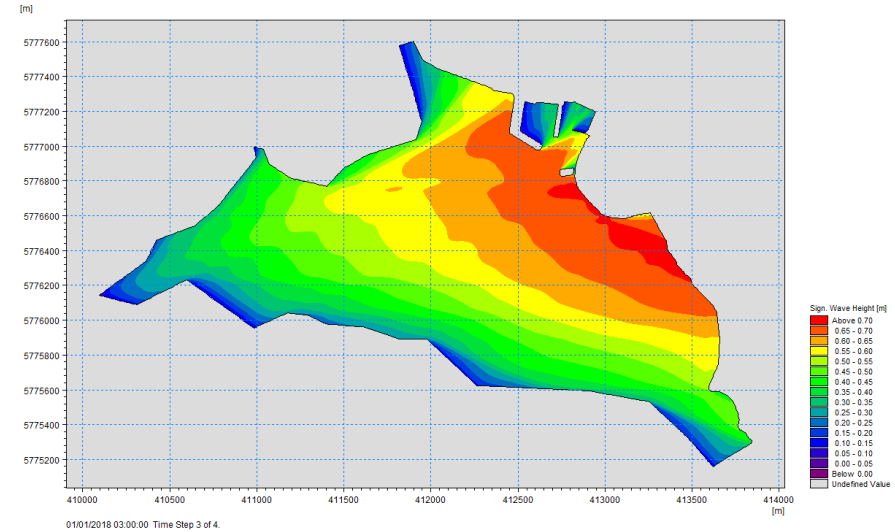
Tp 180 degrees (South)



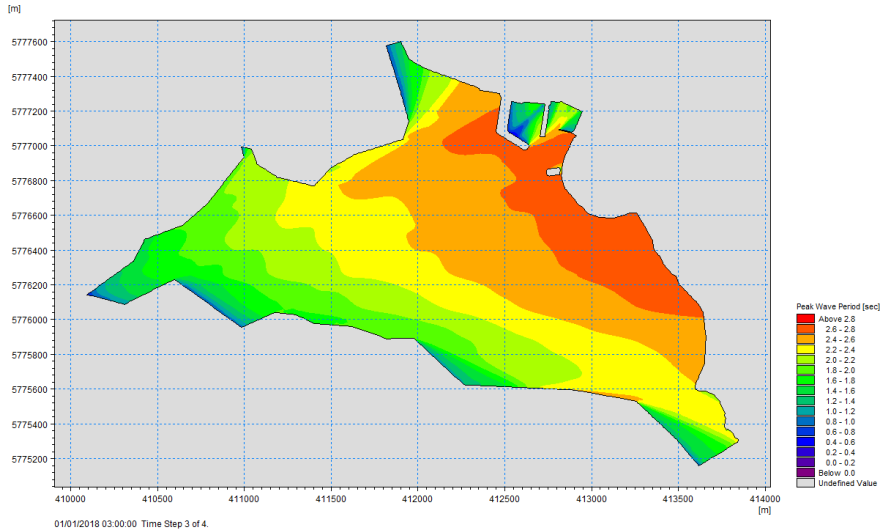
Hs 210 Degrees (South South West)



Tp 210 degrees (South South West)



Hs 240 degrees (South West)



Tp 240 degrees (South West)

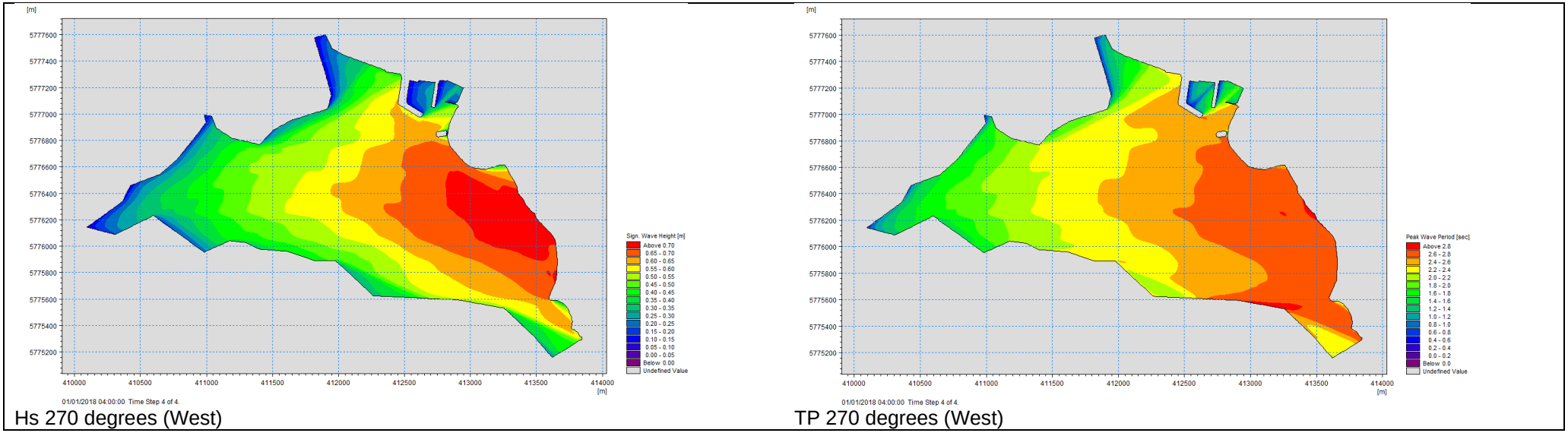


Figure 22 Inner Harbour: Locally Generated 50 year Significant Wave Heights and Peak Wave Periods various wind direction

Ecological Survey 2021

For New Small Craft Harbour at An Daingean Fishery Harbour Centre, Dingle Harbour

FINAL REPORT – January 27th to 31st August 2021

M.O'Clery & K.Kelly

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Tel. (Home): 066 7130005
Email: michaeloclery@gmail.com

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PLATES

1 INTRODUCTION & SCOPE OF SERVICES

Goldcrest Environmental Services was commissioned by Malachy Walsh & Partners (MWP) to undertake an ecological survey consisting of nine bird and Otter surveys of the coastal area around Dingle Harbour, Co. Kerry. The surveys were to assess the ecological importance of the bird and Otter population in relation to any possible impacts both in the vicinity of the proposed new marina site in Dingle port, and also the wider Dingle Harbour area and the outer coastal area where it is proposed to dump the spoil from dredging at the marina site. These surveys were:

- Habitats Survey;
- Wintering Birds Survey;
- Vantage Point Survey of the proposed area designated for dumping of dredged material;
- Otter Survey;
- Black Guillemot Survey;
- Breeding Birds Survey;
- Foraging Chough Survey;
- Herring Gull Colony Survey, and
- Cliff-nesting Seabird Survey.

The initial surveys were from late January to end of April 2021, undertaking the Habitats, Wintering Birds, Dump Area, and Otter Surveys, and an Interim Report was issued at the end of May 2021. The remaining surveys were carried out during April to August 2021, as were the continuing Habitats and Otter Surveys.

The detailed **Habitats Survey** was carried out in March, May and June 2021 to include the inner Dingle Harbour area, the port and marina area, and out to Dingle Harbour Entrance, and included all maritime and Littoral habitats up to the Spring High Tide line.

The **Wintering Bird Survey**, covering Dingle Harbour and the port and marina areas, was conducted by means of Vantage Point counts at five sites, of all seabird and waterbird species, on two days of each month, one at high tide, one at low tide. This was conducted from January to April 2021 inclusive.

The scope of the surveys for the **Otter Survey** work was the whole of Dingle Harbour, including the marina and port areas, while the scope for the Dump Area Survey was to be a visual survey of the 1 km x .5 km proposed dump area from the nearest cliff top vantage point, just west of Short Strand. These were carried out monthly for the duration of the survey work, January to August 2021 inclusive.

The Otter Survey was carried out for one day of each month and was conducted by means of walkover and searching of the shoreline areas and adjacent internal areas for signs of the presence of Otters. Two to three 'Camera traps' were continuously deployed at various coastal sites to record possible Otter (and other bird and mammal) activity.

The **Interim Report** issued at the end of May 2021 covered the initial period of Survey work, from 27th January to 30th April 2021 inclusive.

The scope of the **Black Guillemot Survey** was to determine the nesting locations and foraging areas, and was conducted during one day in each of the four months April to June 2021, and covered all suitable possible nesting habitat in Dingle Harbour and within 2km of the proposed dump area outside of Dingle Harbour.

The **Breeding Birds Survey** was to include an area to within 500 m of the proposed new marina, and also included all the shoreline in the inner Dingle Harbour area in order to include any potential nesting waders or waterbirds. It was to be carried out from April to August inclusive to ensure early- and late-nesting species were detected. Particular emphasis was also placed on any nesting species within 100m of the proposed new marina in order to assess possible impacts from any construction work.

The **Foraging Chough Survey** was to be carried out in May and June 2021 and cover 1 km from all coastal areas in Dingle Harbour and the outer sea cliffs, to 2 km from the proposed dump area, and was to include an assessment of habitats used by foraging birds.

As Herring Gulls are a Red-listed species of high conservation concern, a **Herring Gull Colony Survey** was to assess the two known colonies in the study area – at Shirrag An Searreach and Máthair an tSearraigh, and the Doonsheane area – and to search further in the study area to locate any additional colonies, sub-colonies, or isolated nesting pairs. This was to cover the outer Dingle Harbour coastal cliff areas and included the area within 2km of the proposed dump zone. It was to be carried out on two days, one in May and one in June, during the recommended period to ascertain breeding status.

The **Cliff-nesting Seabird Survey**, as with the Herring Gull Colony Survey mentioned above, was to assess all nesting seabirds on the coastal cliffs to a distance of 2 km from the proposed dump area. It was to be carried out over two full days, one each in May and June, and the peak nesting period for the possible nesting seabird species. Where possible, counts of nests were to be made, and status of breeding of each species to be confirmed.

2 RELEVANT QUALIFICATIONS OF PERSONNEL

Michal O'Clery of Goldcrest Environmental Services, and Kilian Kelly undertook all survey work.

Michael has been an active naturalist and birdwatcher for over 35 years and has worked professionally as a wildlife surveyor since 1999. He specialises in bird surveys, particularly raptors and owls, but has also been engaged in a wide variety of other surveys, such as Bird Atlas work, montane bird surveys, seabird surveys, and small mammal surveys. He has been professionally engaged in annual monitoring, tracking and ringing of Barn Owls in Ireland and has also undertaken large-scale surveys of Kestrel and Long-eared Owl as well as involvement in Curlew, Hen Harrier and Merlin surveys. He is the illustrator and co-author of four books on Irish birds, including the best-selling, *Complete Guide to the Birds of Ireland* (Dempsey & O'Clery, 2002) and *Finding Birds in Ireland: The Complete Guide* (Dempsey & O'Clery, 2014).

Kilian is an Assistant Lecturer in Wildlife Biology at Tralee I.T., with a PhD in Wildlife Conservation, and has a wide variety of ecological monitoring and assessment skills, in plant surveys, habitat mapping and habitat conservation assessments. He has experience of tracking of large herbivores, with home range and habitat selection analysis and experience with bird survey and monitoring techniques.

3 SITE LOCATION AND DESCRIPTION

The project area comprises the area as shown in Figure 1. The site includes a large natural sheltered inlet, Dingle Harbour, the port and marina area on the south side of Dingle town, and the outer Harbour area of mainly coastal cliff, to a 2km radius from the proposed offshore dump area.

Figure 1. *Overview of the Dingle Harbour survey areas.*

Dingle port and marina are active sites, the port still receiving marine traffic, mainly trawlers, with a small fish processing plant nearby, and has berths for numerous smaller fishing craft. The marina has 100 berths and 20 visitor berths. The area immediately adjacent to the port and marina is built-up urban fabric, and much of the rest of the harbour area is rocky or stony shoreline, with some sand and mud substrate on the eastern side of the Harbour, at Milltown just to the west of Dingle town, and at the far western end of the Harbour at Burnham Inlet (a.k.a. Burnham Wood). The narrow entrance to Dingle Harbour is low rocky cliff, and outside Dingle Harbour the coast is high rocky coastal cliff, up to 140m in places.

The proposed site for the new Harbour extension is shown in Figure 2.

Figure 2. *Looking south toward the proposed extension area (red) for the existing Dingle port and marina, Dingle Harbour, February 2021.*

4 METHODOLOGY

The specific data collection methodology employed during these surveys is detailed in this section.

4.1 Methodology: Desktop Study

A comprehensive desktop study was initially performed in order to establish the conservation status of the area, and the numbers and importance of bird species found within Dingle Harbour.

There are two designated sites in the vicinity of Dingle town. The first, the Dingle Peninsula SPA (Site code 004153) is a Special Protection Area (SPA) under the E.U. Birds Directive, and is of special conservation interest for three bird species: Chough; Peregrine and Fulmar (Link: https://www.npws.ie/protected-sites/spa/004153).

The Dingle Peninsula SPA is a large site situated west coast of Co. Kerry which encompasses much of the high coast and sea cliff sections of the Dingle peninsula from south of Brandon Point in the north, around to the western end of the peninsula at Slea Head, and as far east as Inch Beach in the south east of the Peninsula. The site includes the sea cliffs, the land adjacent to the cliff edge, an area of sand dunes near Murreagh and also several upland areas further inland of the coast about Ballybrack, Lough Doon, Anascaul Lough, Arraglen and Ballynane. Much of the coastal cliffs on the seaward side of Dingle Harbour fall within this SPA. The site overall supports some of the highest densities in Ireland of breeding Chough, a Red-listed species of High Conservation Concern that is listed on Annex I of the E.U. Birds Directive (Link: https://www.npws.ie/maps-and-data).

The second designated site in the study area is Burnham Inlet (Site Code: 001960) and known locally as Burnham Lagoon, which is a pNHA - Proposed Natural Heritage Area, published on a non-statutory basis in 1995. The pNHA have not since been statutorily proposed or designated since, though this is under review. These sites are proposed on the basis of being of significance for wildlife and habitats. (Link: https://data.gov.ie/dataset/proposed-natural-heritage-areas).

The extent of the Dingle Peninsula SPA within the study area and the Burnham Inlet pNHA are shown in the figure below.

Figure 3. *Extent of the Dingle Peninsula SPA in the study area (pink) and the Burnham Inlet pNHA (blue).*

Regular waterbird counts were conducted in Dingle Harbour through the BirdWatch Ireland's I-WeBS Survey, and this information was assessed to gauge average numbers of wintering birds in the Dingle Harbour area. Counts were conducted in eight of the ten winters, 2008–09 to 2017–18 (Link: [accessed May 2021]. https://c0amf055.caspio.com/dp/f4db30005dbe20614b404564be88). Additional information on peak wintering bird numbers in Dingle Harbour was in the *Dingle Peninsula Bird Reports* (O'Clery, 2002, 2005, 2008, 2011, 2014). This information was used to inform both the Wintering Birds Survey and the Black Guillemot Survey.

Information to inform the Breeding Birds Survey, the Herring Gull Colony Survey and the Cliff-nesting Seabird Survey was obtained from the *Breeding Bird Atlas 2007–11* (Balmer, *et al*, 2013). In addition, the Herring Gull Colony at Máthair an tSearraigh was surveyed by one of the authors (MOC) in summer 2017, as were short sections of cliff between Trabeg and Dingle Harbour entrance.

Based on this initial assessment, the type and duration of surveys was drawn up and submitted for approval. The overall ecological survey was to run from late January to the end of August 2021, and the initial phase of the survey, from January to April, was to include a Habitats Survey, a Wintering Birds Survey, VP counts of the proposed dump area outside of Dingle Harbour, and an Otter Survey. The findings from these surveys were presented in an Interim Report, issued in June 2021. The second part of the survey work was to run from April to August 2021 and included a continuation of the VP Survey, a Black Guillemot Survey (from April to July), a Breeding Birds Survey (April to August), a foraging Chough Survey (May and June), a Cliff-nesting Seabird Survey (May and June), and a Survey of the known Herring Gull colony in the study area (May and June). The period and number of days of survey work for each element of the Survey is shown below.

Survey Type	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	Total Days
Dump area VP Survey	1	1	1	1	1	1	1	1		8
Wintering Birds Survey	2	2	2	2						8
Otter Survey	1	1	1	1	1	1	1	1		8
Habitats Survey			1		1		1			3
Black Guillemot Survey				1	1	1	1			4
Breeding Birds Survey				2	2	2	2	1		9
Foraging Chough Survey					1	1				2
Cliff-nesting Seairds Survey					1	1				2
Herring Gull Colony Survey					1	1				2
Report Writing									6	6
										52

Survey days covered by Interim Report

Figure 4. *Overview of all Dingle Harbour survey days, showing work completed and covered by the Interim Report (dark grey) and additional survey work completed to the end of August 2021 (grey).*

4.2 Methodology: Dingle Harbour Habitats Survey

Three one-day surveys were made of the coastal habitats of the inner Dingle Harbour area, conducted at low to mid tide, on foot and by boat. The survey included the littoral habitats, up to the spring high tide line, and each habitat type assigned and mapped in accordance with *Fosset, 2000*. One visit each was made in March, May and July, to encompass the differing growing rates, appearance and flowering dates of the flora.

4.3 Methodology: Wintering Birds Survey

Wintering Bird Surveys were conducted twice monthly from January to April inclusive, one at high tide, one at low tide. Each survey comprised counts of all shore and seabird species from five vantage points in the Harbour and were of between three and a half and four hours duration. The five vantage points gave full visual coverage of all coastal Harbour areas, and are shown in Figure 5 below.

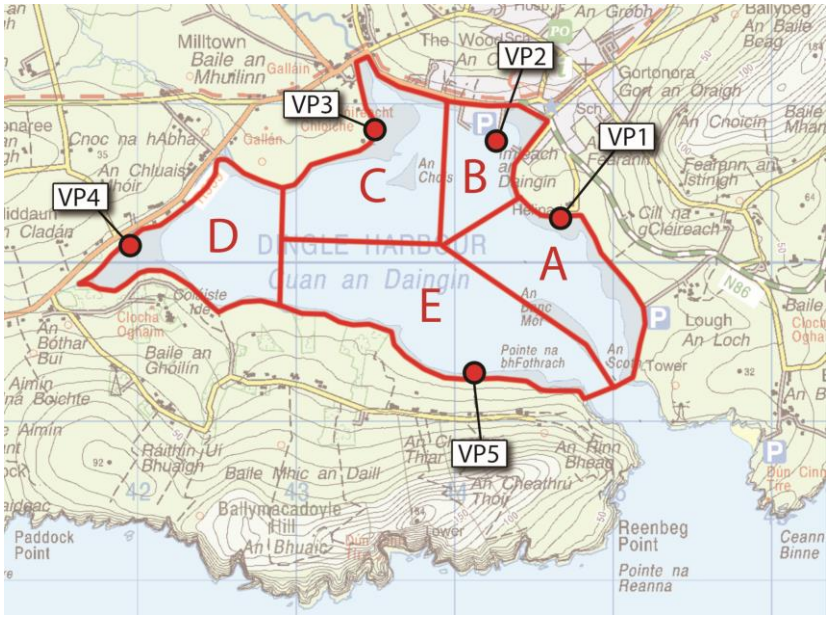

Figure 5. *Vantage Points and division of survey sectors (lettered A to E) for the Wintering Birds Survey January to April 2021.*

4.4 Methodology: Dump Area Bird Survey

The proposed extension of Dingle marina involves the dredging of c.100,000m^3 of material from the footprint of the site, and the proposed dredged material disposal site is to be in the vicinity of the 2017 dump site, 450m from the nearest shore (Dept. of the Marine/Malachy Walsh. 2020). The Vantage Point (VP) was selected as the nearest point to the Dump Area on the adjacent mainland with an uninterrupted view over the proposed site, and was at an elevation of 55m. The Dump Area and VP is shown in Figure 6 and 7 below.

Figure 6. *Vantage Points (VP1) for survey area of proposed dredged material dump site.*

Figure 7. *Left) Overhead view of the Vantage Points (VP1) for survey area of proposed dredged material dump site and right) view of same from the cliff top to the west of the VP.*

The survey of this area included once-monthly, six-hour Vantage Point observations of all birds using the site. Distinction was recorded between those birds flying over the dump area (without stopping to forage or feed), and those feeding, foraging and or resting on or over the water of the proposed dump area. The site was observed with 8x42 binoculars and a 30x – 60x telescope. All other marine mammals utilising the site were also recorded as incidental observations.

4.5 Methodology: Otter Survey

The entire Dingle Harbour area was specifically surveyed for signs of Otters on one day of each month, using a walkover technique and thorough inspection of likely habitats. Surveys were conducted with regard to best practice guidelines; in particular, *Ecological surveying techniques for protected flora and fauna during the planning of National Road Schemes* (National Roads Authority, 2008). The shoreline included in the survey is shown in Figure 8, below.

Figure 8. *Shoreline included in the Otter Survey in the inner Dingle Harbour area.*

The survey focused on finding evidence of use of the site by Otter. The site was visually assessed and all visible evidence of Otters recorded, in particular for potential breeding areas (holts), or resting or loafing

areas, and visual evidence such as ‘spraints’ (droppings) used to mark territory, and ‘chutes’ where they might access the coast on steep slopes.

From Late January to the end of April 2021, following an initial walkover of the entire coastal area of Dingle Harbour, two to three trail cameras (camera traps) were deployed continuously at coastal locations where Otters may have accessed the shoreline, such as at resting places on or adjacent to the shore, at any possible resting places such as overhanging (or undercut) shore just above the high tide line, and at possible ‘chutes’ or shallow slopes from the shore to the beach and other points where Otters might be accessing the shoreline. These cameras are activated by motion or infra-red heat signatures and all were set to maximum sensitivity and, upon triggering, were set to record 20 seconds of video, with sound. All other incidental bird and mammal species that triggered the cameras were also recorded.

Otters can breed at any time of year, though this is most frequently recorded from May to August, and cubs can stay with the mother for typically seven to eight months though occasionally for as long as 12 months (Hayden & Harrington, 2000), and as Otters are usually nocturnal, deploying trail cameras over the entire period of the survey work from January to August would have a reasonable chance of recording any adults and cubs. Signs and sightings of Otters were also monitored casually while conducting the other survey elements in the study area.

The use of trail cameras also informed the Breeding Birds Survey, during April to August 2021, capturing a number of breeding activities (see below)

4.6 Methodology: Black Guillemot Survey

Black Guillemots are coastal seabirds which nest in sea caves, coastal boulder fields at the base of cliffs, and occasionally on man-made structures such as pier walls and groynes (Walsh, *et al*., 1995). They are also frequently recorded in and around the Dingle port and marina areas, so the survey was to include this area, the whole of the Dingle Harbour area, as well as the outer Dingle Harbour area to 2km from the proposed dump site.

A pre-survey check of the coastline identified potentially suitable nesting areas (areas with coastal cliff/ boulder fields, and man-made structures, piers, etc >3m high), and eliminated unsuitable stretches of coast (flat, estuarine and/or gently sloped coastline, no boulders, cliffs of structures >3m high). The unsuitable areas were thus excluded from further investigation.

The survey area for Black Guillemots is shown in the Figure below.

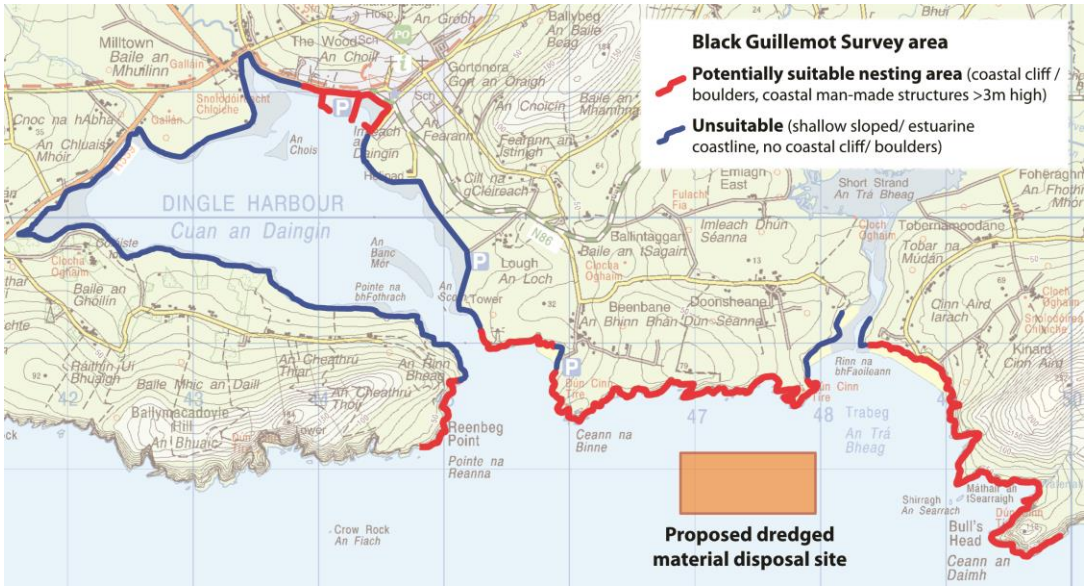

Figure 9. *The Black Guillemot Survey area, showing potentially suitable coastal nesting habitat included in the Survey (red), and unsuitable coastal nesting habitat (blue) excluded from the Survey work.*

Observations were made in accordance with survey guidelines published in the *Seabird Monitoring Handbook* (Walsh, *et al*., 1995), and included visual inspection of suitable sites, to detect adult birds on the water at or close to potential nesting sites. Flat or gently shelving estuarine coastal habitats, such as parts of the inner Dingle Harbour area, offered no possible nest sites so were excluded from the search area.

The recommended census unit is 'individual adult' recorded before 0900 BST in the pre-breeding season (April), the best proof of breeding, though according to Walsh, *et al*., "Apparently occupied sites (AOS) can sometimes be counted reasonably accurately at small colonies, later in the season, but numbers are easily underestimated. Accurate correction factors to breeding pairs require specialised study of individual breeding groups, impractical for most general surveys and for other than very localised monitoring." It was however considered possible, given the small survey area, that a full determination of occupied nest sites could be made, rather than relying on the pre-breeding adult counts alone. With this consideration, further observations made during the Cliff-nesting Seabird Survey (which were to cover the same coastal cliffs), and the Wintering Birds Survey and the Breeding Birds Survey (which would be covering the inner Dingle Harbour area, the port and marina), could further inform the breeding status and nesting sites for Black Guillemot in the survey area as the breeding season progressed.

As the preferred observation time for detecting nesting Black Guillemots, especially in the pre-breeding season, was before 0900, the April and May Survey days were split into 3 hours, starting at or close to dawn, while the later survey days in June and July concentrated on confirming potential nesting status at the nest sites detected in early spring.

4.7 Methodology: Breeding Birds Survey

A survey was to be made of the immediate area of and around the proposed marina site, to 100m, to 500m, and a breeding waterbirds transect survey on the remaining coastline of the inner Dingle Harbour area. The Survey was to be carried out on two dates of each month, April to July inclusive, and one final visit in early August, to ensure any late-nesting species or second or third broods were included. All species recorded in the 500m buffer, and to 100m on transects, were recorded and the breeding status of each species assessed as the breeding season progressed.

The breeding status of each species was assessed on presence and observed behaviour in the survey area, based on the standard BTO nesting birds guidelines (Download: https://www.bto.org/our-science/projects/birdatlas/methods/breeding-evidence). See also Appendix 2.

The habitat in the 500m buffer and the transects was varied, with salt and freshwater bodies, estuarine and rocky shoreline, mature woodland, hedgerow and farmland (mainly improved grassland), and urban fabric of buildings, parks and gardens especially in and around Dingle town.

A map of the Survey area is shown below.

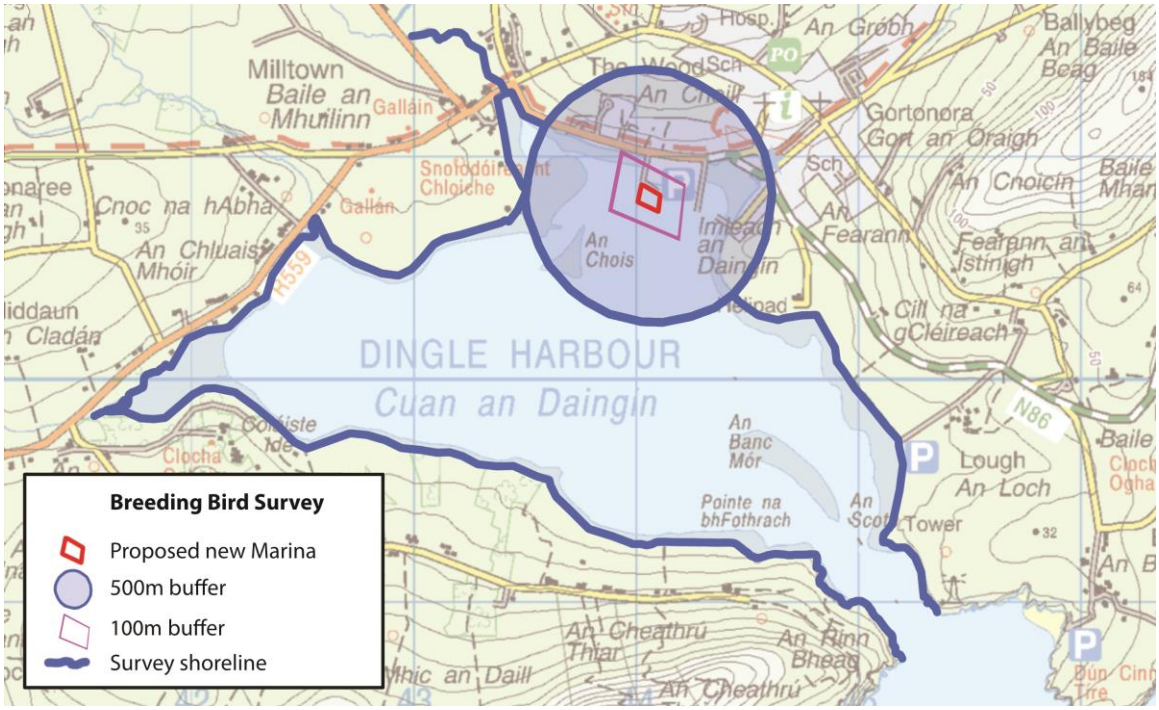

Figure 10. *Breeding Birds Survey area (shaded blue circle) showing 500m buffer around the proposed new marina area, and the coastal survey area (blue line) of the remaining Dingle Harbour shoreline, conducted from April to August 2021.*

Plate 1. Overview of the *Breeding Birds Survey study area showing Dingle Harbour (centre), Dingle town, port and marina (right).*

4.8 Methodology: Foraging Chough Survey

The survey area included was within 1km of all coastal areas in the inner Dingle Harbour area as well as the outer sea cliffs to within 2km of the dump area (as with the Cliff-nesting Seabird Survey). The coastal areas were searched by a combination of walking/scanning with binoculars and telescope, and on the inland areas by driving and stopping every 100-200m to scan and listen for any Chough. Whenever flying Choughs were encountered they were observed until landing and foraging or until out of view, and all foraging birds were mapped and assigned the habitat type on which they were feeding, in accordance with the habitat classification in *Fosset, 2000*.

A map of the Foraging Chough Survey area is shown in the figure below.

Figure 11. *Foraging Chough Survey area, including all areas 1 km from the Dingle Harbour coastline and the coastal cliffs up to 2km from the proposed dump area.*

Plate 2. *(Above, left) Overview of the foraging Chough Survey area with coastal cliffs to the left and Dingle Harbour at centre top, and (right) an adult Chough.*

4.9 Methodology: Herring Gull Colony Survey

The Survey was to be carried out on two full survey days in May and June 2021. The Survey area covered all coastal cliffs to within 2km of the proposed dump area.

Observations were to be made on foot from the adjacent cliff tops, using 8x42 binoculars and 30x telescope. The census unit used was based on *The Seabird Monitoring Handbook* (Walsh, *et al*., 1995), in which the recommended census unit for Herring Gull is an Apparently Occupied Nest (AON), i.e. a well-constructed nest, attended by an adult and capable of holding eggs, or an adult apparently incubating. Counts should be made during the mid incubation period, usually late May-early June, between 0900 and 1600 BST.

Without repeated visits during the entire nesting season it was not possible to produce estimates of productivity, but the maximum breeding status based on BTO Breeding Bird Survey criteria (BTO, 2021) eg, adult incubating eggs, nest building, display, etc., was possible, based on observation during the two visits.

Two Herring Gull colonies were known prior to the survey being carried out in 2021 at Doonsheane and Shirragh An Searrach/ Mathair an tSsearraigh (authors own notes, Balmer *et al,* 2013), but a full search of the survey area was made to detect any additional unknown colonies, or isolated nesting pairs. The Cliff-nesting Seabird Survey (see below), carried out in May and June 202 was also used to inform the presence of additional nest sites, if any, outside the known colony areas.

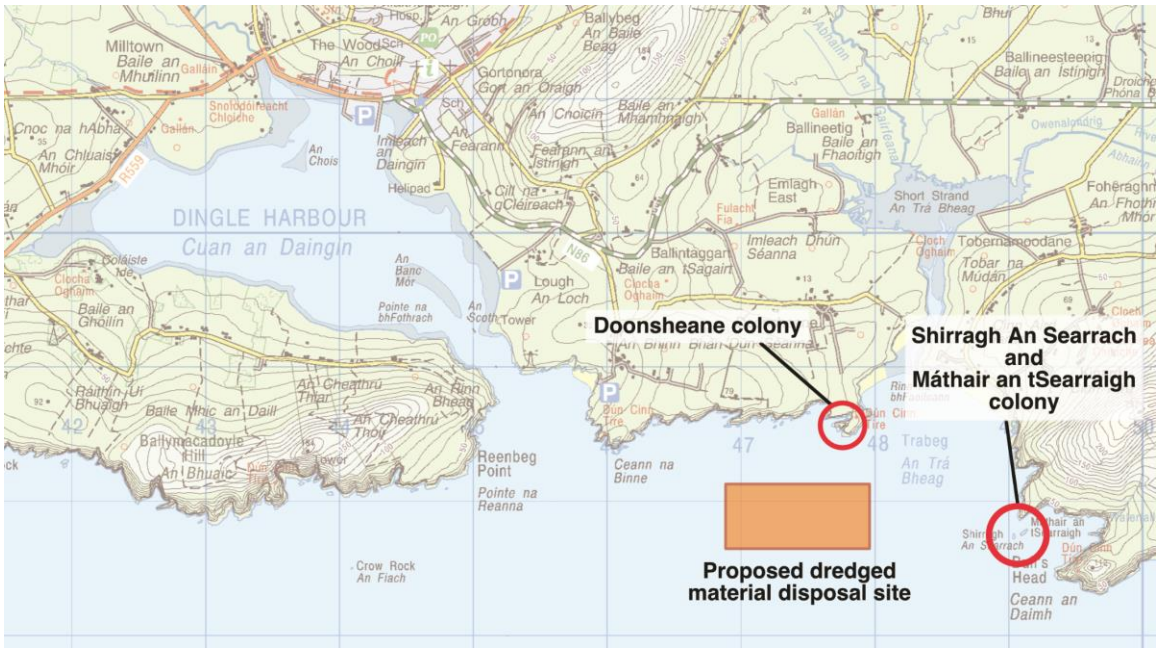

Figure 12. *The location of the two known Herring Gull colonies in the study area, Doonsheane, and the two adjacent islets of Shirragh An Searrach and Máthair An tSearraigh, in relation to the proposed dump site.*

For recording purposes, the cliff areas were divided into survey sectors A – G, and these are shown in the figure below.

Figure 13. *Designated sectors A – G in the Herring Gull Colony Survey area.*

4.10 Methodology: Cliff-nesting Seabird Survey

A survey was to be made of the cliff-nesting seabirds in the outer Dingle Harbour area to a range of 2km from the proposed 1km x .5km offshore dump area, near Doonsheane. With the indented nature of the coastline, this represents approximately 9km of coast. This survey area is shown in the figure below.

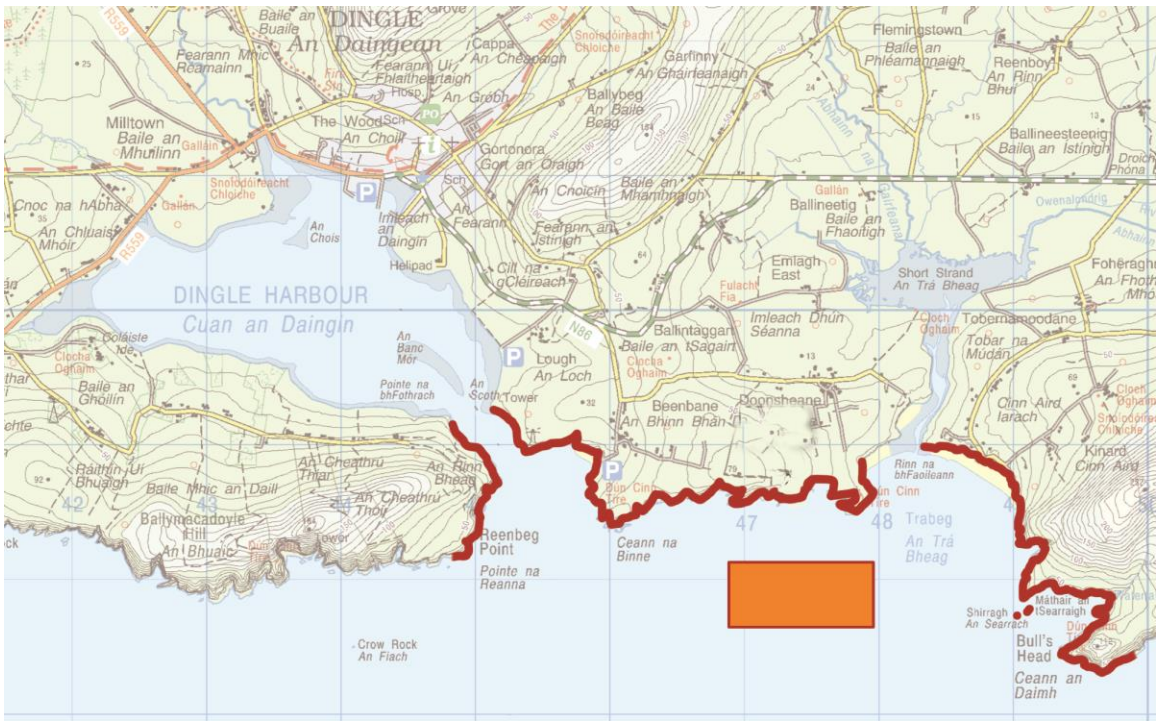

Figure 14. *Cliff-nesting Seabird Survey area (red), and the proposed offshore dump area (orange rectangle).*

The Survey was to be carried out on two full survey days in May and June 2021. The observations were to be made on foot from the adjacent cliff tops, using 8x42 binoculars and 30x telescope. The different census units for each potentially nesting species described in *The Seabird Monitoring Handbook* (Walsh, *et al*., 1995), were used and first (May) and second (June) visits were combined to give the breeding status

of each. Without repeated visits during the entire nesting season it was not possible to produce estimates of productivity, but the maximum breeding status based on BTO Breeding Bird Survey criteria (BTO, 2021) eg, adult incubating eggs, nest building, display, etc., was possible, based on observation during the two visits.

For recording purposes, the cliff areas were divided into survey sectors A – G, and these are shown in the figure below.

Figure 15. *Designated sectors A – G in the Cliff-nesting Seabird Survey area.*

The census units used for each species (based on Walsh, *et al*., 1995), were as follows:

Fulmar The recommended unit is the Apparently Occupied Site (AOS). A site is counted as occupied only when a bird appears to be sitting tightly on a reasonably horizontal area judged large enough to hold an egg. Two birds on such a site, apparently paired, count as one site. As May visits might include prospecting or non-breeding birds, counts should be made in June, between 0900 and 1730 BST

Shag The most consistent and accurate index of population size was the maximum number of nests occupied at one time, as breeding pairs often construct more than one nest during a season.
The recommended method involves counting all Apparently Occupied Nests (AON) at the peak of the breeding season. This is typically late May in the SW, but may be several weeks later in some years (Harris & Forbes, 1987). The recommended Apparently Occupied Nest (AON) includes active nests (bird sitting tight whether or not eggs or young were seen, or an unattended brood of young) and other attended, well-built nests (apparently capable of holding eggs).

Great Black-backed Gull, Herring Gull and **Lesser Black-backed Gull** The recommended census unit for these three large gull species is an Apparently Occupied Nest (AON), i.e. a well-constructed nest, attended by an adult and capable of holding eggs, or an adult apparently incubating. Counts should be made during the mid incubation period, usually late May-early June, between 0900 and 1600 BST.

Razorbill The recommended census unit is the Individual Adult on land (IND.). Counts of breeding pairs are virtually impossible without highly intensive observations of mapped study-plots. Counts are best made in the first three weeks of June (incubation/early nestling period), between 0800 and 1600 BST.

Black Guillemot The recommended counting unit is the Individual Adult (IND.), ideally counted in the early morning (before 0900 BST [0800 GMT]) in the pre-breeding season. Later in the season, Apparently

Occupied Sites (AOS) can be counted reasonably accurately at small colonies (see also the Methodology in the Black Guillemot Survey, above).

Although other seabird species were seen offshore from the study area during this and other survey work, the seven listed above were the only ones showing any potential nesting activity.

5 CONSTRAINTS

There were no significant constraints encountered during survey work. All coastal areas, including the urban coastal areas, docks and marina areas (apart from the pontoons with private yachts and small fishing craft) around Dingle town, were publicly accessible. Parts of the coastline near Dingle Harbour entrance were not accessible on foot, but were easily accessible by kayak. The outer high coastal cliff tops were also publicly accessible, with mainly clear - occasionally rough - pathways, and provided excellent viewing opportunities of virtually all the coastal cliffs in the study area. Similarly, the Vantage Point survey of the proposed dump site was possible from a safe and sheltered position on the cliff top.

Land to the south of the lagoon at Burnham Inlet is privately owned, but the relevant survey area (for Otter and the Breeding Birds Survey) in that sector was accessible by foot at mid- to low tide, so it was not necessary to venture onto private land. One small inland area of dense woodland habitat on the south side of Dingle Harbour was too dense to inspect properly for evidence of the presence of Otter, but it was considered not to have unduly impacted the Otter Survey as the coastward side of this habitat was easily observed and inspected and camera traps easily deployed on the few possible access points.

6 RESULTS

The results of the Habitats Survey, the Wintering Birds Survey, the Dump Area Survey the Otter Survey, the Black Guillemot Survey, the Breeding Birds Survey, the Foraging Chough Survey, the Herring Gull Colony Survey and the Cliff-nesting Seabird Survey are shown below.

6.1 Results: Dingle Harbour Habitats Survey

The Dingle Harbour Habitats Survey was carried out on the dates, times and weather conditions outlined below in Table 1.

Date	Time	High Tide	Low Tide	Wind Beaufort	Weather	Visibility	Temp. OC	Disturbance
20.03.2021	10:00-16:00	**HW** 16:18	**LW** 10:19	NW-2	Cloudy, calm	V. good	10	Low
25.05.2021	10:00-15:00	**HW** 16:18	**LW** 10:19	NE-1	Cloudy, calm	V. good	12	Low
27.07.2021	13:30-18:00	**HW** 07:30	**LW** 14:01	NW-3	Sunny, light breeze	V. good	17	Low

Table1. *Survey effort for Dingle Harbour Habitats Survey, in March, May and July 2021.*

The Habitats Survey found a total of 11 habitat types, which are shown in the maps below.

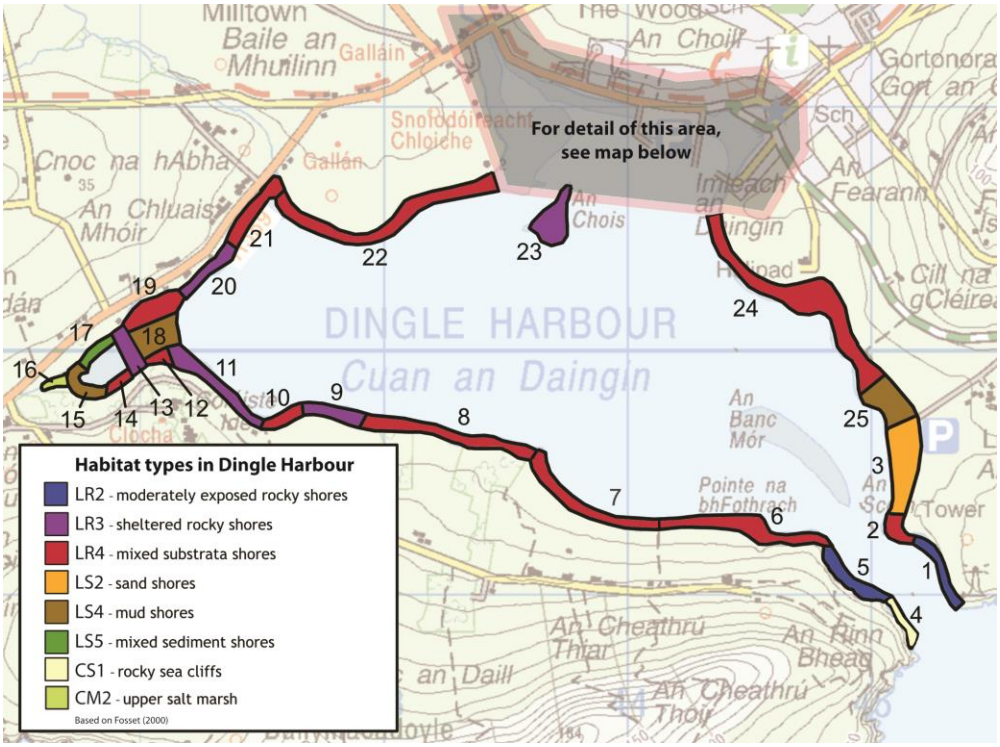

Figure 16a. *Habitat types in the inner Dingle Harbour area.*

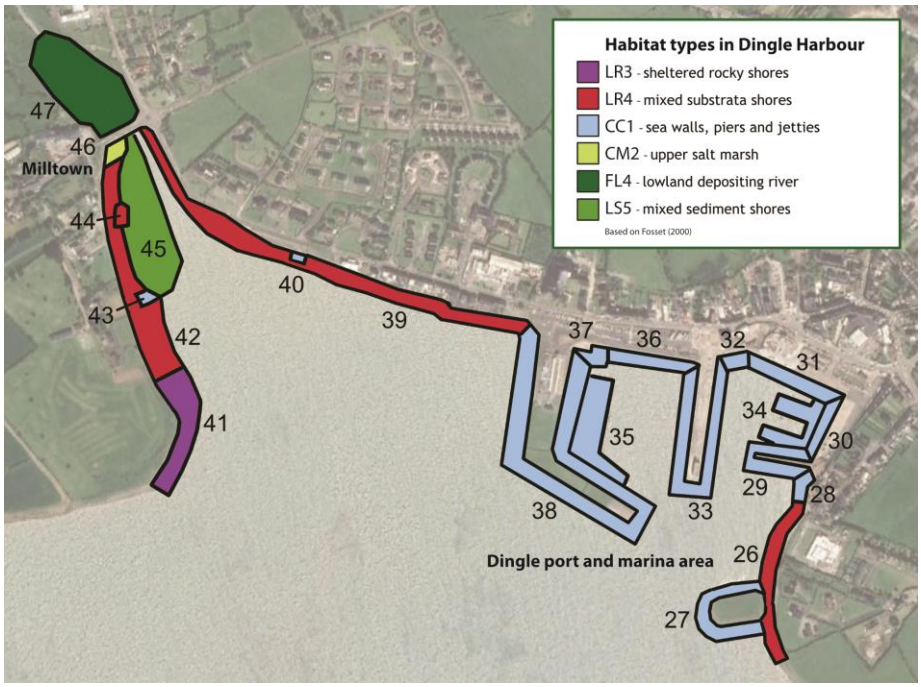

Figure 16b. *Habitat types in the Dingle port and marina, and Milltown rivermouth areas.*

Much of the littoral habitat throughout Dingle Harbour is mixed substrate shore, sheltered rocky shore and moderately exposed rocky shore, with small areas of mud and sand shores on the eastern side of Dingle Harbour, and at the seaward side of Burnham Inlet. A small area of Salt marsh and tidal river is at Milltown, just west of the marina and port area. The area of the port and marina are all man-made habitat - sea walls, piers and jetties – apart from a small area of mixed substrate shore on the eastern side, around the small breakwater to the SW of the port entrance. Details of the habitat and vegetation types are shown below.

Area	Habitat type 1 (Fossitt, 2000)	Habitat type 2	Habitat type 3	Notes on habitat and vegetation
				Dingle Harbour area (Figure 9a)
1	LR2			Sand shore. *Pelvetia canaliculata, Fucus* sp., *Patella* sp., *Littorina* spp., *Semibalanus balanoides, Chthamalus* spp. Small clumps of *Armeria maritima* on upper shoreline.
2	LR4			Mix of sediment and rock. *Littorina littorea.* Some *Himanthalia elongata* in more sheltered area.
3	LS2			Sand shore. Scattered small patches of *A. nodosum* and fucoids. Line of boulders on upper shore with lichen cover, *P. cannaliculata* and barnacles. A few drainage streams pour onto the beach.
4	CS1			Steep cliff on harbour entrance.
5	LR3			*P. canaliculata* on upper shore, *Fucus spirilis, H. elongata* mid/low shore. *Littorina* spp. and barnacles. Sharp boundary with terrestrial habitat. Narrow lichen boundary.
6	LR4			Mix of bedrock, cobbles, gravel. *P. cannaliculata* on upper shore, *Fucus serratus*, red algae, fucoids, fewer *Littorina* spp. and barnacles. In the May Survey, the invasive plant Wireweed *Sargassum muticum* was found. **Note** presence of Wireweed *Sargassum muticum.*
7	LR4			Mix of bedrock, cobbles, gravel. *P. canaliculata* on upper shore, *Fucus serratus*, red algae fucoids, fewer *Littorina* spp. and barnacles. In the May Survey, the invasive plant Wireweed *Sargassum muticum* was found. **Note** presence of Wireweed *Sargassum muticum.*
8	LR4			Mix of bedrock, cobbles, gravel. *P. canaliculata* on upper shore, *Fucus serratus*, red algae fucoids, fewer *Littorina* spp. and barnacles.
9	LR3			Dense cover of fucoids, some epifauna and epiphytes (periwinkles and red algae).
10	LR4			Mixed substrate. Dense fucoid cover.
11	LR3			Dense cover of *H. elongata* and fucoids. Red algae epiphyte cover. *P. cannaliculata* on upper shore. Narrow lichen band before sharp terrestrial transition.
12	LS4			Mud shore. A few stones with fucoid cover. Polychaete worms abundant. In July Survey, additional species included *Limonium humile.*
13	LR3			Rocky divide at Burnham Inlet. Small patches of *Beta vulgaris* on uppershore. Sharp transition of terrestrial habitat. *P. cannaliculata* on upper shore and rocky area with dense fucoid cover.
14	LR4	CM2		Mixed stone and mud with scattered fucoid cover.

				Thin fringe of salt marsh (5m x 2m) area, with *Juncus* spp., *Cochlearia officinalis, Plantago maritima* and *Triglochin maritima.*
15	LS4			Mud shore. Fringe of *Phragmites australis and Juncus* spp. Scattered stones on mud with fucoid cover. Polycheate worms present.
16	CM2	CM1	LS5	Upper salt marsh, with scattered fucoids. Salt marsh fringe. Salt marsh communities typical of CM2 upper salt marsh but with some patches of lower salt marsh (CM1) occurring in mosaic. Species of upper salt marsh and its fringes: L*ychmachia maritima, Plantago maritima, Tripolium pannonicum, Tripleurospermum maritimum, Triglochin maritima, Atriplex patula, Sonchus arvensis, Spergularia marina, Limonium humile, Oenanthe lachenalii, Hypochaeris radicata, Leontodon* sp. Species occurring in lower salt marsh patches: *Salicornia* agg., *Puccinellia maritime.*
17	LS5	CM2		Mixed sediment with scattered fucoids. Fringe of saltmarsh (CM2) with *Cochlearia officinalis, Tripolium pannonicum* and *Puccinellia maritima.* Area of CM2 is 20m x 5 m approx. Additional species recorded on the April survey were: *Lychmachia maritima, Plantago maritima, Tripolium pannonicum* and *Tripleurospermum maritimum*
18	LS4			Mud shore. Polychaete worms.
19	LR4			Mixed substrate.
20	LR3			Sheltered rocky shore. Dense fucoid cover.
21	LR4	CM2		Mixed substrate with fucoid cover. Note boundary of boulders reinforcing the bank. Small area of upper salt marsh occurs here (10m x 5 m) below the bridge.
22	LR4			Mixed substrate shore with fucoid cover.
23	LR3			Rocky island with intertidal communities. Dense fucoid cover.
24	LR4			Mixed substrate. Boundary of boulders with lichen cover. On the July Survey, additional species recorded at high water mark where a small patch of shingle bank occurs: *Tripleurospermum maritimum, Sonchus arvensis, Atriplex patula.*
25	LS5			Poorly sorted mixed sediment shore. Mud, sand, stone, cobbles. Scattered fucoids.
				Dingle port and marina area (Figure 9b)
26	LR4			Mixed stone, gravel, fucoid cover on stone.
27	CC1			Man-made island (50m x 20m approx.). Improved grassland on top. Edged with boulders, which form the foundation and habitat for fucoid species.
28	CC1			Slipway. Outflow of the stream occurs here in concrete spillway.
29	CC1			Boulder pier with fucoid cover.
30	CC1			Boulders with dense fucoid cover.
31	CC1			Pier wall.
32	CC1			Boulders with dense fucoid and *H. elongata* cover.
33	CC1			Main pier with fishing boats.
34	CC1			Pontoons with yachts.
35	CC1			Pontoons with yachts.
36	CC1			Boulders with fucoids and *H. elongata*.
37	CC1			Slipway.
38	CC1			Boulders with fucoids and *H. elongata.*
39	LR4			Mixed rocky shore. *P. canaliculata*, fucoids. Some sand and gravels.
40	CC1			Slipway.
41	LR3			Rocky shore with fucoids
42	LR4			Mixed mud shore and gravel, with dense fucoid cover on large stones.
43	CC1			Old pier remains and a small pontoon.
44	LR4			Mixed rocky shore. *P. canaliculata*, fucoids.
45	LS5			Mixed sediment. Green algae (posssibily *Cladophora* spp.).
46	CC1			Small fringe (10 x 3m) of upper saltmarsh community. **Note** presence of *Spartina anglica.* This may pose a considerable threat to intertidal habitats in the harbour.
47	FL4	LR4	CM2	Lowland depositing river. The substrate immediately above the bridge is LR4, which has mixed mud and sand substrate with some rocks, covered in fucoid species. The fringes include *Betua vulgaris, Plantago maritima, Cochlearia officinalis, Armeria maritima, Ranunculus repens,* and *Argentina anserina*). There are also patches of *Choenoplectus lacustris*. The islands where the river braids are CM2, with *Plantago maritima, Cochleria officinalis* and *Agrostis stolonifera*). During the July Survey additional species recorded included: *Oenanthe lachenalii, Leontodon* sp., *Hypochaeris radicata, Lysimachia maritima, Spergularia* sp., *Potentilla anserina, Tripleurospermum maritimum, Plantago major, Atriplex patula.*

Table 2. *Habitat Survey for Dingle Harbour, sectors numbered 1 –47 (corresponding to Figures 16a and 16b above), and notes on specific habitats and vegetation, conducted in February, April and June 2021.*

The port and marina area is uniformly of man-made boulder sea walls, piers and jetties, with only sparse fucoid (seaweed) cover below the High Water mark, though a small area on the eastern side consisting of a mixed substrate of stone and gravel shoreline and which also had a cover of fucoids. Much of the remaining shore of the Dingle Harbour area is of rocky shoreline, rather uniform in places (i.e. large tracts of the south shore of the Harbour), though there were two areas with a much more varied habitat mosaic – Burnham Inlet and around Milltown Bridge.

Plate 3. The two areas with much the most varied habitat mosaics in the Dingle Harbour area, *(left) the salt marsh and estuary at Milltown Bridge just to the west of Dingle Town, and (right) Burnham Inlet(or Burnham Lagoon) and Burnham Wood – a tidal inlet and mature, mainly deciduous woodland.*

In Burnham Inlet there is mixed substrate and mixed sediment habitats, as well as a fringing salt marsh, mud shore and sheltered rocky shoreline, all showing a much more complex system of habitats in a relatively small area. The area around Milltown Bridge, while also small, shows a variety of habitat types, including sheltered and mixed substrate rocky shores, an area of tidal, lowland depositing river to the north of the bridge, and a small patch of salt marsh on the seaward side of the bridge with associated maritime plants. Of note was the presence on the salt marsh habitat of a small area of the invasive plant *spartina anglica* of about 1m^2 - not previously recorded at this site (Link: https://invasivespeciesireland.com/species-accounts/established/marine/smooth-cord-grass). On the second Survey visit in May, the invasive Wireweed *Sargassum muticum* was found in sector 6 and 7, the southern shore just west of Dingle Harbour entrance. It has been recorded in Dingle Harbour previously (Link: https://invasivespeciesireland.com/species-accounts/established/marine/wire-weed), (Stokes, O'Neill, & McDonald, 2004).

6.2 Results: Wintering Birds Survey

The Wintering Birds Survey was carried out on the dates, times and weather conditions outlined below in Table 3.

Date	Time	High Tide	Low Tide	Wind Beaufort	Weather	Visibility	Temp. oc	Disturbance
28.01.2021	14:40-18.25	**HW** 16:23		SW- 5	Light showers	V. good	11	None
29.01.2021	09:00–12:40		**LW** 11:05	W-3	Dry, light shower	V. good	8	Slight
22.02.2021	10:25-14:00	**HW** 12:27		S-5	Dry, light shower	V. good	9	None
26.02.2021	08:00-11:00		**LW** 10:01	S-5	Dry, sunny	V. good	10	None
02.03.2021	10:50-13:45		**LW** 12:48	SE-3	Dry, calm, sunny	V. good	9	None
05.03.2021	07:40-10:10	**HW** 08:50		E1	Dry, calm sunny	V. good	6	None
06.04.2021	11:00-13:55	**HW** 13:03		N-4	Light showers, sunny	V. good	6	None
06.04.2021	17:40-20:40		**LW** 19:33	N-3	Light showers, sunny	V. good	7	None

Table 3. *Survey effort for Wintering Birds Survey, January to April 2021.*

A summary of the counts for each waterbird species (and Kingfisher) is shown in the table below.

Winter Bird Survey		HW Jan	LW Jan	HW Feb	LW Feb	HW Mar	LW Mar	HW Apr	LW APR
Species	BoCCI	Total	Total	Total	Total	Total	Total	Total	Total
Brent Goose		101	103	96	98	87	97	101	101
Red-breasted Merganser		16	14	15	14	14	14	13	13
Wigeon		46	46	20	28	45	43	13	13
Mallard		4	5	3	7	7	8	4	8
Teal		25	23	14	17	12	15	5	9
Little Grebe		4	4	1	1	3	2	0	1
Red-throated Diver		1	3	2	0	0	0	1	0
Great Northern Diver		3	2	1	3	0	1	1	2
Fulmar		0	1	0	0	5	0	2	0
Grey Heron		2	4	0	4	5	4	6	5
Little Egret		3	3	0	3	3	4	6	6
Gannet		3	2	0	0	3	0	25	11
Shag		2	4	7	19	6	13	7	11
Cormorant		3	9	16	16	16	14	18	10
Oystercatcher		7	2	12	28	23	28	2	12
Grey Plover		0	1	0	0	0	0	0	0
Ringed Plover		0	3	0	6	12	7	5	5
Lapwing		4	0	0	0	7	0	0	0
Curlew		2	5	9	16	17	37	1	8
Whimbrel		1	1	1	1	1	1	0	3
Bar-tailed Godwit		2	0	0	0	0	4	0	1
Turnstone		0	2	0	3	4	6	0	4
Sanderling		0	0	0	0	0	0	0	1
Dunlin		0	1	0	3	0	6	0	9
Snipe		1	1	0	0	0	0	0	0
Greenshank		3	6	7	7	7	12	3	5
Redshank		11	11	22	23	32	25	12	23
Black-legged Kittiwake		1	0	0	1	0	1	2	0
Black-headed Gull		10	20	27	38	67	105	17	14
Mediterranean Gull		0	1	0	5	0	1	0	1
Common Gull		5	13	23	36	9	27	0	11
Lesser Black-backed Gull		1	0	1	2	2	1	31	32
Herring Gull		59	71	24	95	26	121	115	236
Iceland Gull		1	0	1	2	2	2	0	0
Glaucous Gull		1	0	0	0	0	0	0	0
Great Black-backed Gull		18	10	0	10	29	39	42	81
Sandwich Tern		0	0	0	0	0	0	2	0
Black Guillemot		6	3	4	5	11	7	6	0
Razorbill		1	0	0	0	2	5	6	23
Guillemot		0	1	0	0	1	2	6	4
Kingfisher		1	0	0	0	0	0	0	0

Highest total per species

Table 4. *Summary of peak counts of each High and Low Tide count during the Winter Bird Survey, January to April 2021. Highest counts for the period are highlighted (pale orange). BoCCI classification is red (Red-listed, High Conservation Concern), orange (Amber-listed, Medium Conservation Concern) and green (Low Conservation Concern).*

A total of 41 target species was recorded (40 waterbird species and Kingfisher). The single highest count of any species was of Herring Gull, which accounted for the three highest counts (n=236 at LW in April, n=121 at LW in March, and n=115 at HW in April). However, averaging the eight winter counts over the four months of the Winter Survey showed that Brent Goose had the highest average count (n=98), followed by Herring Gull (n=93), and Black-headed Gull (n=37).

Absolute numbers of birds were fairly consistent over the four months with numbers of individuals highest in March (n=1083) but only slightly higher than the counts in February (n=1022) and April (n=1016). The lowest count was in January (n=733). This is shown in Figure 17, below.

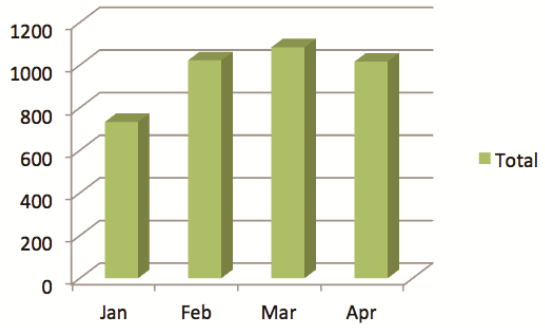

Figure 17. *Total number of birds recorded in the Winter Bird Survey by month.*

The distribution of all target species by sector was much more varied, with highest numbers over the four months in Sector E (the south side of Dingle Harbour). The lowest numbers were in Sector B (Dingle port and marina area). This is illustrated in the figure below.

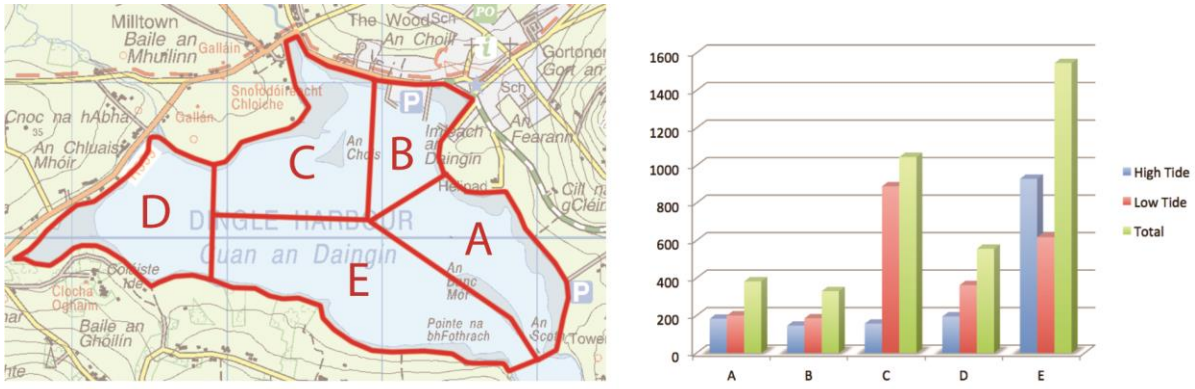

Figure 18. *Left) Sectors of the Winter Bird Survey in Dingle Harbour and right) Totals of target species during High Tide counts (blue), Low Tide counts (red), and Total counts (green).*

6.3 Results: Dump Area Bird Survey

The monthly Dump Area Bird Survey was carried out on the following dates and weather conditions.

Date	Time	Tides	Wind Beaufort	Weather	Visibility	Temp. oC
31.01.2021	09:30-15:50	**HT** 06:09 **LT**12:28	NE-4	Cloudy, dry	V. good	9
20.02.2021	09:10-15:35	**HT** 10:12 **LT** 16:36	SW-4	Mainly dry, light showers	V. good	8
12.03.2021	10:10-16:40	**HT** 16:40 **LT** 10:37	NE-2	Light mist, calm	Good	9
24.04.2021	10:10-16:10	**HT** 15:19 **LT** 09:15	E4	Dry, sunny	V. good	10
22.05.2021	08:20-14:20	**HT** 13:56 **LT** 07:43	N-3	Cloudy, occasional light showers	V. good	9
10.06.2021	07:40-13:40	**HT** 17:26 **LT** 11:24	S-4	Light mist	Good	15
19.07.2021	08:20-14:20	**HT** 12:39 **LT** 06:36	W-1	Calm, sunny, warm	V. good	17
05.08.2021	11:15-17:15	**HT** 15:18 **LT** 09:08	SW-5	Showers, sunny spells, breezy	Good	16

Table 5. *Survey effort for the monthly Dump Area Bird Survey, January to August 2021.*

A summary of the species recorded during the eight once-monthly, six-hour Vantage Point surveys that were using the 1 km x 0.5 km study area is shown in the table below.

Conservation status, winter, passage (BoCCI, 2021)		January 2021			February 2021			March 2021			April 2021			Overall
Species		**Fly**	**FF**	**Total**	**Fly**	**FF**	**Total**	**Fly**	**FF**	**Total**	**Fly**	**FF**	**Total**	**Total**
Great Northern Diver		3	0	**3**	1	0	**1**	1	0	**1**	0	0	**0**	**5**
Red-throated Diver		1	0	**1**	0	0	**0**	0	1	**1**	0	0	**0**	**2**
Fulmar		11	0	**11**	23	0	**23**	10	0	**10**	10	2	**12**	**56**
Manx Shearwater		0	0	**0**	0	0	**0**	7	0	**7**	5	0	**5**	**12**
Northern Gannet		17	2	**19**	9	0	**9**	13	2	**15**	14	22	**36**	**79**
Great Cormorant		2	0	**2**	1	0	**1**	0	0	**0**	0	0	**0**	**3**
European Shag		5	0	**5**	0	3	**3**	1	0	**1**	0	0	**0**	**9**
Common Scoter		1	0	**1**	0	0	**0**	0	0	**0**	0	0	**0**	**1**
Black-headed Gull		1	0	**1**	3	0	**3**	0	0	**0**	0	0	**0**	**4**
Mediterranean Gull		0	0	**0**	1	0	**1**	0	0	**0**	0	0	**0**	**1**
Common Gull		0	0	**0**	0	0	**0**	2	0	**2**	0	0	**0**	**2**
Herring Gull		20	27	**47**	13	3	**16**	14	3	**17**	0	4	**4**	**84**
Lesser Black-backed Gull		0	0	**0**	8	0	**8**	5	0	**5**	1	0	**1**	**14**
Great Black-backed Gull		5	5	**10**	10	1	**11**	4	0	**4**	0	1	**1**	**26**
Black-legged Kittiwake		0	1	**1**	0	0	**0**	2	0	**2**	0	0	**0**	**3**
Iceland Gull		1	0	**1**	1	0	**1**	0	0	**0**	0	0	**0**	**2**
Black Guillemot		0	0	**0**	0	0	**0**	1	0	**1**	0	5	**5**	**6**
Guillemot		7	0	**7**	0	0	**0**	0	2	**2**	1	0	**1**	**10**
Razorbill		4	0	**4**	0	0	**0**	0	3	**3**	7	0	**7**	**14**
Total		78	35	**113**	70	7	**77**	60	11	**71**	38	34	**72**	**333**
Flying		78			70			60			38			**246**
Feeding/foraging			35			7			11			34		**87**

Conservation status, summer, passage (BoCCI, 2021)		May 2021			June 2021			July 2021			August 2021			Overall
Species		**Fly**	**FF**	**Total**	**Fly**	**FF**	**Total**	**Fly**	**FF**	**Total**	**Fly**	**FF**	**Total**	**Total**
Great Northern Diver		2	0	**2**	1	0	**1**	0	0	**1**	0	0	**0**	**4**
Red-throated Diver		7	0	**7**	1	0	**1**	0	0	**0**	0	0	**0**	**8**
Fulmar		4	0	**4**	9	0	**9**	3	0	**3**	18	28	**46**	**73**
Storm Petrel		0	0	**0**	0	0	**0**	2	0	**2**	6	10	**16**	**18**
Manx Shearwater		6	0	**6**	44	0	**44**	8	2	**10**	215	90	**305**	**365**
Sooty Shearwater		0	0	**0**	0	0	**0**	0	0	**0**	0	3	**3**	**3**
Northern Gannet		9	3	**12**	1	0	**1**	32	8	**40**	63	26	**89**	**142**
Great Cormorant		0	0	**0**	0	0	**0**	3	0	**3**	0	0	**0**	**3**
European Shag		0	4	**4**	1	0	**1**	9	0	**9**	12	10	**22**	**36**
Common Scoter		5	0	**5**	0	0	**0**	0	0	**0**	0	0	**0**	**5**
Black-headed Gull		5	0	**5**	8	2	**10**	6	0	**6**	2	7	**9**	**30**
Mediterranean Gull		0	0	**0**	8	0	**8**	5	0	**5**	1	0	**1**	**14**
Common Gull		5	5	**10**	10	1	**11**	4	0	**4**	0	1	**1**	**26**
Herring Gull		0	1	**1**	0	0	**0**	2	0	**2**	0	0	**0**	**3**

Lesser Black-backed Gull		1	0	**1**	1	0	**1**	0	0	**0**	0	0	**0**	**2**
Great Black-backed Gull		0	0	**0**	0	0	**0**	1	0	**1**	0	5	**5**	**6**
Black-legged Kittiwake		7	0	**7**	0	0	**0**	0	2	**2**	1	0	**1**	**10**
Iceland Gull		4	0	**4**	0	0	**0**	0	3	**3**	7	0	**7**	**14**
Great Skua		0	0	**0**	0	0	**0**	0	0	**0**	0	2	**2**	**2**
Black Guillemot		0	0	**0**	0	0	**0**	3	0	**3**	0	0	**0**	**3**
Guillemot		4	12	**16**	0	15	**15**	0	26	**26**	7	0	**7**	**64**
Razorbill		0	9	**9**	0	0	**0**	0	17	**17**	0	3	**3**	**29**
Atlantic Puffin		0	0	**0**	0	0	**0**	3	0	**3**	1	11	**12**	**15**
Sandwich Tern		2	0	**2**	0	0	**0**	0	0	**0**	7	0	**7**	**9**
Arctic Tern		0	0	**0**	4	0	**4**	2	0	**2**	9	0	**9**	**15**
Total		61	34	**95**	88	18	**106**	83	58	**141**	349	96	**445**	**787**
Flying		61			88			83			349			**581**
Feeding/foraging			34			18			58			96		**206**

Table 6. *Totals of seabirds flying over (**Fly**) or feeding/foraging (**FF**) on/over the 1km x 0.5km dump area during once monthly, six-hour Vantage Point watches, January to Augustl 2021. Colours indicate BoCCI status: Red = Red-listed Species, Orange = Amber-listed Species, and green = Green-listed Species.*

During the eight days of Vantage Point counts, over a combined total of 48 hours, 1120 individual birds of 25 species was recorded in the study area.

The August count showed the highest overall numbers, with 445 birds of 18 species recorded, of which 349 were overflying the area and 96 were feeding on or over it. The counts on the first 6 months, January to June, were broadly similar, with 113, 77, 71, 72, 95 and 106 individuals recorded in January, February, March, April, May and June 2021 respectively, and a noticeable increase in the July count to 141, and higher again in August – 445 individuals.

The commonest species overall was Manx Shearwater (n=377) followed by Northern Gannet (n=227), and then Fulmar (n=129).

6.3.1 Other species

The cetaceans and other marine species seen during the Dump Area Survey were: two Bottle-nose Dolphins on 31st January 2021; a single Porpoise on 12th March 2021, and a pod of c.12 Common Dolphins on 24th April 2021. A single Grey Seal was also recorded on 24th April. On 10th June, 2 Grey seals and 3 Bottle-nose Dolphins were present, and during the July survey, there were 16 Common Dolphins in the survey area. On the 5th August survey, at least 20 Common and 5 Bottle-nose Dolphins were recorded along with 2, possibly 3 Minke Whales and a single Sunfish.

6.4 Results: Otter Survey

The Otter Survey was carried out on the dates, times and weather conditions outlined below in Table 6.

Date	Time	Tide	Wind Beaufort	Weather	Visibility	Temp. oc	Activity
30.01.2021	11:00-17:00	**HT** 05:27 **LT** 11:27	NE-4	Cloudy, dry	V. good	9	Sign-searching, camera traps
19.02.2021	10:00–16:40	**HT** 09:19 **LT** 15:38	SW-4	Mainly dry, light showers	V. good	8	Sign-searching, camera traps
03.03.2021	08:20-14:50	**HT** 07:13 **LT** 13:32	NE-2	Light mist, calm	Good	9	Sign-searching, camera traps
04.04.2021	08:00-11:00	**HT** 10:27 **LT** 16:55	NW3	Dry, sunny	V. good	10	Sign-searching, camera traps
07.05.2021	09:25-15:25	**HT** 14:49 **LT** 08:51	E-4	Sunny spells, light breeze	V. good	10	Sign-searching, camera traps
09.06.2021	09:20-15:30	**HT** 16:49	SW-4	Mist, light breeze	Good	15	Sign-searching, camera traps

		LT 10:48					
17.07.2021	9:05-15:05	**HT** 10:43 **LT** 17:05	NE-1	Sunny, calm, warm	V. good	20	Sign-searching, camera traps
07.08.2021	09:30-16:30	**HT** 16:45 **LT** 10:38	NW-4	Light showers, sunny spells	V. good	16	Sign-searching, camera traps

Table 7. *Survey effort for the Otter Survey, January to April 2021.*

On each of the survey days, searches were made of the shoreline in Dingle Harbour in order to find 'spraint' or any other signs of Otter. As Otters are usually nocturnal, two to three infra-red trail cameras (camera traps) were in continuous use at various sites around the shoreline of Dingle Harbour from 27th January to 30th August 2021. All were deployed within 1m to 8m of the high tide line at sites where Otters might occur, ie, gaps in vegetation close to the shoreline, small streams, and other access points to the shore.

Signs of the presence of Otter were initially found at two locations on the south shore of Dingle Harbour, one where a raised platform of rock on the upper shoreline had both an area of Otter 'spraint' and an adjacent area of grass and Sea Thrift *Armeria maritima* which had been scuffed and disturbed, indicating an area where an Otter had been marking territory. A trail camera was deployed at this site, and initially recorded visits to the first site by an Otter on 8 of 11 nights of recording, a total of 16 camera triggers involving from one to three visits per night. A trail camera was therefore deployed almost continuously at this site until survey end on 30th August, recording a total of 349 triggers by Otter.

The second site where signs were found was an Otter spraint on a flat, grassy patch c.6m from the high tide line, also on the southern shore of Dingle Harbour, and approximately 1.4km from the site above. The spraint was fresh, and although a trail camera was deployed overlooking this site, and later at sites nearby (<20m) over the following 5 weeks, no further triggers by Otter were recorded.

Plate 4. (Left) *Trail cam capture of an adult female Otter on the south shore of Dingle Harbour in June and (Right), fresh Otter spraint on a flat grassy area about 1.4km to the west.*

Four sightings of Otter were made during survey work: one of an adult swimming close to the south shore of Dingle Harbour, seen during Otter Survey work on 30th January 2021; another was swimming close to shore near Milltown Bridge at dawn on 26th February 2021 during Wintering Birds Survey work; one was seen swimming just off the SW corner of the marina in Dingle at 06:10 on 4th May during the Black Guillemot Survey and; one was seen swimming close to the shore in the SW corner of Dingle Harbour at 08:20 on 9th June 2021 during the Breeding Birds Survey.

The signs and sightings of Otter, and location of camera traps are mapped below.

Figure 19. *Signs and sightings of Otter, and location of camera traps in the inner Dingle Harbour area, January to August 2021.*

The video recordings of Otter on the south shore of Dingle Harbour showed rolling behaviour and defecation consistent with an adult female Otter marking territory (see Plate below).

Plate 5. *Area on south shore of Dingle Harbour just above the High Water mark, used by a female Otter to mark territory – the scuffed brown grass area on left. On the right, two still images from videos from a camera trap, showing a female Otter rolling repeatedly, and marking territory with 'spraint'.*

Of the 379 camera triggers of Otter over 6 months, all were at the same site and, as male and female Otters are largely solitary and territorial, it is reasonable to assume they were of the same individual. However, footage captured on 14th June showed an apparently smaller Otter nervously approach the spraint area, and retreat hastily after smelling the scent, and repeated this an hour later. No young Otters (cubs) were detected by sight or camera trap.

On 7th May 2021, on the south shore of Dingle Harbour, an area of fresh tracks through some short vegetation just above the high tide line led to some freshly dug earth at the base of a small cliff. A trail camera was deployed overlooking this and, though initially an adult Badger was caught on the camera, the animal was seen to sniff at the entrance and retreat. Subsequent footage then showed an adult Otter entering the burrow, and this was caught on camera a further four times on subsequent nights. It was not possible to discern from the footage if it was the same individual on the trail camera footage 1.4km to the east (see above).

6.4.1 Other species

Over the 217 days of the survey period, the cameras were triggered a total of 792 times, of which 379 were by Otter. The triggers were also by eight other species of mammal, 12 species of bird, and four by insects, as shown in the table below.

Species			Species			Species	
Mammals	**No. of triggers**	**Notes**	**Birds**	**No. of triggers**	**Notes**	**Insects**	**No. of triggers**
American Mink	2	Stream at Burnham Inlet	Blackbird	123		Butterfly spp.	1
Badger	9	Burnham Inlet	Grey Heron	10		Moth spp.	3
Bank Vole	2		Great Black-backed Gull	22			
Brown Rat	98		Little Egret	11	All diurnal, Burnham Inlet		
Domestic cat	11		Song Thrush	2	Including recent fledgling		
Fox	21		Mallard	24	Including nestlings		
Human	14		Robin	12	Including recent fledgling		
Otter	**379**	**All at south shore of Dingle Harbour**	Shag	3			
Wood Mouse	8		Starling	5	Including recent fledgling		
Unidentified small mammal	2		Woodcock	11	All nocturnal, Burnham Inlet		
			Wood Pigeon	13			
			Wren	6	Including recent fledgling		
Total	**546**			**242**			**4**

Table 8. *Species of mammal, bird and insect captured on camera traps deployed during the Otter Survey, Dingle Harbour, January to August 2021.*

The presence of the invasive American Mink was detected at two sites in Dingle Harbour, Burnham Inlet in March 2021, and Milltown Bridge in June 2021. Although some local observations of Otter were reported to the author in the Dingle Harbour area, the possibility of misidentification (of American Mink) could not be ruled out, so were excluded from the sightings during the survey period (ie, see VWT, 2015).

Plate 6. *(Left) American Mink at Burnham Inlet in March 2021, and (Right), close to Milltown Bridge in June 2021.*

The presence of Woodcock at Burnham Wood was of interest, and only detected by nocturnal recordings from the camera traps. Mallard chicks caught on the camera traps at the small stream to the west end of Burnham Inlet provided proof of breeding during the survey period (see Breeding Bird Survey, below).

6.5 Results: Black Guillemot Survey

The Black Guillemot Survey was carried out on the dates, times and weather conditions outlined below in the table below.

Date	Time	Tide	Wind Beaufort	Weather	Visibility	Temp. oc	Disturbance
05.04.2021	07:10-10:10	**HW** 11:39 **LW** 18:06	N-4	Showers, cold	V. good	10	None
21.04.2021	06:00-09:15	**HW** 12:05 **LW** 06:12	E-2	Calm, sunny spells	V. good	10	Slight
04.05.2021	06:05-09:10	**HW** 11:28 **LW** 17:57	NW-4	Cloudy, showers, light wind	V. good	8	None
07.05.2021	06:30-09:30	**HW** 14:49 **LW** 08:51	E-3	Sunny spells	V. good	6	None
08.06.2021	06:30-12:30	**HW** 16:14 **LW** 10:14	SE-3	Light rain, mist, warm	Good	15	None
16.07.2021	06:10-09:10	**HW** 09:48 **LW** 16:08	N-2	Sunny, calm, warm	V. good	16	None

Table 9. *Survey effort for the Black Guillemot Survey, April to July 2021.*

Black Guillemots were detected in Dingle Harbour and the port and marina area throughout the Wintering Birds Survey, from January to April 2021 (see above). However, the only suitable nesting sites for Black Guillemot all fell within Sector B – the port and marina area, and the winter counts for that sector were as follows: January – 4 individuals; February – 3; March –4, and April –0. No further sightings of Black Guillemots were made during survey work in and around the port and marina area after 21st April (during the Black Guillemot Survey), nor during the Breeding Bird Survey conducted in that area from April to August.

The four early morning pre-breeding survey visits in April and May detected up to eight individuals at or close to coastal cliffs in the outer Dingle Harbour area, and display behaviour between pairs was recorded. On the 21st April and 4th May surveys, three pairs were seen actively displaying close to a large boulder field below a high cliff at Ceann ba Binne, to the east of Dingle Harbour entrance, and another pair were on the water below, and seen flying into another boulder field, below a high coastal cliff near Doonsheane.

Plate 7. (Left) *Black guillemot nest site at Ceann na Binne (white arrow) and (top right) displaying pairs of Black Guillemots in May, and (lower right) adult Black Guillemot carrying prey before flying into the nest site to feed chicks, in June 2021.*

Survey visits in June and July confirmed these two sites, with 3 and 1 active nests respectively, with adult birds recorded flying into the boulder fields carrying fish, on both the 8th June and 16th July visits. No other Black Guillemot nest sites were recorded or suspected in the survey area during additional survey work (including during the Cliff-nesting Seabird Survey).

The areas where individual Black Guillemots were recorded on the sea during the four April and May survey visits, and the confirmed nest sites from the June and July survey visits are shown in the figure below.

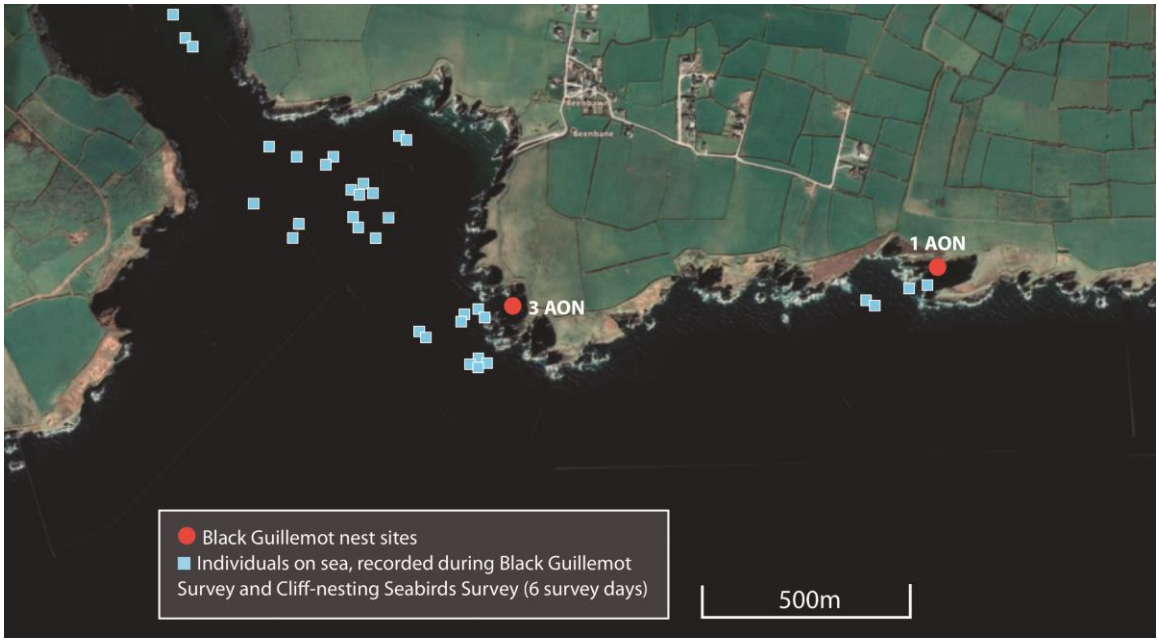

Figure 20. *Black Guillemots recorded on the sea (blue) in the four pre-breeding survey visits in April and May 2021, and the two nest sites of 3 and 1 pairs confirmed in two June and July 2021 survey visits.*

Although 20 sightings were at the Dingle Harbour Entrance, all were confirmed by observation through 30x telescope to be foraging pairs, actively diving and fishing, the only display activity being observed was at or close to the two nest sites outlined above.

6.6 Results: Breeding Birds Survey

The Breeding Birds Survey was carried out on the dates, times and weather conditions outlined in the table below.

Date	Time	High Tide	Wind Beaufort	Weather	Visibility	Temp. oc	Disturbance
10.04.2021	08:10-14:20	**HT**16:41 **LT** 10:49	NE-3	Sunny, light wind, cold	V. good	5	None
26.04.2021	09:20-15:20	**HT** 16:44 **LT** 10:45	NE-2	Sunny, calm	V. good	11	Low
04.05.2021	09:10-15:10	**HT** 11:28 **LT** 17:57	NW-5	Showers, then dry	V. good	9	Low
10.05.2021	07:40-13:40	**HT** 16:46 **LT** 10:50	SW-4	Cloudy, occasional light shower	V. good	11	None
09.06.2021	07:10-13:10	**HT** 16:49 **LT** 10:48	SW-3	Patches of light rain, mist	Good	15	Low
22.06.2021	08:20-14:20	**HT** 15:04 **LT** 09:06	N-3	Hazy sunshine	V. good	13	Low
16.07.2021	08:20-15:45	**HT** 09:48 **LT** 16:08	N-2	Sunny, calm, warm	V. good	16	None
26.07.2021	08:10-14:10	**HT** 06:49 **LT** 13:14	NW-3	Dry, warm, occ. mist & light showers	Good	19	None
06.08.2021	08:00-14:00	**HT** 16:05 **LT** 09:57	NW-5	Occasional light showers	V. good	15	Low

Table 10. *Survey effort for Breeding Birds Survey, April to August 2021.*

The Breeding Birds Survey found a total of 84 species in the survey area, of which 28 were confirmed breeding, 10 were probable breeders, 10 were possible breeders, and the remaining 36 were migrant or summering birds.

The breeding status of the 84 species in the full survey area is shown in the table below.

Species	April 2 survey days	May 2 survey days	June 2 survey days	July 2 survey days	August 1 survey day	Notes	Highest breeding status
Conservation status (BoCCI, 2021, breeding, passage)							
Great Northern Diver	M	M				Wintering birds, none nesting	
Red-throated Diver	M	M				Wintering birds, none nesting	
Fulmar	F	F			F	Nesting just outside area	
Gannet	F	F	F		F		
Cormorant	F	M	F	F	F		
Shag	F	F	F	F	F		
Grey Heron	ON	ON	NY	NY	FL	4 pairs in Burnham Wood	Confirmed
Little Egret	N	ON	NY	FL	FL	6-7 pairs in Burnham Wood	Confirmed
Brent Goose	M	M				Wintering birds, none nesting	
Mallard	P	FL	FL			2 pairs nested in Burnham Wood	Confirmed
Wigeon	M	M				Wintering birds, none nesting	
Eurasian Teal	M	M				Wintering birds, none nesting	
Red-breasted Merganser	M	M				Wintering birds, none nesting	
Sparrowhawk	F	F	F	ON		1 pair nested successfully at Burnham Wood	Confirmed
Kestrel	F	H	H			Regularly hunting over area, but no nesting	Possible
Peregrine Falcon		F	2			Not breeding in area	
Pheasant	H	H	H	H	H	Near Milltown Bridge	Possible
Oystercatcher	H	H	H	H	H	Feeding in area, no nesting	Possible
Ringed Plover	H	H	H	H	H	Suitable habitat on S shore, but no nesting	Possible
Lapwing	M				M	Wintering birds, none nesting	
Knot	M						
Sanderling	M	M					
Turnstone	M	M					
Dunlin	M	M					

Common Sandpiper			M	P	P		Pair present, but no nest found, on S shore	Probable
Redshank		M	M			M		
Greenshank		M	M		M	M		
Bar-tailed Godwit			M				Wintering birds, none nesting	
Curlew		M	M			M	Wintering birds, none nesting, no suitable habitat	
Whimbrel		M	M			M	Migrants	
Woodcock		H					Recorded on trail cam, Burnham Wood, in April, but no subsequent sightings	Possible
Snipe		M						
Black-headed Gull		M	M		M	M	Wintering birds, none nesting, no suitable habitat	
Common Gull		M	M	M	M	M		
Mediterranean Gull		M			M	M		
Herring Gull		F	F	F	F	F	Breeding just outside this study area	
Great Black-backed Gull		F	F	F	F	F	Breeding just outside this study area	
Lesser Black-backed Gull		F	F	F	F	F	Breeding just outside this study area	
Sandwich Tern		M					Regularly fishing in Harbour area, but no nesting, no suitable habitat	
Black Guillemot		H	H	H	H	H	Breeding just outside this study area	Possible
Guillemot		M	M		M	M		
Razorbill			M	M		M		
Rock Dove		H	D	D	A		Several probable nests in urban area of Dingle	Probable
Woodpigeon		H	D	FL	FL	H	Confirmed nesting in garden in urban Dingle, and near Burnham	Confirmed
Collared Dove		P	P	FL			Confirmed nesting in garden in urban Dingle	Confirmed
Cuckoo			S				One singing on one date in May at Burnham	Possible
Swift				N	N		2-4 pairs, in urban Dingle	Probable
Skylark		H	S	D	D		Fields to SE of Dingle town	Probable
Sand Martin		M	D				Display noted at Milltown Bridge, but no nesting	Possible
House Martin			M	ON	ON	ON	4+ occupied nests in urban Dingle	Confirmed
Barn Swallow			M	ON	FL	FL	Common, around farms, sheds, c.10-15 nests	Confirmed
Meadow Pipit		H	D	FF	FF	H	Fields to SE, W and SW of Dingle town	Confirmed
Rock Pipit		H	D	FF	FF	FL	2-3 pairs on Dingle seafront, including 1 at marina	Confirmed
Pied Wagtail		H	P	FF	FF	FL	10+ pairs, in and around town Dingle town	Confirmed
Grey Wagtail		H	P	P	FL		1 pair, stream near centre of Dingle town	Confirmed
Wren		S	S	P	FL	P	Common in well-vegetated gardens, hedgerow	Confirmed
Dunnock		S	H	P	P	P	Common in well-vegetated gardens, hedgerow	Probable
Robin		P	FL	P	FL		Common in well-vegetated gardens, hedgerow	Confirmed
Wheatear			M					
Stonechat		P	P	FL	FL		Common along field edges, rough ground	Confirmed
Song Thrush		P	P	T	T		Common in gardens and hedgerow	Probable
Mistle Thrush		P	T	T	T	H	2-4 pairs, in gardens, hedgerow, fields	Probable
Blackbird		T	D	FL	T	H	Common in gardens, hedgerow, woodland	
Blackcap			S	T	T		3-4 singing birds Burnham, 3-5 singing elsewhere, in mature hedgerow, gardens	Probable
Willow Warbler		S	T	FF	T	T	6-8 singing birds/territories, in hedgerow, woodland edge	Confirmed
Chiffchaff		S	T	ON	T		2 pairs/territories Burnham	Confirmed
Goldcrest		H	H	T	H	H	Regular, in gardens, hedgerow, woodland	Probable
Great Tit		H	FF	FL	H		Common in gardens, hedgerow, woodland	Confirmed
Blue Tit		P	ON	FL	H		Common in gardens, hedgerow, woodland	Confirmed
Coal Tit		S	T	T	P		Small numbers in mature gardens, conifers	Probable
Magpie		P	ON	ON	FL		Common in gardens, hedgerow, woodland	Confirmed
Jackdaw		ON	ON	FL			Common in all areas, many nests, in chimneys and old buildings	Confirmed
Chough		F	F			F	Foraging in area but not nesting	
Rook		ON	ON	FL	FL		Common in all areas, several colonies	Confirmed
Hooded Crow		T	T	FL	FL		Common in all areas, several family parties	Confirmed
Raven		T	P	FL			Pairs and young feeding in area but not nesting	Possible

Starling		T	ON	FL	FL	FL	Common, 10-12 nests, all in buildings	Confirmed
House Sparrow		T	ON	FF	FF		Common, urban areas and farms	Confirmed
Chaffinch		T	T	FL	FL		Common, urban areas, hedgerow and woodland	Confirmed
Linnet		P	P	FL	FL		Scarce, fields and hedgerow, gorse	Confirmed
Redpoll		F	F	F				
Goldfinch		H	T	T	FL		Common, gardens and hedgerow	Confirmed
Greenfinch			H	H	H		Uncommon, gardens and hedgerow	Possible
Siskin		F	F		F			
Bullfinch		H	H	P	T			Probable

BoCCi Status

Red-listed (high conservation concern), breeding, passage

Amber-listed (medium conservation concern), breeding

Green-listed (low conservation concern)

BTO Breeding status

Confirmed breeding

Probable breeding

Possible breeding

Non-breeding

Table 11. *Breeding status of species recorded during the Breeding Birds Survey, Dingle Harbour, April to August 2021.*

Plate 8. *Examples of BTO breeding categories used in the Breeding Birds Survey: (Top far left) House Martin, **ON** Occupied Nest; (Top second left) Stonechat, **T** Territorial (singing male); (Top third from left) Song Thrush, **FL** recently fledged young; (Top right) Robin, **FF** Food/feeding; (Bottom left) Wren, **S** Singing, in suitable habitat; (Bottom centre) Little Egret, **ON** Occupied Nest; (Bottom right) Rook, **ON** Occupied Nest – a nest which includes a large section of plastic in its construction.*

The breeding status of the breeding species in the 500m buffer and 100m buffers from the proposed marina area is shown in the table below

Species		< 500m Highest breeding status, April to August 2021, 9 survey days				< 100m Highest breeding status, April to August 2021, 9 survey days		
Conservation status (BoCCI, 2021, breeding,				Notes				Notes
Rock Dove		ON	Confirmed	Nest building		H	Possible	Individuals present, not nesting
Collared Dove		P	Possible	Pair(s) present				
Swift		T	Probable	Present regularly during survey period				
House Martin		ON	Confirmed	Occupied nest				
Rock Pipit		FF	Confirmed	2-3 pairs on Dingle seafront, including 1 at marina		FF	Confirmed	1-2 pairs in rock foreshore
Pied Wagtail		FF	Confirmed	Carrying food, several pairs		FF	Confirmed	1 pair seen carrying food to nest in sea wall
Grey Wagtail		P	Probable	1 pair, stream near centre of Dingle town				
Wren		S	Confirmed	Fledged young seen				
Dunnock		T	Probable	Several pairs present in gardens				
Robin		P	Confirmed	Fledged young seen				
Stonechat		P	Probable	2-3 pairs on periphery of urban areas				
Song Thrush		P	Probable	Several pairs present in gardens				
Blackbird		FL	Confirmed	Fledged young seen				
Great Tit		FF	Confirmed	Fledged young seen				
Blue Tit		FL	Confirmed	Fledged young seen				
Magpie		P	Confirmed	Several nests in high trees in gardens				
Jackdaw		ON	Confirmed	Several pairs in buildings				
Starling		T	Confirmed	Several pairs in buildings		H	Possible	Seen close to cavity on marina building, but not nesting
House Sparrow		T	Confirmed	Common, urban areas and farm outbuildings		P	Probable	Pair seen close to cavity on marina building,
Chaffinch		T	Probable	Several pairs in gardens				Common, urban areas, hedgerow and woodland

Table 12. *Breeding status of species recorded within the 500m and 100m buffers from the proposed marina area during the Breeding Birds Survey, Dingle Harbour, April to August 2021.*

The Otter and Foraging Chough Surveys (which see) overlapped in area and timing with the Breeding Bird Surveys to some degree, but it is worth noting that the main input to the Breeding Birds Survey from either of those came from the trail cameras installed for the Otter Survey. From the footage, it was possible to confirm recently fledged young (FL Confirmed breeding) of Robin, Stonechat, Blackbird and Starling, though these were also confirmed by observation during the Breeding Birds Survey itself. Two species which had their breeding status confirmed by trail camera alone, and not during the Breeding Birds Survey fieldwork, were Mallard (FL confirmed) and Woodcock (H possible). See the Plate and caption below.

Plate 9. *(Left) Woodcock, captured on a trail camera during the Otter Survey at Burnham Inlet in April 2021 and, (Right) female Mallard with 9 recently fledged chicks, also at Burnham Inlet, also in April 2021.*

6.7 Results: Foraging Chough Survey

The Foraging Chough Survey was carried out on the dates, times and weather conditions outlined in the table below.

Date	Time	Wind Beaufort	Weather	Visibility	Temp. oc	Disturbance
12.05.2021	09:15-15:15	N-3	Showers, then dry	V. good	11	None
10.06.2021	12:50-18:35	SW-4	Light mist, dry, light breeze	V. good	15	None

Table 13. *Survey effort for Foraging Chough Survey, May and June 2021.*

The Survey recorded a total of 55 foraging Chough during the 12 hours of survey work. The flock sizes varied from 1 to 7, resulting in 21 specific sites where the habitat was assessed. These are shown in the map below.

Figure 21. *Numbers and location of foraging Chough detected during the survey, on 12th May and 10th June 2021.*

There were 21 encounters with flocks or individual Choughs (12 during the May count, 9 in the June count) of a total of 55 birds (26 during the May count, 29 during the June count). The average flock size was 2.61, with the lowest being single individuals, the highest flock size was of 7 birds, and included recently fledged young.

The habitat types on which foraging Chough were recorded is shown in the table below.

Date	Time	No. birds	Habitat type *Fosset*, 2000	Foraging habitat type	Notes
12.05.2021	09:35	5	GA1	Improved agricultural grassland	Close cropped, grazed maritime sward
	09:38	3	GA1	Improved agricultural grassland	Close cropped, grazed maritime sward
	09:46	1	GA1	Improved agricultural grassland	Close cropped, grazed maritime sward
	09:55	2	HH	Sea cliffs	Soil patches on non-grazed maritime sward
	10:17	2	GA1	Improved agricultural grassland	Grass field (cattle)
	10:21	2	GA1	Improved agricultural grassland	Grass field (cattle)
	10:30	1	CS	Sea cliffs	Soil patches on non-grazed maritime sward
	11:05	1	GA1	Improved agricultural grassland	Grass field (cattle/ sheep)
	14:20	2	GA1	Improved agricultural grassland	Grass field (cattle/ sheep)
	14:25	3	GA1	Improved agricultural grassland	Grass field (cattle/ sheep)
	14:34	1	GA1	Improved agricultural grassland	Grass field (cattle/ sheep)
	14:41	3	GA1	Improved agricultural grassland	Grass field (cattle/ sheep)
10.06.2021	13:14	3	HH	Heath	Soil patches on heath-covered slope
	13:20	2	GA1	Improved agricultural grassland	Close cropped, grazed maritime sward
	13:26	2	GA1	Improved agricultural grassland	Close cropped, grazed maritime sward
	13:47	1	CS	Sea cliffs	Soil patches on non-grazed maritime sward
	14:11	7	GA1	Improved agricultural grassland	Family party. Grass field (cattle/ sheep)
	14:25	4	GA1	Improved agricultural grassland	Grass field (cattle)
	18:00	5	GA1	Improved agricultural grassland	Family party. Grass field (cattle/ sheep)
	18:02	3	GA1	Improved agricultural grassland	Grass field (cattle/ sheep)
	18:24	2	GA1	Improved agricultural grassland	Grass field (cattle/ sheep)

Table 14. *Habitat types used by foraging Chough in the study area, May and June 2021.*

18 of the 21 (85.7%) flock encounters were foraging on GA1 Improved Agricultural Grassland, the remaining 4 (flocks of 2, 1, 3 and 1 individuals) were foraging on CS Sea Cliffs (3) and HH Heath (1).

All Choughs encountered during the survey occurred along a thin coastal stretch, none further from the sea than 250m. None were encountered on improved agricultural grassland or any other habitat further inland, and none were recorded in or around Dingle town, or the port and marina area.

Plate 10. *Coastal cliffs near Dingle Harbour entrance, looking east towards Doonsheane in the middle distance and Bulls Head, top right. Foraging Chough fed almost exclusively on the grass fields adjacent to the coastal cliff tops.*

The Wintering Birds Survey (see above), from January to April 2021, recorded 4 additional sightings of foraging Chough, during the January and March counts. Two sightings were of a flock of 3 (January) and a flock of 4 (March) feeding on seaweed on the high tide line close to the eastern side of the entrance to Dingle Harbour, and 2 were of a single bird (January) and a flock of 4 birds (March) also feeding on the high tide line approximately 1km west of Dingle Harbour entrance. These are shown in the figure below.

Figure 22. *Additional sightings of foraging Chough recorded during the Wintering Birds Survey within the Foraging Chough Survey area (red outline).*

6.8 Results: Herring Gull Colony Survey

The Herring Gull Colony Survey was carried out on the dates, times and weather conditions outlined in the Table below.

Date	Time	Tide	Wind Beaufort	Weather	Visibility	Temp. oc	Disturbance
26.05.2021	09:30-13:30	**HW** 17:07 **LW** 11:10	SE-3	Sunny, hazy sunshine	V. good	11	None
30.06.2021	09:05-12:05	**HW** 09:36 **LW** 16:10	NE-1	Sunny, calm, warm	V. good	17	None

Table 15. *Survey effort for the Herring Gull Colony Survey, May and June 2021.*

The Herring Gull Colony Survey results are shown in the table below.

Sector	Site	Species	No. of AONS	Highest breeding status	Notes
A	SW of Dingle Harbour Entrance	**Herring Gull**	1	Probable Breeding	Single AON on small, isolated sea stack
B	E of Dingle Harbour Entrance	**Herring Gull**	0	No breeding	
C	E of Ceann na Binne	**Herring Gull**	3	ON, Confirmed	Sub-colony of 3 AON
D	Doonsheane	**Herring Gull**	24	ON, Confirmed	
E	Cliffs E of Trabeg	**Herring Gull**	4	ON, Confirmed	Sub-colony of 3 AON, one isolated AON
F	Shirragh An Searreach / Máthail an tSearraigh	**Herring Gull**	33	ON, Confirmed	The largest colony
G	Cliffs around Bull's Head	**Herring Gull**	1	Probable Breeding	Single AON on small, isolated sea stack

Table 16. *Number and location of AON (Apparently Occupied Nests) found during the Herring Gull Colony Survey in May and June 2021, and breeding status for each species.*

66 confirmed AONs were detected in 6 Sectors, 57 of which were at the two known colonies in the study area at Doonsheane (33) and Shirragh An Searreach / Máthair an tSearraigh (24). There was also a small sub-colony of 4 AON on a high vertical cliff 750m E of Trabeg in Sector E, and 3 AON on steep cliff 1km W of Doonsheane. The remaining 3 AON were single nests on the top of rock pinnacles, in Sector A, E and G. See also Results of the Cliff-nesting Seabird Survey below.

Plate 11. *The sea stack of Shirragh An Searrach (left) and the rocky islet of Máthair an tSearraigh (top, right of centre), which together held 33 AON of Herring Gull.*

Plate 12. *The rocky outcrop at Doonsheane (green area, left of centre), which had 23 AON of Herring Gull during the Herring Gull Colony Survey, May and June 2021.*

There were numerous fledged and almost-fledged juvenile Herring Gulls recorded during the June survey, with 15 seen at Doonsheane and 22 at Shirragh An Searreach / Máthair an tSearraigh. Without constant repeated survey visits it is not possible to estimate overall productivity per nest, and by the June visit there were numerous fully-fledged and independent Herring Gull fledglings, so it was not possible to determine their exact origin in relation to the colonies.

6.9 Results: Cliff-nesting Seabird Survey

The Cliff-nesting Seabird Survey was carried out on the dates, times and weather conditions outlined in the table below.

Date	Time	Tide	Wind Beaufort	Weather	Visibility	Temp. OC	Disturbance
26.05.2021	09:30-17:30	**HT** 17:07 **LT** 11:10	SE-3	Sunny, hazy sunshine	V. good	11	None
30.06.2021	08:10-17:25	**HT** 09:36 **LT** 16:10	NE-1	Sunny, calm, warm	V. good	18	None

Table 17. *Survey effort for Cliff-nesting Seabird Survey, May and June 2021.*

The Cliff-nesting Seabird Survey found a total of 7 breeding species – 5 confirmed, 1 probable and 1 possible – within the Survey area. Although recorded in the vicinity (<500m) of the study area during the overall survey period of January to August 2021, there was no breeding evidence for a further 11 seabird species – Manx Shearwater, Storm Petrel, Gannet, Cormorant, Black-headed Gull, Kittiwake, Common Gull, Guillemot, Puffin, Arctic Tern and Sandwich Tern.

Of the 7 breeding species detected in the survey area, the number of Apparently Occupied Nests/Sites is shown in the table below.

Species			Sector								
Conservation status Breeding (BoCCI, 2021)		**Nest Unit***	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Total**	**Breeding status** (BTO. 2021)
Fulmar		AOS	**13**	**9**	**6**	**24**	**10**	**1**	**4**	**67 AOS**	ON, **Confirmed**
Shag		AON			**2**	**1**	**3**	**3**		**9 AON**	ON, **Confirmed**
Herring Gull		AON	1		**3**	**24**	**4**	**33**	**1**	**66 AON**	ON, **Confirmed**
Lesser Black-backed Gull		AON				**15**		**3**		**18 AON**	ON, **Confirmed**
Great Black-backed Gull		AON				1				**1 AON**	ON, **Probable**
Black Guillemot		IND/AOS		3 AOS	1 AOS					**4 AOS**	FF, **Confirmed**
Razorbill		AOS			1					**1 AON**	ON, **Possible**

***AON** Apparently Occupied Nest **AOS** Apparently Occupied Site **IND** Individual adults on or near potential nest site

BoCCi Status

Red-listed (high conservation concern), breeding, passage

Amber-listed (medium conservation concern), breeding

Green-listed (low conservation concern)

BTO Breeding status

Confirmed breeding

Probable breeding

Possible breeding

Non-breeding

Table 18. *Number of Apparently Occupied Nests/Sites found during the Cliff-nesting Seabirds Survey in May and June 2021, combined with Confirmed, Probable and Possible breeding status for each species.*

The location of each of these nest sites is shown in the two figures below.

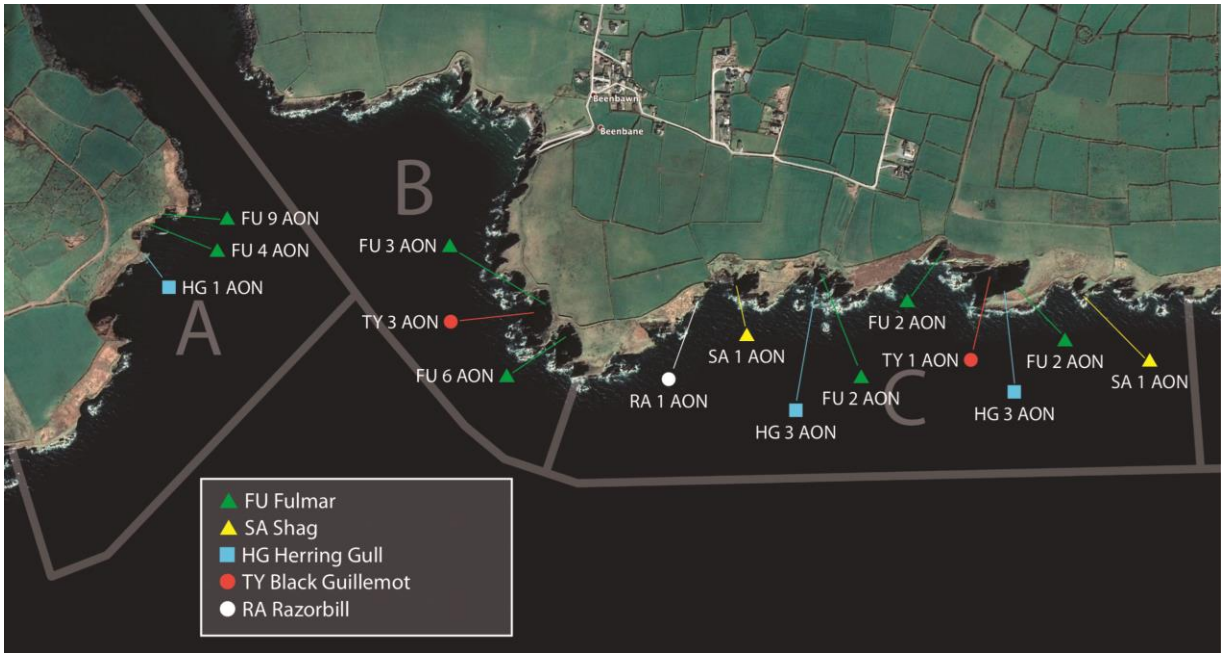

Figure 23a. Location of *AON/AOS of seabird species in Sectors A, B and C, detected during the Cliff-nesting Seabird Survey, May and June 2021.*

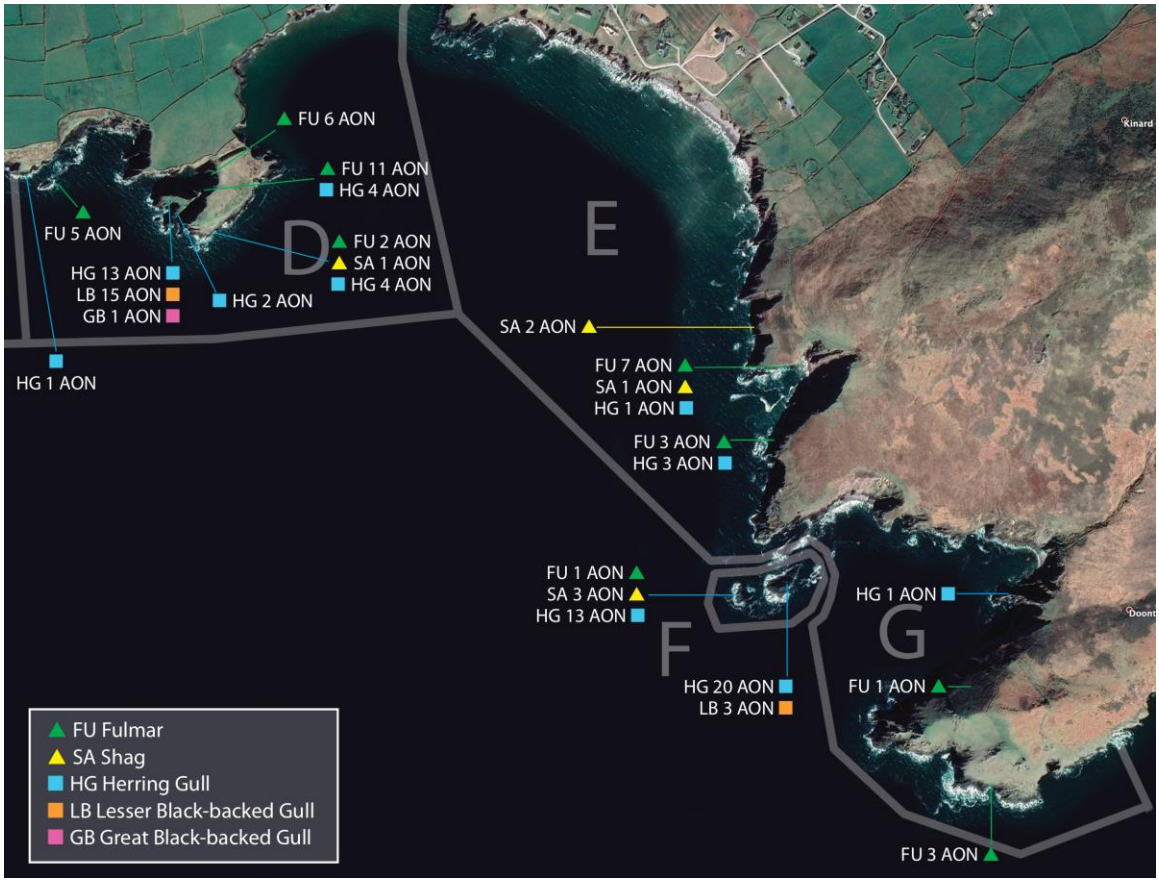

Figure 23b. Location of *AON/AOS of seabird species in Sectors D, E, F and G, detected during the Cliff-nesting Seabird Survey, May and June 2021.*

Fulmar A total of 67 AOS were found, with the greatest concentration (n=24) in Sector D, around Doonsheane.

Shag There were 9 AONs in four Sectors, during the May survey visit, 6 of which had incubating adult(s) and 3 of which had young/newly hatched young. 2 further nests in Sector E were abandoned, most likely from the previous summer, and not included in the results here. 5 of the 9 nests had well-developed young on the June survey visit.

Herring Gull 66 confirmed AONs were detected in 6 Sectors, 57 of which were at the two known colonies in the study area at Doonsheane (33) and Máthair an tSearraigh (24). There was a small sub-colony of 4 AON on a high vertical cliff 750m NW of Bull's Head in Sector E, and 3 AON on steep cliff 1km W of Doonsheane. The remaining 3 AON were single nests on the top of rock pinnacles, in Sector A, E and G. See also Results of the Herring Gull Colony Survey above.

Lessser Black-backed Gull 15 AON were at the Doonsheane gull colony, and 3 AON were in the Máithai an tSearraigh gull colony. At least 16 well-developed chicks were seen at the former site on the June Survey visit and 3 at the latter.

Great Black-backed Gull The only pair in the survey area was on the upper slope of the Doonsheane gull colony area, with a pair present at a nest during the May Survey visit, but seemingly abandoned during the June visit. No chicks or eggs were seen.

Black Guillemot 3 AOS were detected just NW of Ceann na Binne, and another 1 AOS was below the cliff just to the W of Doonsheane. See also the Results of the Black Guillemot Survey above.

Razorbill 3 adult birds were observed on a low rock ledge near the base of a vertical section of cliff in Sector C, and numerous calls and apparent display behaviour seen and heard. However, on subsequent survey visits there were no birds present on the cliffs.

Plate 13. (*Left) Cliffs at the W entrance to Dingle Harbour which held 13 AOSs of Fulmar and 1 AON of Herring Gull and (Right) the gull colony area at Doonsheane.*

Plate 14. (Foreground) *The sea stack of Shirrag An Searreach and behind and right of it, the rocky islet of Máthair an tSearraigh, which together hold the largest Herring Gull colony in the survey area (33 AON).*

7 DISCUSSION

7.1 Discussion: Dingle Harbour Habitats Survey

The Habitats Survey showed that Dingle Harbour area has a regionally typical mix of species and habitats, of mainly rocky and mud substrate, with two relatively small areas of more varied habitat at Burnham Inlet and Milltown Bridge. Relative densities of fucoid species are moderate to low in the wider Harbour area, and lower again in the man-made habitats of mostly boulder reinforced and concrete pier walls in the port and marina areas.

Of conservation concern was the detection of a small patch (1 m x 1 m) of the invasive *Spartina anglica* at Milltown Bridge and the presence of the invasive Wireweed *Sargassum muticum*, found along the southern shore just west of Dingle Harbour entrance.

Seasonal changes to habitats noted in the May and July Surveys were slight, with the addition of Wireweed (noted above), and several additional terrestrial salt marsh plants at Burnham Inlet and Milltown Bridge.

7.2 Discussion: Wintering Birds Survey

The waterbird species recorded during the Wintering Birds Species involved 9 Red-listed and 14 Amber-listed species, as shown in the table below.

Winter Bird Survey Dingle Harbour		Mean Jan-Apr 2021	I-WeBS 10yr Mean	1% National Threshold
Species				
Brent Goose		98	37	350
Red-breasted Merganser		14	21	25
Wigeon		32	51	560
Mallard		6	33	280
Teal		15	7	360
Little Grebe		2	6	20
Red-throated Diver		1	0	20
Great Northern Diver		2	2	20
Fulmar		1	0	n/a
Grey Heron		4	9	25
Little Egret		4	10	20
Gannet		6	0	n/a
Shag		9	1	n/a
Cormorant		13	39	110
Oystercatcher		14	110	610
Grey Plover		0	0	30
Ringed Plover		5	42	120
Lapwing		1	0	850
Curlew		12	26	350
Whimbrel		1	1	n/a
Bar-tailed Godwit		1	2	170

Species		Mean Jan-Apr 2021	I-WeBS 10yr Mean	1% National Threshold
Turnstone		2	14	95
Sanderling		0	3	85
Dunlin		2	38	460
Snipe		0	6	n/a
Greenshank		6	12	20
Redshank		20	28	240
Black-legged Kittiwake		1	0	n/a
Black-headed Gull		37	100	n/a
Mediterranean Gull		1	0	n/a
Common Gull		16	54	n/a
Lesser Black-backed Gull		9	21	n/a
Herring Gull		93	121	n/a
Iceland Gull		1	0	n/a
Glaucous Gull		0	0	n/a
Great Black-backed Gull		29	22	n/a
Sandwich Tern		0	0	n/a
Black Guillemot		5	0	n/a
Razorbill		5	0	n/a
Guillemot		2	0	n/a
Kingfisher		0	0	n/a

Table 19. *Monthly average counts of target species at Dingle Harbour, January – April 2021, compared with ten-year average of I-WeBS counts (2008/09 – 2017/18), and the comparison with the 1% National Threshold.*

As shown above, the only species that showed higher counts than the 10-year I-WeBS (2008/09 – 2017/18) mean were Brent Goose, Teal, Gannet, Shag, Black Guillemot and Razorbill (and a further 10 species where only one or two individuals were counted). All other species (n=25) totals were higher during the 10-year mean I-WeBs counts, though as the current survey was only conducted from January

to April 2021 the comparison may not be appropriate to all species. For example, Little Egret and Mediterranean Gull numbers peak in autumn at Dingle Harbour (O'Clery, 2002 – 2014).

In both the current and in the I-WeBS counts, no waterbird species reached the 1% Threshold of National Importance, with the species closest to that mark being Red-breasted Merganser (56%), Greenshank (30%), Brent Goose (28%) and Little Egret (20%).

Of the five sectors used for counts during the Wintering Birds Survey Sector B – which includes Dingle port and marina – held the fewest birds (n=329), followed by Sector A (n=381), then Sector D (n=555), Sector C (n-1044) and Sector E (n=1545). Although Sector B was also the smallest area of the five sectors, the relatively low numbers of waterbirds in that sector could be accounted for by the comparative lack of variety of habitat compared with other sectors, and also possible human disturbance and general activity in a busy port.

Although no roosts of any size (>5 individuals) were detected during low- and high tide counts around the port and marina, it was notable that several species of birds were actively foraging in the port and marina area, notably, Shag, Cormorant, all species of gulls, Black Guillemot and small numbers of Gannet. All of these species are piscivorous and/or scavengers, and most of the sightings during survey counts were of were actively fishing birds, either for live fish, or trawler discards, within the port and marina itself. Thus, although other species of waterfowl and waders shun the port and marina area, the species listed above actively feed within it.

7.3 Discussion: Dump Area Bird Survey

During the eight days of Vantage Point counts, over a combined total of 48 hours over 8 months, a total of 1120 individual birds of 25 species was recorded in the proposed Dump Area.

There was a significant difference in the number of birds overflying the area rather than feeding on or over it, with 827 birds (65%) flying over, and 293 feeding or foraging in/on it (35%). Of the more numerous species, Manx Shearwater showed 285 birds overflying the area while 92 (32%) fed or foraged, while Gannet showed 158 birds over-flying the area and 63 feeding/ foraging on or in it (40%). Fulmars – the third commonest species – almost exclusively overflew the area without feeding from January to July, with only two of 70 individuals feeding on the area, until the August count when 18 of 28 individuals were seen to feed on the sea within the survey area. That resulted in an overall proportion of 34% of Fulmars feeding (88 flying over, 30 feeding).

Three notable events accounted for much of the feeding /foraging records within the proposed dump area: a fishing boat travelled through the survey area on the January count, with a following retinue of 25 feeding Herring Gulls and five Great Black-backed Gulls; during the April count, a small gathering of Northern Gannets started plunge-diving on a shoal of fish within the study area, resulting in 20 individuals feeding over the area, and during the August survey, a large 'bait ball' in the sea drew 90 Manx Shearwaters, 26 Gannets and 28 Fulmar to feed in a small area. Without these three events, numbers of foraging/feeding birds during the survey overall would have been more than halved.

The three events outlined above, accounting for almost half of all birds feeding and foraging in the study area, illustrate the importance of unpredictable natural ('bait-ball') or man-made (trawler) activities in drawing birds to the area to feed.

Numbers of individuals were broadly similar during each monthly count, although there was a slight increase in the July count and a large increase in the August count. However, as illustrated above, natural or man-made events can significantly increase the numbers of birds feeding or foraging in the area.

7.4 Discussion: Otter Survey

During the survey period of January to August 2021 there were a minimum of two adult Otters present in the Dingle Harbour area and, though no Otter cubs were detected during survey work, there was a strong territorial presence on the southern shore of Dingle Harbour, and a possible holt, or breeding site found there in June.

The Otter activity recorded on camera traps was largely nocturnal. Of 379 camera triggers of Otter, only 14 were in daylight (1 in May at dawn and 13 in June near dusk), representing just 3.6%. Also, the four sightings of Otter recorded during survey work in the Harbour area were all in the early morning (<2 hours after sunrise). Although Otter activity is usually nocturnal, they can be more active during the day at coastal sites (Hayden & Harrington, 2000), though the findings here show that the Otters in Dingle Harbour are almost exclusively nocturnal.

No nocturnal activity was detected in or around the marina or port area, either by trail cameras or sightings during survey work, though one of the four sightings made of Otter elsewhere during survey work was just to the west of the proposed new marina site. All four sightings were also close to dawn, at times of low human activity, and low disturbance.

7.5 Discussion: Black Guillemot Survey

Although Black Guillemots were recorded foraging in the Dingle port and marina area in January to late April, no birds were recorded in the area after 21st April. After that date, Black Guillemots were only recorded foraging around the Dingle Harbour entrance, and below the sea cliffs on the outer Dingle Harbour area. No nesting or display activity was recorded in the inner Dingle Harbour area at any time during the survey period.

Four AOS (Apparently Occupied Sites) were recorded, all on the seaward cliffs, with three AOS in a large boulder clump east of Dingle Harbour entrance, and one other AOS near Doonsheane. Breeding was confirmed at all four AOS, with adult birds seen entering rock crevices within boulder fields at the base of coastal cliffs with fish. No breeding or display activity was detected inside Dingle Harbour at any time during the survey period. Although birds foraged extensively in Dingle port and marina, as well as the inner Harbour area, this was not recorded after late April, with birds seen foraging only at Dingle Harbour entrance and the outer Harbour area.

7.6 Discussion: Breeding Birds Survey

The total of 86 species, of which 58 were possible, probable or confirmed nesting, shows a relatively high diversity of bird species in the study area, though perhaps not unexpected given the diversity of habitats – including salt and freshwater, rocky and estuarine coast, farmland, woodland and urban habitats. However, within 100m of the port and marina area, that diversity is considerably reduced with only 5 breeding species detected, only two of which were confirmed nesting (Rock Pipit and Pied Wagtail). One other species was probable breeding (House Sparrow) and two were possible breeding (Starling and Rock Dove).

The confirmed breeding species, Rock Pipit and Pied Wagtail, were nesting in the sea wall close to the base of the west pier, while the other three probable/possible species were associating with the main marina building. No birds were found to be nesting on the outer pier walls.

7.7 Discussion: Foraging Chough Survey

The 21 encounters with foraging Chough flocks during the survey were all within 250m of the coastal cliffs on the outer Dingle Harbour area. None was recorded in the inner Dingle Harbour, or the port and marina areas. All but 4 encounters with foraging birds were on improved agricultural grassland adjacent to the coastal cliffs. The 4 flocks encountered elsewhere were foraging on the coastal heath on the cliff tops, on areas where the growth of the heath was patchy and low-growing, exposing patches of soil.

The Wintering Birds Survey, from January to April 2021 recorded 4 additional sightings of a total of 12 foraging Chough, during the January and March counts, all of which were feeding on seaweed on the high tide line close to the entrance to Dingle. Although sedentary, Chough are known to forage more widely outside the breeding season (Balmer, *et al.,* 2013) though the 12 individuals encountered in the winter months were still <1km from the coastal cliffs. No Chough were seen elsewhere in Dingle Harbour during the Wintering Birds Survey or the Breeding Birds Survey.

7.8 Discussion: Herring Gull Colony Survey

The Herring Gull Colony Survey detected a total of 66 AON (Apparently Occupied Nests) at two main colonies, and smaller sub-colonies of 3 and 4 (in Sectors C and E respectively) and three isolated AONs (in Sectors A, E and G).

Most (87%) are concentrated in two colonies, the two islets of Shirrag An Searreach and Máthair an tSearraigh, and the Doonsheane area. Both areas are also the two closest coastal sections to the proposed dump area, at distances of 400m (Doonsheane colony) and 1km (Shirrag An Searreach and Máthair an tSearraigh).

In my considered opinion, while the direct and indirect effects of the proposed dumping of mud and silt in proximity to these two nest areas are unknown (it may be detrimental to feeding, or indeed, as gulls are regular scavengers, may be of benefit) it would best practice to take the precautionary principle and, where possible, dump the sediments at the furthest points from the two colonies, towards the southern edge of the proposed dump zone.

7.9 Discussion: Cliff-nesting Seabird Survey

The Cliff-nesting Seabird Survey detected a total of 167 nests of 7 species, the c.9km of coastline averaging 18.5 nests per km of coast. While this is a relatively low density of nesting seabirds, it should be noted that most are concentrated in two areas, the two islets of Shirrag An Searreach and Máthair an tSearraigh and the Doonsheane area.

Of the three most numerous nesting species in the survey area – Fulmar (67 AOS), Herring Gull (66 AON) and Lesser Black-backed Gull (18 AON) – these two areas accounted for 25 of 67 Fulmar nests (37%), 57 of 66 Herring Gull nests (87%), and 18 of 18 Lesser Black-backed Gulls (100%) in the study area. Both areas are also the two closest areas to the proposed dump area, at 400m (Doonsheane colony) and 1km (Shirrag An Searreach and Máthair an tSearraigh).

In my considered opinion, while the direct and indirect effects of the proposed dumping of mud and silt in proximity to these two nest areas are unknown (it may be detrimental to feeding, or indeed, as gulls are regular scavengers, may be of benefit) it would best practice to take the precautionary principle and, where possible, dump the sediments at the furthest points from the two colonies.

8 CONCLUSION

8.1 Conclusion: Habitats Survey

The habitats in the Dingle Harbour area are typical of the region, with shorelines of largely rocky shores, some mud and sand, and small areas of other more estuarine habitats. The area immediately around the port and marina area are almost uniformly of rock and boulder-reinforced pier walls and jetties, and have a reduced variety of habitats, resulting in fewer species and lower numbers of waterbird species than other areas in Dingle Harbour. Two invasive plants, *spartina anglica* and Wireweed *Sargassum muticum* were detected, the former by Milltown Bridge, the latter on the southern shore of Dingle Harbour, but neither in the vicinity of the marina or port area, and thus unlikely to be affected by proposed works in those areas.

8.2 Conclusion: Wintering Waterbird Survey

The wintering waterbird species in Dingle Harbour are varied, with several Red- and Amber-listed species utilising the various littoral habitats of which Red-breasted Merganser and Brent Goose are perhaps the most important on a local level. No species recorded during this survey, or in the ten-year I-WeBS surveys, reach the National Threshold of 1% of the national population.

Few waders and waterfowl utilise the port and marina areas for foraging or roosting. Rather, some – mainly piscivorous – species, such as gulls, Cormorant, Shag and Black Guillemot, actively forage or scavenge in the port and marina area.

8.3 Conclusion: The Dump Area Bird Survey

The proposed dump area outside Dingle Harbour recorded relatively few seabirds foraging on or over the dump area, with higher numbers overflying the area. However, the counts of feeding and foraging birds were much influenced by three local events – a trawler (1) and fish shoal activity (2) – which doubled the numbers of birds involved in directly feeding in the dump area. The dumping of silt in the immediate vicinity of the natural (bait ball) activity could be detrimental to feeding seabirds (and cetaceans), and crew should be advised to avoid dumping any sediment close to any such feeding activities.

8.4 Conclusion: Otter Survey

Otters are present in Dingle Harbour, and at least two individuals were detected, with most sightings, signs and camera trap footage showing that the southern shore is much the most active area. Only 3.6% of camera trap triggers were in daylight, demonstrating that the Otters using Dingle Harbour are almost entirely nocturnal.

No nocturnal activity was detected in or around the marina or port area, either by trail cameras or sightings during survey work, though one of the four sightings made of Otter elsewhere during survey work was just to the west of the proposed new marina site. Thus although it is likely that Otters will actively avoid any construction activity in the area of the proposed marina, Otters may not be able to forage in the immediate area of the construction. However, their likely foraging time at night and dawn/dusk is unlikely to coincide with peak construction activity.

8.5 Conclusion: Black Guillemot Survey

Black Guillemots did not breed in the inner Dingle Harbour area, and no display or nesting activity was recorded in and around the port and marina area. However, up to 4 individuals were recorded foraging in and around the port in January to late April. Dredging in the vicinity of the port could have an impact on foraging birds during this time, but from late April to August, any impact would be minimal or non-

existent. However, to minimise impact on foraging Black Guillemots in winter, dredging in the vicinity of the port and marina should be conducted from mid-April onwards.

8.6 Conclusion: Breeding Birds Survey

There were no nesting birds on the outer pier walls of the port and marina area. Any construction work in that immediate vicinity would have no detrimental effect on any nesting birds. Only three species (Pied Wagtail (confirmed breeding), Starling and Rock Dove (possible breeding) nested in or on the adjacent marina buildings or on stone sea walls at the base of the pier, but it is my considered opinion that these would not be affected by any construction work in the proposed new marina site.

8.7 Conclusion: Foraging Chough Survey

There were no sightings of Chough foraging in or around the Dingle port and marina area, nor in the inner Dingle Harbour area during the May and June survey period. All sightings during survey work were on Improved Agricultural Grassland, Sea Cliff and Heath on or adjacent to the coastal sea cliff. Additional encounters of small numbers of foraging Chough were made near the entrance to Dingle Harbour during the Wintering Bird Survey work, though all were still less than 1km from the coastal cliffs. There would therefore be no impact to foraging Chough during any works on the proposed marina site during May and June.

8.8 Conclusion: Herring Gull Colony Survey

Herring Gulls are a Red-listed species, and the two main nesting colonies in the survey area are among the closest stretches of coast to the proposed dump site for dredged sediment from the construction site in Dingle Harbour. It would therefore be best practice to take the precautionary principle and, where possible, dump the sediments at the furthest points from the two colonies, towards the southern edge of the proposed dump area.

8.9 Conclusion: Cliff-nesting Seabird Survey

As with the Herring Gull Colony Survey above, most cliff-nesting seabirds are nesting at some of the closest points to the proposed offshore dump area. It would best practice to take the precautionary principle and, where possible, dump the sediments at the furthest points from the two colonies, towards the southern edge of the proposed dump area.

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Online resources

I-WeBS online maps.
https://bwi.maps.arcgis.com/apps/View/index.html?appid=1043ba01fcb74c78bc75e306eda48d3a

I-WeBS data for Dingle Harbour [accessed May 2021].
https://c0amf055.caspio.com/dp/f4db30005dbe20614b404564be88

10 APPENDICES

APPENDIX 1

Latin names of species used in this Report

Birds

Brent Goose *Branta bernicla*
Red-breasted Merganser *Mergus serrator*
(Eurasian) Wigeon *Mareca penelope*
Mallard *Anas platyrhynchos*
(Common) Teal *Anas crecca*
Little Grebe *Tachybaptus ruficollis*
Red-throated (Loon) Diver *Gavia stellata*
Great Northern Diver (Common Loon) *Gavia immer*
(Northern) Fulmar *Fulmarus glacialis*
Manx Shearwater *Puffinus puffinus*
Sooty Shearwater *Ardenna grisea*
Storm Petrel *Hydrobates pelagicus*
Grey Heron *Ardea cinerea*
Little Egret *Egretta garzetta*
(Northern) Gannet *Morus bassanus*
(European) Shag *Gulosus aristotelis*
Great Cormorant *Phalacrocorax carbo*
(Eurasian) Oystercatcher *Haematopus ostralegus*
Grey Plover *Pluvialis squatarola*
(Common) Ringed Plover *Charadrius hiaticula*
(Northern) Lapwing *Vanellus vanellus*
(Eurasian) Curlew *Numenius arquata*
Bar-tailed Godwit *Limosa lapponica*
Black-tailed Godwit *Limosa limosa*
(Ruddy) Turnstone *Arenaria interpres*
Sanderling *Calidris alba*
Dunlin *Calidris alpina*
(Eurasian) Woodcock *Scolopax rusticola*
(Common) Snipe *Gallinago gallinago*
Common Sandpiper *Actitis hypoleucos*
(Common) Greenshank *Tringa nebularia*
(Common) Redshank *Tringa totanus*
Black-legged Kittiwake *Rissa tridactyla*
Black-headed Gull *Larus ridibundus*
Mediterranean Gull *Larus melanocephalus*
(Mew) Common Gull *Larus canus*
Lesser Black-backed Gull *Larus fuscus*
(European) Herring Gull *Larus argentatus*
Iceland Gull *Larus glaucoides*
Glaucous Gull *Larus hyperboreus*
Great Black-backed Gull *Larus marinus*
Arctic Tern *Sterna paradisaea*
Sandwich Tern *Thalasseus sandvicensis*
(Atlantic) Puffin *Fratercula arctica*
Black Guillemot *Cepphus grylle*
Razorbill *Alca torda*
(Common) (Murre) Guillemot *Uria aalge*
(Common) Kingfisher *Alcedo atthis*
Wood Pigeon *Columba palumbus*
Blackbird *Turdus merula*
Song Thrush *Turdus philomelos*

Mammals

Wood Mouse *Apodemus sylvaticus*
Bank Vole *Myodes glareolus*
Brown Rat *Rattus norvegicus*
Minke Whale *Balaenoptera acutorostrata*

Harbour Porpoise *Phocaena phocaena*
Common Dolphin *Delphinus delphus*
Bottlenose Dolphin *Tursiops truncates*
Grey Seal *Halichoerus grypus*
Porpoise *Phocoena phocoena*
Red Fox *Vulpes vulpes*
American Mink *Neovision vision*
Badger *Meles meles*
Otter *Lutra lutra*
Domestic cat *Felis catus*

APPENDIX 2

Categories of breeding evidence.

BTO Breeding evidence guide. Downloaded from: https://www.bto.org/our-science/projects/birdatlas/methods/breeding-evidence
All codes for **Possible, Probable** and **Confirmed** Breeding had to relate to individuals in **potentially suitable nesting habitat.**

Non-breeding

F	**F**lying over
M	Species observed but suspected to be still on **M**igration
U	Species observed but suspected to be s**U**mmering non-breeder

Possible breeder

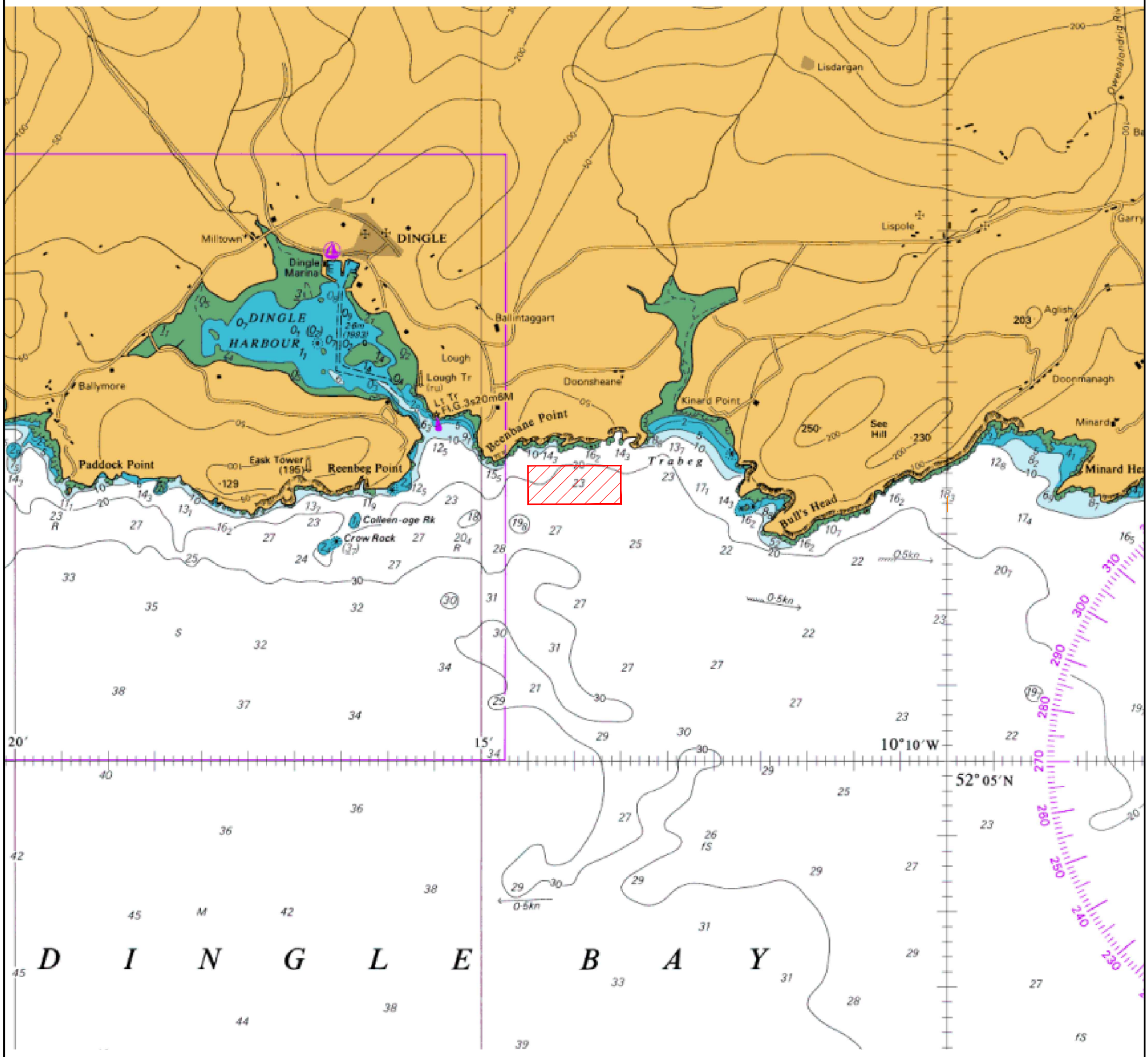
H	Species observed in breeding season in suitable nesting **H**abitat
S	**S**inging male present (or breeding calls heard) in breeding season in suitable breeding habitat

Probable breeding

P	**P**air observed in suitable nesting habitat in breeding season
T	Permanent **T**erritory presumed through registration of territorial behaviour (song etc) on at least two different days a week or more apart at the same place or many individuals on one day
D	Courtship and **D**isplay (judged to be in or near potential breeding habitat; be cautious with wildfowl)
N	Visiting probable **N**est site
A	**A**gitated behaviour or anxiety calls from adults, suggesting probable presence of nest or young nearby
I	Brood patch on adult examined in the hand, suggesting **I**ncubation
B	Nest **B**uilding or excavating nest-hole

Confirmed breeding

DD	**D**istraction-**D**isplay or injury feigning
UN	**U**sed **N**est or eggshells found (occupied or laid within period of survey)
FL	Recently **FL**edged young (nidicolous species) or downy young (nidifugous species). Careful consideration should be given to the likely provenance of any fledged juvenile capable of significant geographical movement. Evidence of dependency on adults (e.g. feeding) is helpful. Be cautious, even if the record comes from suitable habitat.
ON	Adults entering or leaving nest-site in circumstances indicating **O**ccupied **N**est (including high nests or nest holes, the contents of which can not be seen) or adults seen incubating
FF	Adult carrying **F**aecal sac or **F**ood for young
NE	**N**est containing **E**ggs
NY	**N**est with **Y**oung seen or heard



Note:
The above map is taken from Admiralty Chart No. 2789.

Signed:

Eoin Lucey

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ENGINEERING AND ENVIRONMENTAL CONSULTANTS
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PROJECT:
AN DAINGEAN SMALL CRAFT HARBOUR

TITLE:
DAS PERMIT APPLICATION ATTACHMENT E.2. (II) - DUMPING SITE

CLIENT
DEPARTMENT OF AGRICULTURE, FOOD AND MARINE

REV	DATE	DESCRIPTION	BY	APP

DRAWN:	CHECKED:	APPROVED:
EL	EL	PP
PROJECT NUMBER:	DATE:	SCALE @ A3:
21579	JUNE 2022	1:50,000

STATUS DESCRIPTION	STATUS:
FOR INFORMATION	S2

DRAWING NUMBER:	REV:
21579 - MWP - ZZ - ZZ - DR - S - 5102	P01