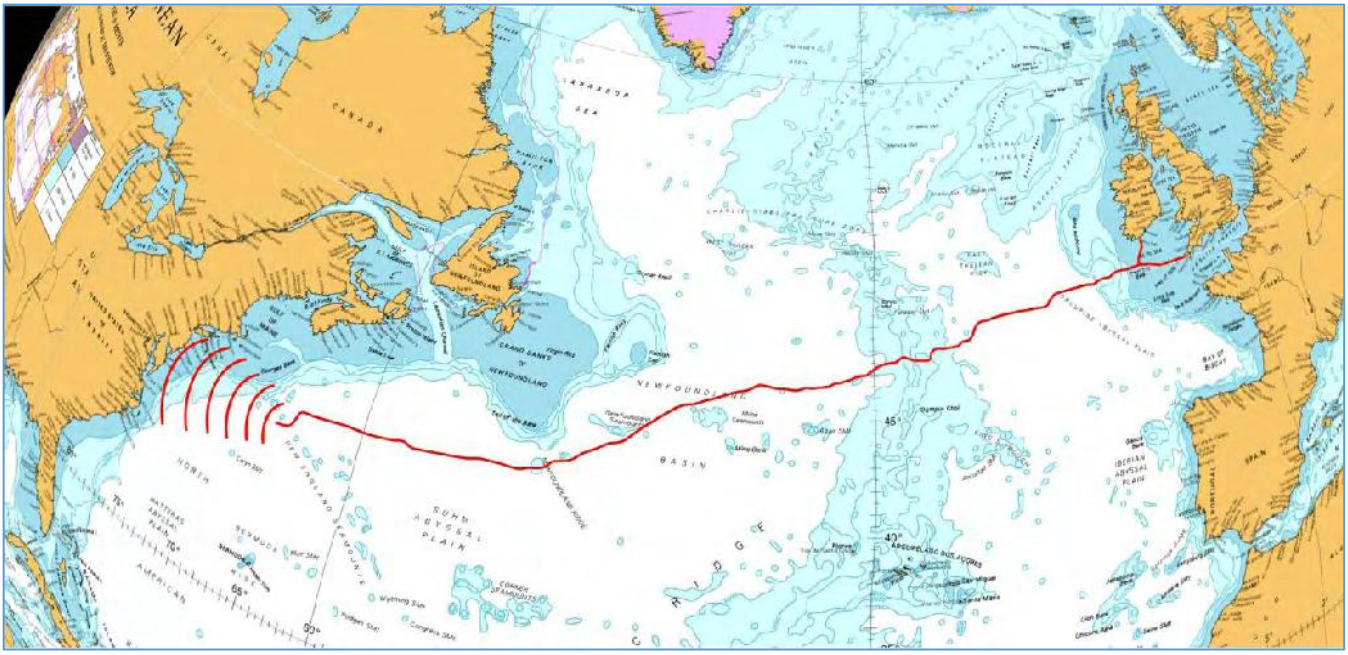
ALTEMAR

Marine & Environmental Consultancy

Ecological Impact Assessment (EcIA) for marine survey and site investigations for a fibre optic cable with a landfall at Glandore Bay and Castlefreke, Long Strand, Co. Cork.



14th May 2024

Prepared by: [redacted]) of Altemar Ltd.

On behalf of: McMahon Design and Management Ltd.

Altemar Ltd., 50 Templecarrig Upper, Delgany, Co. Wicklow.[redacted]

Directors: [redacted]

Company No.427560 VAT No. 9649832U

www.altemar.ie

Document Control Sheet			
Project	Ecological Impact Assessment (EcIA) for marine survey and site investigations for a fibre optic cable with a landfall at Glandore Bay and Castlefreke, Long Strand, Co. Cork.		
Report	Ecological Impact Assessment		
Date	14th May 2024		
Version	Author	Reviewed	Date
Draft 01	[redacted]	[redacted]	20th March 2024
Planning			14th May 2024

Table of Contents

1. Introduction

1.1 Background

Ecological Impact Assessment (EcIA) has been defined as '*the process of identifying, quantifying and evaluating the potential impacts of defined actions on ecosystems or their components*' (Treweek, 1999). "*The purpose of EcIA is to provide decision-makers with clear and concise information about the likely ecological effects associated with a project and their significance both directly and in a wider context. Protecting and enhancing biodiversity and landscapes and maintaining natural processes depends upon input from ecologists and other specialists at all stages in the decision-making and planning process; from the early design of a project through implementation to its decommissioning*" (IEEM, 2010).

The following EcIA has been prepared by Altemar Ltd. at the request of McMahon Design and Management Ltd. for marine survey and site investigation works out to the limits of the Irish Maritime Area (encompassing the Exclusive Economic Zone (EEZ) and Agreed Continental Shelf) from a landfall at Glandore Bay and Castlefreke, Long Strand, Co. Cork.

1.2 Study Objectives

The objectives of this EcIA are to:

1. Outline the project and any alternatives assessed;
2. Undertake a baseline ecological feature, resource and function assessment of the site and zone of influence;
3. Assess and define significance of the direct, indirect and cumulative ecological impacts of the project during its construction, lifetime and decommissioning stages;
4. Refine, where necessary, the project and propose mitigation measures to remove or reduce impacts through sustainable design and ecological planning; and
5. Suggest monitoring measures to follow up the implementation and success of mitigation measures and ecological outcomes.

The following guidelines have been used in preparation of this EcIA:

- Guidelines on the information to be contained in EIARs (2022);
- Guidelines for Ecological Impact Assessment (EcIA) (IEEM, 2019);
- Advice Notes on current practice in the preparation of EIS's (EPA, 2003);
- Institute of Ecology and Environmental Management Guidelines for EIA (IEEM, 2005).

1.3 Altemar Ltd.

Since its inception in 2001, Altemar has been delivering ecological and environmental services to a broad range of clients. Operational areas include: residential; infrastructural; renewable; oil & gas; private industry; Local Authorities; EC projects; and, State/semi-State Departments. Bryan Deegan, the managing director of Altemar, is an Environmental Scientist and Marine Biologist with 30 years' experience working in Irish terrestrial and aquatic environments, providing services to the State, Semi-State and industry. He is currently contracted to Inland Fisheries Ireland as the sole "External Expert" to environmentally assess internal and external projects. Bryan Deegan has been the project ecologist for nine marine fibre optic cable projects (from design stage to installation), within Ireland and the UK. Bryan Deegan (MCIEEM) holds a MSc in Environmental Science, BSc (Hons.) in Applied Marine Biology, NCEA National Diploma in Applied Aquatic Science and a NCEA National Certificate in Science (Aquaculture). To date, Bryan has been environmental lead on 11 marine fibreoptic cable projects in Ireland and the UK. This has involved pre-consent submissions, marine surveys and main lay operations that included Horizontal Direction Drilling (HDD) at landfall locations and offshore main lay operations.

2. Description of the Proposed Project

2.1 Project Overview

The applicant plans to investigate the feasibility of constructing a new subsea telecoms cable system, linking United States to Ireland, from a landfall on the north east coast of the USA to a landfall at Glandore Bay, County Cork on the south west coast of Ireland as shown in Figure 1 below. This Works Methodology is produced in support of an application for a marine survey and site investigations licence under the Maritime Area Planning Act 2021, and should not be used for any other purpose apart from that expressly stated in this document. The applicant intends to undertake the survey campaign across the Licence Application Area within the IRL Exclusive Economic Zone (EEZ) and Maritime Area in order to inform the location and design of the cable route and landfall.

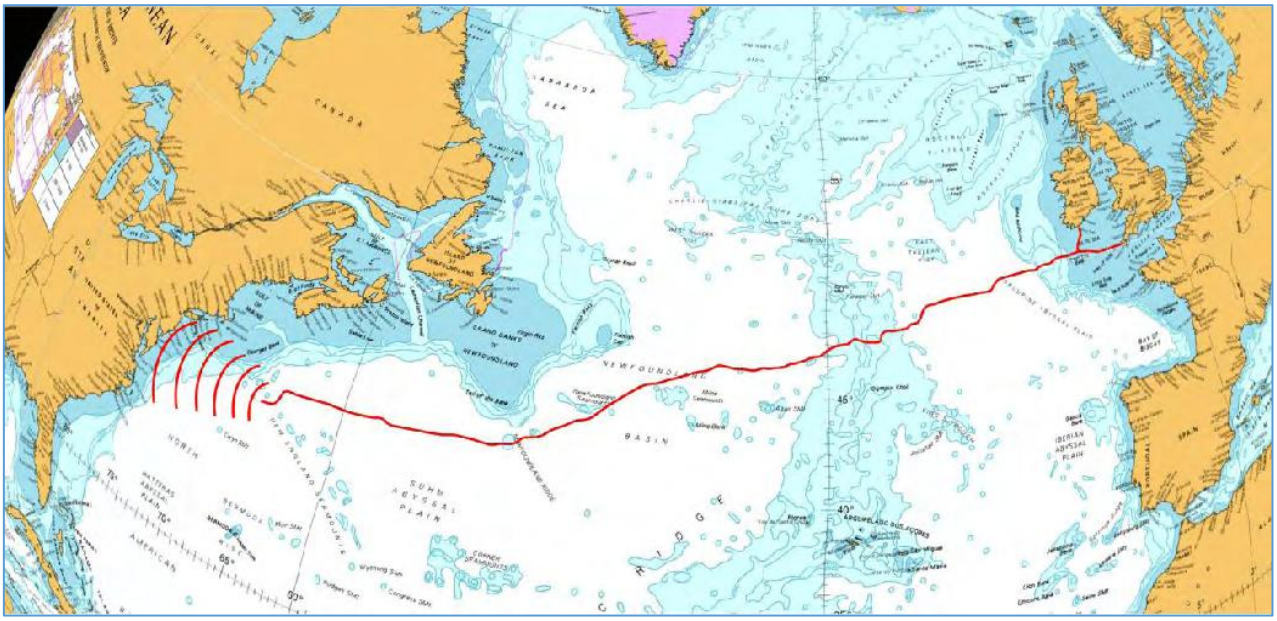


Figure 1. Proposed Telecoms Cable System (final configuration subject to change)

The works will be carried out within a 500m corridor within the licensed area, predominantly by seabed mapping techniques (geophysical survey) with some selective sampling of the upper layers of the seabed (geotechnical survey). Once the results of the survey are obtained and analysed a preferred route corridor will be determined, design and method statements will be developed and a final Route Position List (RPL) will be defined as part of a further submission for a Maritime Area Consent and Planning consent for the installation works.

2.2 Proposed Survey Route and Survey Application Area in Irish Maritime Area

Licence Application Area

The License Application Area is situated off the coast of County Cork (Figure 2). The survey corridor has length of 898.5 km and a total area of 16,880 km^2. A single cable route corridor of approx. 500m width will be surveyed within the licence application area. The survey corridor will be approximately 3 x Water Depth (up to 10km in width) in areas where the water depth is greater than 1500m off the Continental Shelf. The general centre lines of the proposed offshore survey corridors within Irish EEZ are shown in Figure 3.

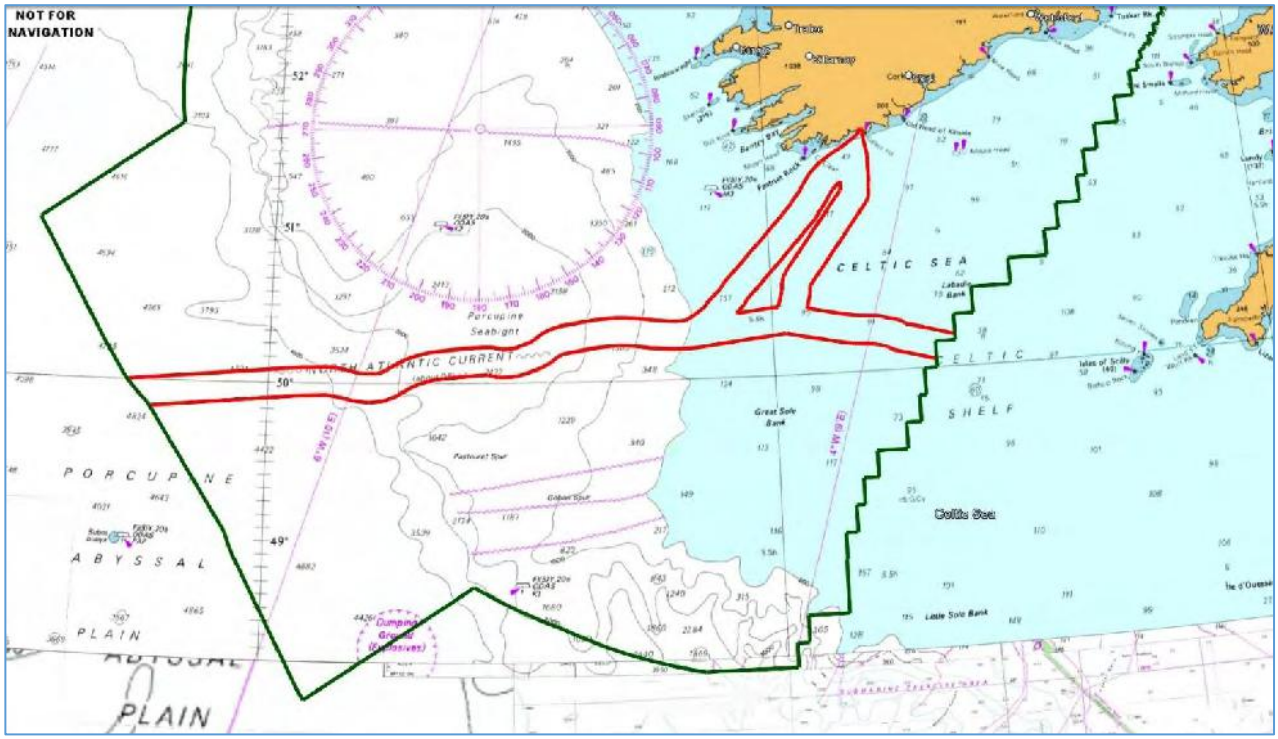


Figure 2. Proposed Survey Licence Application Area.

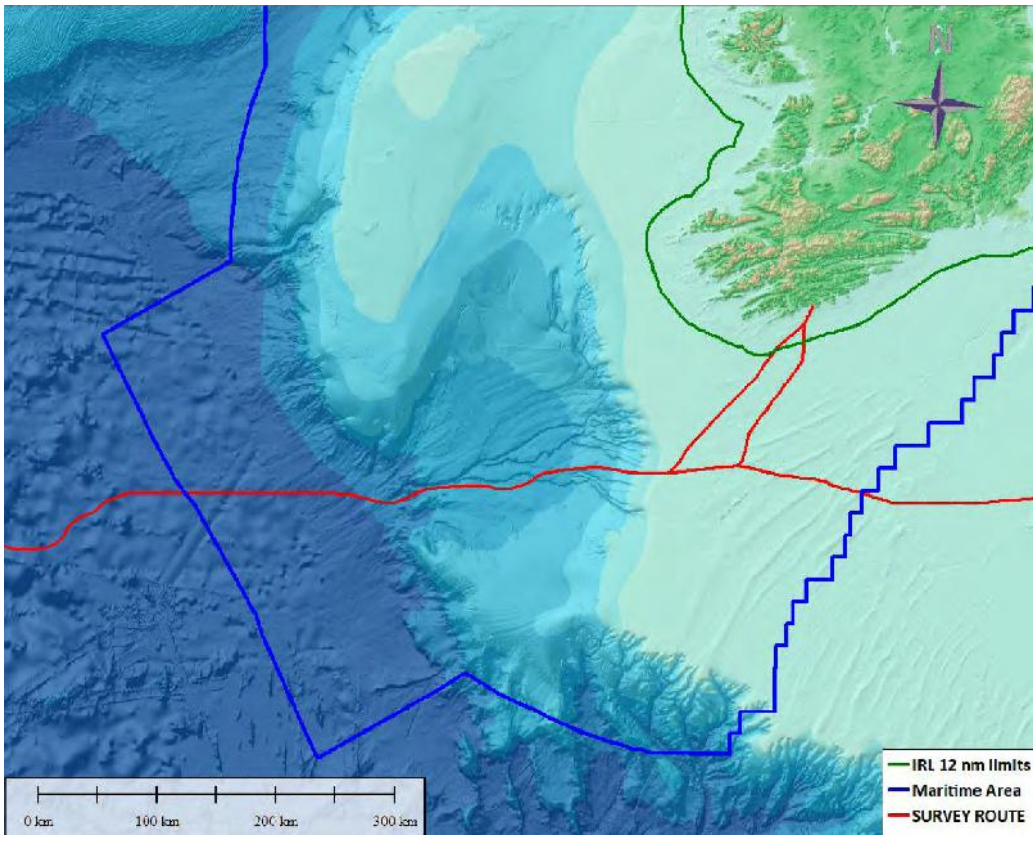


Figure 3. Offshore Survey Route.

The Route Position List for the Survey Area is presented in Table 1 below

Table 1. Survey Area RPL

Idx	Latitude	Longitude	Idx	Latitude	Longitude
1	50° 12' 24.7947" N	8° 12' 00.0000" W	44	51° 15' 27.2163" N	8° 56' 39.4434" W
2	50° 13' 52.6159" N	8° 20' 29.7388" W	45	51° 20' 08.3629" N	8° 56' 44.0419" W
3	50° 13' 59.3369" N	8° 21' 03.0425" W	46	51° 23' 03.7623" N	8° 56' 22.5306" W
4	50° 15' 05.0601" N	8° 27' 14.1305" W	47	51° 30' 59.7680" N	8° 58' 32.5676" W
5	50° 15' 05.8335" N	8° 27' 18.5894" W	48	51° 32' 11.5706" N	8° 58' 35.4110" W
6	50° 17' 30.5697" N	8° 41' 34.3995" W	49	51° 33' 06.7367" N	8° 58' 08.9715" W
7	50° 17' 41.9756" N	8° 41' 52.7713" W	50	51° 33' 29.2953" N	8° 58' 08.4742" W
8	50° 17' 52.7701" N	8° 42' 12.0234" W	51	51° 33' 37.7189" N	8° 58' 34.8189" W
9	50° 18' 00.0218" N	8° 42' 25.6399" W	52	51° 33' 37.2137" N	8° 58' 37.6689" W
10	50° 18' 16.7160" N	8° 42' 59.8586" W	53	51° 33' 36.7325" N	8° 58' 37.8615" W
11	50° 18' 31.4826" N	8° 43' 36.1766" W	54	51° 33' 36.2734" N	8° 58' 37.8551" W
12	50° 18' 44.2141" N	8° 44' 14.3298" W	55	51° 33' 35.3584" N	8° 58' 36.2360" W
13	50° 18' 48.9467" N	8° 44' 30.1228" W	56	51° 33' 22.7922" N	8° 58' 49.9910" W
14	50° 18' 56.7930" N	8° 44' 58.5500" W	57	51° 32' 43.6693" N	8° 59' 31.5684" W
15	50° 19' 03.5083" N	8° 45' 27.6764" W	58	51° 33' 49.6724" N	8° 59' 20.7983" W
16	50° 19' 09.0673" N	8° 45' 57.3922" W	59	51° 33' 52.4838" N	8° 59' 23.9611" W
17	50° 19' 12.1540" N	8° 46' 15.9979" W	60	51° 33' 57.1536" N	8° 59' 43.9247" W
18	50° 19' 14.7808" N	8° 46' 33.0490" W	61	51° 33' 57.1013" N	8° 59' 47.6406" W
19	50° 20' 10.4320" N	8° 53' 05.4726" W	62	51° 33' 56.0684" N	8° 59' 50.5104" W
20	50° 20' 13.0822" N	8° 53' 13.0390" W	63	51° 33' 49.2598" N	8° 59' 50.7161" W
21	50° 20' 25.2505" N	8° 53' 51.5939" W	64	51° 33' 47.9840" N	8° 59' 53.7048" W
22	50° 20' 35.2753" N	8° 54' 31.6293" W	65	51° 33' 49.8527" N	8° 59' 55.0104" W
23	50° 20' 39.5063" N	8° 54' 50.9109" W	66	51° 34' 00.7667" N	8° 59' 55.2567" W
24	50° 20' 46.5931" N	8° 55' 27.7253" W	67	51° 34' 01.8829" N	9° 00' 00.1770" W
25	50° 20' 51.8667" N	8° 56' 05.2771" W	68	51° 34' 02.1284" N	9° 00' 06.8029" W
26	50° 20' 54.1746" N	8° 56' 25.3344" W	69	51° 33' 59.5452" N	9° 00' 09.4498" W
27	50° 20' 56.7699" N	8° 56' 51.9524" W	70	51° 33' 40.0023" N	9° 00' 34.1180" W
28	50° 20' 58.4535" N	8° 57' 18.7492" W	71	51° 32' 34.2711" N	9° 00' 35.6293" W
29	50° 21' 33.0764" N	9° 10' 13.1950" W	72	51° 31' 06.3951" N	9° 02' 23.8692" W
30	50° 22' 33.6653" N	9° 19' 27.3991" W	73	51° 26' 28.5544" N	9° 13' 10.6245" W
31	50° 25' 12.3414" N	9° 39' 03.5705" W	74	51° 25' 39.5883" N	9° 15' 48.8283" W
32	50° 30' 43.9419" N	9° 36' 46.2312" W	75	51° 23' 42.7577" N	9° 20' 35.7655" W
33	50° 32' 59.6297" N	9° 36' 34.4270" W	76	51° 21' 24.7807" N	9° 25' 45.0972" W
34	50° 33' 51.8130" N	9° 36' 16.2691" W	77	51° 18' 22.5455" N	9° 30' 59.9013" W
35	50° 34' 58.3993" N	9° 34' 56.0798" W	78	51° 17' 33.3694" N	9° 32' 11.8681" W
36	50° 50' 42.8301" N	9° 16' 21.1004" W	79	51° 16' 51.1392" N	9° 33' 08.4134" W
37	51° 04' 33.8362" N	8° 59' 49.6290" W	80	51° 13' 20.0250" N	9° 36' 47.1566" W
38	51° 06' 01.7041" N	8° 58' 22.0115" W	81	51° 10' 06.5325" N	9° 40' 03.1335" W

39	51° 07' 00.0804" N	8° 57' 47.7053" W	82	51° 06' 24.4958" N	9° 44' 31.9576" W
40	51° 08' 10.1589" N	8° 57' 17.8808" W	83	51° 05' 48.6931" N	9° 44' 55.5525" W
41	51° 10' 11.4295" N	8° 57' 17.6961" W	84	50° 55' 14.3771" N	10° 00' 05.3184" W
42	51° 10' 54.0956" N	8° 57' 18.8833" W	85	50° 35' 38.9646" N	10° 28' 53.8422" W
43	51° 13' 49.5393" N	8° 56' 37.9742" W	86	50° 34' 13.7565" N	10° 30' 03.3086" W

Idx	Latitude	Longitude	Idx	Latitude	Longitude
87	50° 30' 32.2350" N	10° 35' 43.8587" W	130	50° 03' 50.5006" N	13° 54' 46.3206" W
88	50° 28' 21.2608" N	10° 39' 03.3527" W	131	50° 03' 51.8720" N	14° 03' 46.6143" W
89	50° 27' 30.9308" N	10° 39' 38.9889" W	132	50° 03' 56.9459" N	14° 05' 27.6481" W
90	50° 24' 03.4904" N	10° 47' 06.1042" W	133	50° 05' 14.7727" N	14° 13' 20.7705" W
91	50° 22' 19.5399" N	10° 51' 38.5036" W	134	50° 05' 53.0763" N	14° 20' 04.1122" W
92	50° 22' 12.4232" N	10° 57' 39.4019" W	135	50° 06' 14.2169" N	14° 24' 19.2068" W
93	50° 22' 13.8756" N	11° 00' 07.1365" W	136	50° 05' 56.5160" N	14° 40' 17.0983" W
94	50° 22' 45.2030" N	11° 08' 53.9816" W	137	50° 05' 42.1970" N	14° 47' 00.7019" W
95	50° 22' 47.6390" N	11° 09' 53.8751" W	138	50° 00' 14.0513" N	16° 26' 15.6274" W
96	50° 23' 21.0761" N	11° 15' 45.8819" W	139	50° 00' 08.3564" N	16° 26' 08.6198" W
97	50° 23' 28.4490" N	11° 17' 14.2863" W	140	49° 59' 22.1386" N	16° 25' 09.6488" W
98	50° 23' 52.2735" N	11° 23' 17.8315" W	141	49° 57' 51.2408" N	16° 23' 08.2465" W
99	50° 23' 59.8721" N	11° 26' 43.9291" W	142	49° 55' 40.0233" N	16° 19' 57.7592" W
100	50° 24' 11.1238" N	11° 31' 31.5306" W	143	49° 53' 35.0207" N	16° 16' 37.6427" W
101	50° 24' 10.8972" N	11° 32' 02.3352" W	144	49° 51' 36.5288" N	16° 13' 08.3824" W
102	50° 24' 00.1298" N	11° 35' 54.8087" W	145	49° 50' 07.9693" N	16° 11' 35.7482" W
103	50° 23' 39.7889" N	11° 42' 49.3406" W	146	49° 50' 11.1504" N	16° 11' 09.4136" W
104	50° 23' 32.8918" N	11° 45' 03.9208" W	147	49° 55' 11.2124" N	14° 42' 45.6938" W
105	50° 22' 33.0012" N	11° 55' 20.7298" W	148	49° 55' 39.3435" N	14° 25' 20.5199" W
106	50° 22' 12.0928" N	11° 59' 05.9218" W	149	49° 54' 47.3825" N	14° 17' 06.3631" W
107	50° 21' 36.2752" N	12° 04' 14.3509" W	150	49° 53' 23.9523" N	14° 08' 26.9229" W
108	50° 21' 22.9439" N	12° 06' 05.6057" W	151	49° 52' 47.5154" N	13° 59' 24.7156" W
109	50° 20' 35.2565" N	12° 10' 26.7544" W	152	49° 53' 21.7651" N	13° 51' 05.7692" W
110	50° 20' 20.4908" N	12° 11' 45.0433" W	153	49° 55' 07.6247" N	13° 43' 31.6371" W
111	50° 20' 03.7650" N	12° 12' 47.3296" W	154	49° 58' 25.5099" N	13° 34' 51.3828" W
112	50° 18' 43.4839" N	12° 16' 40.1391" W	155	49° 59' 40.8428" N	13° 30' 26.8608" W
113	50° 18' 23.0556" N	12° 17' 35.8454" W	156	50° 00' 55.2116" N	13° 24' 21.3272" W
114	50° 16' 10.1470" N	12° 21' 50.5649" W	157	50° 01' 33.4532" N	13° 20' 26.1975" W
115	50° 15' 22.0276" N	12° 24' 08.9340" W	158	50° 02' 59.2302" N	12° 57' 00.7986" W
116	50° 14' 11.1239" N	12° 28' 51.6528" W	159	50° 03' 13.8560" N	12° 49' 02.3339" W
117	50° 13' 14.1792" N	12° 33' 30.0508" W	160	50° 02' 41.2465" N	12° 45' 29.7822" W

118	50° 12' 53.3629" N	12° 37' 10.1483" W	161	50° 02' 15.3946" N	12° 42' 42.4966" W
119	50° 12' 51.0564" N	12° 40' 42.6545" W	162	50° 02' 19.6326" N	12° 35' 50.3345" W
120	50° 13' 42.7263" N	12° 46' 23.1301" W	163	50° 02' 51.3673" N	12° 30' 16.9639" W
121	50° 13' 46.0366" N	12° 47' 19.2162" W	164	50° 05' 12.0962" N	12° 19' 07.3160" W
122	50° 13' 45.3192" N	12° 48' 11.8018" W	165	50° 06' 53.4130" N	12° 13' 33.1523" W
123	50° 13' 36.2727" N	12° 57' 08.1169" W	166	50° 07' 56.9095" N	12° 11' 12.1242" W
124	50° 13' 27.0923" N	13° 00' 21.7968" W	167	50° 09' 37.3375" N	12° 08' 03.5175" W
125	50° 12' 00.3844" N	13° 23' 11.3524" W	168	50° 10' 28.8582" N	12° 05' 35.9203" W
126	50° 10' 25.9394" N	13° 32' 54.9254" W	169	50° 10' 58.8310" N	12° 03' 10.5590" W
127	50° 08' 49.3657" N	13° 39' 30.5950" W	170	50° 11' 33.2453" N	11° 57' 40.6937" W
128	50° 06' 15.2202" N	13° 46' 44.5626" W	171	50° 13' 00.4249" N	11° 43' 32.5188" W
129	50° 04' 54.0184" N	13° 50' 11.0431" W	172	50° 13' 17.6376" N	11° 37' 39.5659" W

Idx	**Latitude**	**Longitude**	Idx	**Latitude**	**Longitude**
173	50° 13' 35.6983" N	11° 31' 43.1639" W	194	50° 09' 54.8634" N	8° 58' 35.4923" W
174	50° 13' 22.0632" N	11° 25' 11.5198" W	195	50° 09' 50.9752" N	8° 58' 14.6499" W
175	50° 12' 58.1970" N	11° 19' 42.0965" W	196	50° 09' 45.4662" N	8° 57' 40.7929" W
176	50° 12' 13.5902" N	11° 11' 39.4218" W	197	50° 09' 41.4744" N	8° 57' 06.4249" W
177	50° 12' 13.4355" N	11° 09' 14.8841" W	198	50° 09' 41.0728" N	8° 57' 02.1220" W
178	50° 11' 50.9770" N	11° 04' 16.6517" W	199	50° 09' 04.0902" N	8° 52' 40.9073" W
179	50° 11' 36.4628" N	10° 58' 14.1489" W	200	50° 08' 44.7053" N	8° 52' 07.4655" W
180	50° 11' 40.7220" N	10° 53' 36.0400" W	201	50° 08' 27.3146" N	8° 51' 31.4698" W
181	50° 11' 56.3894" N	10° 44' 56.1893" W	202	50° 08' 20.7334" N	8° 51' 16.5027" W
182	50° 12' 47.1228" N	10° 34' 07.2453" W	203	50° 08' 09.0373" N	8° 50' 47.8865" W
183	50° 15' 14.2903" N	10° 02' 26.8876" W	204	50° 07' 58.6034" N	8° 50' 18.1139" W
184	50° 15' 55.0301" N	9° 52' 18.9596" W	205	50° 07' 49.4790" N	8° 49' 47.3197" W
185	50° 15' 55.8673" N	9° 52' 11.5538" W	206	50° 07' 44.6810" N	8° 49' 29.5835" W
186	50° 11' 59.2029" N	9° 22' 47.4828" W	207	50° 07' 36.4346" N	8° 48' 55.7606" W
187	50° 11' 56.6586" N	9° 22' 26.7085" W	208	50° 07' 29.7680" N	8° 48' 21.1067" W
188	50° 10' 52.3624" N	9° 12' 38.7127" W	209	50° 04' 40.5338" N	8° 31' 39.0166" W
189	50° 10' 49.9882" N	9° 12' 13.2755" W	210	50° 03' 35.9283" N	8° 25' 45.4688" W
190	50° 10' 48.4482" N	9° 11' 47.6835" W	211	50° 03' 15.2034" N	8° 24' 06.7466" W
191	50° 10' 17.0718" N	9° 00' 03.7540" W	212	50° 10' 00.0012" N	8° 24' 00.0000" W
192	50° 10' 12.2892" N	8° 59' 47.7565" W	213	50° 10' 00.0012" N	8° 12' 00.0000" W
193	50° 10' 02.6878" N	8° 59' 12.1428" W			

Landfalls & Inshore Survey Corridors

The survey area covers two potential landfalls close to Rosscarbery, County Cork, with survey corridors through Rosscarbery Bay to a potential landfall at Ownahincha / Little Island Strand to the West and a landfall at Long Strand to the East. The general location is shown in Figure 4.

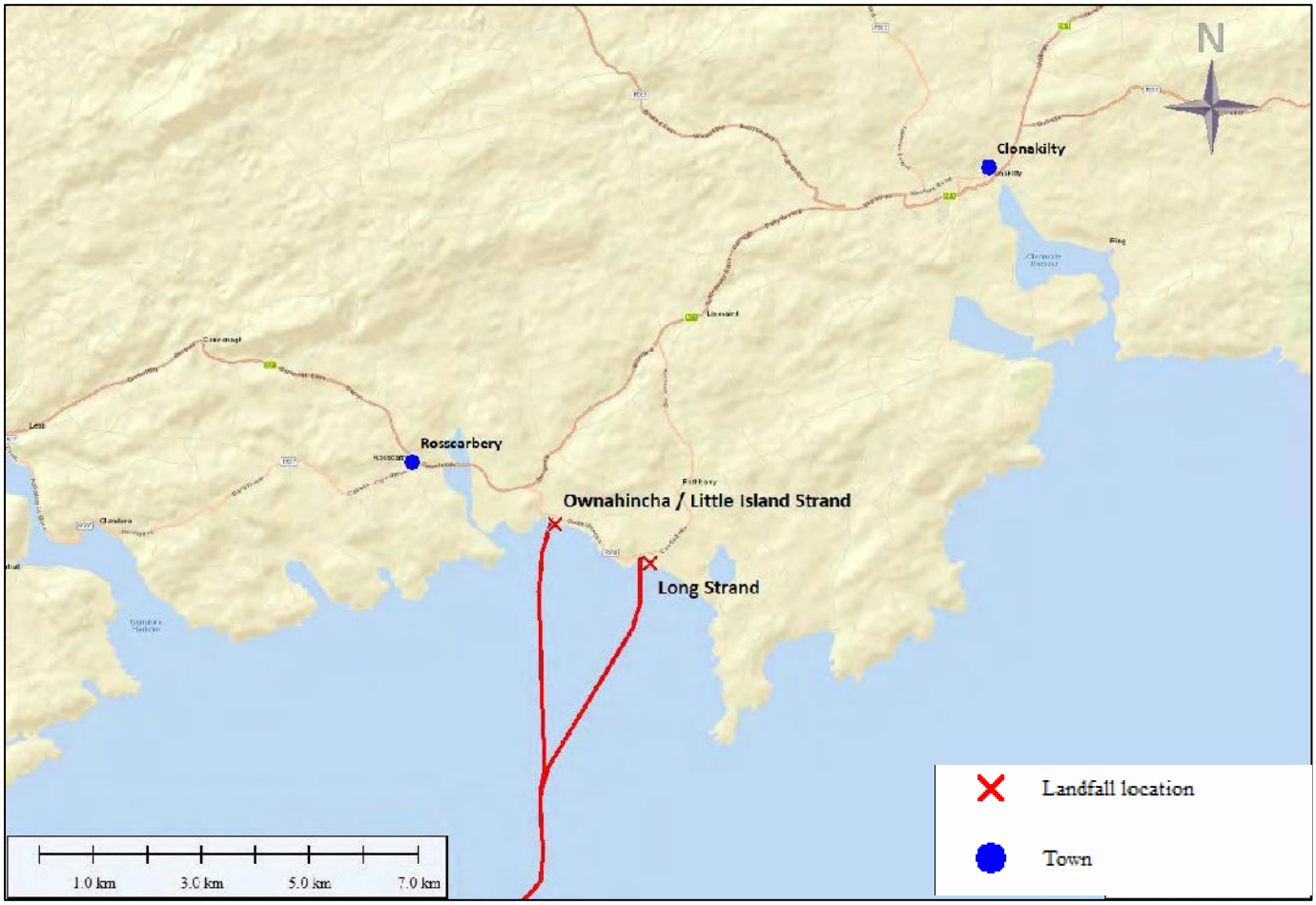


Figure 4. Landfall Locations.

Long Strand

The survey area covers a potential landfall at Long Strand. The beach is a long and uninterrupted stretch of sand and is buffered to the North from the R598 (Clonakilty Rd) and L4006 (to Galley Head) by a belt of grassy coastal sand dunes. (Figure 5.) Any requirement for beach access for vehicles or equipment will be solely via the existing track way adjacent to the Fish Basket Café. (Figure 6.) No vehicles or equipment will traverse the sand dune system.

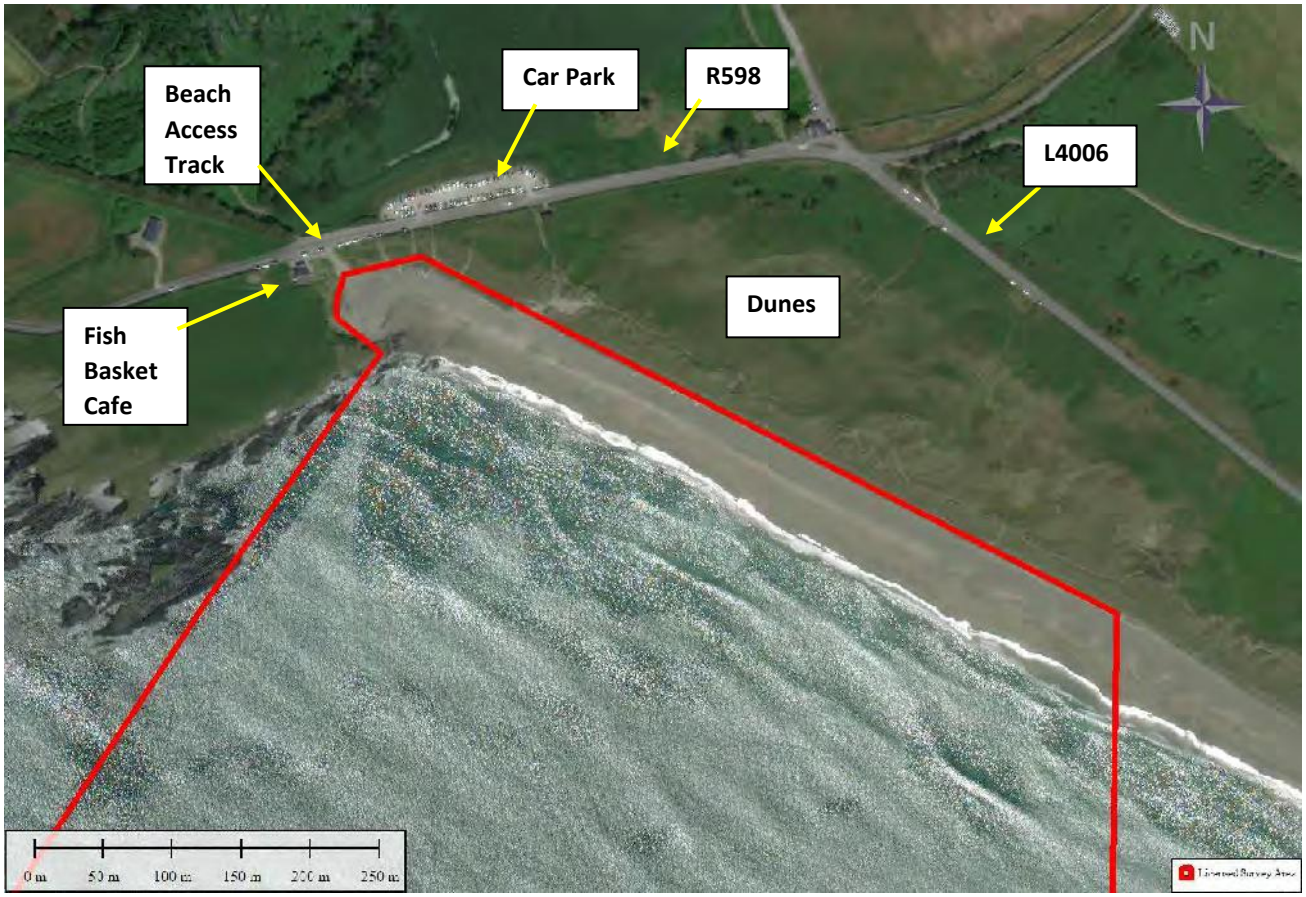


Figure 5. Long Strand.

Figure 6. Beach Access track at Long Strand.

The survey area covers a potential landfall at Ownahincha / Little Island Strand. This is effectively two beaches linked by a spit at Iron Rock with shingle and Ownahincha River to the west and with sand, dunes and rocky inlets to the east. The R598 (Clonakilty Rd) runs parallel to the beach, separated by a belt of grassy coastal sand dunes on the eastern side. (Figure 7.) Any requirement for beach access for vehicles or equipment will be via the existing established access tracks from the R598. (Figures 8 & 9). No vehicles or equipment will traverse the sand dune system.

Figure 7. Ownahincha / Little Strand.

Figure 8. Little Island Beach Access A.

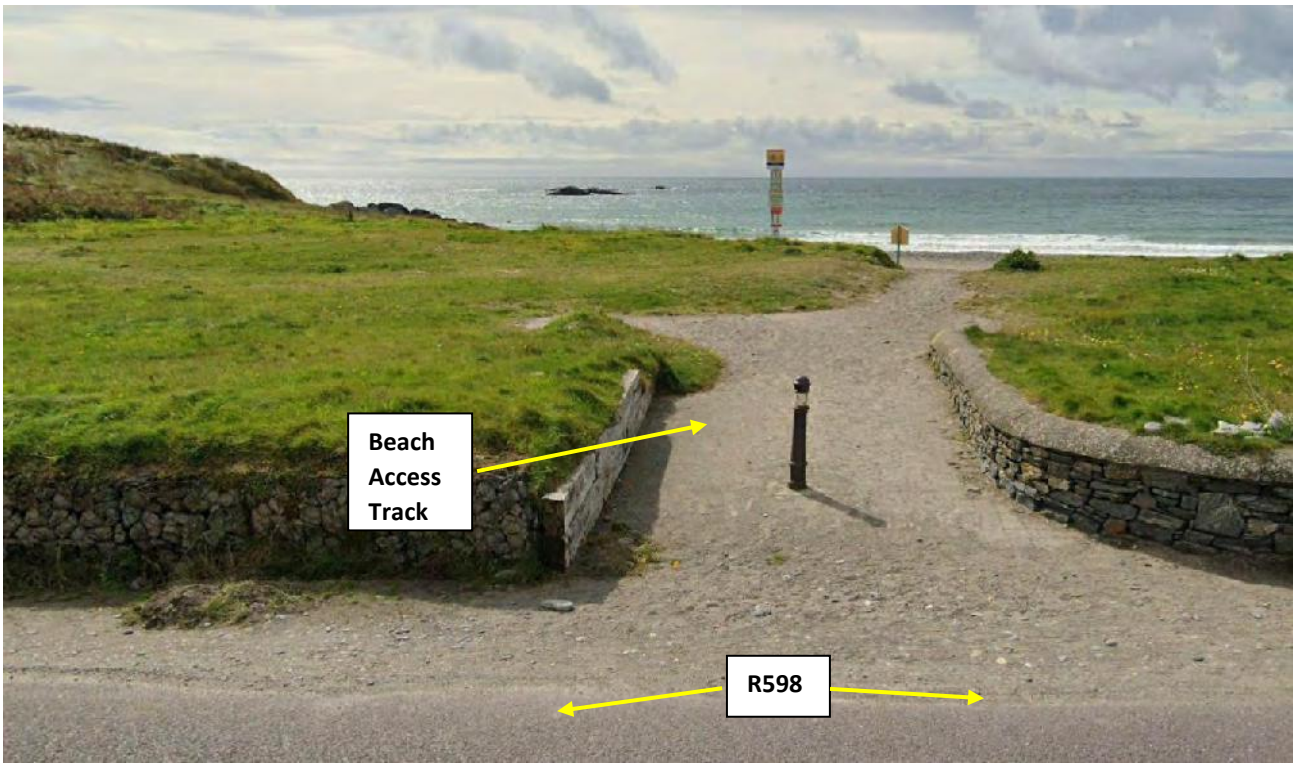


Figure 9 Ownahincha Beach Access B.

The landfall locations shown on Admiralty and Ordnance Survey Maps are provided in Drawings 1355-A-101 Licence Map, 1355-A-102 Site Layout Map 1 & 1355-A-103 Site Layout Map 2 and included with the Licence Application

The general line of the inshore section of the proposed survey route is shown on an Admiralty Chart base in Figure 10. After approx. 2.5km, the survey corridors converge in Glandore Bay and head in a south westerly direction from the landfalls, staying west of Galley Head.

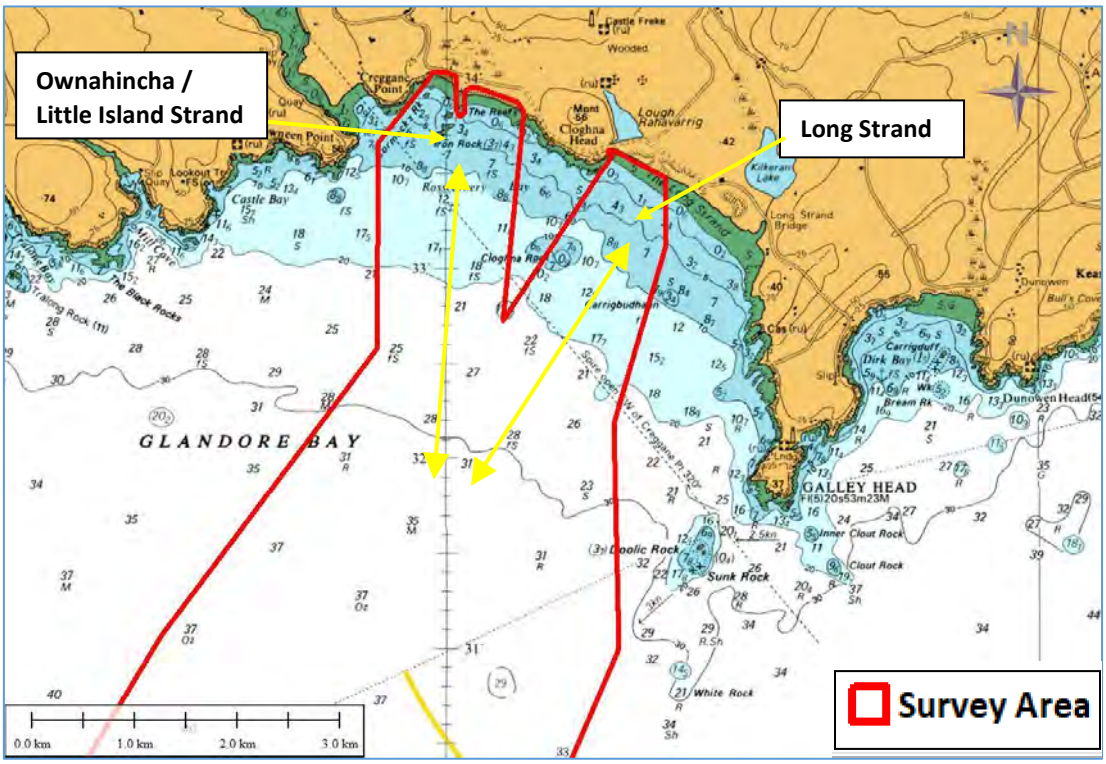


Figure 10. Inshore Sections and Landfalls.

After exiting Glandore Bay, the survey corridor continues in a southwestern direction with eastern and western route options as shown on Figure 11. The survey will be carried out on one of the route options and will survey a 500m swathe within the licensed area. Approximately 150km form the landfall, the route corridor changes to an east-west orientation. The route east across the Celtic Sea towards Cornwall, UK stays South of the Labadie Bank.

The route west (Figures 12 & 13) crosses the continental shelf to enter the deep waters of the Porcupine Seabight, south of the primary Gollum Channel and the Mound Provinces which are located north of the Gollum Channel System. The route traverses the ultra deepwaters of the Porcupine Abyssal Plain before leaving the Irish Maritime Area and continuing in a westerly direction towards the United States.

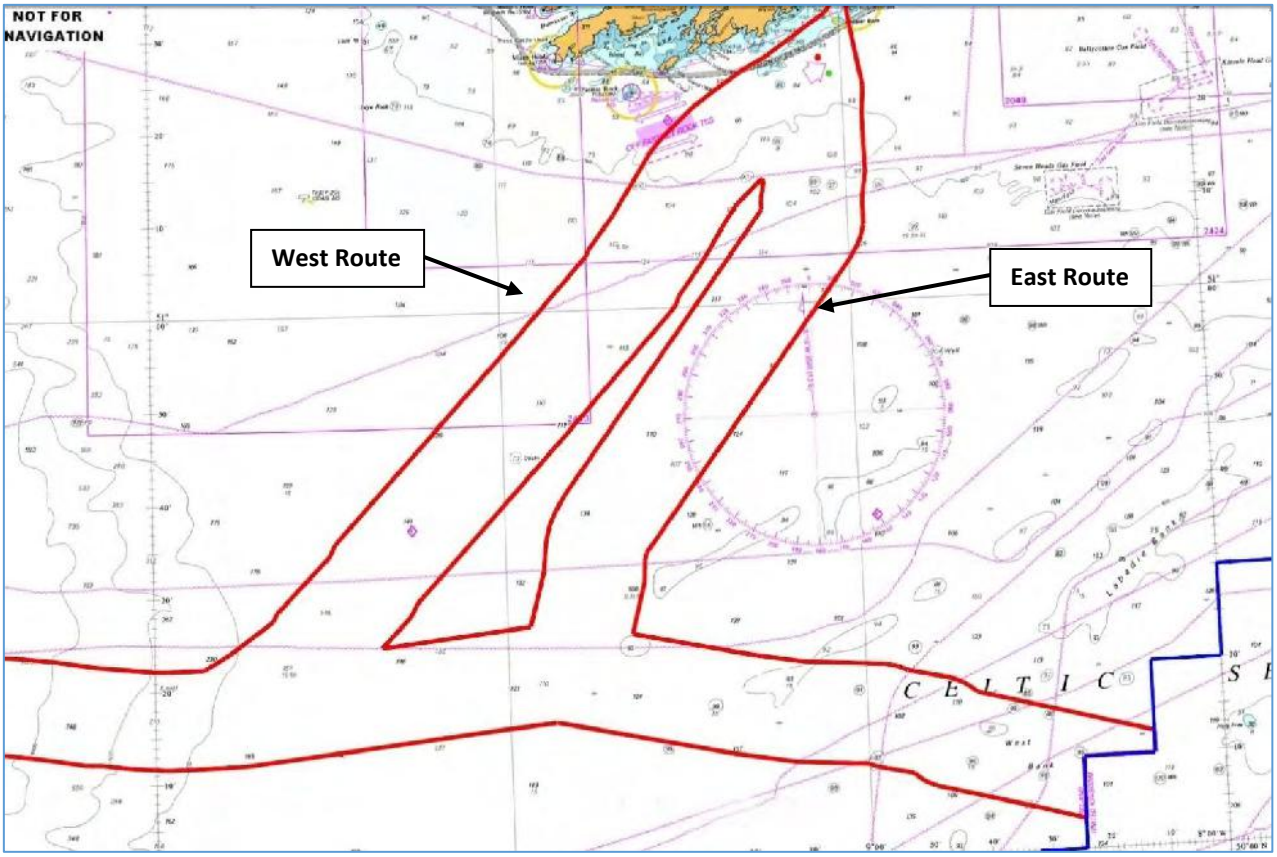


Figure 12. Offshore Survey Corridor options .

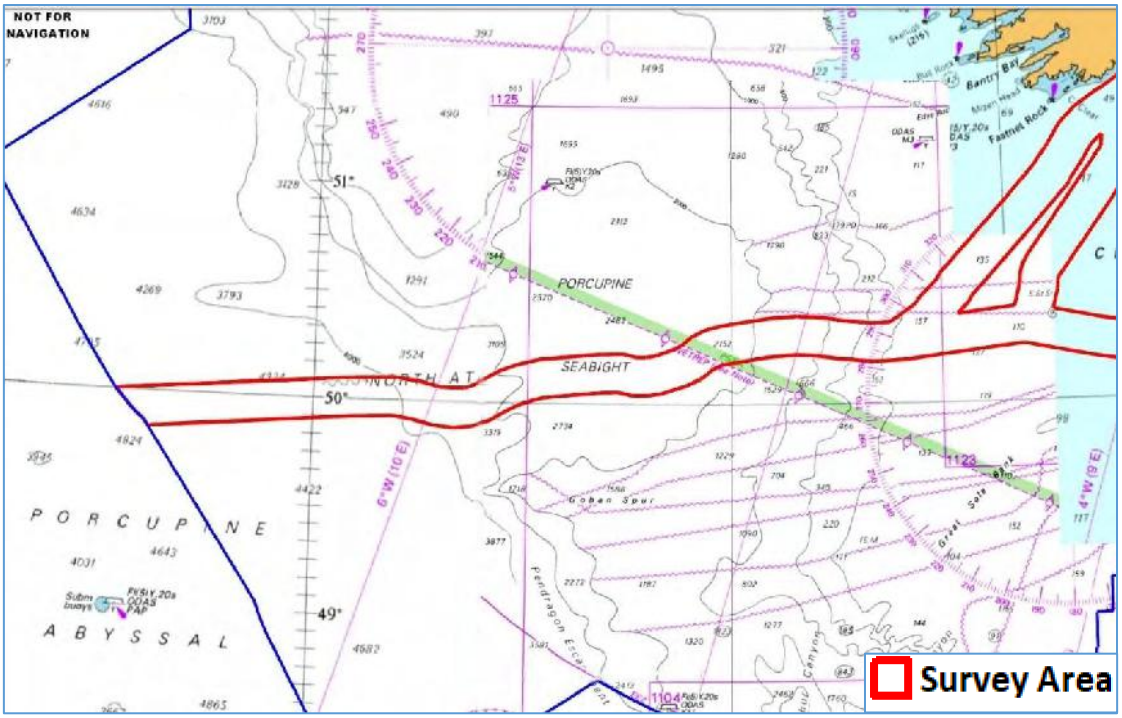


Figure 11. Deepwater Survey Corridor.

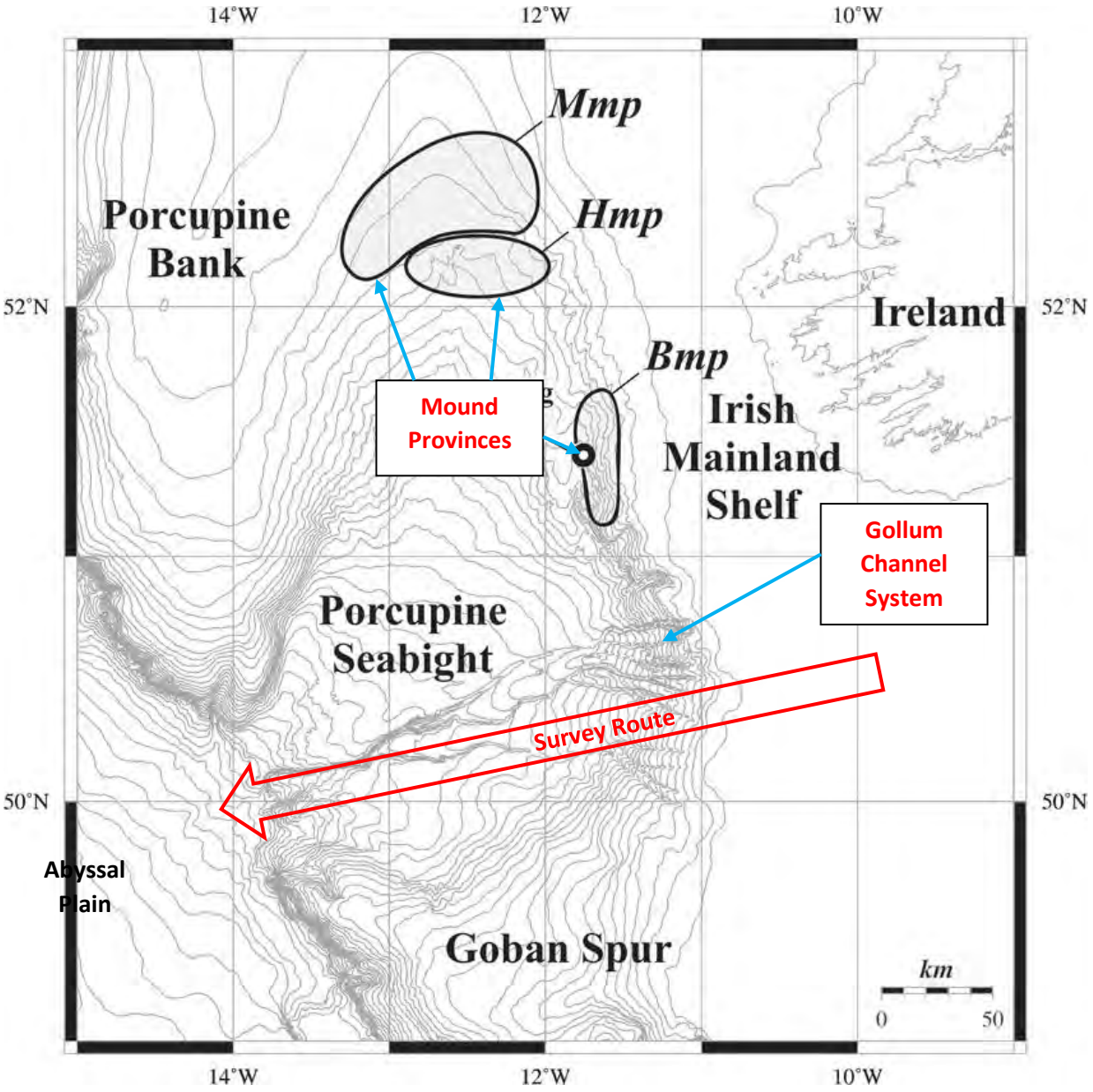


Figure 13. Porcupine Sea Bight

2.3 Proposed Marine Survey & Site Investigations Schedule of Works

The principal objective of the Marine Survey & Site Investigations is to ascertain a feasible and safe route for cable system design, deployment, survivability and subsequent maintenance with due regard for environmental and ecological considerations. The survey will also enable decisions to be made on cable armouring and burial. The survey will identify the necessary water depths, route features, seabed obstructions, seabed geomorphology and cable hazards and will also provide detailed information on the seabed sediment, subsurface stratigraphy and upper sediment layers to support cable route and installation engineering. The site investigations will provide "ground-truthing" of the geophysical data along the route.

The objectives of the marine geophysical survey shall be:

- To collect up to date high-resolution bathymetry along a 500m wide cable corridor (or 3 x Water Depth up to 10km in Deepwater) within the Maritime Usage License Application Area;
- To obtain information on the seabed surface (type, texture, variability, etc.) and in particular, to identify any seabed features that may be of interest.
- Identify any shallow geohazards and man-made hazards (including but not limited to outcropping, boulders, shallow gas, wrecks, debris etc.);
- Determine the stratigraphy of the upper layers of the seabed along the cable route and quantify the variability in the lateral and vertical extents to depths of 2-5m
- Identify any seabed obstructions;
- Identify sensitive marine habitats which will need to be avoided during site investigations and sampling.

The survey operations will be broken down into separate but overlapping areas, with boundaries defined by water depth as specified in the technical requirements outlined below. These water depth boundaries may be adjusted due to suitability of the survey vessel(s) and survey spread. The survey and survey line spacing will be designed to ensure adequate coverage and overlap of geophysical measurements.

- Landfall Beach Survey – Terrestrial Beach and Intertidal Zone
- Inshore Survey – from 3m Chart Datum to 15m Chart Datum
- Offshore Survey – Water depths greater than 15m Chart Datum up to 1500m
- Deepwater Survey - Water depths greater than 1500m Chart Datum

In order to ensure data continuity, coverage between the survey areas is required with indicated overlap below;

- Landfall Beach Survey to Inshore Survey – 50m overlap
- Inshore Survey to Offshore Survey – 500m overlap
- Offshore Survey to Deepwater Survey – 500m overlap

Landfall Beach Survey & Site Investigations

A non-intrusive topographic and geophysical survey of the beach along the line of the proposed cable route at each landfall is required to the low water mark.

The topographical survey would typically be carried out by GPS Rover, Total Station or UAV Aerial Drone using photogrammetry or LiDAR techniques. The terrestrial geophysical survey will comprise remote sensing techniques such as Ground Penetrating Radar to establish subsurface features and depth to bedrock and magnetometer or handheld marine metal detector to locate buried ferrous objects.

An intertidal and beach survey (walkover survey) will be carried out on the beach by the project ecologist. The intertidal surveys will be undertaken at low or Spring tides in line with guidance in the JNCC Marine Monitoring Handbook (Davies et al., 2001).

An intertidal and beach survey (walkover survey) will be carried out on the beach by the project archaeologist under licence from the National Monuments Service. The intertidal surveys will be undertaken at low or Spring tides. A camera, GPS and marine metal detector will be deployed, scanning a series of survey lines in a grid pattern on the beach and intertidal zones. All archaeological survey will be carried out to determine the location of all known archaeological or cultural heritage features in advance of the landfall site investigations.

Landfall Site Investigations will be undertaken on the beach to establish the depth and nature of the sediment and depth to bedrock. The focus of the site investigations will be on the upper layers of sediment to assess the feasibility of cable burial and installation techniques. The following may be undertaken at each landfall:

- 3 Trial Pits on the beach (target depth 2.5m).
- Bar probes on the beach at 10m spacing (approx. 6 to 8).
- Bar probes from the Low Water Line to the 3m water depth contour at 10m spacing. (approx. 6 to 8)

The Trial Pits will be positioned at approximately 30m centres starting seaward of the High Water Mark. The Trial Pits will be excavated, logged, photographed and backfilled in a single tidal cycle. The trial pits will be backfilled with the original excavated materials in the sequence in which they are excavated

A summary Method Statement for excavation of any Trial Pits is as follows;

- Excavate sand and place to one side.
- Excavate substrate and place separate from sand.
- Measure, log and photograph each Trial Pit.
- Backfill in sequence compacting with bucket of back-hoe as the backfilling proceeds.

Figure 14 Long Strand Trial Pit Locations.

Figure 15 Ownahincha Trial Pit locations.

The bar probes on the beach are manually driven to a depth of 2 metres simply to prove the depth of upper layers of sand, gravel or soft material.

A non-invasive Electrical Resistivity Tomography (ERT) survey may be required (tbc) and would be utilized within the Study Area on the beach. ERT survey involves the measurement of electric potential differences between a series of dispersed electrodes that are generated by an electrical current that is injected into the subsurface. Typically, this involves the placement of multiple vertical electrode strings (VES) in the ground where the electrodes are equally spaced. Additional electrodes can also be placed, temporarily, just beneath the surface to aid measurements. The ERT survey provides:

a) Depth of Penetration below ground,

b) High resolution of vertical geomorphic boundaries and

c) Is not sensitive to velocity inversions.

Furthermore, the combined results of the ERT and topographic survey (Section 3.6) will allow for a better understanding of the existing stratigraphy.

Inshore Marine Survey

The area extending seaward from the low water mark at each landfall and inshore of the safe working draft limits of the primary survey vessel will be accurately surveyed with a small craft or Unmanned Survey Vessel (USV) using Multibeam Echosounder (MBES), sidescan sonar, marine magnetometer and sub-bottom profile equipment. Sub-bottom profile equipment will be able to discern the nature and density of the upper 3 metres of seabed and will be used on a non-interfering basis with other sounding systems. A minimum of seven survey lines, based upon the Survey RPL, is required.

Features such as shallow reefs, surge channels, debris fields, archaeological features or anything that could be a hazard to the cable or installation team will be noted. General reconnaissance of the survey corridor beyond the planned survey lines and tie-lines may be necessary to describe the seabed as accurately as possible. A line plan showing number of survey lines as a function of depth will be determined prior to start of survey operations.

Survey Area	Depth Range	Survey Corridor Width	Min. # of Lines	Min. Overlap	Typical Survey Speed
Inshore	3m to 15m	500m	7	SSS: 100% MBES Bathy: 20%	4 knots

Table 2 Inshore Survey

Offshore Marine Survey

The area extending seaward from the outer limits of the inshore survey to the 12nm limits will be surveyed by the primary survey vessel using Multibeam Echosounder (MBES), sidescan sonar, marine magnetometer and sub-bottom profiler equipment. A continuous bathymetric swathe along with side scan sonar imagery and sub-bottom traces will be obtained, centred on the preliminary route and along all wing lines needed to complete the route corridor coverage. A minimum of five survey lines, based upon the Survey RPL, is required.

Sub-bottom profile equipment will be able to discern the nature and density of the upper 3 metres of seabed and will be used on a non-interfering basis with other sounding systems.

Survey Area	Depth Range	Survey Corridor Width	Min. # of Lines	Min. Overlap	Typical Survey Speed
Offshore	15m to 100m	500m	7	SSS: 100% MBES Bathy: 20%	4 knots
Offshore	100m to 1,000m	500m	5	SSS: 100% MBES Bathy: 20%	4 knots
Offshore	1,000m to 1,500m	500m	7	SSS: 100% MBES Bathy: 20%	4 knots

Table 3. Offshore Survey

The area extending seaward from 1,500m water depth to the Maritime Area limits will be surveyed by the primary survey vessel using Multibeam Echosounder (MBES) equipment. A continuous bathymetric swathe will be obtained, centred on the preliminary route and along all wing lines needed to complete the route corridor coverage. One survey line, based upon the Survey RPL, is required.

The width of the seabed covered by a single survey line increases as a function of water depth, with the width approximately equal to up to 3 times the water depth. This is illustrated in Figure 19 below. Therefore, in deep water the survey corridor width increases as the survey progresses into deeper waters. The maximum water depth of the survey within the Maritime Area is approximately 4,000m. Based on previous experience of deepwater cable route surveys, the survey corridor width will therefore extend up to a maximum of approximately 10,000m at the Maritime Area extents.

Survey Area	Depth Range	Survey Corridor Width	Min. # of Lines	Min. Overlap	Typical Survey Speed
Offshore	> 1,500m	3 x WD Max. approx. 10,000m	1	NA	4 knots

Table 4. Deep Water Survey

Marine Site Investigations and Seabed Sampling

The purpose of the marine site investigations and seabed sampling is to evaluate the physical properties of the superficial seabed sediments along the cable route. These methodologies will ensure that a full understanding of the subsurface is achieved, focussing on the upper 3 metres of sediment to subsequently develop a cable burial assessment, installation and burial plan.

The scheduled site investigations and seabed sampling within the maritime area limits will comprise of the following techniques:

- Up to 96 CPTs (2m to 3m)
- Up to 48 Gravity Cores / Vibrocores (3m)
- Up to 26 Grab Samples

Indicative locations for the relevant site investigation activities (Gravity or Vibrocore, Grab Samples and CPT's) are shown in Figure 16 - 18. Site investigations and seabed sampling will only be undertaken up to a limit of 1,500m water depth. Typically, individual sampling positions will be determined following initial interpretation of the geophysical survey data. The positioning of individual site investigation locations will also take into consideration environmental constraints such as the position of sensitive habitats or archaeological features.

Two or more attempts may be made at each location to acquire a suitable sample. If an acceptable sample is achieved on the first attempt, there is no need to perform a second attempt.

An acceptable sample is defined as;

- Grab Sample – recovery of approximately a full bucket of sediment. Recovery of large size granular material may be taken as indication of a hard seabed.
- Gravity Core / Vibrocore – recovery of < 3m core of soil. If stiff or hard soils are encountered and are clearly indicated in the sample, it sample may be deemed acceptable. Any sample site yielding less than 1m of recovery must be investigated a second or third time unless there is obvious damage to the coring equipment indicating a hard or rocky substrate.
- CPT – Penetration to the 2m – 3m target depth or refusal. Any push resulting in less than 2m penetration will warrant a second attempt.

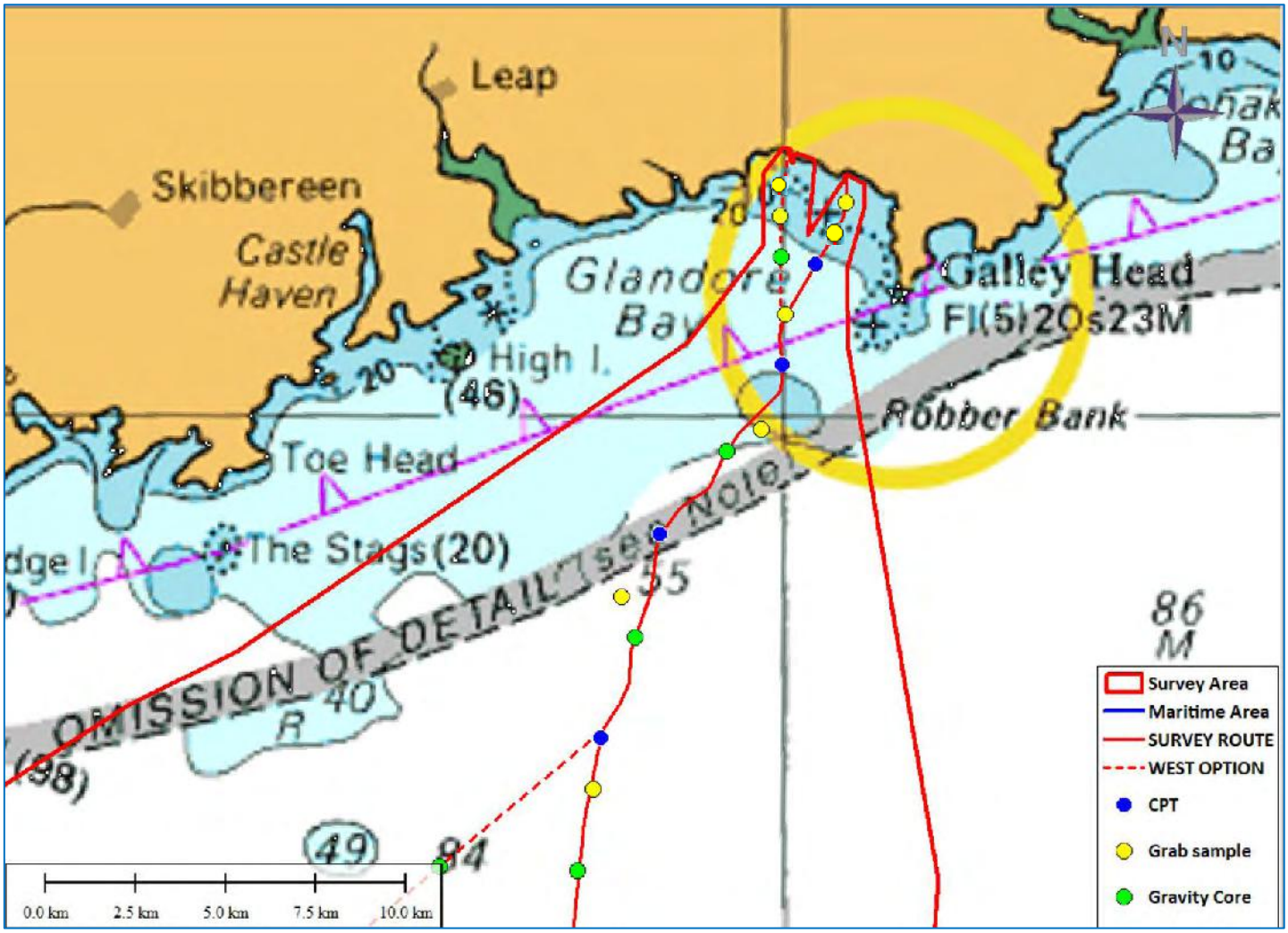


Figure 16. Indicative CPT, Grab sample and GC Locations.

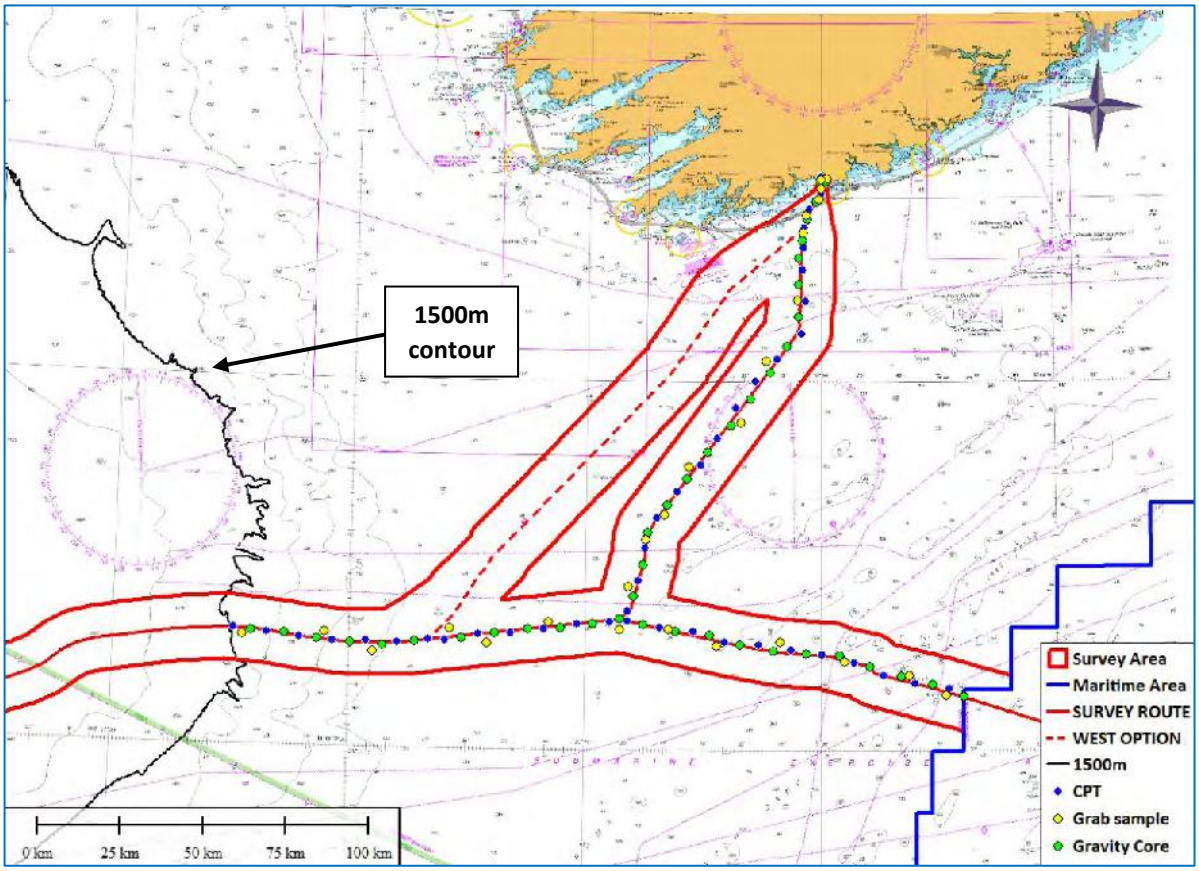


Figure 17. Indicative Sampling Locations - Eastern Route Option

Seabed Sampling

The total overall scope of the Site Investigations is as follows

- Trial Pits — Up to 3 No. on the beach.
- Bar Probes — 16 No. on the beach.
- Bar Probes — 16 No. from Low Water to 3m contour.
- Grab Samples — 26 No. along the route corridor.
- Gravity Cores / Vibrocores — 48 No. along the route corridor.
- Cone Penetration Tests — 96 No. along the route corridor.

Underwater Video Surveys

Underwater video camera system may be used for inspections of the seabed to investigate seabed obstructions, marine archaeology or benthic habitats. An underwater drop-down camera system or similar may be used in a series of video transects which would be georeferenced and later mapped in GIS.

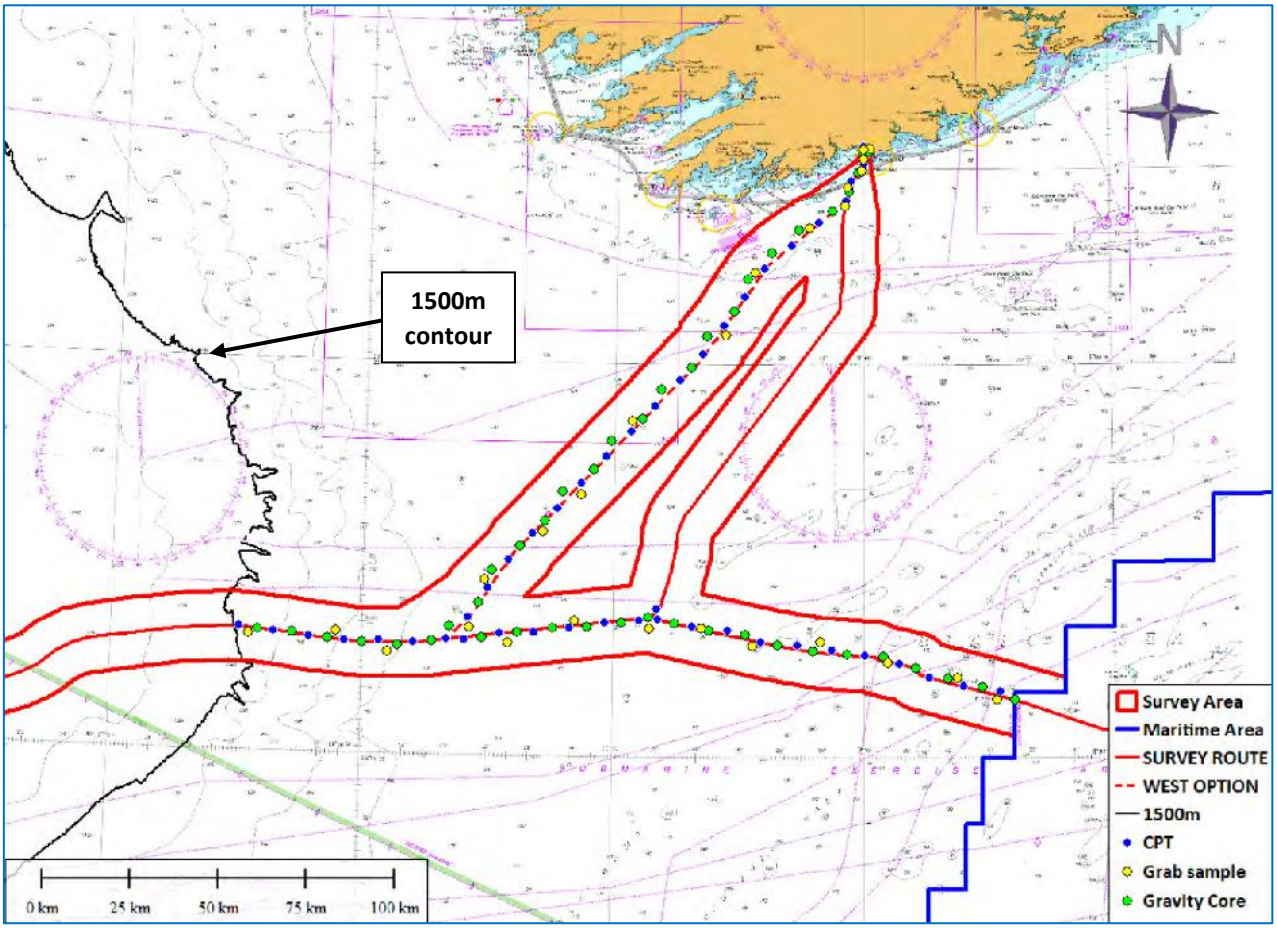


Figure 18. Indicative Sampling Locations - Western Route Option

Archaeological Survey

The proposed survey specification takes into account archaeological data acquisition to enable professional archaeological interpretation and analysis of data. The survey equipment deployed and data acquisition and processing shall comply with the requirements of the National Monuments Service, Underwater Archaeology Unit. Walk over surveys will be conducted within the intertidal area to check for marine archaeology features and evidence of features of cultural heritage significance.

All archaeological assessments will be carried out under by a suitably qualified and experienced marine archaeologist to determine the location of all known archaeological features in advance of the intrusive site investigations and seabed sampling. The data collected will be used to support the archaeological assessments.

2.4 Survey Equipment Parameters

Multibeam Echosounder (MBES)

Echo-sounders are a diverse group of acoustic sources used to collect information on bathymetry, seabed features and objects in the water column (e.g. Multi beam echosounder, scientific echo-sounders/ fish-finders). They measure water depth by emitting rapid pulses of sound towards the seabed and measuring the sound reflected back.

Multibeam Echosounder (MBES) will be used during the marine survey to provide detailed 3 dimensional bathymetric mapping of the cable route corridor using multiple beams elongated in the across-track direction to cover a fan-shaped sector (or swath) (Figure 19). Measurements of the across-track beam from MBES showed 3 dB beam widths of 150-160°; in the along-track orientation beam width is narrow, typically ~1.5-3.0° (Crocker & Fratantonio 2016).

MBES is non-intrusive and does not interact with the seabed. The MBES system will be used will be confirmed following the appointment of a survey contractor but typical systems which can be taken as examples would be the R2 Sonic 2024, Kongsberg EM2040 or Teledyne Seabat T50 which would be hull mounted on the survey vessel.

A specific deepwater Multibeam system will be required for surveying in water depths greater than 1,500m. The deepwater MBES system that will be used will be confirmed following the appointment of a survey contractor but a typical system which can be taken as examples would be the Kongsberg EM122 operating at 12kHz with 1x1 degree beamwidth.

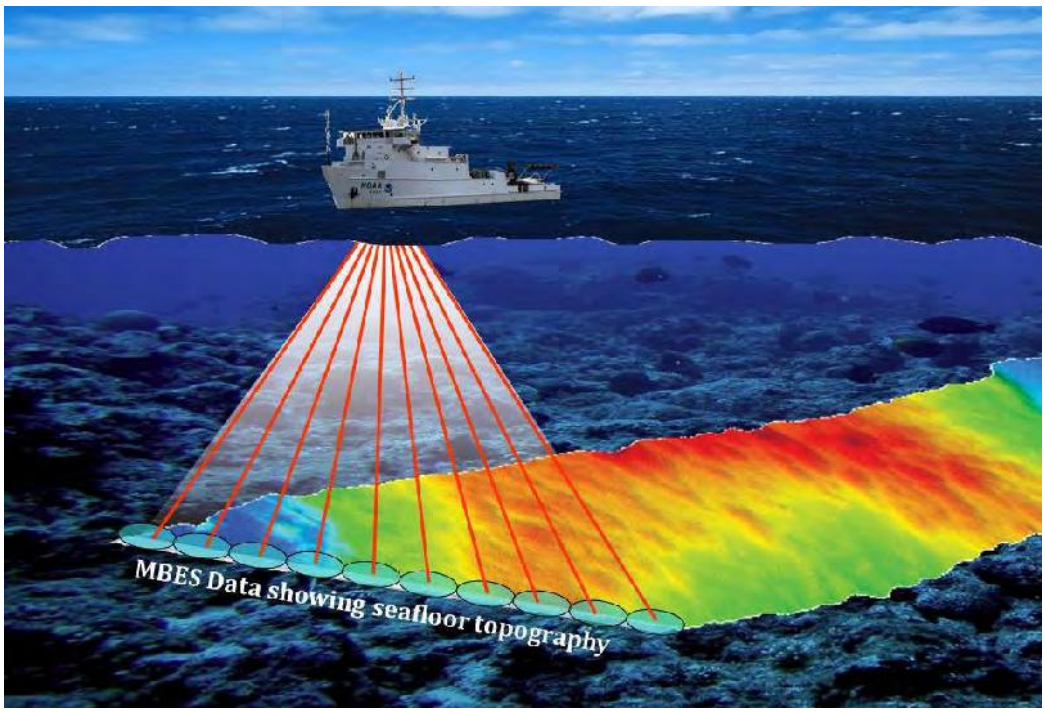


Figure 19 Graphic of MBES survey in operation

The acoustic signal emitted by MBES systems is short duration, typically of a few milliseconds or less, and can be configured to within the range 0.05-10 ms for certain systems. Repetition rates are highly customisable, varying with signal frequency and water depth. Ping rates of up to 10-20 pings per second may be used in very high frequency systems, whereas there may be several seconds between pings in low-frequency deep-water applications.

For collecting information on the seabed, emitted sound frequencies are typically between 12 – 400 kHz depending on water depth, with surveys in continental shelf applications operating at between 70 to 150 kHz, and in shallower waters of less than 200 m using multi-beam echosounders operating at between 200 and 500 kHz The typical operating frequencies for the cable route survey within the Maritime Usage Licence application area will be in the range of 200kHz to 500kHz in shallow water and 12kHz in deep water (>1500m) . (Danson 2005, Hopkins 2007, Lurton and DeReutier 2011).

Maximum sound source pressure levels of MBES have been reported as ranging from 210-245 dB re 1µPa at 1m with the highest levels corresponding to the lowest frequency systems (DECC 2011, Lurton and DeReutier 2011, Lurton 2016, BEIS 2020). The highest measured source levels among three MBES systems when operated at maximum power for central operating frequencies of ≥100 kHz was between Lp,pk 225-228 dB re 1µPa at 1m (LE,p 181-197 dB re 1µPa^2 s at 1m (Crocker & Fratantonio 2016).

Side-scan Sonar

Side-scan sonar (SSS) is a seabed imaging technique used to provide high-resolution and detailed 2 dimensional imagery of the seabed for a variety of purposes. SSS involves the use of an acoustic beam to obtain an accurate image over a narrow area of seabed to either side of the instrument.

Piezoelectric transducers in the SSS generate high-frequency acoustic pulses which are directed either side of the tow fish. The transducers are oriented such that the acoustic signal covers a wide angle perpendicular to the path of the tow fish through the water, providing information on a strip either side of the device (port and starboard). The intensity of the acoustic reflections from the seafloor is recorded in a series of cross-track images. When stitched together along the direction of motion, these images form a waterfall view of the sea floor within the swath of the beam. The range (swath width) is dependent upon the frequency, power and other source configurations, but is typically between 50-300 m on both sides.

Analysis of SSS data can aid identification of seafloor sediment, surficial bedrock outcrops and geomorphology mapping. Obstacles rising proud of the seafloor, such as shipwrecks, boulders, pipelines, outfalls, exposed cables, fishing gear etc. can cast shadows on the resulting seafloor image where no acoustic signal is returned. The size of the shadow can be used to determine the size of the feature casting it (Figure 20).

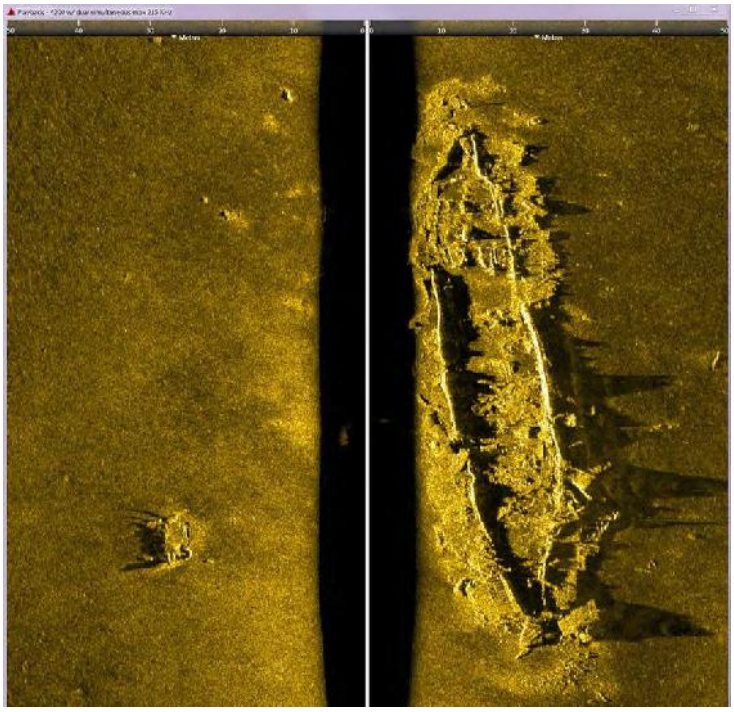


Figure 20. SSS image of shipwreck on seabed and nadir gap.

SSS is non-intrusive and does not interact with the seabed. The SSS system will be used will be confirmed following the appointment of a survey contractor but typical systems which can be taken as examples would be the Klein 3000 or Edgetech 4200 (Figure 21). The SSS may be hull mounted but is typically towed at depth behind the survey vessel on an armoured tow cable.

Figure 21. Deployment of Edgetech 4200 Tow fish.

Acoustic signal durations of SSS systems are short (0.4ms – 1.0ms), but vary between models and configurations with longer signal durations are required to survey greater ranges. Repetition rates are highly customisable with ping rates of up to several tens of pings per second (Crocker & Fratantonio 2016). The frequencies used by side-scan sonar are relatively very high, typically between 100 and 900 kHz. Most SSS systems offer real-time dual frequency operation which allows acquisition of both frequencies across a swath independently and simultaneously. The higher frequency produces higher resolution data and sharper images but with a narrow swath width while the lower frequency results in wider seabed coverage at lower resolutions.

SSS typically offer a selection of two operational frequencies in the range of 100-500 kHz, or may operate both simultaneously. Some models may offer an upper frequency of up to 900 kHz for applications requiring the highest resolution data. Across-track resolutions vary between 1-8 cm with finer resolution at higher operating frequencies. The typical operating frequencies for the cable route survey within the Maritime Usage Licence application area will be between 200 to 700 kHz.

The line spacing for the survey will be determined after consideration of all factors including water depth and prevailing conditions at time of survey. Generally for SSS, full coverage requires two passes with 100% overlap over a given area of sea-floor, with the two passes each insonifying the sea-floor from opposite directions to ensure targets are adequately imaged. This also ensures that the 'nadir gap' or the centre of the image directly under the path of the towfish is fully covered (Figure 20).

Sound source pressure levels of SSS systems have been reported typically in the range Lp,pk 200-240 dB re 1µPa at 1m. (BOEM 2016, BEIS 2020, DAHG 2014). Maximum calibrated source levels, (sound pressure) measured by Crocker & Fratantonio (2016) were Lp, pk 227 dB re 1µPa at 1m for a 0.1 ms pulse, whereas the highest energy source level of LE, p 205 dB re 1µPa^2 s at 1m corresponded to a longer pulse of 1.1 ms at lower maximum pressure (Lp, pk 210 dB re 1µPa at 1m).

Marine Magnetometer

A marine magnetometer is a passive towed sensor used to measure magnetic field strength and to detect variations in the total magnetic field of the underlying seafloor. The magnetometer does not transmit any signals into the marine environment.

Usually, the increased magnetization is caused by the presence of ferrous (unoxidized) iron on the seafloor or buried below the surface, whether from a shipwrecked vessel made of steel or from natural rock formations containing grains of magnetite. After corrections are made to measurements of the total magnetic field, magnetic data is used to locate existing infrastructure such as buried pipelines, undersea cables and to identify shipwrecks and potential unexploded ordnance.

Marine magnetometers are non-intrusive and do not interact with the seabed. They are towed at depth at least two and a half ship-lengths behind the survey vessel, so that the ship's magnetic field does not interfere with magnetic measurements. The marine magnetometer may be integrated and towed in tandem with the SSS. The marine magnetometer will be of the Caesium Vapour type and capable of recording variations in magnetic field strength during survey to an accuracy of ±0.5nT.

The marine magnetometer system to be used will be confirmed following the appointment of a survey contractor but typical systems which can be taken as examples would be the Geometrics G-882 or Marine Magnetics SeaSpy (Figure 22). The line spacing and coverage will generally match the SSS as they are towed in tandem and the parameters of the survey may be determined by the requirements of the Underwater Archaeology Unit of the National Monuments Service.

Figure 22. Marine Magnetics SeaSpy towfish.

Sub-bottom Profiler

Sub-bottom profilers (SBPs) encompass a range of acoustic systems which are designed to collect information on the characteristics of strata below the seabed, establish changes in sediments and detect and image structures buried within the sediments (Figure 23). Shallow Sub-bottom profiling can penetrate the seabed to a range of depths, from a few metres to tens of metres depending on the geological conditions encountered, and with vertical resolutions from a few centimetres to a few metres. Most are towed behind a survey vessel, either at/near the surface or at depth, whereas some smaller devices may be hull-mounted or lowered over the side of a vessel on a pole mount.

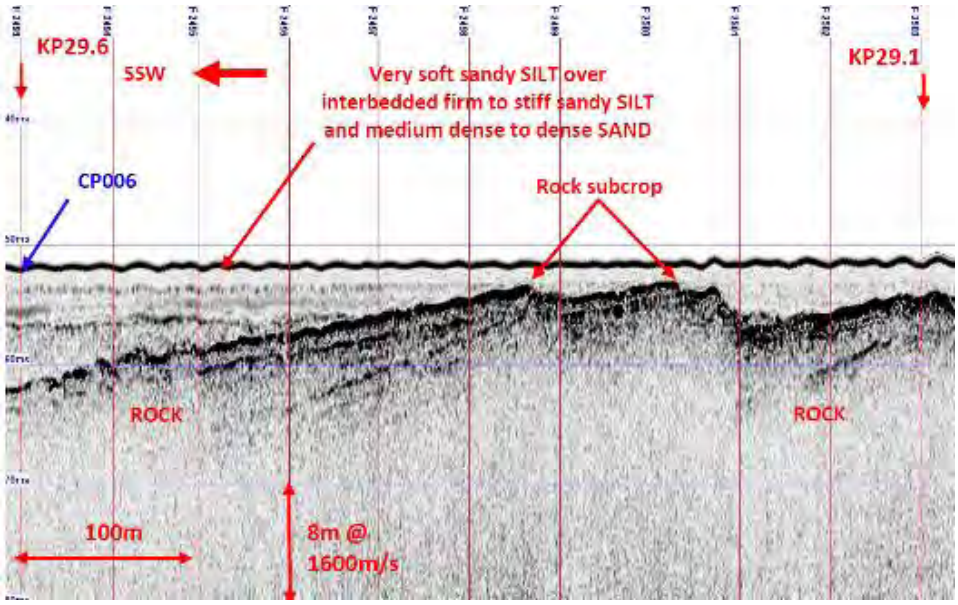


Figure 23. Interpreted SBP seabed profile

Pulsed waveform SBPs generate an acoustic signal either through the impulsive physical processes of electrostatic discharge, as in sparkers, or electromechanically via accelerated water mass, as in boomers. All periodic waveform SBPs i.e. pingers, chirpers and parametric SBPs are electromechanical sources which employ piezoelectric transducers to generate an acoustic waveform by converting electrical energy into mechanical movement i.e. vibrations. Through the reverse of this process, the transducers can also detect sound. As such, these sources are highly customisable; in many cases, the signal is modulated in frequency and/or amplitude to improve its detectability and performance.

The systems most commonly used for high-resolution surveying are the boomer (such as the Applied Acoustics S-Boom), pinger (such as the Kongsberg GeoPulse), chirp (such as the Edgetech SB-424, Figure 24) and parametric chirp systems (such as the Innomar SES-2000). Whereas the boomer system provides best results for coarser sediments, the pinger and chirp systems deliver detail for finer sediments.

The objective of the SBP cable route survey is to investigate the upper layers of the seabed sediments for cable burial potential and installation risk from seabed obstructions such as subcropping rock formations and is not focussed on deep seabed conditions such as required for investigation of offshore wind farm foundations or deepwater seismic surveys carried out by Oil and Gas Exploration. The SBP system used for the survey will be confirmed following the appointment of a survey contractor and the most appropriate system chosen depending on the seabed, anticipated geological environment and the survey vessel capabilities.

Sound source pressure levels of various SBP systems have been reported typically in the range Lp,pk 185-247 dB re 1µPa at 1m. (Hartley Anderson 2020, Crocker & Fratantonio 2016). A summary of the Maximum Sound Pressure Levels for SBP systems is described in Table 4 below. The SBP survey is non-intrusive therefore does not interact with the seabed.

Figure 24. Edgetech SB-424 tow body

Equipment Type	Frequency Range	Duration	*Maximum* Source Pressure Level (re 1µPa at 1 m)	Reference
Sub-bottom Profiler (SBP) - Pinger	2 kHz to 15 kHz	0.5 - 30 ms	214 dB.	Hartley Anderson 2020
Sub-bottom Profiler (SBP) - Chirper	2 kHz to 13 kHz	5 - 40 ms	185 - 215 dB.	Crocker & Fratantonio 2016, Hartley Anderson 2020
Sub-bottom Profiler (SBP) - Boomer	500 Hz to 15 kHz	0.5 - 1.0 ms	205 - 215 dB.	Crocker & Fratantonio 2016
Sub-bottom Profiler (SBP) - Parametric	4 to 15 kHz, 85 to 115 kHz	0.2 - 30 ms	238 - 247 dB. 200 - 206 dB.	Hartley Anderson 2020

Table 4. Typical SBP specifications

Ultra-Short Baseline (USBL) Subsea Positioning

An Ultra-Short Baseline (USBL) is a subsea positioning system widely used by the offshore marine industry and scientific research vessels to accurately track the position of towed equipment and sensors. The USBL system consists of a transceiver mounted to the survey vessel, and transponders on the towed equipment.

To calculate a subsea position, the USBL calculates both a range and an angle from the transceiver to the subsea beacon. Angles are measured by the transceiver, which contains an array of transducers. The transceiver emits an acoustic signal at predetermined periods (often 0.5 seconds) which is returned by the transponder and allows for the bearing and distance to be calculated.

USBL systems are designed for close range transmission and thus typically emit pulses of medium frequency sound (20 to 50 kHz). Manufacturers report SPL values of 194 to 207dB re 1µPa at 1m depending on the model used, taking as an example the higher range of USBL source (Kongsberg HiPAP) with a SPL of 207dB re 1µPa at 1m.

Cone-Penetration Test (CPT)

The survey vessel will position itself over the target position to carry out the CPT. The seabed CPT rig (such as a Neptune 3000, Figure 25) is deployed to the seabed from the vessel crane, A-frame or dedicated Launch and Recovery System (LARS). Once on the seabed, in a stable position, a steel rod with a conical tip (typically an apex angle of 60° and a diameter of 35.7 mm) is pushed at a steady rate into the seabed until it reaches target penetration depth of 3 to 6m or refusal. The penetration resistance at the tip and along a section of the shaft (friction sleeve) is measured and recorded for later analysis.

Refusal is indicated by peak system thrust, excessive load on the tip or excessive inclination of the cone. If target penetration depth is not met, the CPT rig may be moved to a nearby position on the seabed and the test repeated. The time taken to complete a shallow CPT is typically less than 10 minutes but the total time in the water from deployment to recovery may be 1 to 2 hours at each position, depending on water depth and sea state.

There is very little published information on the sound pressure levels generated from CPT equipment, collected either from field experimentation or from manufactures specifications. Data from a similar device, indicates that sound pressure source levels are typically within the range 118 - 145 decibels (dB) (BOEM 2012, EIRGRID 2014.

Figure 25. Neptune 3000 CPT rig

Gravity Core

Gravity corers (Figure 26) provide a rapid means of obtaining a continuous core sample in water depths from a few metres down to several thousand metres. A gravity corer consists of a steel tube in which is inserted a plastic liner to hold the core sample. Gravity corers are commonly used for cable route investigations.

A set of heavy weights, up to 750 kg, is attached at the top end of the tube above which is a fin arrangement to keep the corer stable and vertical during its fall to the seabed. The sampler penetrates the seabed under its own weight. Normal practice is to lower the device to within 10 m of the seabed before releasing. The penetration depth is between 1 m and 3 m. Penetration in stiffer clays or sands is usually limited.

The penetrating end of the tube is fitted with a cutter and a concave spring-steel core-catcher to retain the sample when the corer is retracted from the soil. The suction caused when withdrawing a core barrel from a soft soil such as clay, can pull the sample from the barrel, or in other ways disturb its homogeneity. By fitting a piston above the sample, the partial vacuum caused above the piston, when the barrel is withdrawn, keeps the sample from being pulled out of the tube.

Upon refusal or at target depth of 3m, the sampler is recovered on deck where the sample is split, typically into 1m lengths, logged, sealed and stored for later laboratory analysis. The typical diameter of the liner is in the region of 90mm with a typical maximum diameter of 120mm.

Figure 26. Gravity Corer schematic

Vibrocore

Vibrocorers are used wherever soil conditions are unsuited to gravity corers or where greater penetration of the seabed is necessary. Vibrocore is best suited to non-cohesive soils (e.g. gravel or sand) as samples recovered are considered disturbed. Vibrocorers are commonly used for cable route investigations.

To penetrate soils such as dense sands and gravels, or to reach deeper into stiff clays, rather than depending on a gravity free-fall, the corer's barrel is vibrated, thus facilitating its penetration into the soil. This vibration energy allows the core barrel to penetrate the sediments under self-weight. In other respects, the barrel and sample retention systems are similar to gravity corers.

The typical vibrocorer consists of a tall steel frame and tripod support. Within the frame is a standard 102 mm steel coring barrel in which is inserted a PVC liner to contain the sample. The typical diameter of the PVC liner is in the region of 90mm with a typical maximum diameter of 120mm. A spring steel core catcher is fitted to the cutting shoe, as with the gravity corer. Two linear electric motors enclosed in a pressure housing provide the vibratory motion; the core barrel is attached directly to the motor housing. Power is fed to the motors via an electrical control line from the survey vessel.

Once in motion, the heavy motor housing provides the mass to drive the core barrel into the seabed. The penetration depth can be from 2m to 8m depending on seabed conditions. A typical 6 m vibrocorer will weigh nearly two tonnes and requires a crane for A-Frame or deployment and recovery. Vibrocorers come with barrel lengths of 3m, 6m and 8m. A normal coring operation in 100 m water depth will take about one hour.

Once coring is started, the core barrel will penetrate to the target depth. Upon refusal or at target depth of 3m, the vibrocore is recovered on deck where the sample in the liner is removed from the barrel, the sample is split, typically into 1m lengths, logged, sealed and stored for later laboratory analysis.

The sounds produced by the operation of a vibrocorer on the seabed consist of a series of impulses corresponding to the movement and impacts of the mechanics of the vibrating motion from the oscillating motors on the core barrel. Expected sound pressure levels generated by vibrocore equipment would be approximately 187.4 dB re 1µPa at 1m (LGL, 2010),

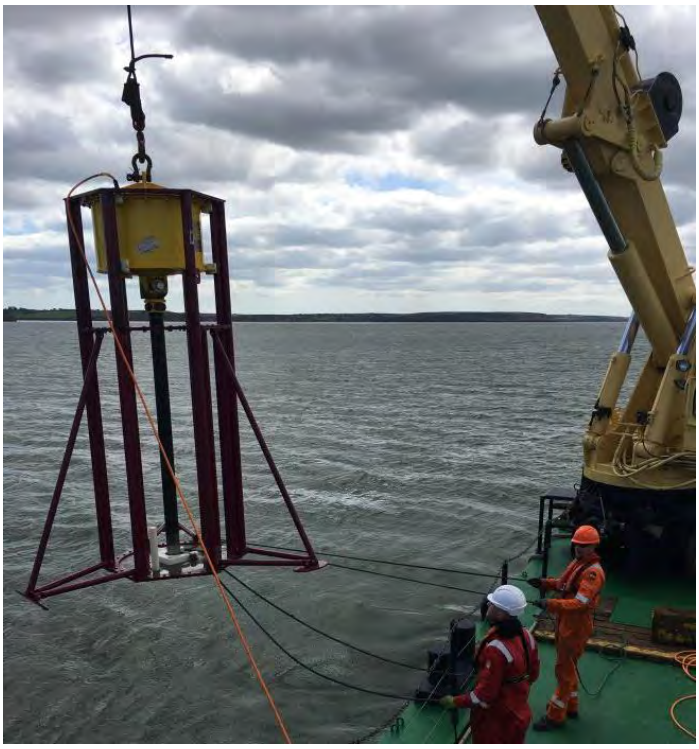


Figure 27. Deployment of Vibrocorer from Survey Vessel

i

Grab Samplers

Grab samplers are one of the most common methods of retrieving soil samples from the seabed surface. The grab sampler is a device that simply grabs a sample of the topmost layers of the seabed by bringing two steel clamshells together and cutting a bite from the seabed surface to a depth of 0.1 to 0.5m. The information they provide can be applied in a number of applications such as seabed classification, environmental sampling, chemical and biological analysis and ground truthing for morphological mapping and geophysical survey. Grab samplers can be used to recover samples of most seabed soils, although care is needed in selecting the right size unit for the task.

There are various grab sampler types to include but not limited to Van Veen (single or double, Figure 28), Hamon, Shipek and Day Grab samplers. Generally, some variants may come both as single or double, and in a variety of different sizes. The grab sampler comprises two steel clamshells acting on a single or double pivot. The shells are brought together either by a powerful spring (Shipek type) or powered hydraulic rams operated from the survey vessel.

In operation, the grab is lowered from the survey vessel to the seabed with the clamshells in the open position and which trigger shut when the sampler is in contact with the seafloor. The shells swivel together in a cutting action and retains a sample of seabed. The sampler is then recovered to the survey vessel for visual inspection, processing, logging and transfer to suitable sample containers for storage and later laboratory analysis. Typical performance rates are between three and four samples per hour.

The smaller Shipek type grab sampler is useful for ground truthing geophysical surveys for the surface layer, and samples are taken to about 0.1 m below the seabed. Larger hydraulic grabs are capable of recovering relatively intact samples of consolidated soils to a depth of about 0.5 m. In areas of large cobbles or boulders, grabs can become jammed open and their contents washed away during recovery to the surface. However, the hydraulic grab is more likely to recover cobbles and small boulders than any other system, and in this respect is invaluable. Various grabs will be available for the survey to ensure adequate sampling equipment for various sediment types.

Figure 28. Single and Double Van Veen Grab.

2.5 Survey Vessels

Offshore survey vessels are typically between 15m and 75m in length with potential for smaller vessels to be used in nearshore / shallow water areas. Offshore survey vessel typically have an endurance of approximately 14 to 28 days. A vessel with a shallow water draft will be utilised for the inshore survey area. An unmanned surface vehicle (USV) and/or autonomous surface vehicle (ASV) may also be used for the geophysical survey. The survey vessels may use a local port for personnel / equipment mobilisation, bunkering and provisioning.

The marine survey works will consist of a dedicated marine spread which will be suitable for the scope of work required, the water depth and the anticipated seabed conditions of the survey area. The exact equipment to be used will be confirmed following a tender process to procure the marine survey contractor.

All survey vessels will be fit for purpose, will possess all relevant classification certificates and capable of safely undertaking the survey work required. Health, safety, environment and welfare considerations will be a priority and will be actively managed during the course of the survey scopes of work. Appointed contractors will be required to comply with all legislation relevant to the activities within their scope of work. Prior to survey works taking place under a Maritime Usage Licence, both Project Supervisor for Design Process (PSDP) and Project Supervisor for Construction Stage (PSCS) will be appointed under the relevant legislation and project / survey specific HSE plans will be put in place which will form part of the survey project execution plans.

The vessels will conform to the following minimum requirements as appropriate:

- Compliance with Safety of Life at Sea (SOLAS), International Maritime Organization (IMO) and national requirements for operating within Irish territorial waters.
- Station-keeping and sea keeping capabilities required to carry out the proposed survey operations safely;
- Calibrated equipment and spares with necessary tools for all specified works;
- Endurance (e.g. fuel, water, stores, etc.) to undertake the required survey works;
- Sufficient qualified staff to allow the survey operations to be carried out efficiently, (typically 24 hour continuous for offshore survey, 12 hour for nearshore survey); and
- Appropriate accommodation and crew welfare facilities.

Survey vessels will generate some subsea noise in the marine environment from engine noise and dynamic positioning thrusters. Shipping noise is typically within the 50-300 Hz frequency band and is the dominant noise source in deeper water (DECC, 2011). Propellers on vessels all have the potential to produce cavitation noise. This sound is caused by vacuum bubbles that were generated by the collapse of bubbles created by the spinning of the propellers

Acoustic broadband source pressure levels typically increase with increasing vessel size, with smaller vessels (<50 m) having source pressure levels 160-175 dB (re 1µPa at 1m), medium size vessel (50-100 m) 165-180 dB (re 1µPa at 1m) and large vessels (>100 m) 180-190 dB (re 1µPa at 1m) (DECC, 2011). Every vessel has a unique noise signature and for each vessel this can change in response to a number of factors, including; ship speed, operational status, vessel load, the condition of the vessel and even the properties of the water that the vessel is operating in.

2.6 Marine Survey and Site Investigations Sound Pressure Level Summary

All survey works that involve the use of acoustic instrumentation will follow the Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters, 2014.

The ranges of noise frequency and sound pressure levels associated with all the surveys outlined in previous sections is summarised in Tables 5. and 6 below. It can be noted that as the focus of the cable route surveys within the Maritime Usage Licence application area is the seabed surface and upper layers of seabed sediments and generally obtaining higher resolution data, the geophysical equipment such as MBES and SSS is generally operated more towards the higher end of the frequency range where possible.

2.7 Timeline and Duration of Survey Activities

The intention is to commence the survey as soon as feasible following license award, taking into account survey vessel availability, the overall transatlantic cable route survey programme, seasonality and suitable weather windows. The exact mobilisation dates will not be known until the process of procuring a contractor and issue of the Maritime Usage Licence is complete. It is anticipated that the marine

geophysical survey and site investigations activities within the Maritime Usage Licence area will take less than 4 months in total and ideally will be completed in one operation. However, depending on operational factors this may be split up over 8 months. The estimated time required to complete the cable route survey campaign activities is described in Table 7 below.

Equipment Type	Purpose	Frequency Range	Duration	*Maximum* Source Pressure Level (re 1µPa at 1 m)	Reference
Multibeam Echo Sounder (MBES)	Measure detailed bathymetry by transmitting sound pulses (active sonar).	200 kHz to 500 kHz	0.05 - 10 ms	210 - 245 dB.	Danson 2005, Hopkins 2007, DECC 2011, Lurton and DeReutier 2011, Lurton 2016, BEIS 2020, Crocker & Fratantonio 2016
Deepwater Multibeam Echo Sounder (MBES)	Measure detailed bathymetry by transmitting sound pulses (active sonar).	12 kHz	2 – 15 ms	210 Db.	Kongsberg
Side Scan Sonar (SSS)	Determine surficial nature of the seabed and detect objects by transmitting sound pulse.	200 kHz to 700 kHz	0.4 - 1.0 ms	200 - 240 dB.	BOEM 2016, BEIS 2020, DAHG 2014, Crocker & Fratantonio 2016
Sub-bottom Profiler (SBP) - Pinger	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	2 kHz to 15 kHz	0.5 - 30 ms	214 dB.	Hartley Anderson 2020
Sub-bottom Profiler (SBP) - Chirper	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	2 kHz to 13 kHz	5 - 40 ms	185 - 215 dB.	Crocker & Fratantonio 2016, Hartley Anderson 2020
Sub-bottom Profiler (SBP) - Boomer	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	500 Hz to 15 kHz	0.5 - 1.0 ms	205 - 215 dB.	Crocker & Fratantonio 2016
Sub-bottom Profiler (SBP) - Parametric	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	4 to 15 kHz, 85 to 115 kHz	0.2 - 30 ms	238 - 247 dB. 200 - 206 dB.	Hartley Anderson 2020
Ultra-Short Base Line (USBL)	Subsea positioning.	20 kHz to 50 kHz	5 - 10 ms	194 - 207 dB.	Kongsberg
Magnetometer	Identify ferrous anomalies for metal obstructions, shipwrecks, etc. on and under the seabed.	Passive	N/A	Passive	N/A
Survey Vessels	Carry out the survey and deploy the equipment.	50 Hz to 300 Hz	N/A	160 - 190 dB.	DECC 2011

Table 5. Marine Survey Activities

Equipment Type	Purpose	Number of locations within Licence Application Area (up to)	Frequency Range	*Maximum* Source Pressure Level (re 1µPa at 1 m)	Reference
Cone Penetration Test (CPT)	Determine geotechnical engineering properties of seabed sediments.	96	28 Hz	118 - 145 dB.	BOEM 2012, EIRGRID 2014
Gravity Corer	Retrieve a seabed sediment sample by penetrating seabed with a steel core barrel under self-weight	48	N/A	N/A	N/A
Vibrocorer	Retrieve a seabed sediment sample by penetrating seabed with a vibrating steel core barrel	48	30 Hz	187.4 dB.	LGL 2010
Grab Samples	Collect small sediment samples from seabed surface with clamshell mechanism	26	N/A	N/A	N/A

Table 6. Marine Site Investigation Activities

Activity	Typical Time Period Required for Activity	Total Number of Site Investigation Locations	Total Time for Survey Activity	Seabed Area per Location	Seabed Area per Activity (ha)	Total Area (ha)	Area Directly Affected as % of Maritime Usage Licence Application Area
Inshore Geophysical Survey	3 to 4 days (weather and sea state dependent)	500m cable route corridor	3 to 4 days (weather and sea state dependent)	N/A	1.9 km^2	1.9 km^2	0.0113%
Offshore Geophysical Survey	20 to 23 days (weather and sea state dependent)	500m cable route corridor	20 to 23 days (weather and sea state dependent)	N/A	294 km^2	294 km^2	1.7417%
Deepwater MBES Survey	7 to 9 days (weather and sea state dependent)	3 x Water Depth (10km maximum)	7 to 9 days (weather and sea state dependent)	N/A	3915 km^2	3915 km^2	23.1931%
CPT	30 minutes - 3 hours in any one location	96	192 hours within total 16 days of Site Investigations campaign (weather and sea state dependent, excluding transit between locations)	8m^2	0.0008 ha	0.076 ha	0.0002%
Gravity Corer	30 minutes - 3 hours in any one location	48	96 hours within total 16 days of Site Investigations campaign (weather and sea state dependent, excluding transit between locations)	1m^2	0.0001 ha	0.0048 ha	0.0000%
Vibro Corer	30 minutes - 3 hours in any one location	48	96 hours within total 16 days of Site Investigations campaign (weather and sea state dependent, excluding transit between locations)	8m^2	0.0008 ha	0.0384 ha	0.0001%
Grab Samples	20 minutes – 2 hours in any one location	26	26 hours within total 16 days of Site Investigations campaign (weather and sea state dependent, excluding transit between locations)	0.5m^2	0.00005 ha	0.0013 ha	0.0000%

Table 7. Estimated Time and Duration of Survey Activities

3. Ecological Assessment Methodology

3.1 Desk Study

A desk study was undertaken to gather and assess ecological data prior to undertaking fieldwork elements. Sources of datasets and information included:

- The National Parks and Wildlife Service
- National Biodiversity Data Centre
- Satellite, aerial and 6" map imagery
- Inland Fisheries Ireland
- INFOMAR (Lidar, backscatter and multibeam) (WMS data)
- Irish Whale and Dolphin Group
- Environmental Protection Agency (Water Quality Data)
- Bing Maps (ArcGIS)

A provisional desk based assessment of the potential intertidal and subtidal habitats was carried out. This included a detailed assessment of INFOMAR data (backscatter, multibeam and LIDAR) in addition to Marine Strategy Framework Directive habitat mapping of the inshore and off-shore area, Admiralty charts and satellite imagery and NPWS Rare and Protected Species Data.

3.2 Field Survey

Field surveys of the potential landfall sites at Long Strand and Ownahincha Beach were carried out by Bryan Deegan (MCIEEM) Altemar Ltd. on 17th December 2022 and 14th March 2024. The surveys covered intertidal and terrestrial elements of the project. It also included areas that involved equipment movements e.g. car park and in addition to beach access routes.

The purpose of the field surveys was to identify habitat extents in relation to the proposed works. In addition, more detailed information on the species composition and structure of habitats, conservation value and other data were gathered.

Survey Limitations

Intertidal field surveys were carried out in December 2022 and March 2024, during the wintering bird season. Significant local pedestrian and canine activity was noted within the landfall areas of the proposed survey works. In light of this, additional detail was gleaned from the desk-based review particularly in relation to the subtidal data and conservation objectives supporting documents for both the SPAs and SACs.

3.3 Consultation

The National Parks and Wildlife Service (NPWS) were consulted in relation to species and sites of conservation interest. Data of rare and threatened species were acquired from NPWS. The National Biological Data Centre records were consulted for species of conservation significance.

3.4 Spatial Scope and Zone of Influence

IEEM (2006) defined the zone of influence as "*the areas/resources that may be affected by the biophysical changes caused by activities associated with a project*". In order to define the extent of the study area for assessment, all elements of the project were assessed and reviewed in order to identify the spatial scale at which ecological features could be impacted. Due to the limited temporal and geographical scale of the project and the use of Best Available Techniques (BAT), the slow speed of the survey vessel (4kn), it is considered that the potential impacts of the proposed works could only extend beyond 500 m of the subtidal elements of the project due to noise generation and potential disturbance of sediment. However, as outlined in IEEM (2010) "*in the marine environment it is more difficult to define the geographical framework precisely and to accommodate all factors that should influence the definition of value, e.g. size or conservation status of populations or the quality of habitats*." As a result, "*it is very unlikely that the impacts on integrity can be evaluated without considering functions and processes acting outside the site's formal boundary*." It is important to note that unlike other maritime operations, the survey vessel speed will be very slow (4 knots). However, the project has the potential to introduce noise into the marine environment particularly through the use of Ultra-Short Baseline (USBL), Multibeam Echosounder (MBES), and Side-scan Sonar (SSS) equipment, which may extend the effects of the project beyond 2km. In the interest of carrying out a thorough assessment in line with the precautionary principle, the ZoI was expanded for this assessment to include designated sites, habitats, and species within 15km of the proposed survey area, and sites beyond 15km that have the potential to be impacted by the proposed survey works based on the Source-Pathway-Receptor model. This was done in the interest of ensuring that any potential impacts, however indirect or remote, were taken into account. It is important to note that this assessment included the potential for noise impacts on marine mammals, in line the accompanying Natura Impact Statement.

Marine Mammals

Cetaceans and Seals

As outlined in NPWS[1] "*Cetaceans account for 48% of all the native species of mammals, both marine and terrestrial, recorded in Ireland and Irish waters are thought to contain important habitats for cetaceans within the northeast Atlantic. To date, 24 species of cetacean, or 28% of species described worldwide, have been recorded in Ireland. Irish cetaceans include six species of baleen whale and eighteen species of toothed whale, including five species of beaked whale. Twenty-two of these have been reported stranded ashore and 20 species observed at sea. Two species (Pygmy sperm whale and Gervais' beaked whale) are only known from stranded individuals and two species (Northern right whale and White whale/beluga) have only been recorded historically, with neither species occurring in the stranding record so far.*

Ireland also has two species of seals, the Common Seal (or Harbour Seal) and the Grey Seal. Whilst both species haul out on land for key stages of their life history, the majority of their time is spent in the marine environment.

In Ireland, the 1992 EC Habitats Directive as transposed by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) requires that both seal species and all cetaceans occurring in Ireland are maintained at favourable conservation status. Under Article 12 of the Directive, all cetaceans should receive strict protection within the Exclusive Economic Zone. Under Article 4 of the Directive, Special Areas of Conservation (SACs) must be proposed for the following species:"

- Bottlenose Dolphin
- Harbour Porpoise
- Common Seal
- Grey Seal

[1] https://www.npws.ie/marine/marine-species/cetaceans

The protection afforded to marine mammals in Ireland is summarised below:

- Harbour Porpoise Annex II of EC Habitats Directive Annex IV of EC Habitats Directive/Protected species of Wildlife (Amendment) Act/OSPAR List of Threatened and Declining Species and Habitats
- Bottlenose Dolphin Annex II of EC Habitats Directive/Annex IV of EC Habitats Directive/Protected species of Wildlife (Amendment) Act
- All Cetacea Annex IV of EC Habitats Directive/Protected species of Wildlife (Amendment) Act
- Grey Seal/Harbour Seal Annex II of EC Habitats Directive/Protected species of Wildlife (Amendment) Act

Recent research suggests that the foraging range for grey seals is 448km (Carter et al., 2022) whilst the foraging range for harbour seal is estimated at 273 km (Carter et al., 2022). Further, there are a number of SACs designated for cetaceans (harbour porpoise and common dolphin) in Ireland. As these species are a highly mobile species and are designated as qualifying interests of Natura 2000 sites within and outside the Irish EEZ, specific Management Units (MU) are utilised to assess the potential impacts of a proposed project on these species, based on the JNCC Review of Management Unit boundaries for cetaceans in UK waters (2023) methodology[2]. The proposed project is located within the Celtic and Irish Seas MU for harbour porpoise, and Oceanic Waters MU, Offshore Channel, Celtic Sea & SW England MU, and West Coast of Ireland MUs for bottlenose dolphin (IAMMWG, 2015). The ZoI of the proposed project has been extended to include the potential for significant effects on grey seal, harbour seal, harbour porpoise and common bottlenose dolphin as there is potential for these mobile marine mammals to enter the ZoI from within the Celtic and Irish Seas MU (harbour porpoise), Oceanic Waters MU (bottlenose dolphin), Offshore Channel, Celtic Sea & SW England MU (bottlenose dolphin), and West Coast of Ireland MU (bottlenose dolphin).

Beaked whales (*Ziphiidae*) are a family of odontocete cetaceans that typically live in deep offshore waters and perform long, deep dives in search of their prey (Quick *et al.,* 2020; Hooker *et al.,* 2019). Due to their preference for deep waters and given that they perform long, deep dives, beaked whales are difficult to study and little information is available on their distribution and population structure (Rogan et al., 2017). Studies indicate that the distribution of these species is associated with steep continental slope habitats in the Northeast Atlantic and have been recorded in northwestern areas of Ireland's offshore waters[3]. Beaked whales are sensitive to anthropogenic noise (Barile et al., 2021), and their diving and hunting behaviours can be impacted by increased underwater noise. Beaked whale species recorded in Irish waters include Cuvier's beaked whale (*Ziphius cavirostris*), Sowerby's beaked whales (*Mesoplodon bidens*), True's beaked whales (*Mesoplodon mirus*), and Northern bottlenose whale (*Hyperoodon ampullatus*).

Otter

Otters are a semi-aquatic species who use the marine environment for foraging and are protected under Annex II and Annex IV of the Habitats Directive. As detailed by Reid *et al.* (2013), female otters have territories of 7.5 ± 1.5km in length along a riverine environment and 6.5 ± 1.0km in coastal environments, while male otter territory along rivers is approximately 13.2 ± 5.3km in length with a high degree of variability. Out of an abundance of caution, the ZoI of the proposed project has been extended to include the potential for significant effects on otter that may enter the proposed area of works.

[2] https://data.jncc.gov.uk/data/b48b8332-349f-4358-b080-b4506384f4f7/jncc-report-734.pdf
[3] https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/marine-mammals/abundance-distribution-cetaceans/abundance-and-distribution-cetaceans/

3.5 Impact Assessment Criteria

This section of the EcIA examines the potential causes of impact that could result in likely significant effects to the species and habitats that occur within the ZOI of the proposed development. These impacts could arise during either the construction or operational phases of the proposed development. The following terms are derived from EPA EIAR Guidance (2022) and are used in the assessment to describe the predicted and potential residual impacts on the ecology by the construction and operation of the proposed development.

Magnitude of effect and typical descriptions

Magnitude of effect (change)		Typical description
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Medium	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Low	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial effect on attribute or a reduced risk of negative effect occurring
Negligible	Adverse	Very minor loss or alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.

Criteria for Establishing Receptor Sensitivity/Importance

Importance	Ecological Valuation
International	Sites, habitats or species protected under international legislation e.g. Habitats and Species Directive. These include, amongst others: SACs, SPAs, Ramsar sites, Biosphere Reserves, including sites proposed for designation, plus undesignated sites that support populations of internationally important species.
National	Sites, habitats or species protected under national legislation e.g. Wildlife Act 1976 and amendments. Sites include designated and proposed NHAs, Statutory Nature Reserves, National Parks, plus areas supporting resident or regularly occurring populations of species of national importance (e.g. 1% national population) protected under the Wildlife Acts, and rare (Red Data List) species.
Regional	Sites, habitats or species which may have regional importance, but which are not protected under legislation (although Local Plans may specifically identify them) e.g. viable areas or populations of Regional Biodiversity Action Plan habitats or species.
Local/County	Areas supporting resident or regularly occurring populations of protected and red data listed-species of county importance (e.g. 1% of county population), Areas containing Annex I habitats not of international/national importance, County important populations of species or habitats identified in county plans, Areas of special amenity or subject to tree protection constraints.
Local	Areas supporting resident or regularly occurring populations of protected and red data listed-species of local importance (e.g. 1% of local population), Undesignated sites or features which enhance or enrich the local area, sites containing viable area or populations of local Biodiversity Plan habitats or species, local Red Data List species etc.
Site	Very low importance and rarity. Ecological feature of no significant value beyond the site boundary

Quality of Potential Impacts on Biodiversity

Quality of Effects	Effect Description
Negative /Adverse Effect	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Neutral Effect	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Positive Effect	A change which improves the quality of the environment (for example, by increasing species diversity, or improving the reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).

Significance of Effects

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

Duration of Impacts

Duration and Frequency of Effect	Description
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting less than a year
Short-term	Effects lasting one to seven years.
Medium-term	Effects lasting seven to fifteen years.
Long-term	Effects lasting fifteen to sixty years.
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

Possibility of Impact

Describing the Probability of Effects	Description
Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

4. Results

4.1 Proximity to Designated Conservation Sites

Designated conservation sites (National and International) within the ZoI of the proposed survey works are demonstrated in Figures 38-41.

The nearest designated conservation sites are Kilkeran Lake and Castlefreke Dunes SAC & pNHA, as the proposed landfall area is located within both sites (Figures 38 & 40). The nearest Special Protection Area (SPA) is Galley Head to Duneen Point SPA (0.9 km) (Figure 39). There are no Natural Heritage Area (NHA) or Ramsar sites within 15km of the proposed survey works (Figures 40 & 41).

The intertidal section of this project will involve trial pits (in SAC & pNHA site) and machinery that will enter the upper shore (within the conservation site). The proposed works within the Kileran Lake and Castlefreke Dunes SAC & pNHA will consist of vehicles, machinery and equipment entering the SAC & pNHA and digging and backfilling three trial pits down the shore. Given that there are proposed works located within Kilkeran Lake and Castlefreke Dunes (SAC & pNHA), mitigation measures are required to ensure that there are no significant impacts on the qualifying interests of these sites. It should be noted that no works are proposed in the vicinity of the features of interest of the SAC, and that beach access is wide enough to allow for machinery to enter the intertidal without impacting on features of interest of this SAC.

In relation to marine mammals, the proposed subtidal survey works are located 8.1 km from the Roaringwater Bay and Islands SAC. There is potential for marine mammals from Roaringwater Bay and Islands SAC (*Halichoerus grypus* (grey seal) and *Phocoena phocoena* (harbour porpoise)) to be in the vicinity of the proposed survey works. Further, following an examination of relevant MU's and foraging areas for grey seal and harbour seal, there is the potential for the proposed survey works to impact on the following conservation sites due to the potential movements of harbour porpoise, common bottlenose dolphin, harbour seals, and grey seals (qualifying interests of these SACs):

- Roaringwater Bay and Islands SAC (IE)
- Glengarriff Harbour and Woodland SAC (IE)
- Kenmare River SAC (IE)
- Lower River Shannon SAC (IE)
- Blasket Island SAC (IE)
- Saltee Islands SAC (IE)
- Galway Bay Complex SAC (IE)
- Slaney River Valley SAC (IE)
- Kilkieran Bay And Islands SAC (IE)
- Slyne Head Peninsula SAC (IE)
- Slyne Head Islands SAC (IE)
- West Connacht Coast SAC (IE)
- Inishbofin and Inishshark SAC (IE)
- Clew Bay Complex SAC (IE)
- Rockabill to Dalkey Islands SAC (IE)
- Duvillaun Islands SAC (IE)
- Lambay Island SAC (IE)
- Inishkea Islands SAC (IE)
- Slieve Tooey/Tormore Island/Loughbros Beg Bay SAC (IE)
- Horn Head and Rinclevan SAC (IE)
- Isles of Scilly Complex (UK)
- Bristol Channel Approaches/Dynesfeydd Môr Hafren (UK)
- Pembrokeshire Marine / Sir Benfro Forol (UK)
- West Wales Marine / Gorllewin Cymru Forol (UK)
- Cardigan Bay / Bae Ceredigion (UK)
- Lundy (UK)
- Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau (UK)

- North Anglesey Marine/Gogledd Môn Forol (UK)
- North Channel (UK)
- The Maidens (UK)
- Mers Celtiques – Talus du golfe de Gascogne (FR)
- Récifs du talus du golfe de Gascogne (FR)
- Ouessant-Molène (FR)
- Nord Bretagne DH (FR)
- Abers – Côtes des legends (FR)
- Anse de Goulven, dunes de Keremma (FR)
- Chaussée de Sein (FR)
- Côtes de Crozon (FR)
- Presqu'lle de Crozon (FR)
- Baie de Morlaix (FR)
- Rade de Brest, estuaire de l'Aulne (FR)
- Cap Sizun (FR)
- Côte de Granit rose-Sept-Iles (FR)
- Baie d'Audieme (FR)
- Rivière Leguer, forêts de Beffou, Coat an Noz et Coat an Hay (FR)
- Trégor – Goëlo (FR)
- Roches de Penmarch (FR)
- Archipel des Glénan (FR)
- Dunes et côtes de Trévignon (FR)
- Baie de Saint-Brieuc – Est (FR)
- Cap d'Erquy-Cap Fréhel (FR)
- Récifs et landes de la Hague (FR)
- Anse de Vauville (FR)
- Banc et récifs de Surtainville (FR)
- Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard (FR)
- Chaucy (FR)
- Côte de Cancale á Parmè (FR)
- Estuairie de la Rance (FR)
- Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire (FR)
- Baie du Mont Saint-Michel (FR)
- Baie de Seine occidentale (FR)
- Baie de Seine orientale (FR)
- Littoral Cauchois (FR)
- Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant (FR)

All designated conservation sites within 15km, and beyond 15km with the potential for significant effects on conservation sites (including Irish, French, and UK sites), are listed in Tables 8-11.

The proposed Survey Route Corridor and Works (including deepwater survey and sampling locations) from the landfall area to the Irish EEZ is demonstrated in Figures 29-33. Waterbodies (incl. high & low water marks and proximate sampling locations) located proximate to the Survey Route Corridor is demonstrated in Figure 34. Waterbodies and designated conservation sites (national and international) within / proximate to the proposed Survey Route Corridor are demonstrated in Figures 35-37. Designated conservation sites within 15 km of the proposed Survey Route Corridor are seen in Figures 38-41. The proposed fibre optic survey route in relation to the 12 nm limit, Designated Irish Continental shelf and Offshore SAC's (no offshore SAC's in the area) is demonstrated in Figure 42. Irish, FR, & UK SACs designated for Grey Seals (*Halichoerus grypus*) within 448km of the Proposed Survey Route Corridor are demonstrated in Figure 43. Irish, FR, & UK SACs designated for Harbour Seals (*Phoca vitulina*) within 273km of the Proposed Survey Route Corridor are demonstrated in Figure 44. Irish, FR, & UK SACs located within the Management Units (MU) for Bottlenose dolphin (*Tursiops truncatus*) and Harbour Porpoise (*Phocoena phocoena*) are demonstrated in Figures 45 & 46. The coastal waterbody status (WFD) of waterbodies proximate to the proposed survey works are demonstrated in Figure 47.

Table 8. Proximity to European sites of conservation importance (IE)

Designation	European Site	Distance
Special Areas of Conservation (SAC)		
SAC	Kilkeran Lake and Castlefreke Dunes SAC	Within
SAC	Lough Hyne Nature Reserve and Environs SAC	5.8 km
SAC	Clonakilty Bay SAC	5.9 km
SAC	Castletownshend SAC	6.5 km
SAC	Roaringwater Bay and Islands SAC	8.1 km **(Within MU for Harbour Porpoise)**
SAC	Myross Wood SAC	9.5 km
SAC	Glengarriff Harbour and Woodland SAC	38.2 km
SAC	Kenmare River SAC	49.8 km
SAC	Lower River Shannon SAC	76.9 km **(Within MU for Common Bottlenose Dolphin)**
SAC	Blasket Island SAC	102.5 km **(Within MU for Harbour Porpoise)**
SAC	Saltee Islands SAC	166.7 km
SAC	Galway Bay Complex SAC	172.7 km
SAC	Slaney River Valley SAC	182.6 km
SAC	Kilkieran Bay And Islands SAC	186.4 km
SAC	Slyne Head Peninsula SAC	217.3 km **(Within MU for Common Bottlenose Dolphin)**
SAC	Slyne Head Islands SAC	219 km **(Within MU for Common Bottlenose Dolphin)**
SAC	West Connacht Coast SAC	223.3 km **(Within MU for Common Bottlenose Dolphin)**
SAC	Inishbofin and Inishshark SAC	240.5 km
SAC	Clew Bay Complex SAC	249.2 km
SAC	Rockabill to Dalkey Islands SAC	271.4 km **(Within MU for Harbour Porpoise)**
SAC	Duvillaun Islands SAC	285.3 km **(Within MU for Common Bottlenose Dolphin)**
SAC	Lambay Island SAC	292.8 km
SAC	Inishkea Islands SAC	293.1 km
SAC	Slieve Tooey/Tormore Island/Loughbros Beg Bay SAC	349.6 km
SAC	Horn Head and Rinclevan SAC	405 km
Special Protection Areas (SPA)		
SPA	Galley Head to Duneen Point SPA	0.9 km
SPA	Sheeps Head to Toe Head SPA	3.7 km
SPA	Clonakilty Bay SPA	5.9 km
SPA	Seven Heads SPA	12.9 km

Table 9. Proximity to (proposed) NHAs & Ramsar sites (IE)

Designation	Site Name	Distance
(Proposed) Natural Heritage Areas		
pNHA	Kilkeran Lake and Castlefreke Dunes	**Survey Area Within pNHA**
pNHA	Rosscarbery Estuary	0.1 km
pNHA	Dirk Bay	2.6 km
pNHA	Lough Hyne Nature Reserve And Environs	5.8 km
pNHA	Clonakilty Bay	5.9 km
pNHA	Castletownshend (Gate Lodge)	6.2 km
pNHA	Castletownshend	6.8 km
pNHA	Cloonties Lough	6.8 km
pNHA	Roaringwater Bay And Islands	8.4 km
pNHA	Myross Wood	8.9 km
pNHA	Bateman's Lough	13.7 km
pNHA	Seven Heads And Dunworly Bay	14 km
Natural Heritage Areas		
N/A	None	N/A
Ramsar Sites		
N/A	None	N/A

Table 10. Proximity to European sites of conservation importance (UK) (within ZOI for Marine Mammals)

Designation	European Site	Distance
SAC	Isles of Scilly Complex	125 km
SAC	Bristol Channel Approaches/Dynesfeydd Môr Hafren	193.4 km **(Within MU for Harbour Porpoise)**
SAC	Pembrokeshire Marine / Sir Benfro Forol	233.1 km
SAC	West Wales Marine / Gorllewin Cymru Forol	235 km **(Within MU for Harbour Porpoise)**
SAC	Cardigan Bay / Bae Ceredigion	286.9 km
SAC	Lundy	293.6 km
SAC	Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau	309.7 km
SAC	North Anglesey Marine/Gogledd Môn Forol	318.3 km **(Within MU for Harbour Porpoise)**
SAC	North Channel	376.2 km **(Within MU for Harbour Porpoise)**
SAC	The Maidens	426.8 km

Table 11. Proximity to European sites of conservation importance (FR) (within ZOI for Marine Mammals)

Designation	European Site	Distance
SAC	Mers Celtiques – Talus du golfe de Gascogne	164.1 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Récifs du talus du golfe de Gascogne	202 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Ouessant-Molène	285.6 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Nord Bretagne DH	287.1 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Abers – Côtes des légendes	302.8 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Anse de Goulven, dunes de Keremma	326.9 km
SAC	Chaussée de Sein	313.9 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Côtes de Crozon	331.4 km **(Within MU for Harbour Porpoise)**
SAC	Presqu'lle de Crozon	333.9 km
SAC	Baie de Morlaix	337.2 km **(Within MU for Harbour Porpoise)**
SAC	Rade de Brest, estuaire de l'Aulne	340.4 km
SAC	Cap Sizun	345.2 km
SAC	Côte de Granit rose-Sept-Iles	345.2 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Baie d'Audieme	367.9 km
SAC	Rivière Leguer, forêts de Beffou, Coat an Noz et Coat an Hay	369.2 km **(Within MU for Harbour Porpoise)**
SAC	Trégor – Goëlo	372.3 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Roches de Penmarch	373.3 km
SAC	Archipel des Glénan	395 km
SAC	Dunes et côtes de Trévignon	400.7 km
SAC	Baie de Saint-Brieuc - Est	438 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Cap d'Erquy-Cap Fréhel	443.3 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Récifs et landes de la Hague	447.1 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Anse de Vauville	448.6 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Banc et récifs de Surtainville	452.4 km

Designation	European Site	Distance
		(Within MU for Bottlenose Dolphin & Harbour Porpoise)
SAC	Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard	463.6 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Chaucy	469.7 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Côte de Cancale á Parmè	479.5 km **(Within MU for Bottlenose Dolphin)**
SAC	Estuairie de la Rance	479.6 km **(Within MU for Harbour Porpoise)**
SAC	Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire	482.8 km **(Within MU for Bottlenose Dolphin)**
SAC	Baie du Mont Saint-Michel	488.9 km **(Within MU for Bottlenose Dolphin & Harbour Porpoise)**
SAC	Baie de Seine occidentale	501.3 km **(Within MU for Bottlenose Dolphin)**
SAC	Baie de Seine orientale	571.5 km **(Within MU for Bottlenose Dolphin)**
SAC	Littoral Cauchois	601.9 km **(Within MU for Bottlenose Dolphin)**
SAC	Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant	696.2 km **(Within MU for Bottlenose Dolphin)**

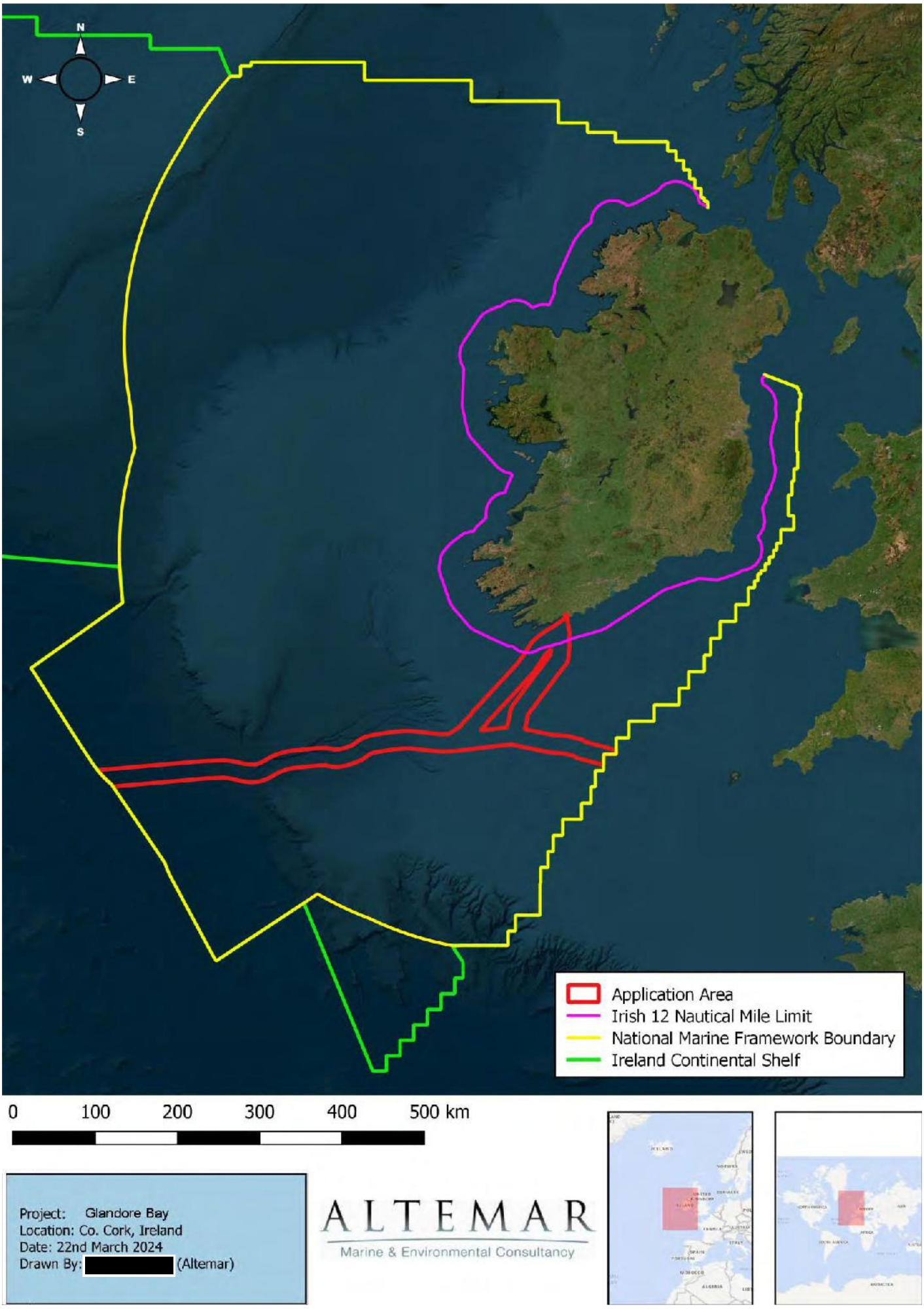


Figure 29: Proposed Survey Route Corridor (incl. 12nm limit, EEZ, & Irish Continental Shelf)

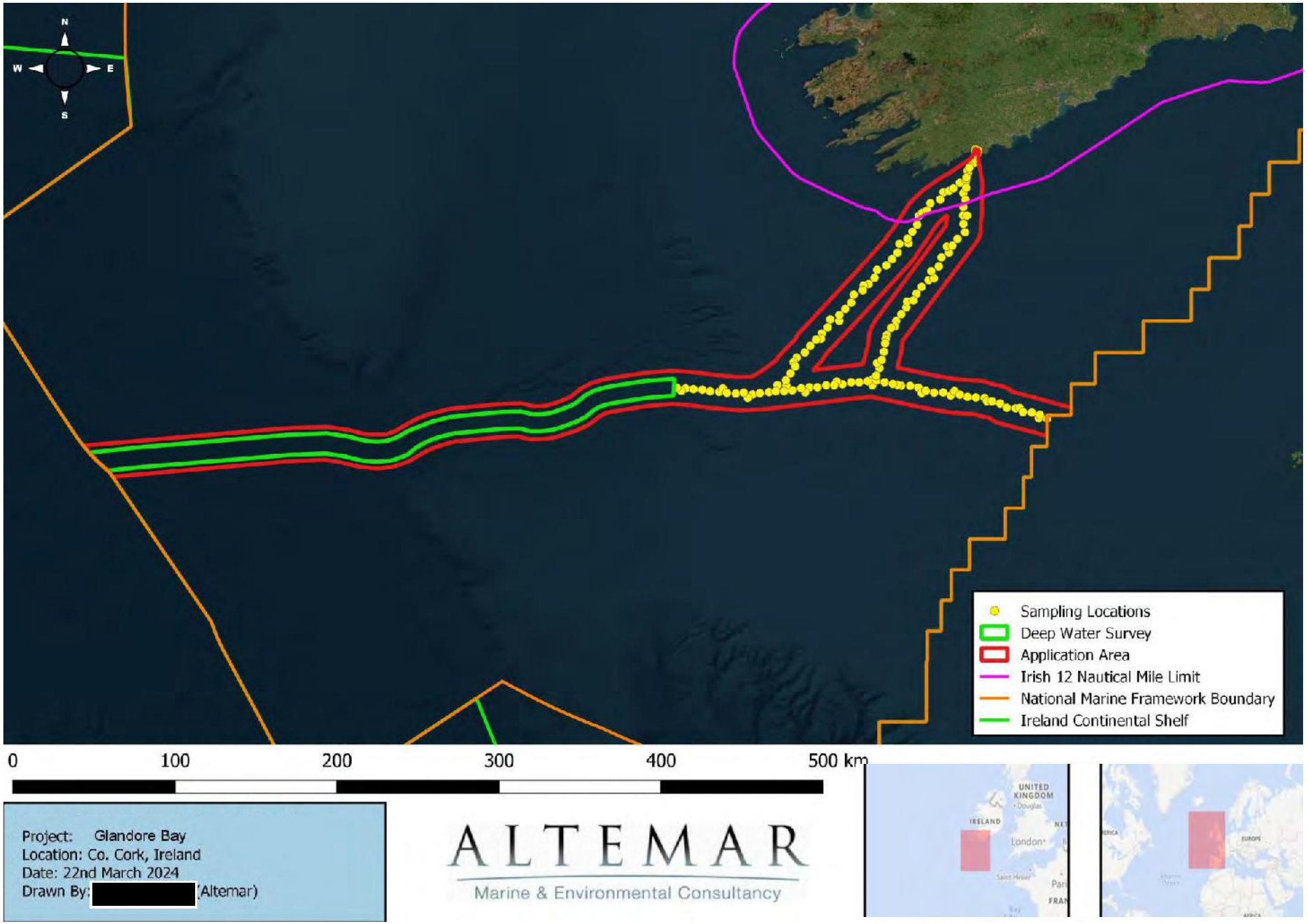


Figure 30: Proposed Survey Route Corridor & Sampling Locations (incl. 12nm limit, EEZ, & Irish Continental Shelf)

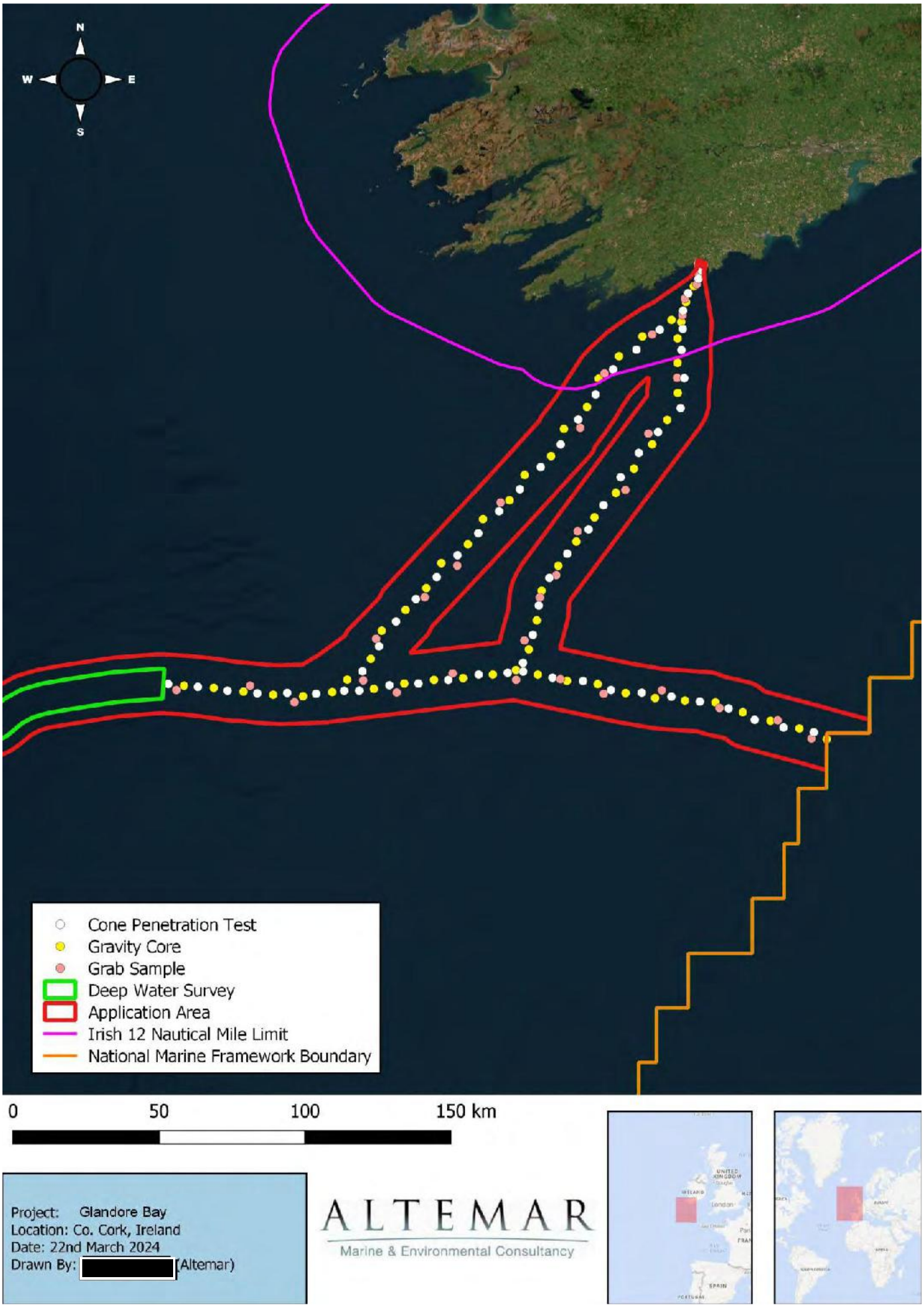


Figure 31: Proposed Survey Route Corridor & Sampling Locations (CPT, Grab Samples, and Gravity Core) (incl. 12nm limit, EEZ, & Irish Continental Shelf)

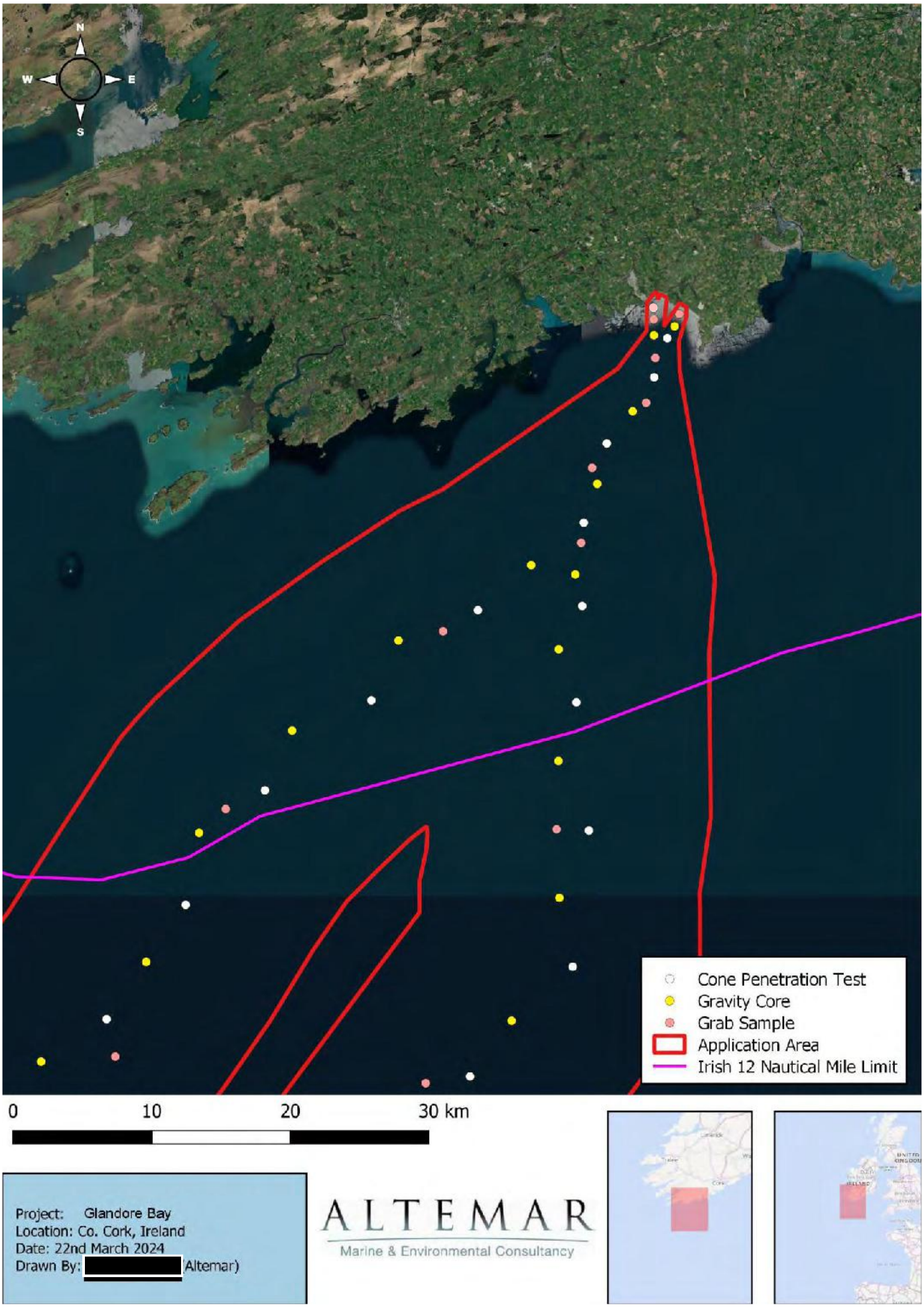


Figure 32: Proposed Survey Route Corridor & Sampling Locations (CPT, Grab Samples, and Gravity Core) to 12nm limit

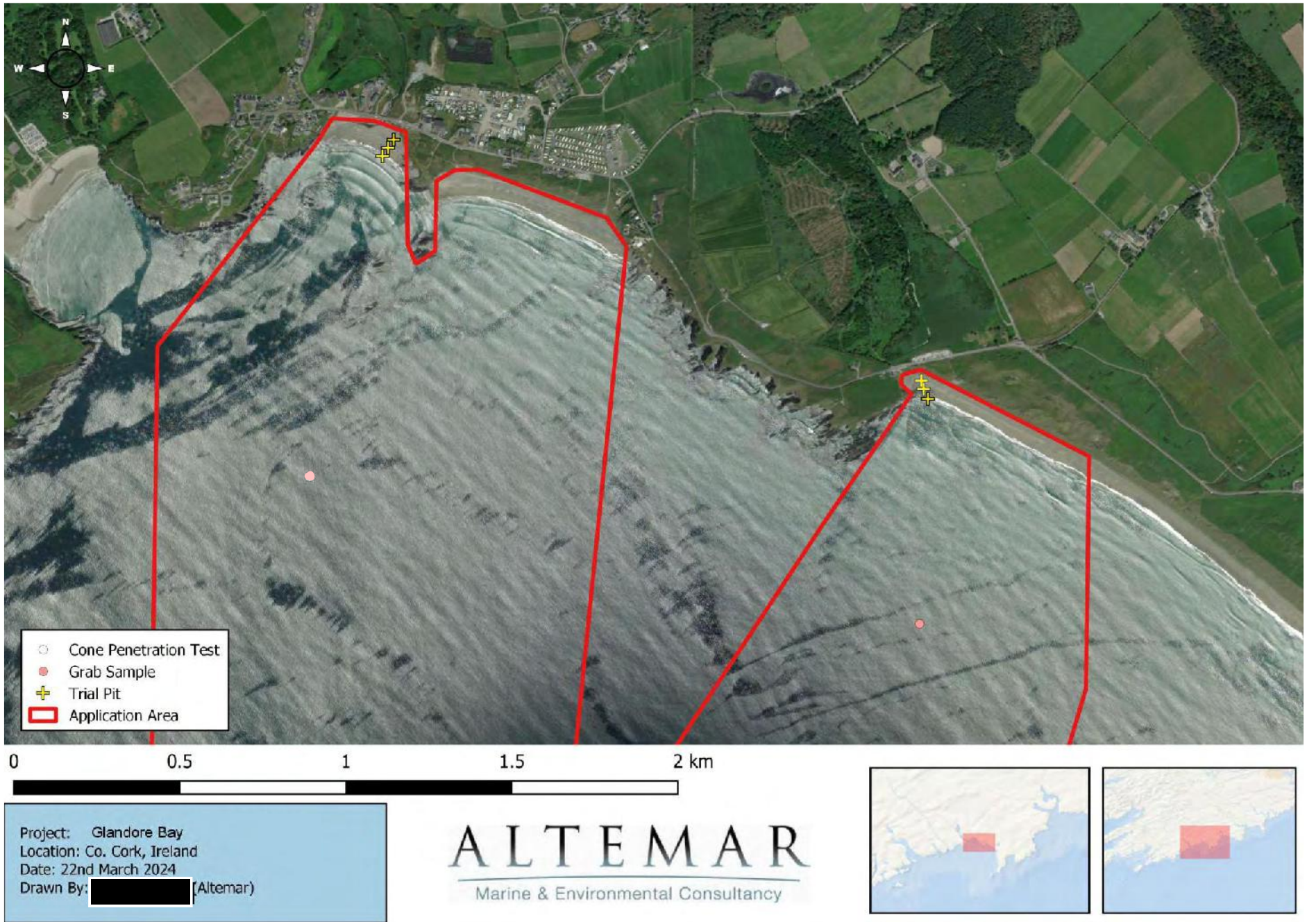


Figure 33. Proposed survey route corridor at landfall sites (incl. sampling locations)

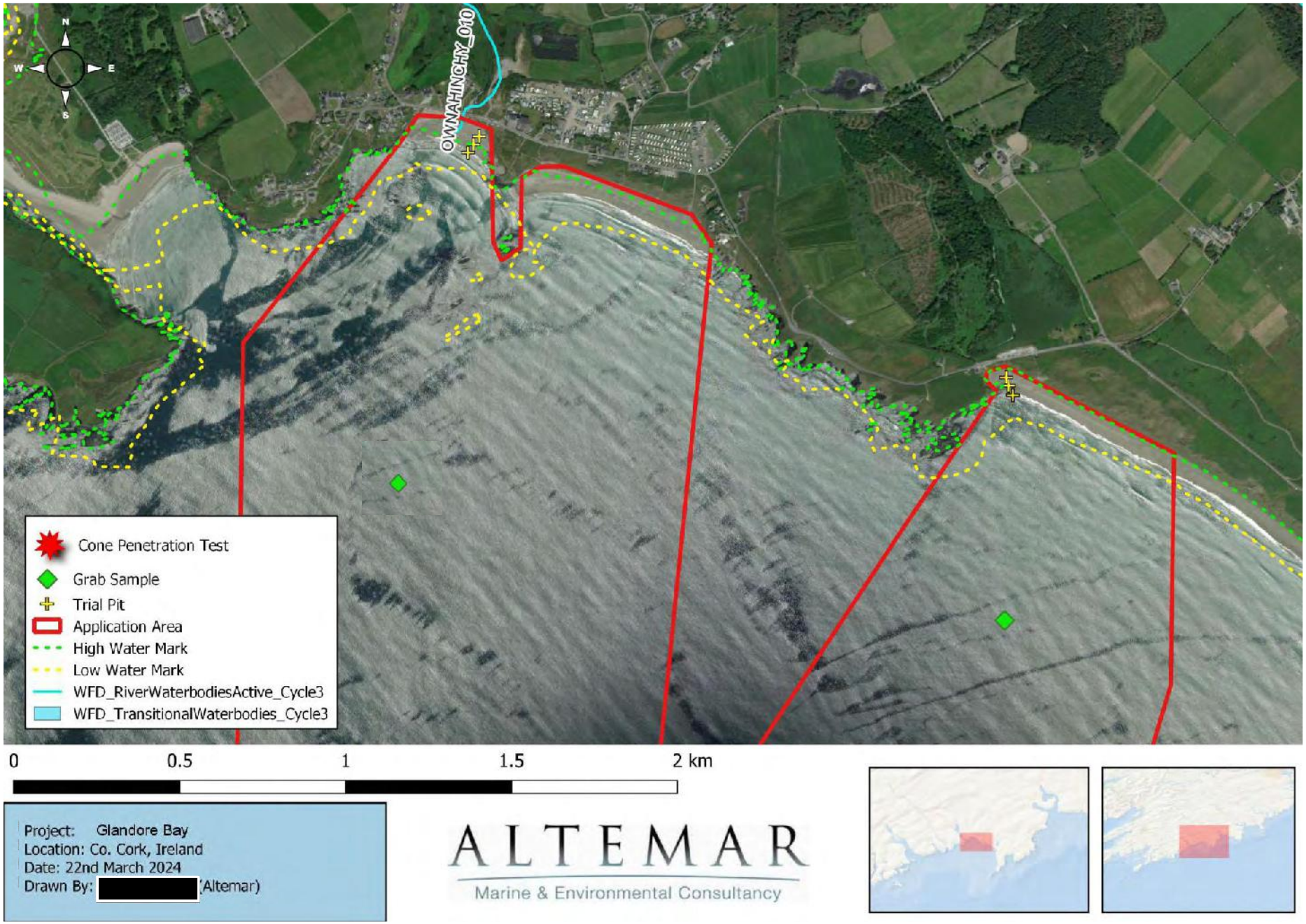


Figure 34. Proposed survey route corridor, sampling locations, HWM / LWM, and proximate watercourses to the landfall area.

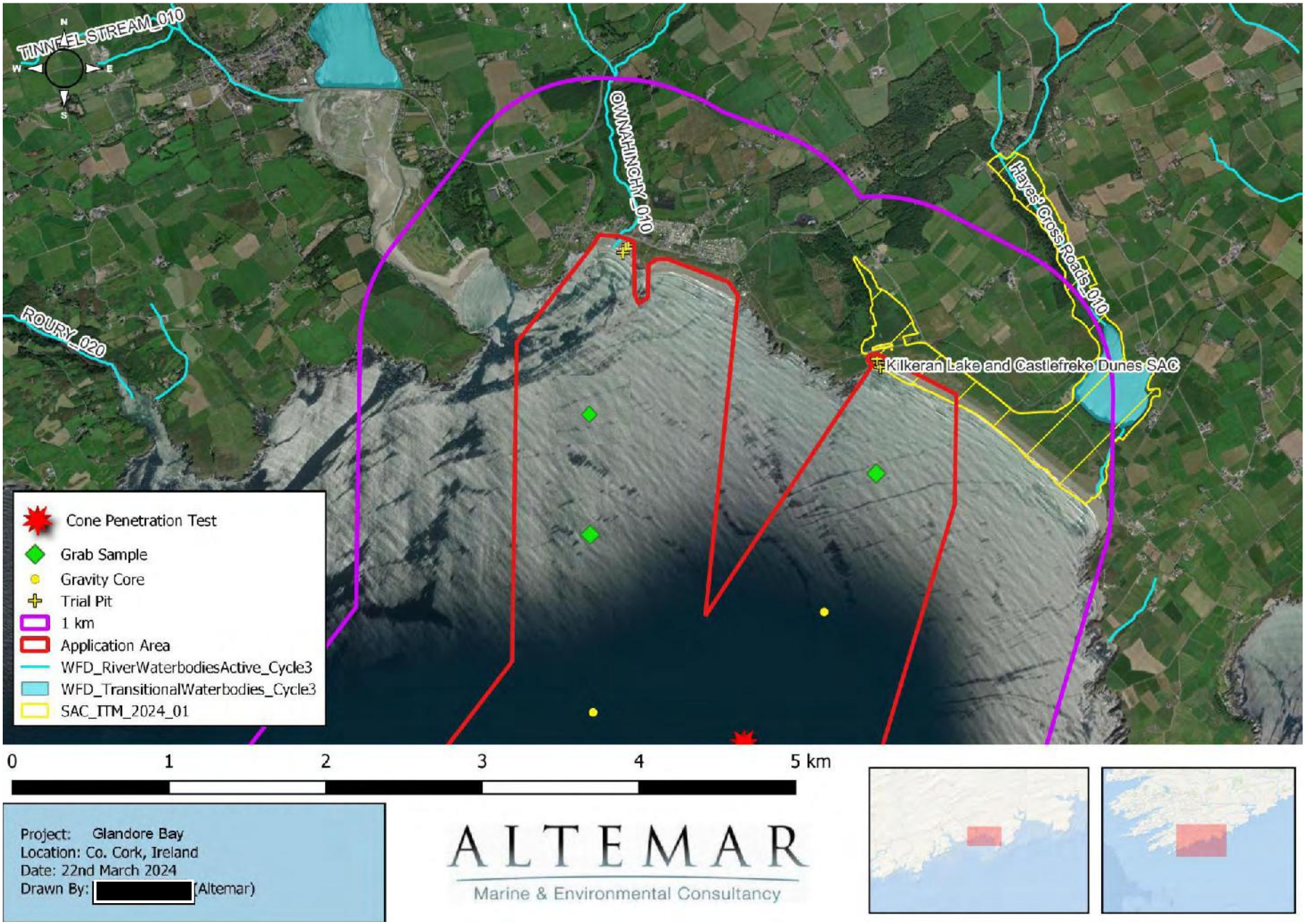


Figure 35. Proposed survey route corridor, sampling locations**,** waterbodies, and SACs proximate to the landfall area

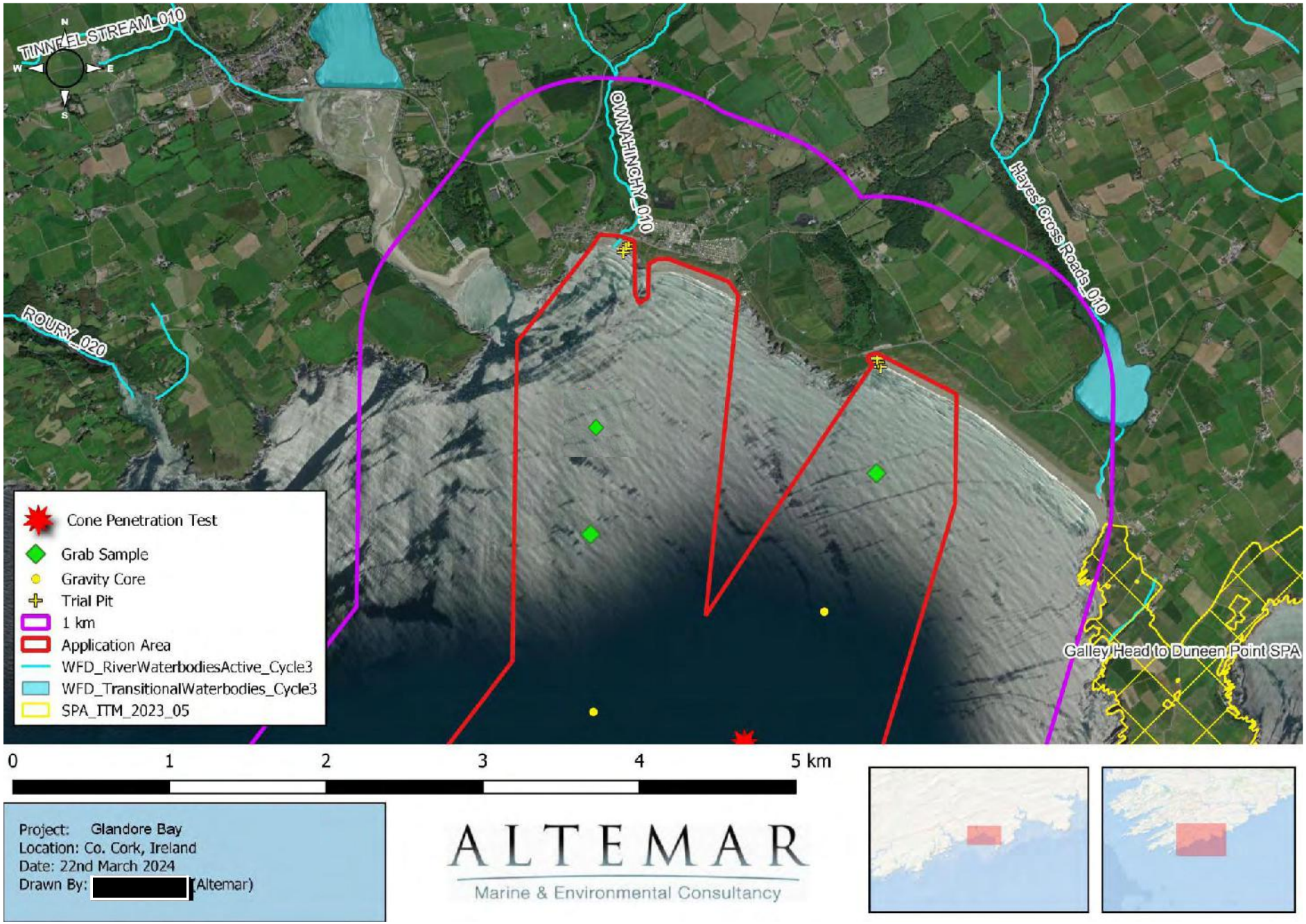


Figure 36. Proposed survey route corridor, sampling locations, waterbodies, and SPAs proximate to the landfall area.

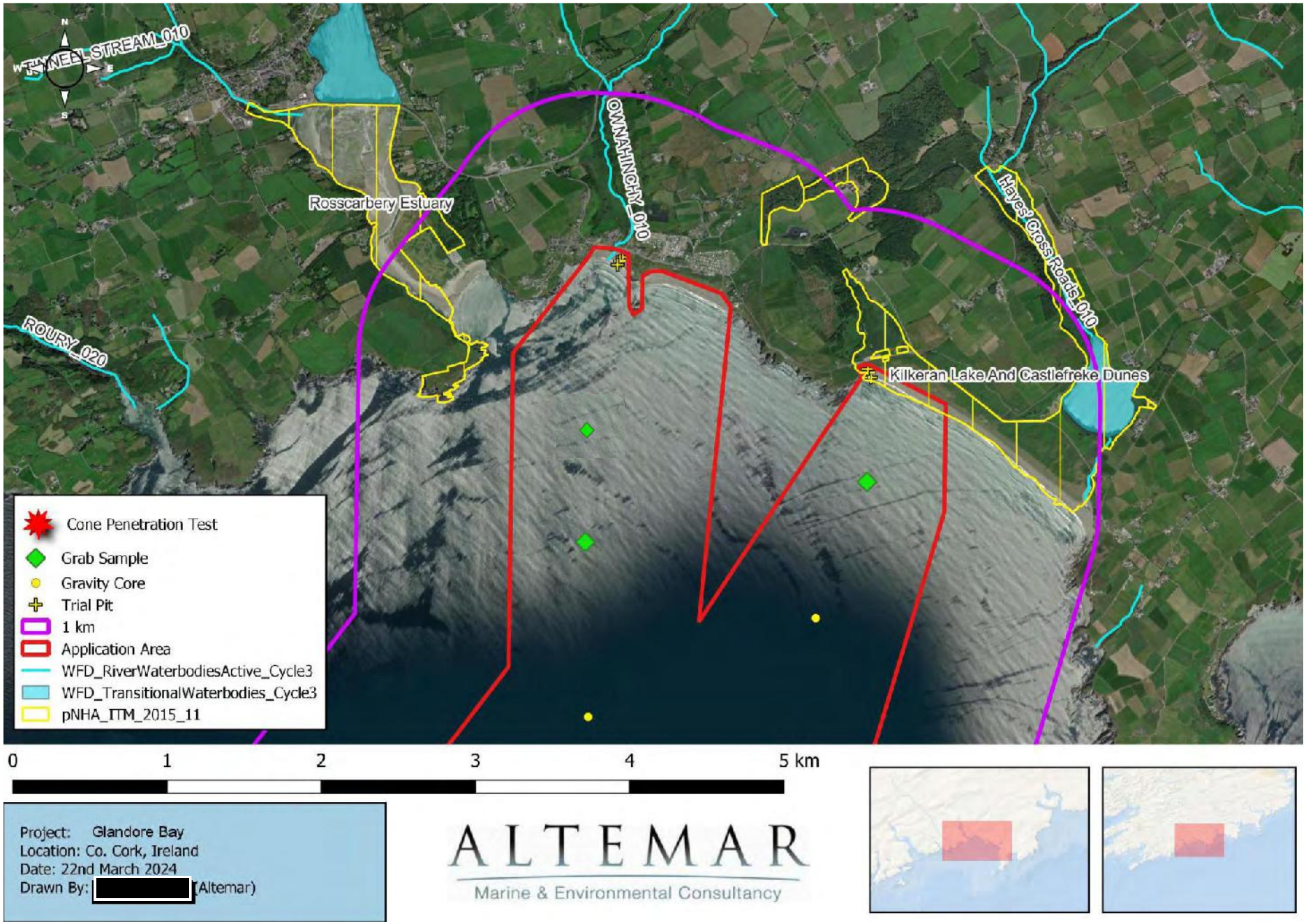


Figure 37. Proposed survey route corridor, sampling locations**,** waterbodies, and pNHAs proximate to the landfall area

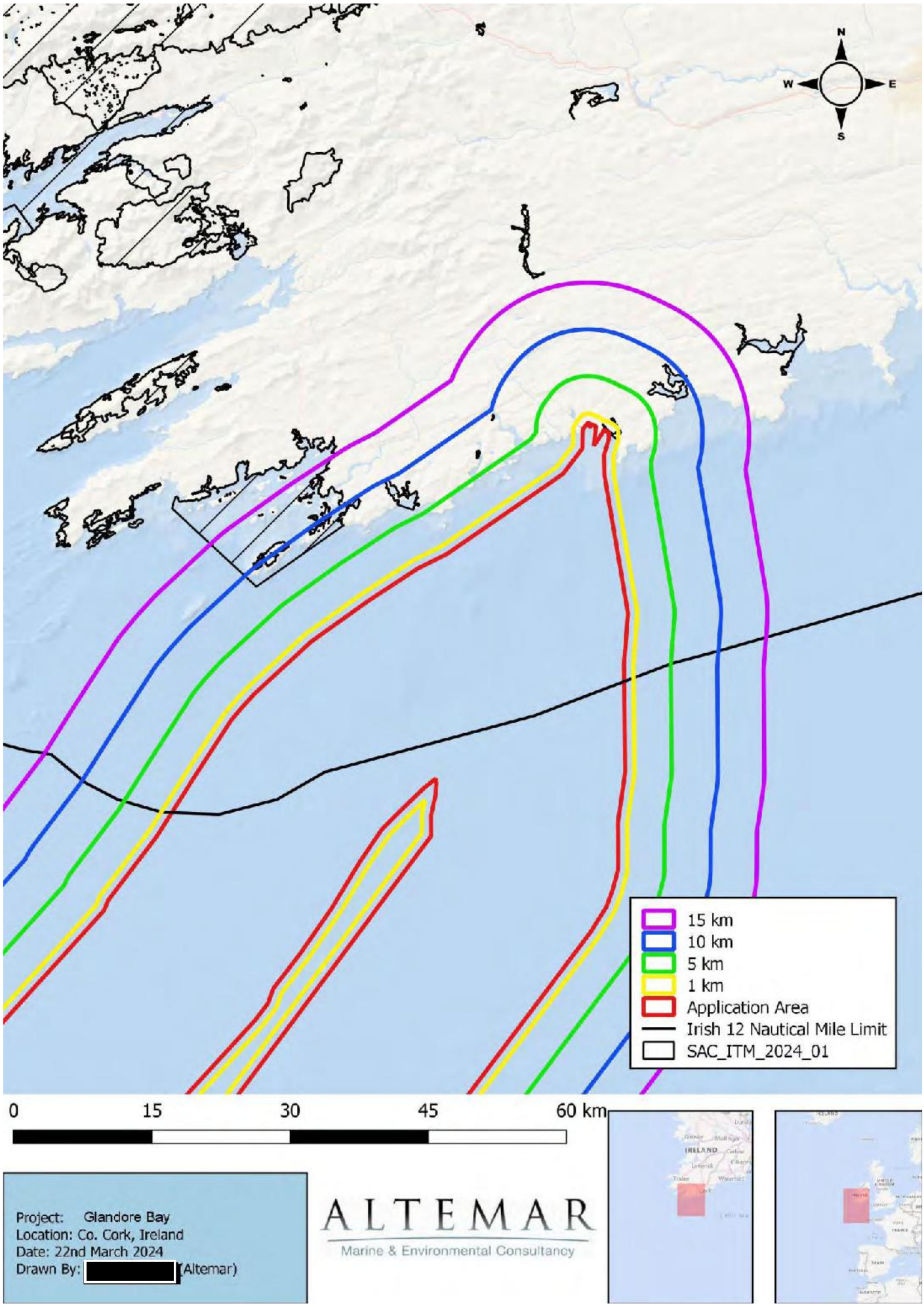


Figure 38. Special Areas of Conservation (SAC) within 15km of the proposed Survey Route Corridor

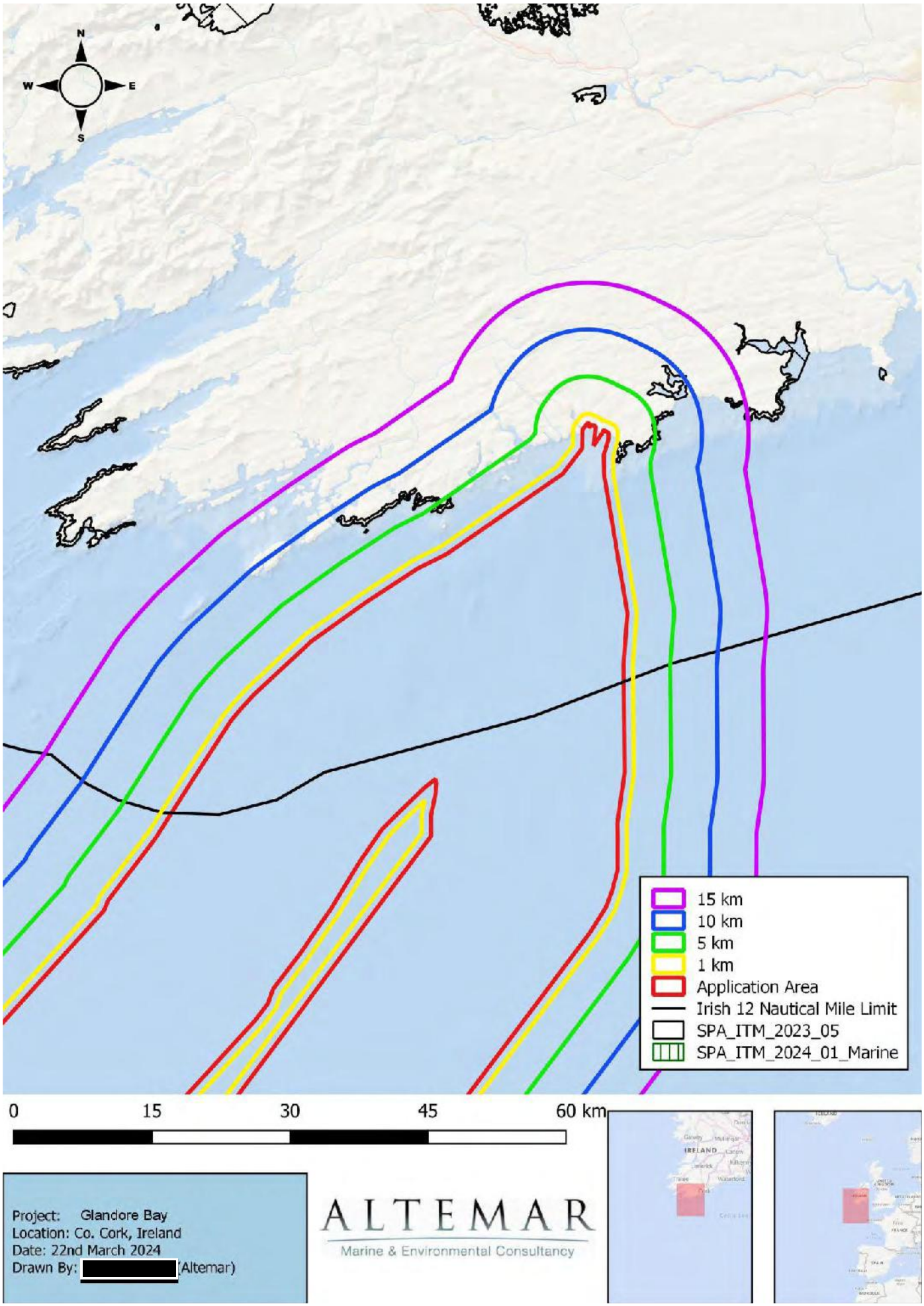


Figure 39. Special Protection Areas (SPA) (incl. marine SPAs) within 15km of the proposed Survey Route Corridor

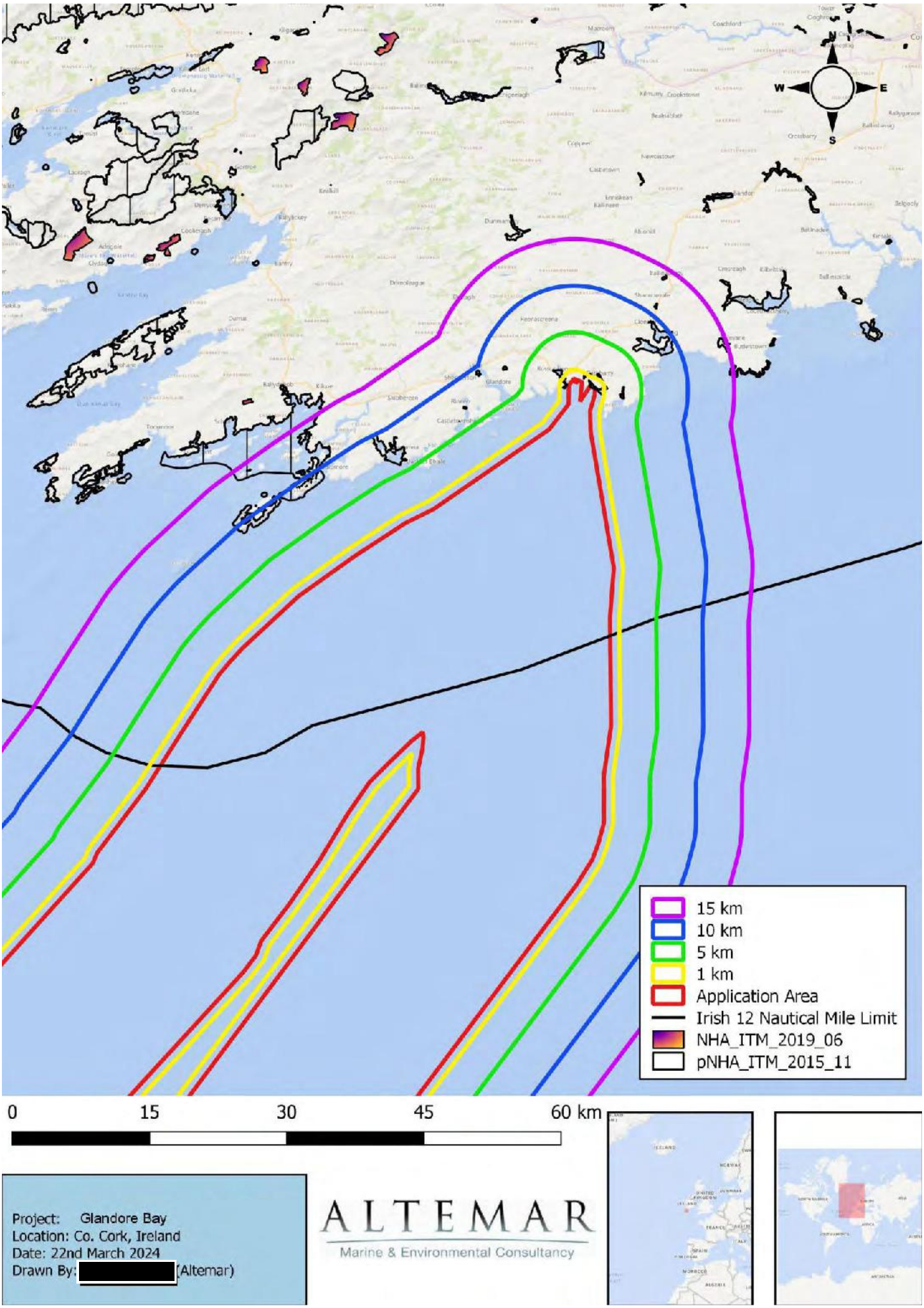


Figure 40. NHAs & pNHAs within 15km of the proposed Survey Route Corridor

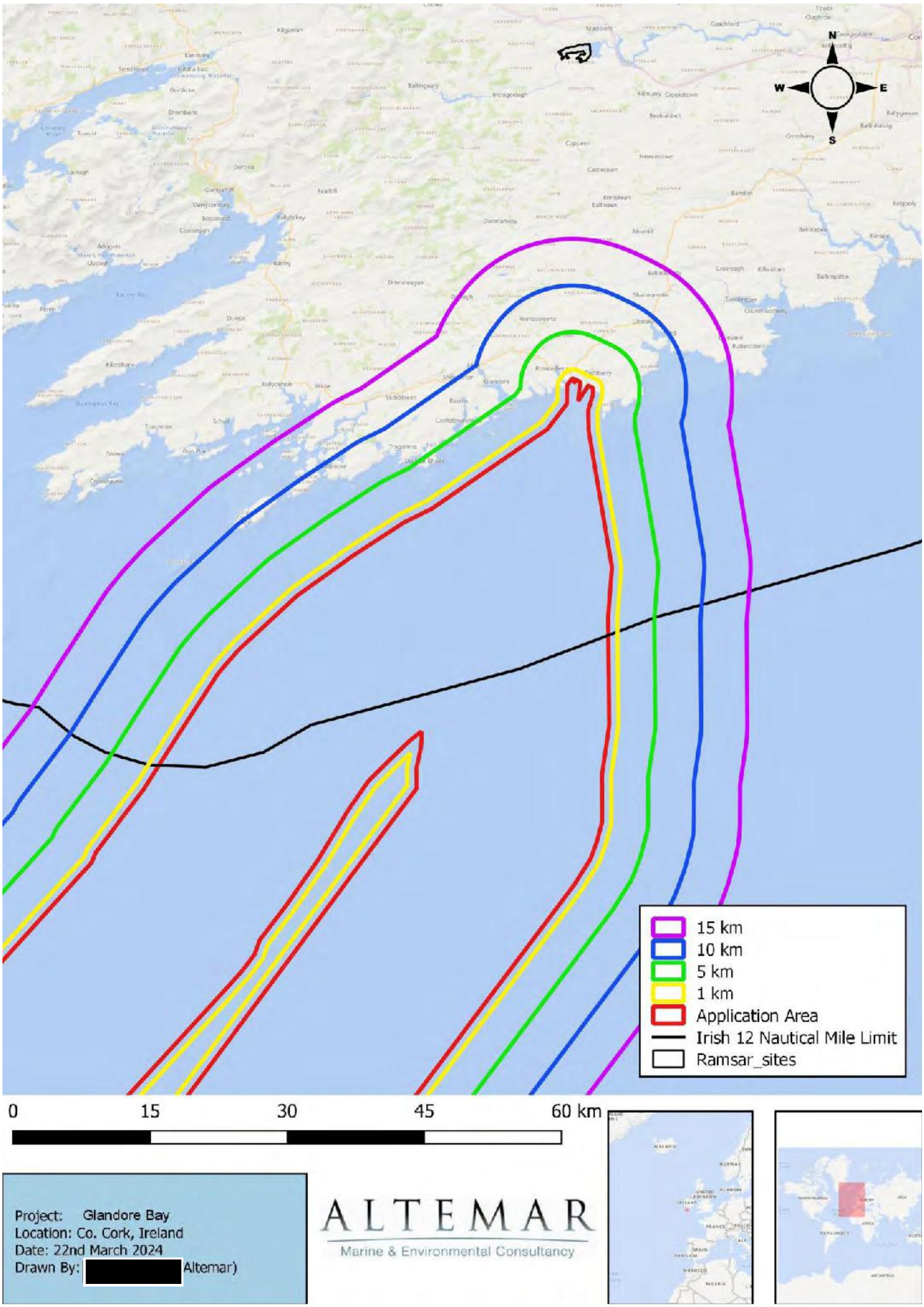


Figure 41. Ramsar Sites within 15km of the proposed Survey Route Corridor

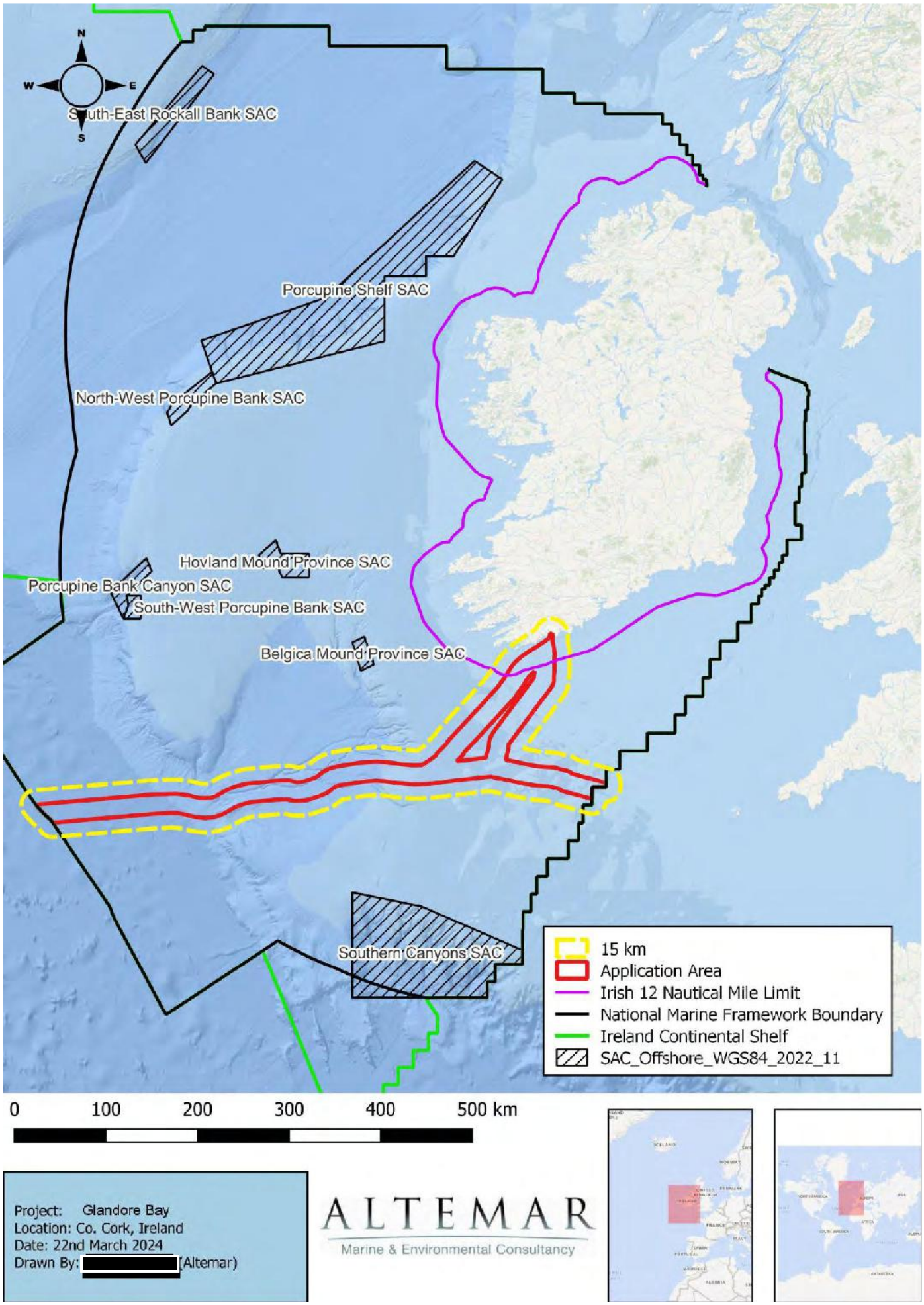


Figure 42: Proposed survey route corridor in relation to the 12 nm limit, Designated Irish Continental shelf and Offshore SAC's (no offshore SAC's in the area)

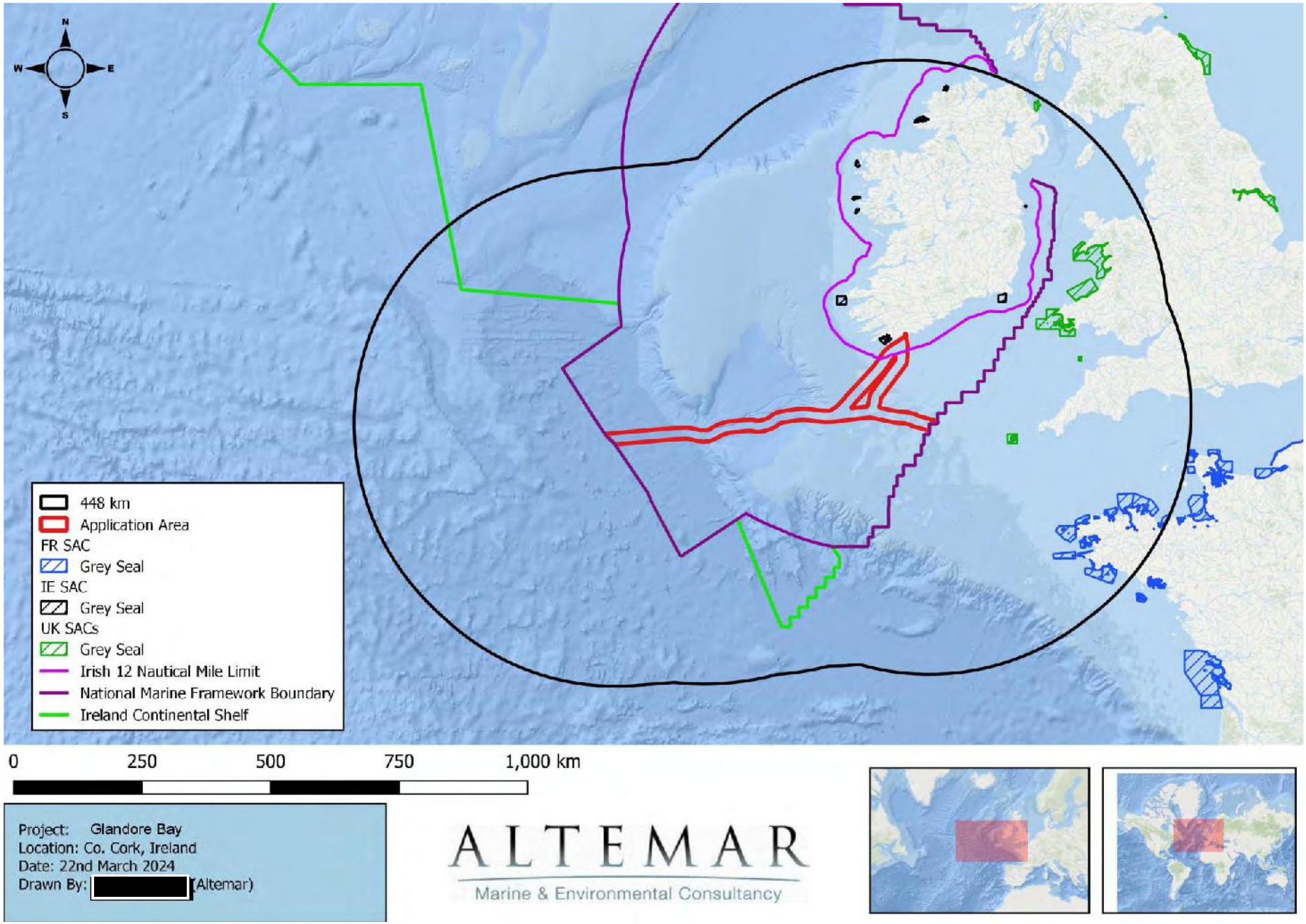


Figure 43: IE, FR, & UK SACs designated for Grey Seals (*Halichoerus grypus*) within 448km of the Proposed Survey Route Corridor

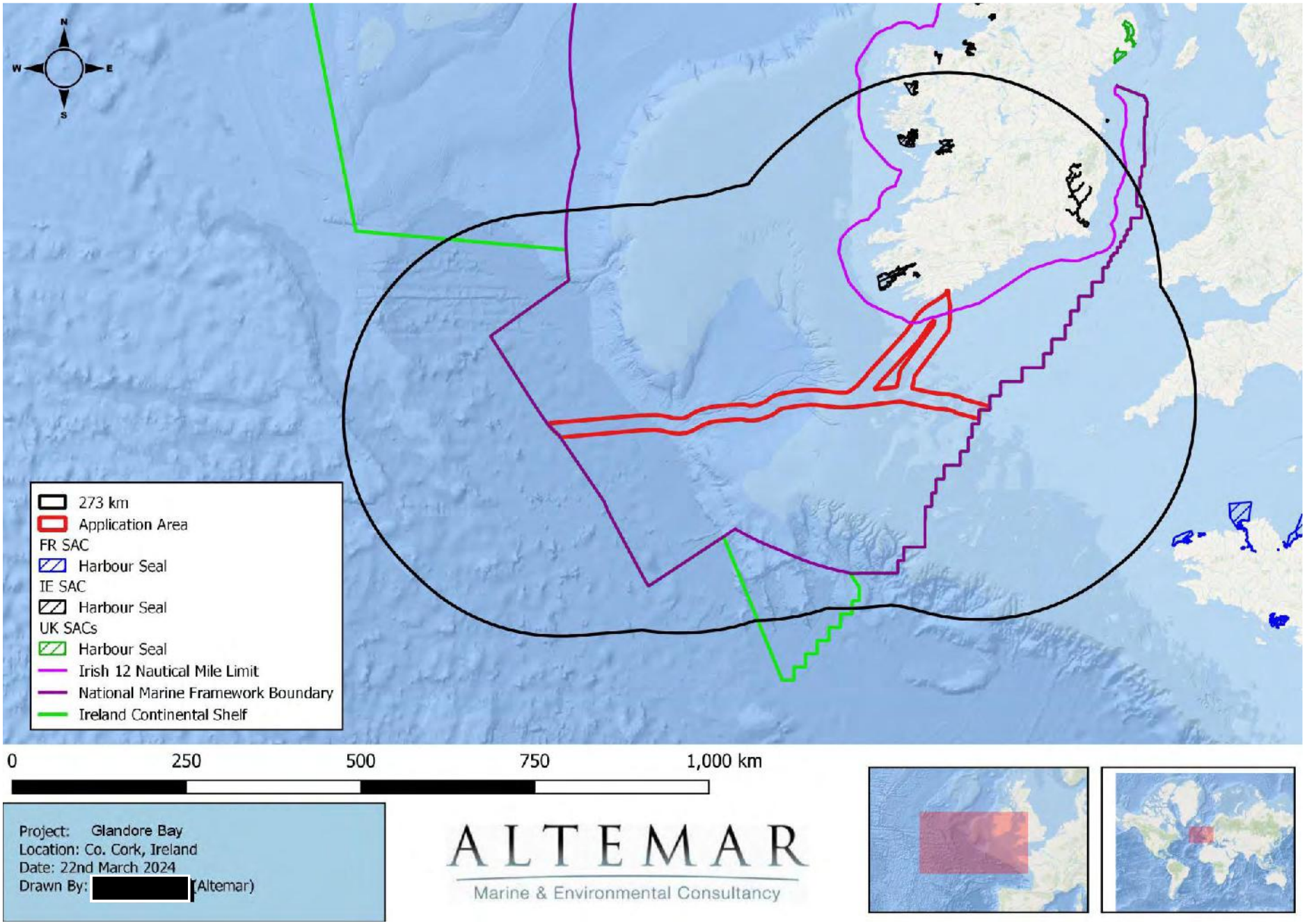


Figure 44: IE, FR, & UK SACs designated for Harbour Seals (*Phoca vitulina*) within 273km of the Proposed Survey Route Corridor

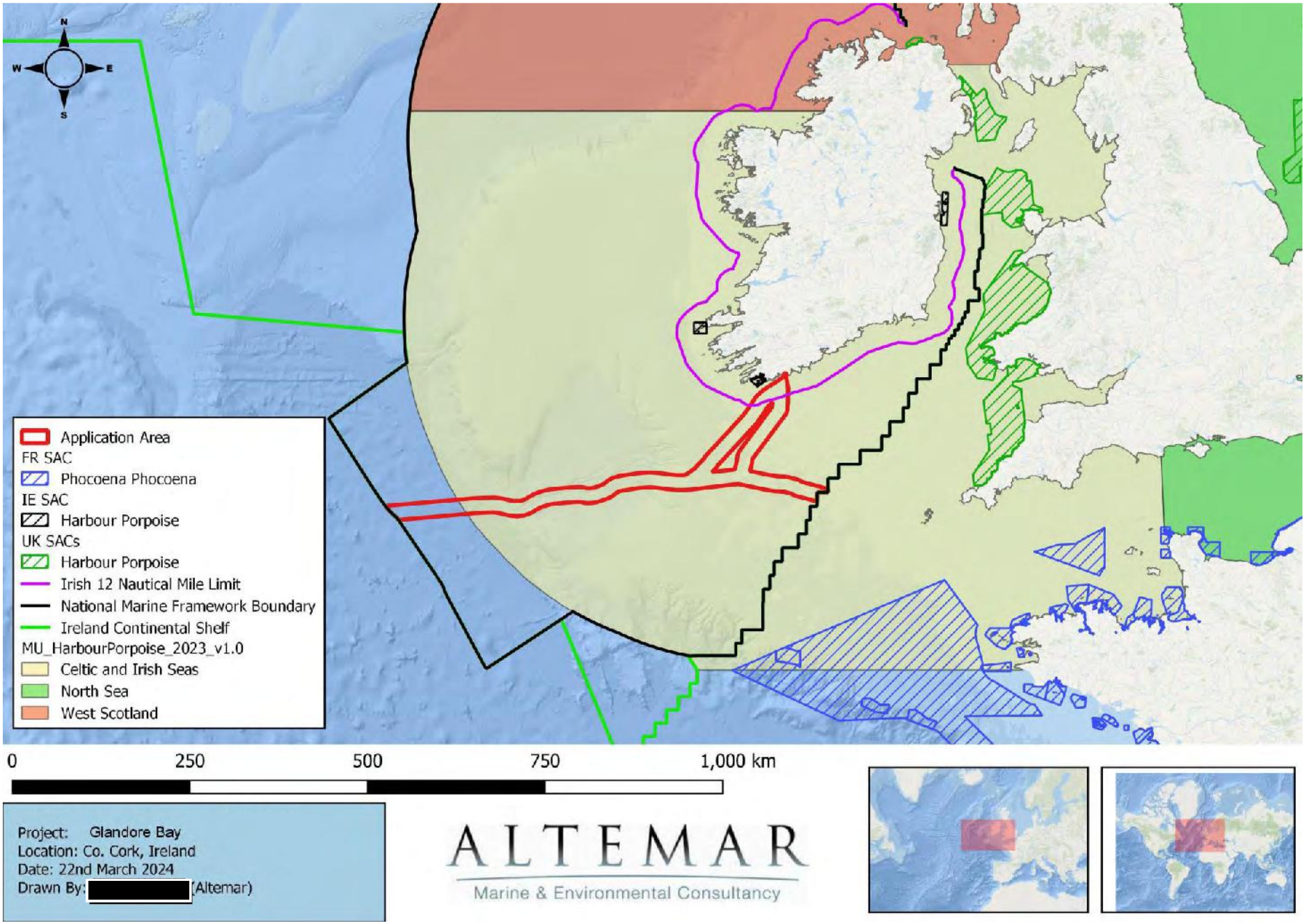


Figure 45: IE, FR, & UK SACs designated for Harbour Porpoise (*Phocoena phocoena*) within the Celtic and Irish Seas MU for Harbour Porpoise

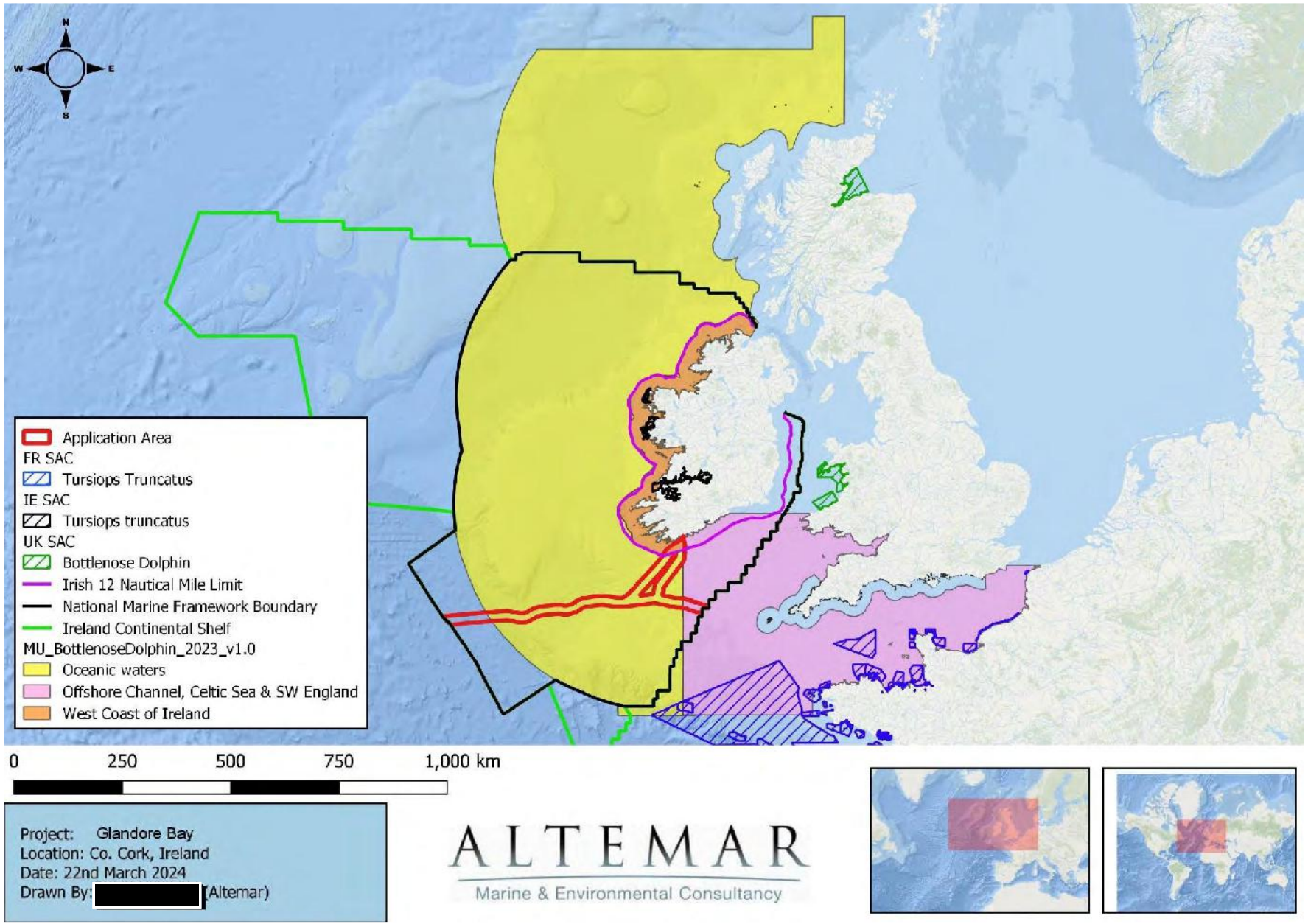


Figure 46: IE, FR, & UK SACs designated for Bottlenose Dolphin (*Tursiops truncatus*) within the Irish Sea MU, West Coast of Ireland MU, and Offshore Channel, Celtic Sea & SW England MU for Bottlenose Dolphin

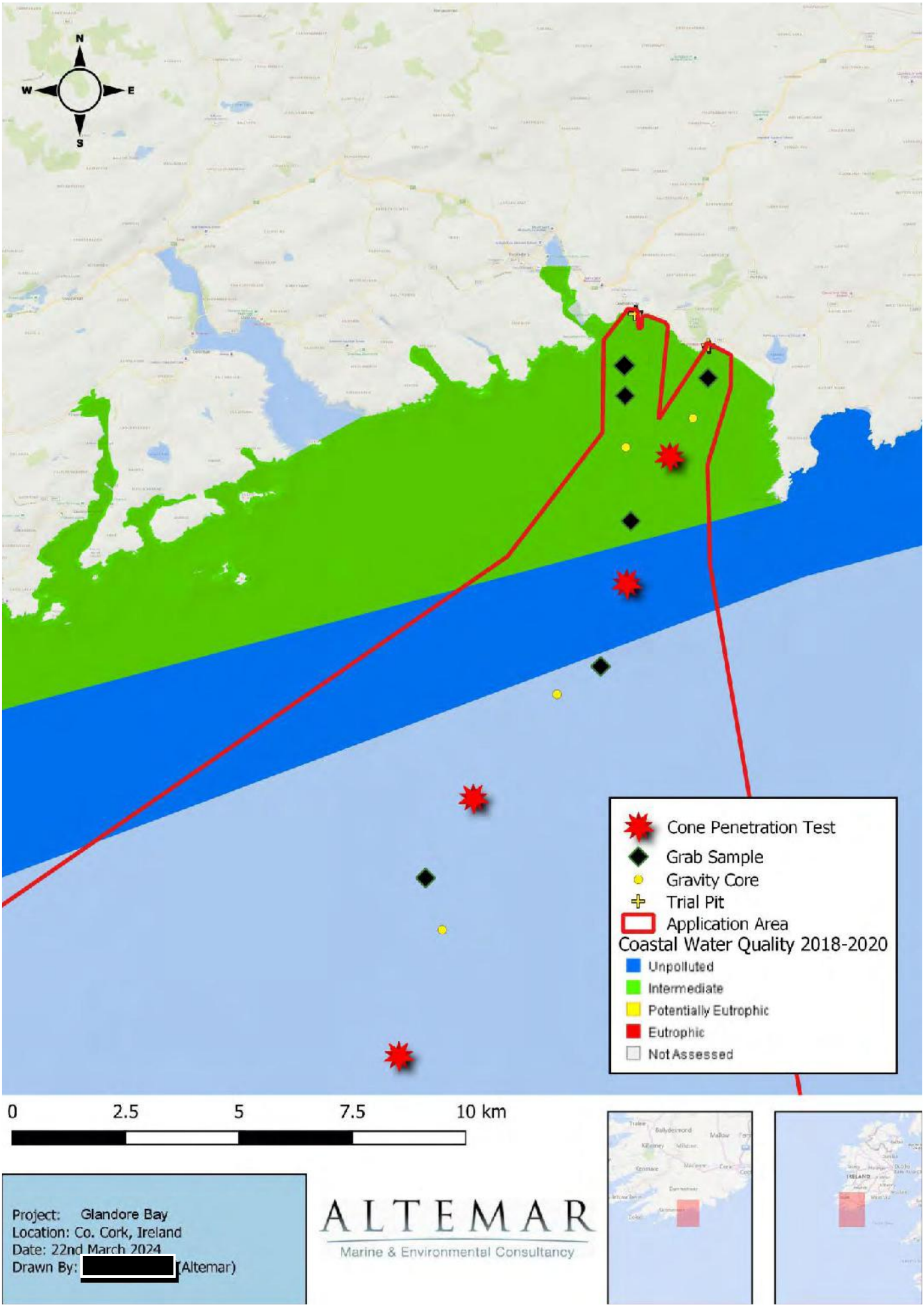


Figure 47. Coastal Waterbody Quality under the Water Framework Directive (WFD)

4.2 Habitats

Infomar backscatter, multibeam in addition to satellite imagery, Admiralty Charts and BioMar data were assessed, where available and relevant, for the entire route within the 12nm. Infomar imagery as seen in Figure 48(a-c). Shallow subtidal areas were examined using Orthophotography (OSI-1995, 2000 and 2005) in addition to satellite imagery (Google (historic) & Bing). Such imagery has proved useful in the 2004-2010 NPWS sensitive subtidal benthic communities[4] to highlight potential seagrass areas (*Zostera marina*) and allow for confirmation by ground truthing. No Zostera was noted in the intertidal or shallow subtidal. The site is moderately exposed with relatively mobile sediments. A survey of the littoral (intertidal) rock in Belacoon Cove, S, Galley Head, Glandore Bay was carried out by Biomar, classed the intertidal rock as exposed and results of the species noted are seen in Table 12.

Table 12. Exposed mid eulittoral rock with barnacles and Patella vulgata. LRK.BP

CRUSTACEA	*Chthamalus montagui*	occasional	RHODOPHYTA	*C*orallinaceae	occasional
CRUSTACEA	*Chthamalus stellatus*	occasional	RHODOPHYTA	*Corallina officinalis*	occasional
CRUSTACEA	*Semibalanus balanoides*	super abundant	RHODOPHYTA	*Mesophyllum lichenoides*	rare
			RHODOPHYTA	*Dilsea carnosa*	rare
MOLLUSCA	*Gibbula cineraria*	occasional	RHODOPHYTA	*Chondrus crispus*	rare
MOLLUSCA	Gibbula umbilicalis	occasional	RHODOPHYTA	Ceramium	occasional
MOLLUSCA	*Patella ulyssiponensis*	frequent	RHODOPHYTA	*Ceramium virgatum*	occasional
MOLLUSCA	*Patella vulgata*	super abundant	RHODOPHYTA	*Osmundea pinnatifida*	occasional
MOLLUSCA	*Littorina littorea*	rare	RHODOPHYTA	*Polysiphonia elongata*	rare
MOLLUSCA	*Littorina neglecta*	frequent	CHROMOPHYTA	*Elachista*	occasional
MOLLUSCA	*Littorina saxatilis*	common	CHROMOPHYTA	*Laminaria digitata*	rare
MOLLUSCA	*Melarhaphe neritoides*	frequent	CHROMOPHYTA	*Halidrys siliquosa*	rare
MOLLUSCA	*Nucella lapillus*	occasional	CHROMOPHYTA	F*ucus*	present
MOLLUSCA	*Mytilus edulis*	occasional	CHROMOPHYTA	*Fucus serratus*	rare
MOLLUSCA	*Lasaea adansoni*	occasional	CHROMOPHYTA	*Fucus vesiculosus*	occasional
RHODOPHYTA	*Porphyra umbilicalis*	occasional	CHLOROPHYTA	*Enteromorpha*	occasional
RHODOPHYTA	*Nemalion helminthoides*	rare	CHLOROPHYTA	*Ulva*	occasional
RHODOPHYTA	*Gelidium pulchellum*	rare	CHLOROPHYTA	*Codium*	rare
RHODOPHYTA	*Hildenbrandia rubra*	frequent			

As can be seen from Figure 49 (a-c) & 50 (a-d), based on a desktop evaluation, distinct habitats were distinguishable from the EU SeaMap (2023) Broadscale Predictive Habitat Map and MSFD Benthic Broad Habitat Types (BBHT) (2019). These data indicate a mixture of coarse sediment, rock, sand and sandy mud/muddy sand along the route within the Irish EEZ. Rock and biogenic reef habitats have been identified along the survey route, predominately within the Irish 12nm limit (Figures 49b & 50b), however, it should be noted that by the very nature of the sampling reef areas will be avoided and finetuning will take place during the survey to avoid reef on a local level. Bathymetry data (Infomar) for the proposed survey route is demonstrated in Figure 51. Best data relating to cold coral sightings (UNEP, Cold Corals 2017), including *Lophelia* records, are demonstrated in Figures 52 & 53.

4.3 Marine Mammals

Marine mammals are afforded protection under the Habitats Directive. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect marine mammals. Figures 54 (a-c) shows all cetacean species and Figures 55 (a-c) shows monthly activity trends, in the vicinity of the proposed survey route, as recorded by IWDG sightings scheme. Cetacean activity has been seen in the vicinity of the proposed survey route. Species seen in the area and along the survey route include Harbour porpoise (*Phocoena phocoena*), Orca (*Orcinus orca*), and Minke whale (*balaenoptera acutorostrata*). Records of beaked whales in Irish waters are seen in Figures 56 & 57.

[4] These subtidal surveys were commissioned by NPWS and the author was involved in the assessment of at least 26 bays in Ireland from 2004-2010 for NPWS.

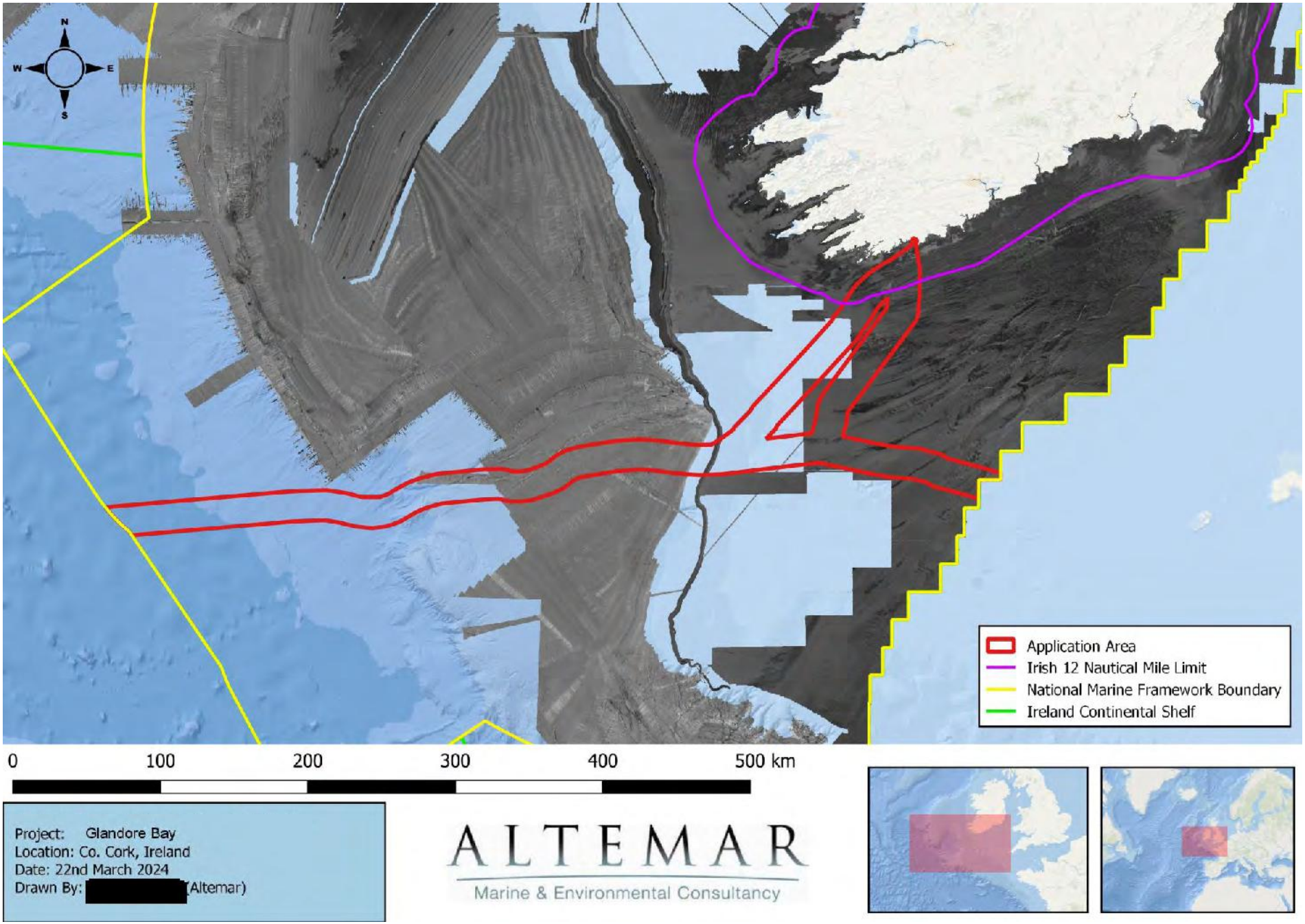


Figure 48a. Seabed backscatter (Infomar)

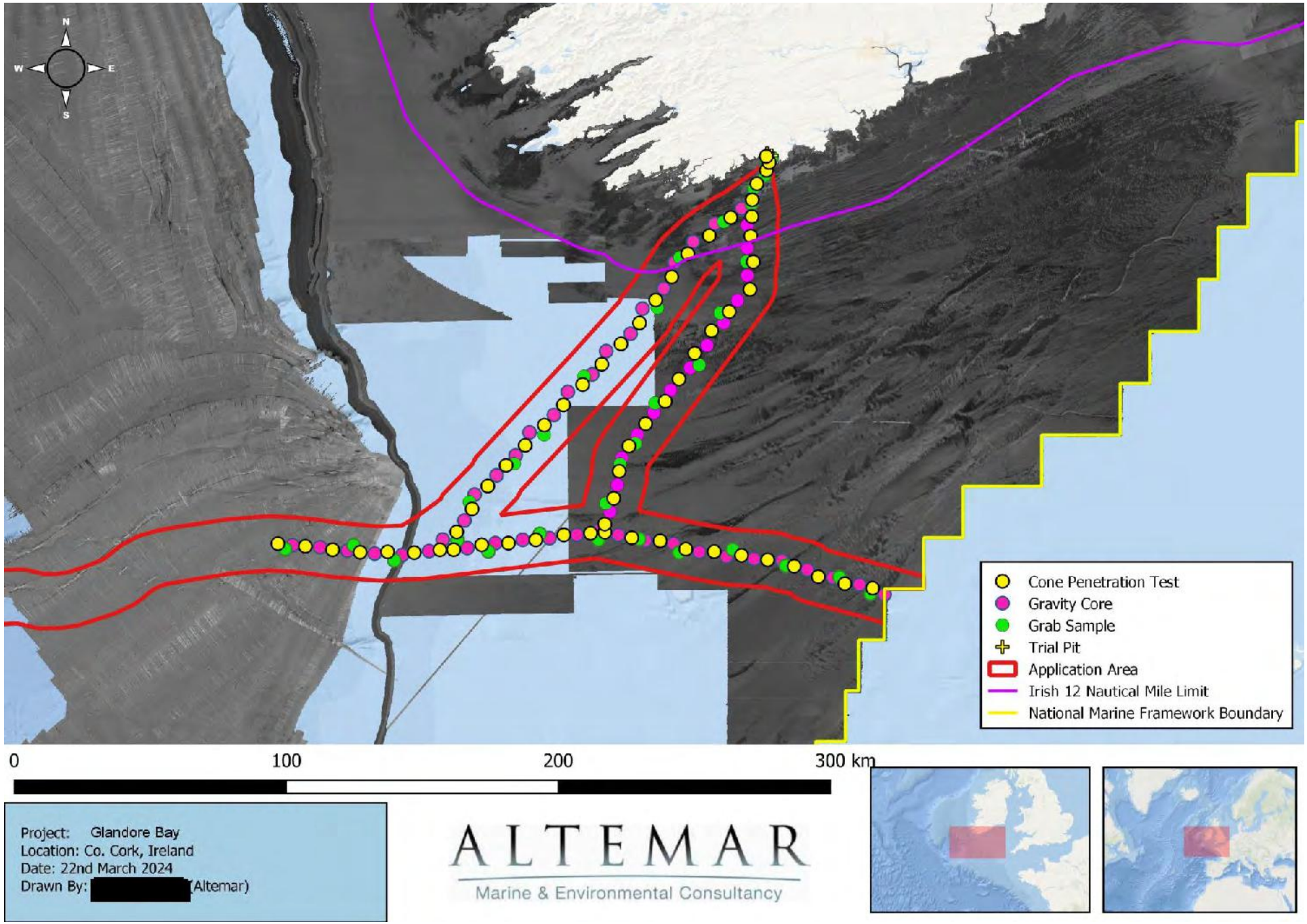


Figure 48b. Seabed backscatter (Infomar) – incl. seabed samples

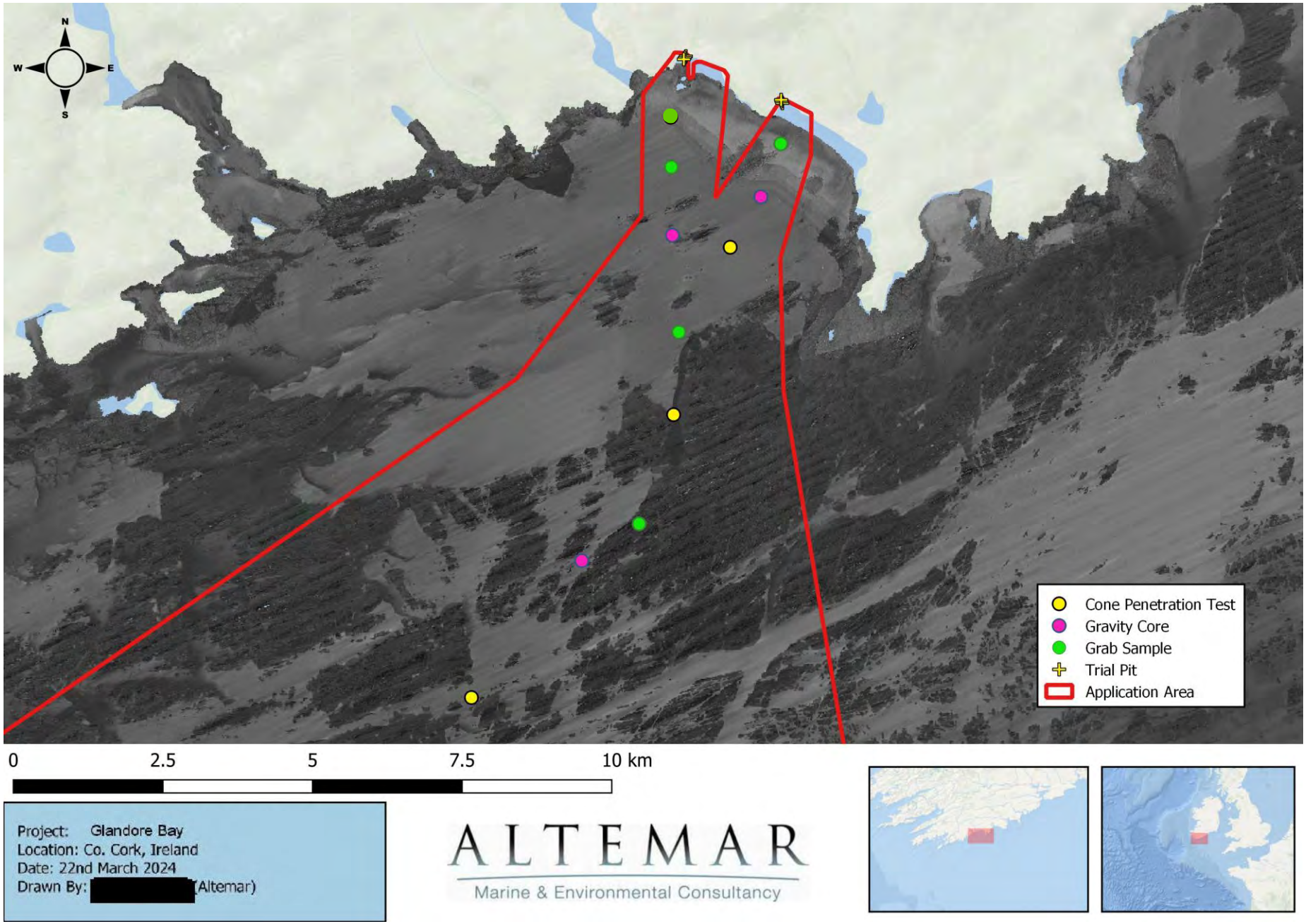


Figure 48c. Seabed backscatter (Infomar) - Inshore

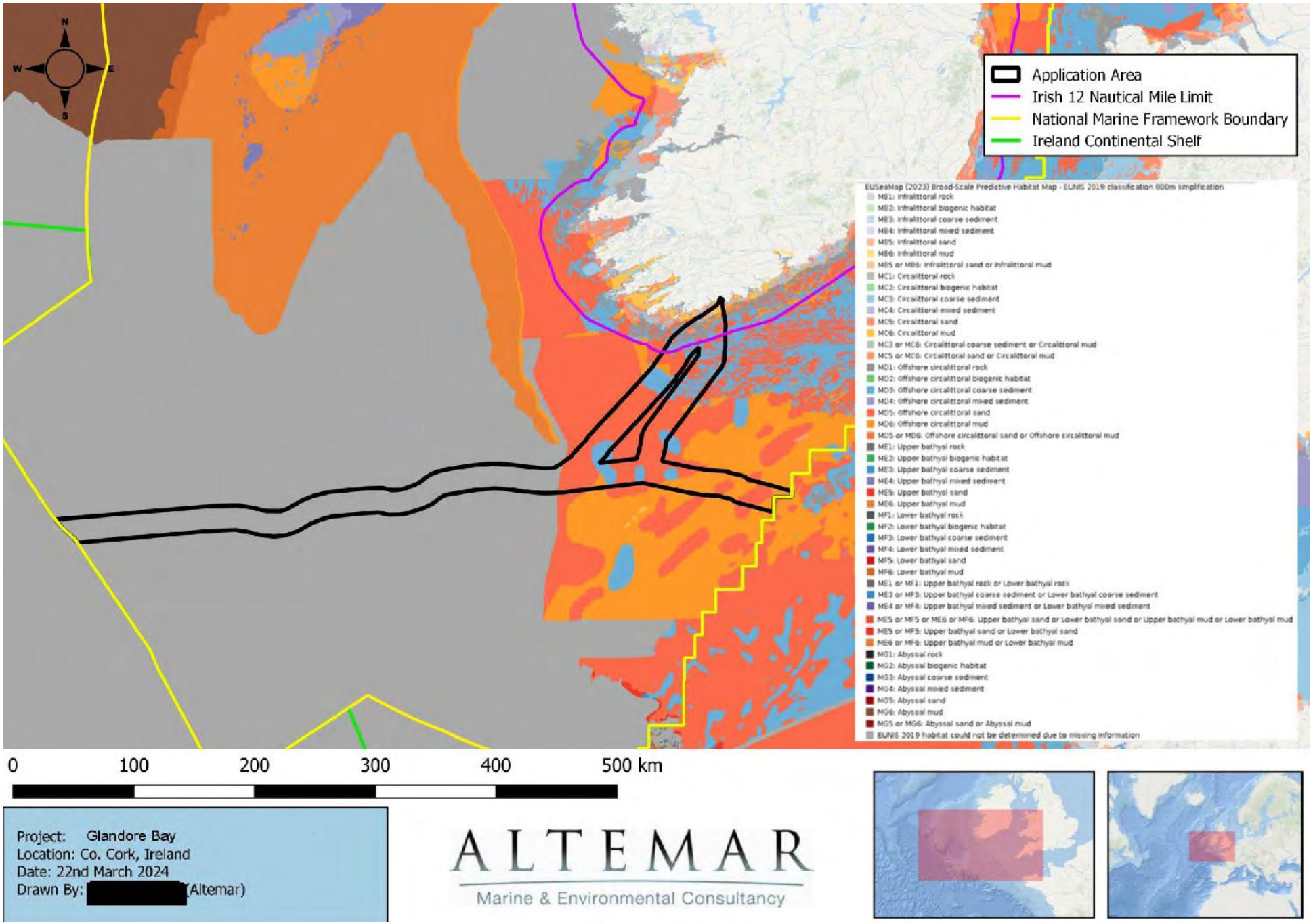


Figure 49a. Broadscale Predictive Habitat Map (EUSeaMap 2023)

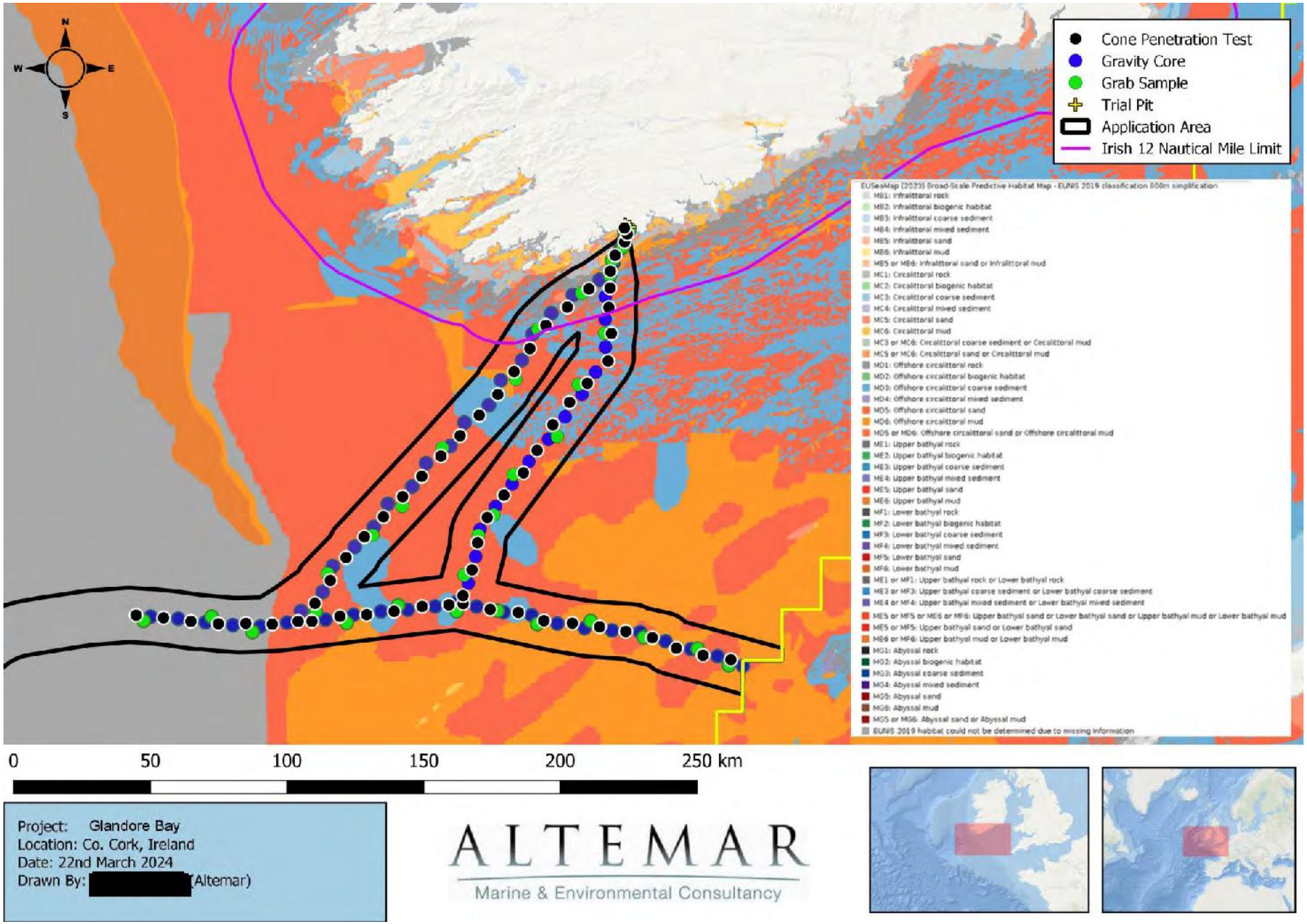


Figure 49b. Broadscale Predictive Habitat Map (EUSeaMap 2023) – incl. seabed samples

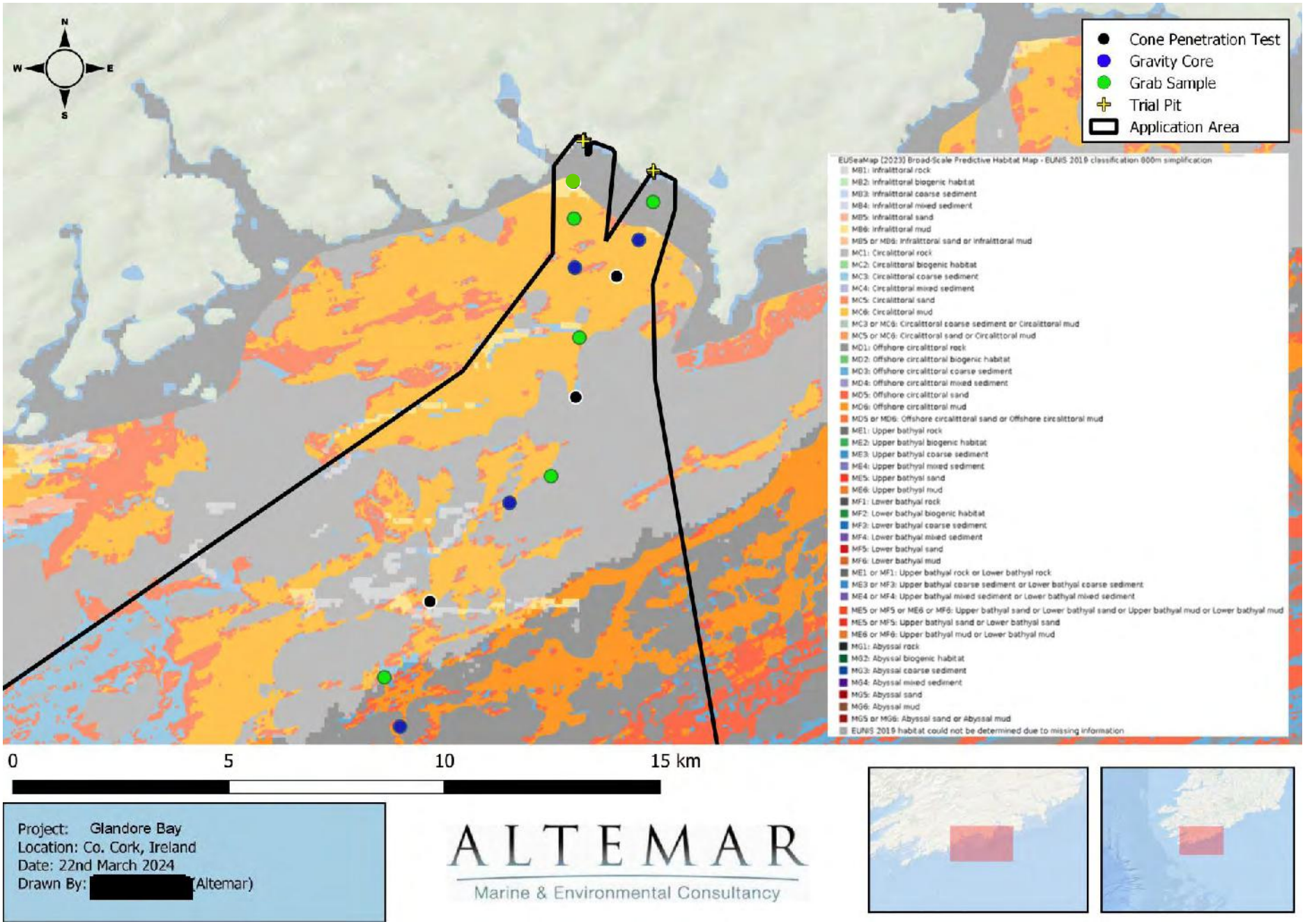


Figure 49c. Broadscale Predictive Habitat Map (EUSeaMap 2023) – Inshore

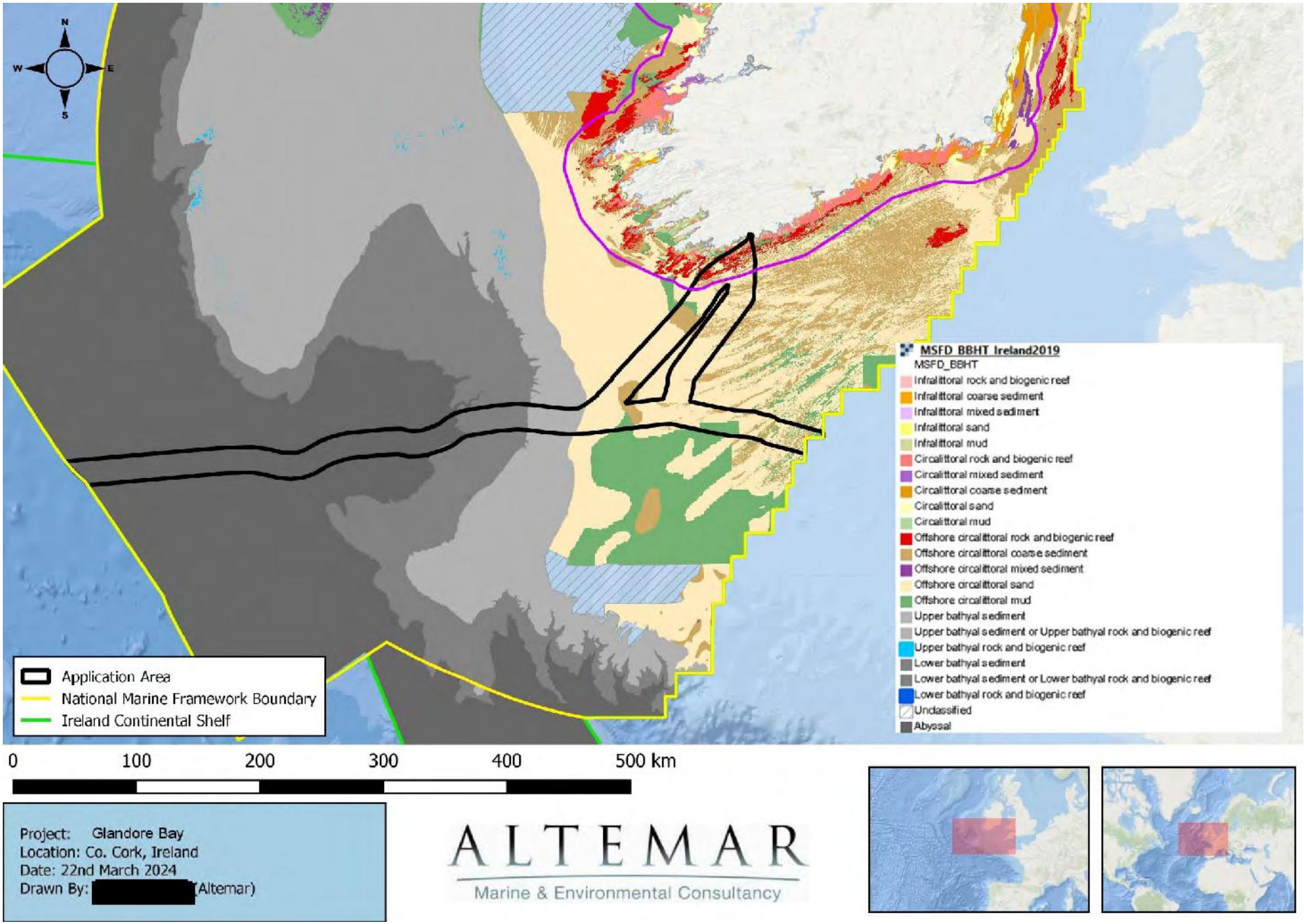


Figure 50a. MSFD BBHT Ireland 2019

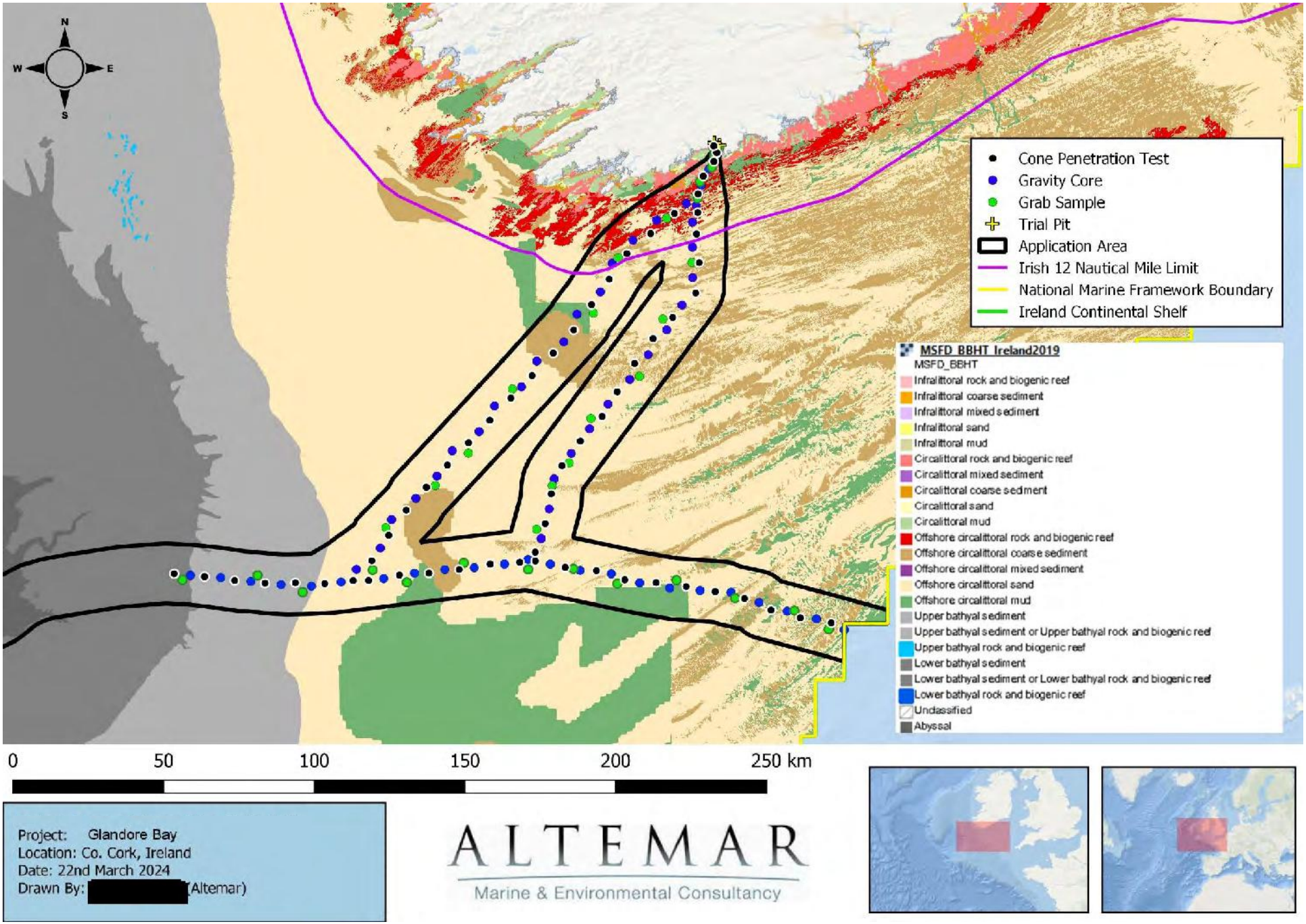


Figure 50b. MSFD Benthic Broad Habitat Types (BBHT) Ireland 2019 – incl. seabed samples

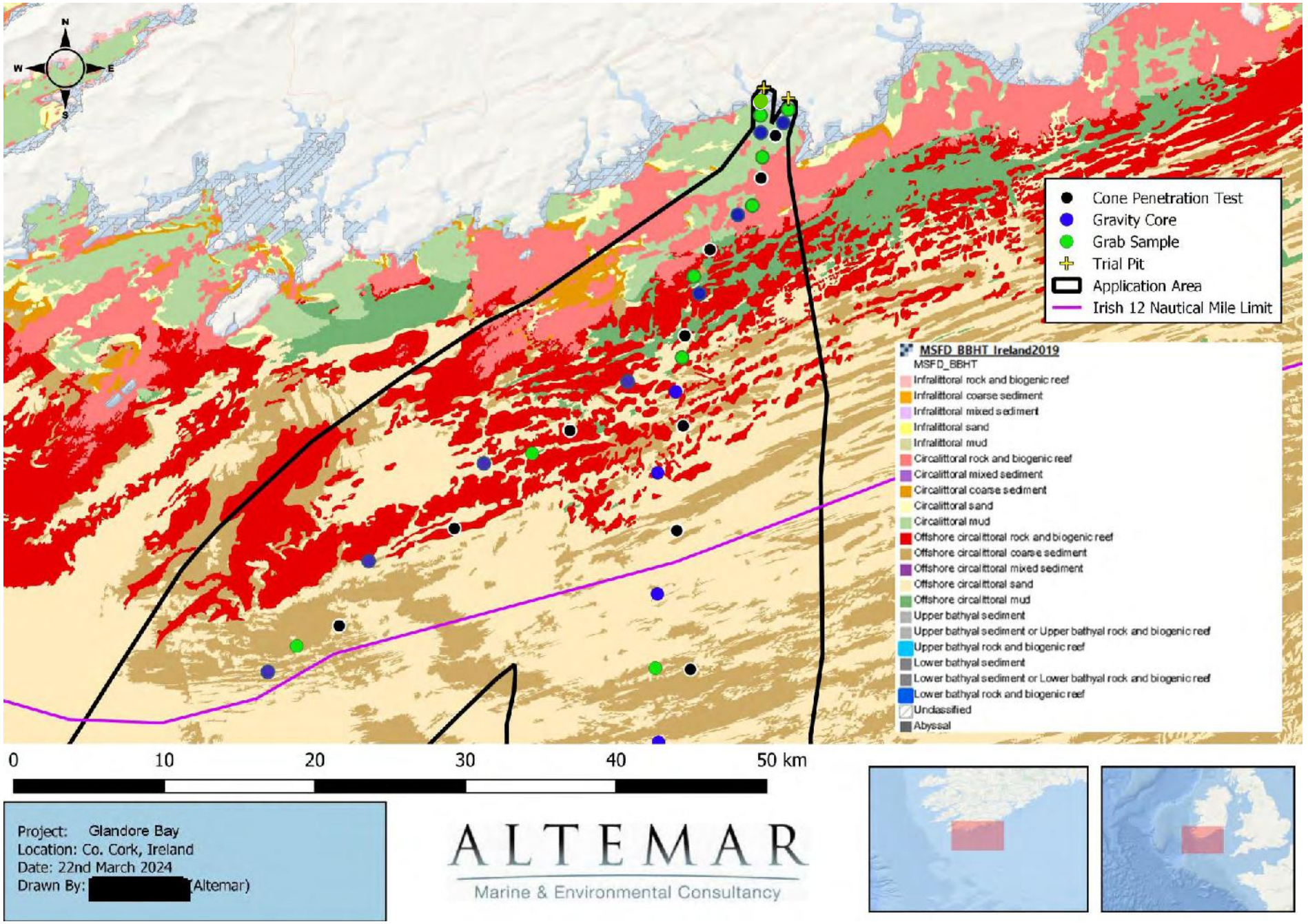


Figure 50c. MSFD BBHT Ireland 2019 – within 12nm limit

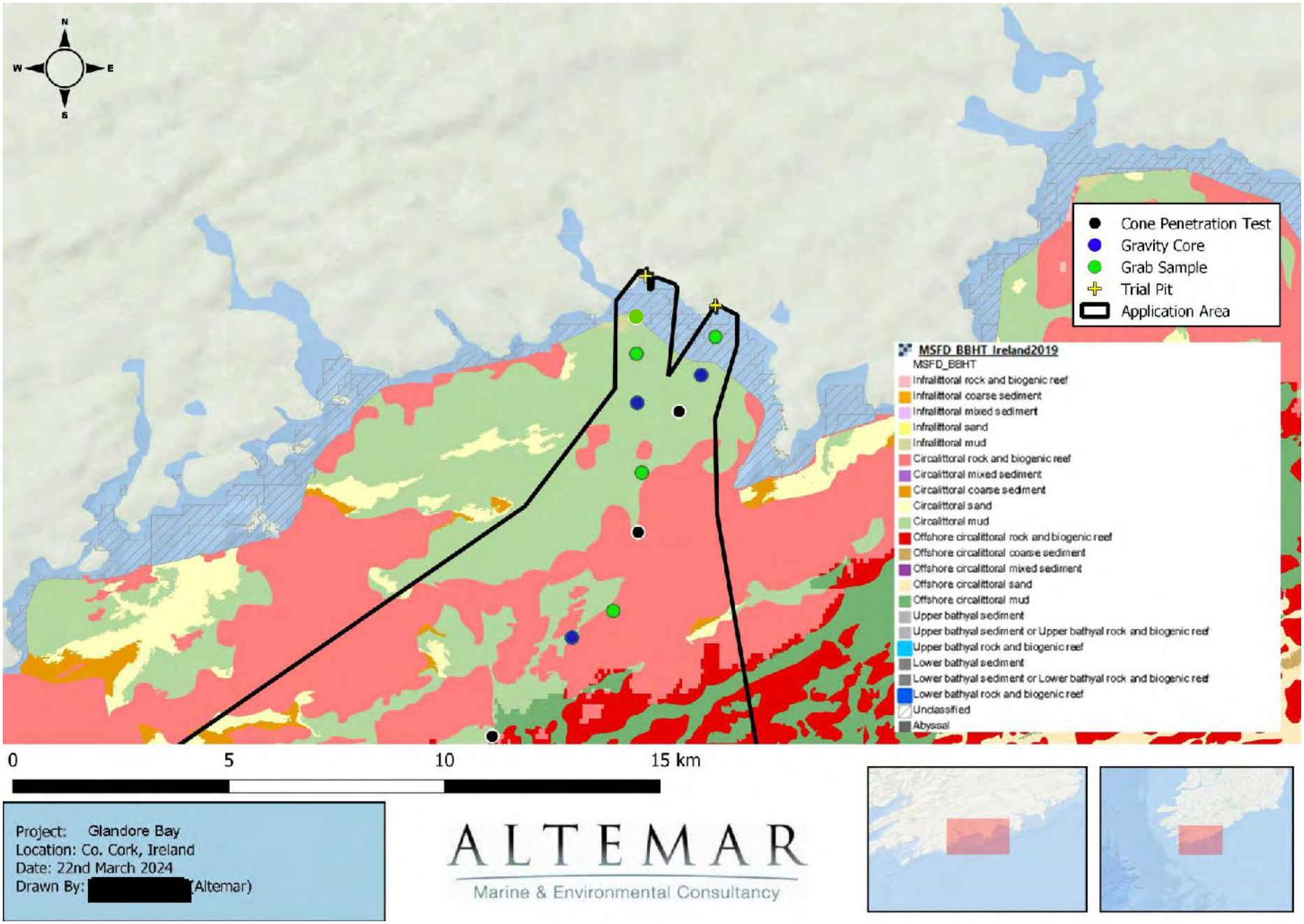


Figure 50d. MSFD BBHT Ireland 2019 – inshore

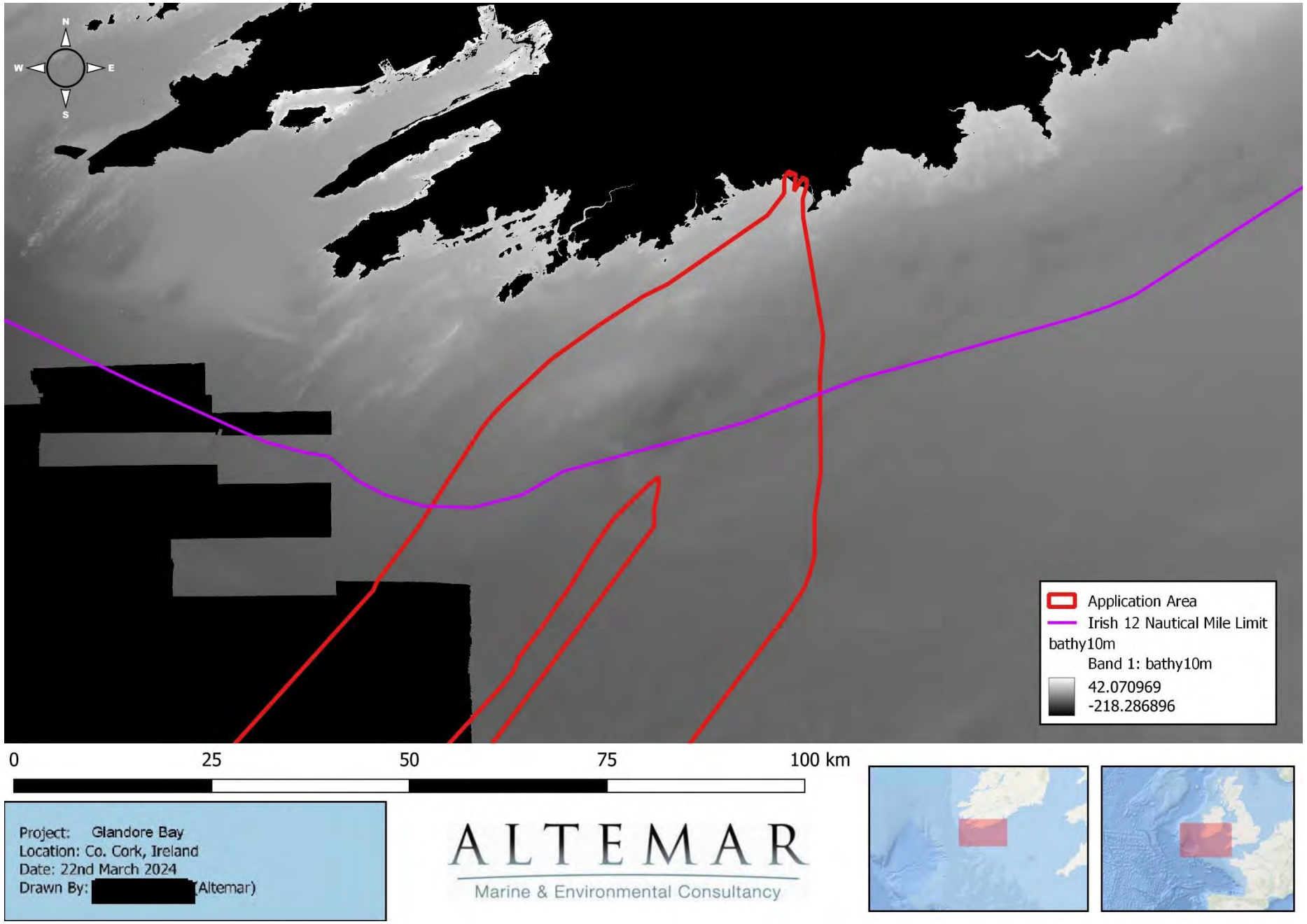


Figure 51 Bathymetry (Infomar)

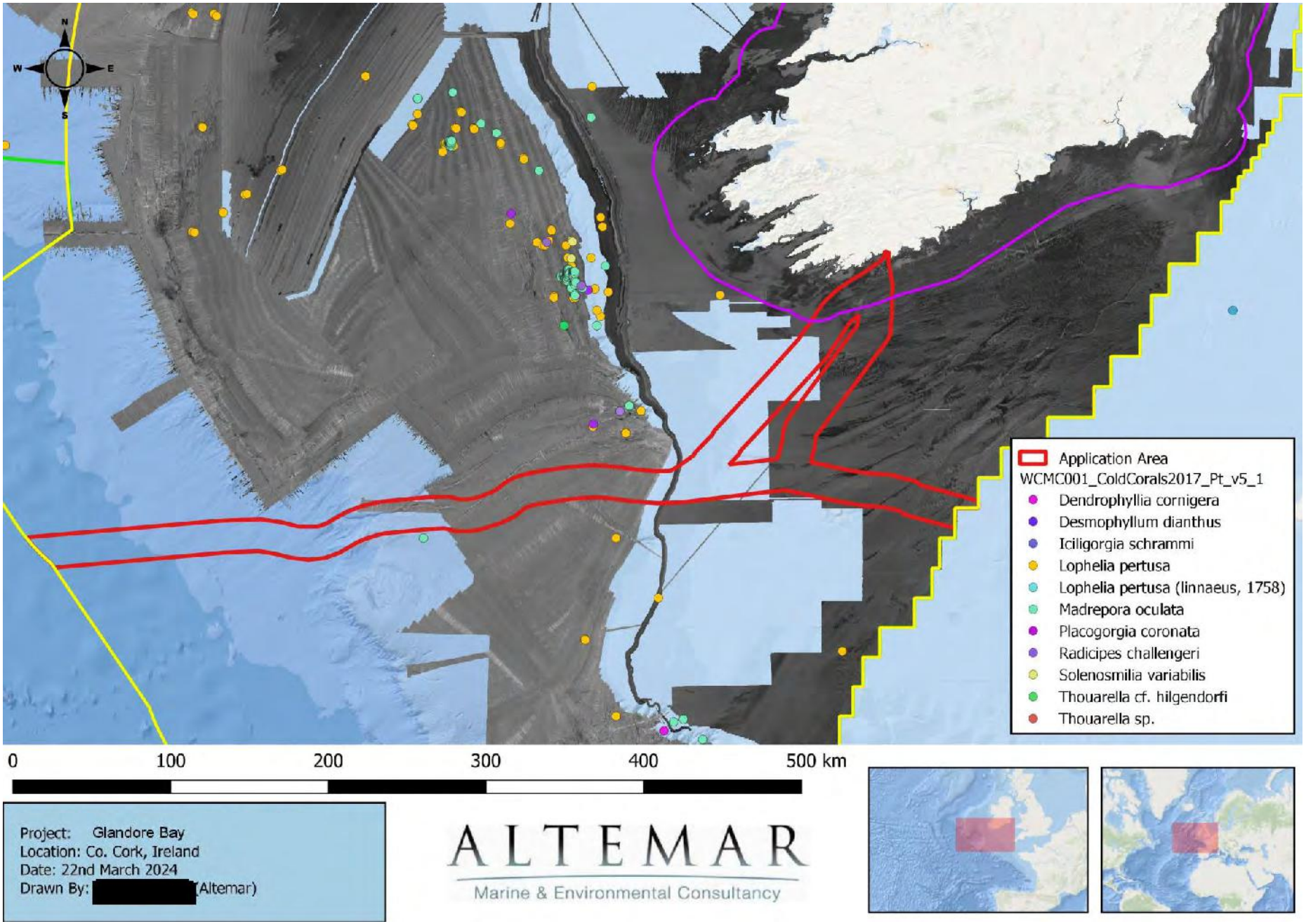


Figure 52. Position of survey route in relation to the Irish EEZ, Designated Irish Continental shelf (Cold Corals 2017 data) (INFOMAR Backscatter)

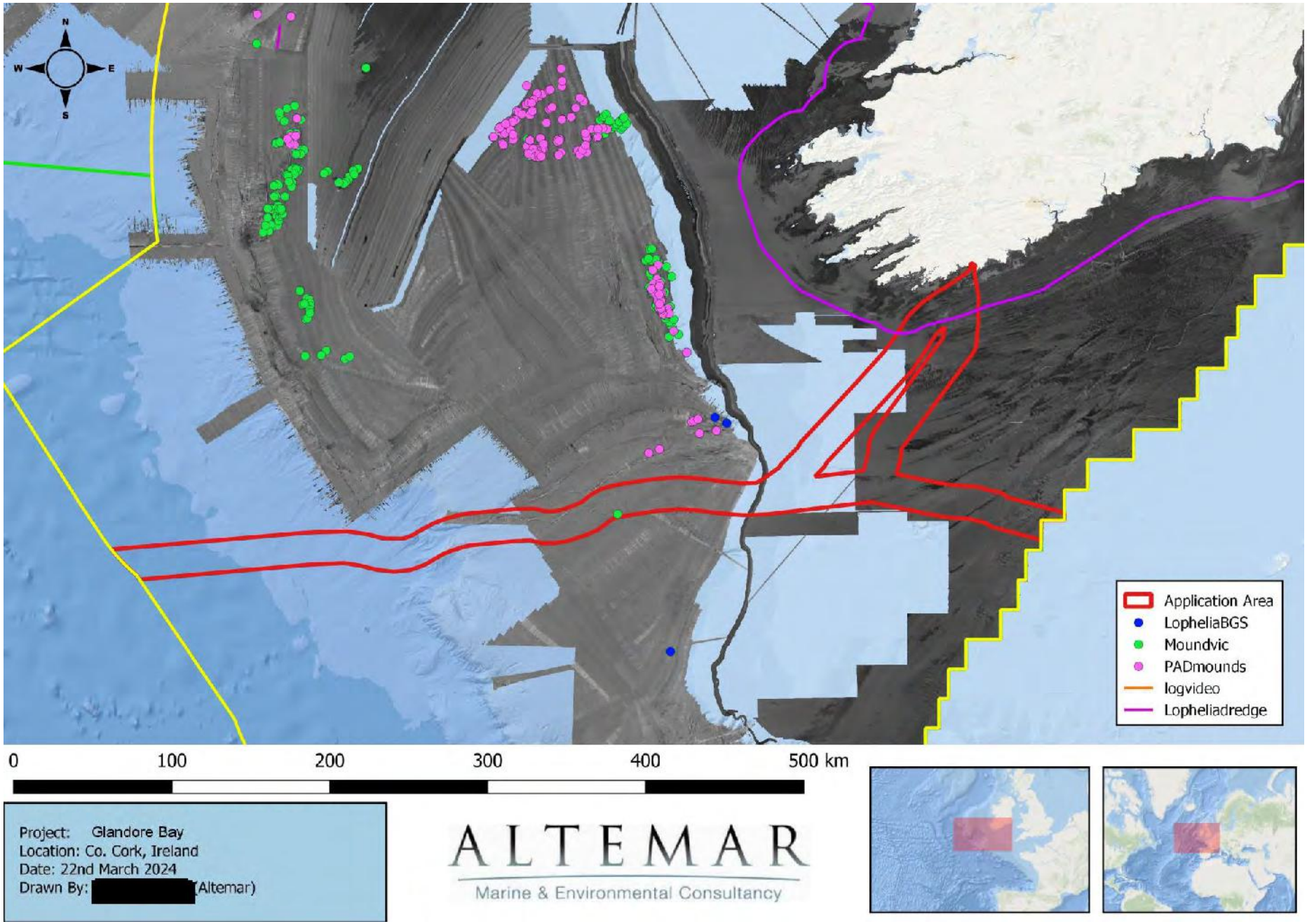


Figure 53. Position of survey route in relation to the Irish EEZ, Designated Irish Continental shelf, carbonate mounds or potential biogenic reefs in the offshore area (Infomar Backscatter).

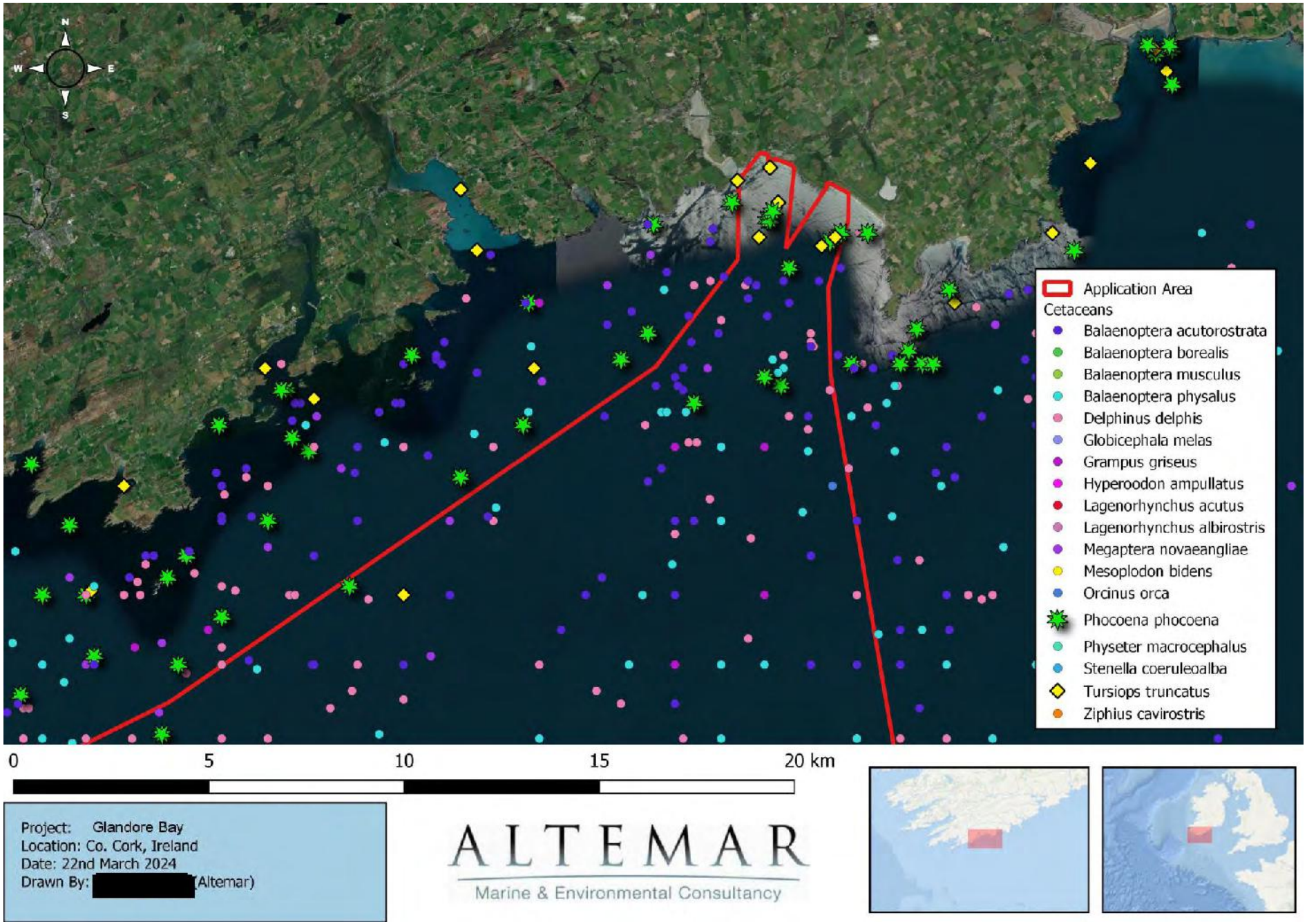


Figure 54a. Recorded Cetacean species sightings (Source NBDC sightings data) proximate to landfall area

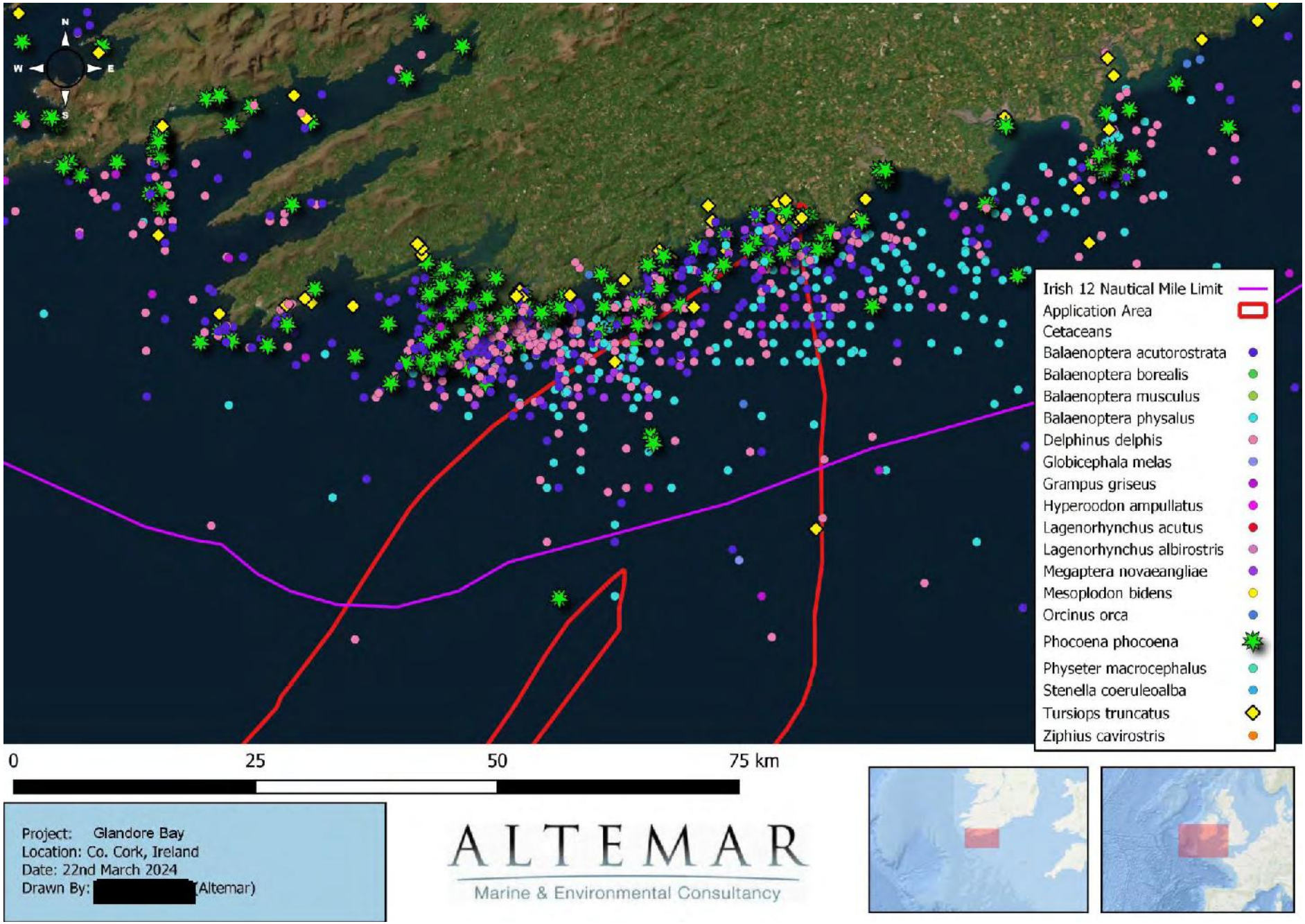


Figure 54b. Recorded Cetacean species sightings (Source NBDC sightings data) within 12nm Limit

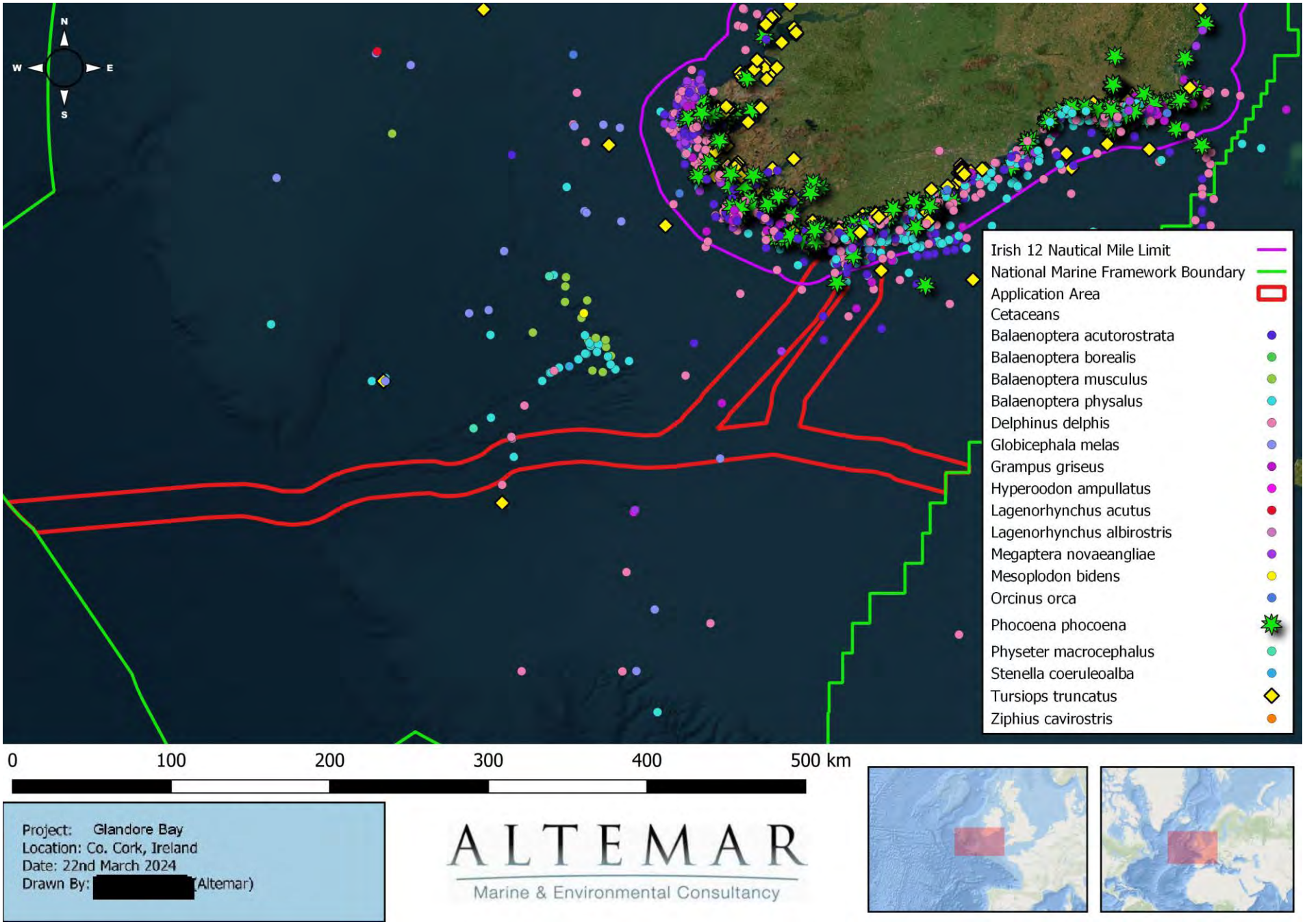


Figure 54c. Recorded Cetacean species sightings (Source NBDC sightings data) within Irish EEZ

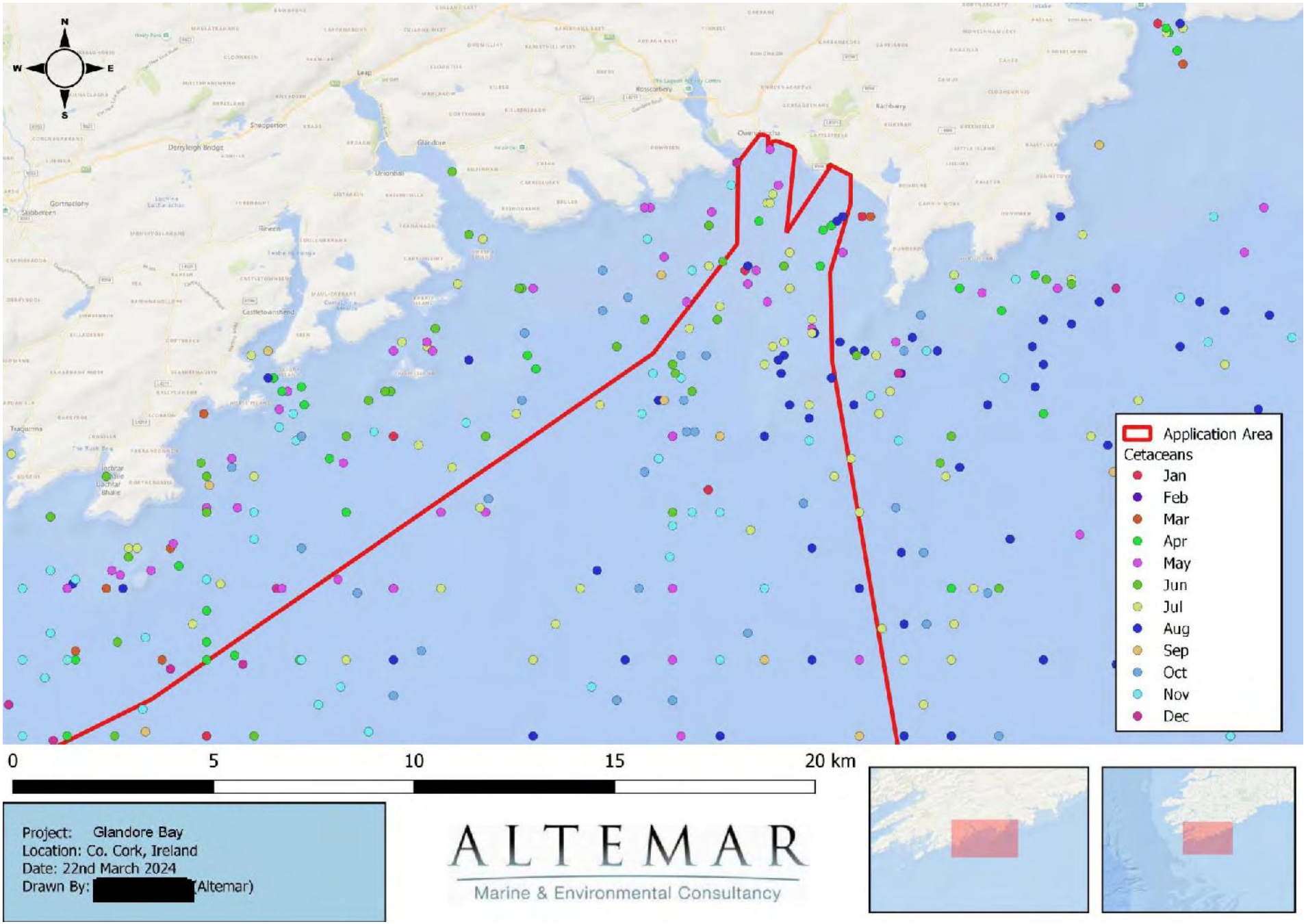


Figure 55a. Recorded Cetacean species sightings (months) (Source NBDC sightings data) proximate to landfall area

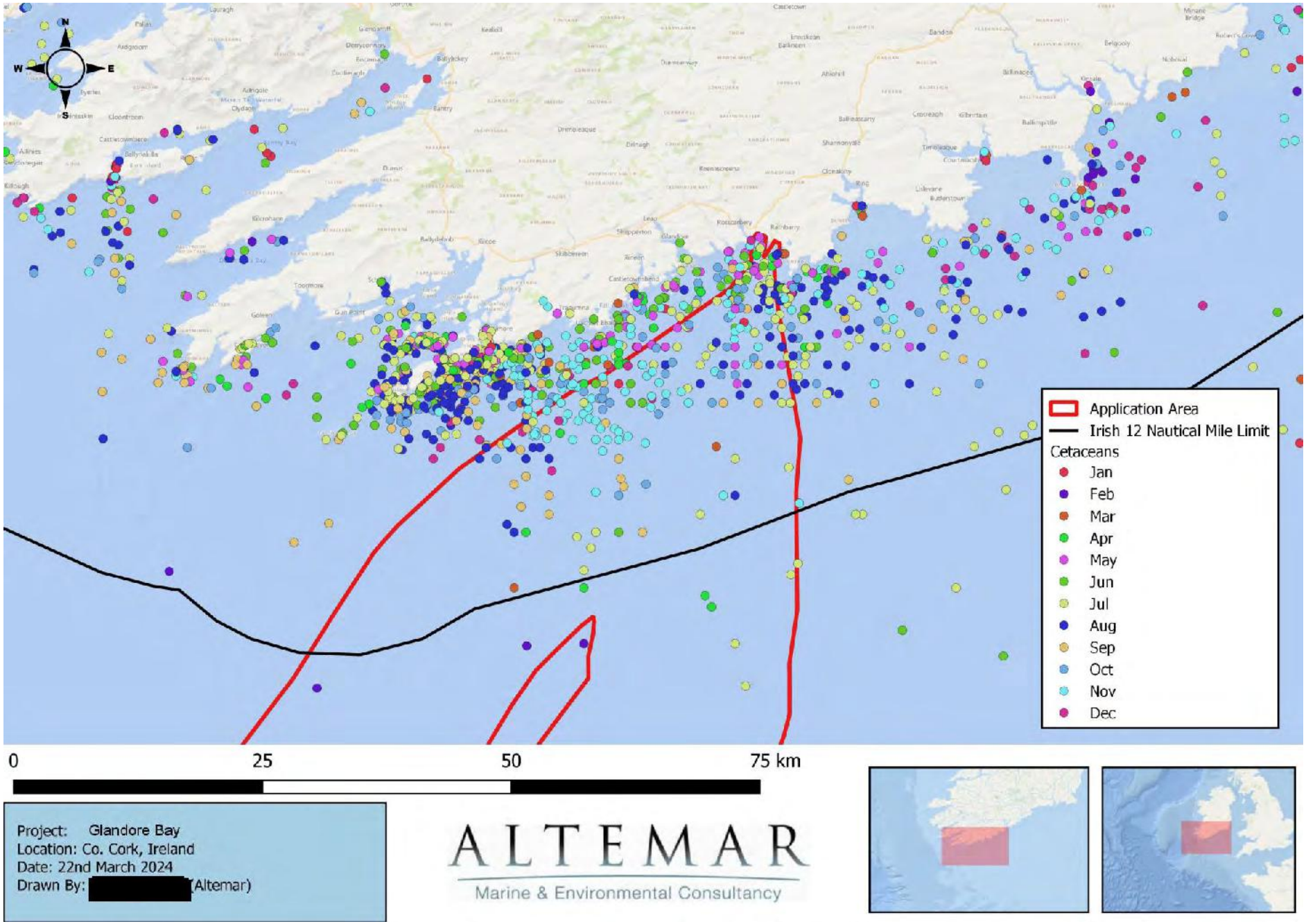


Figure 55b. Recorded Cetacean species sightings (months) (Source NBDC sightings data) within 12nm Limit

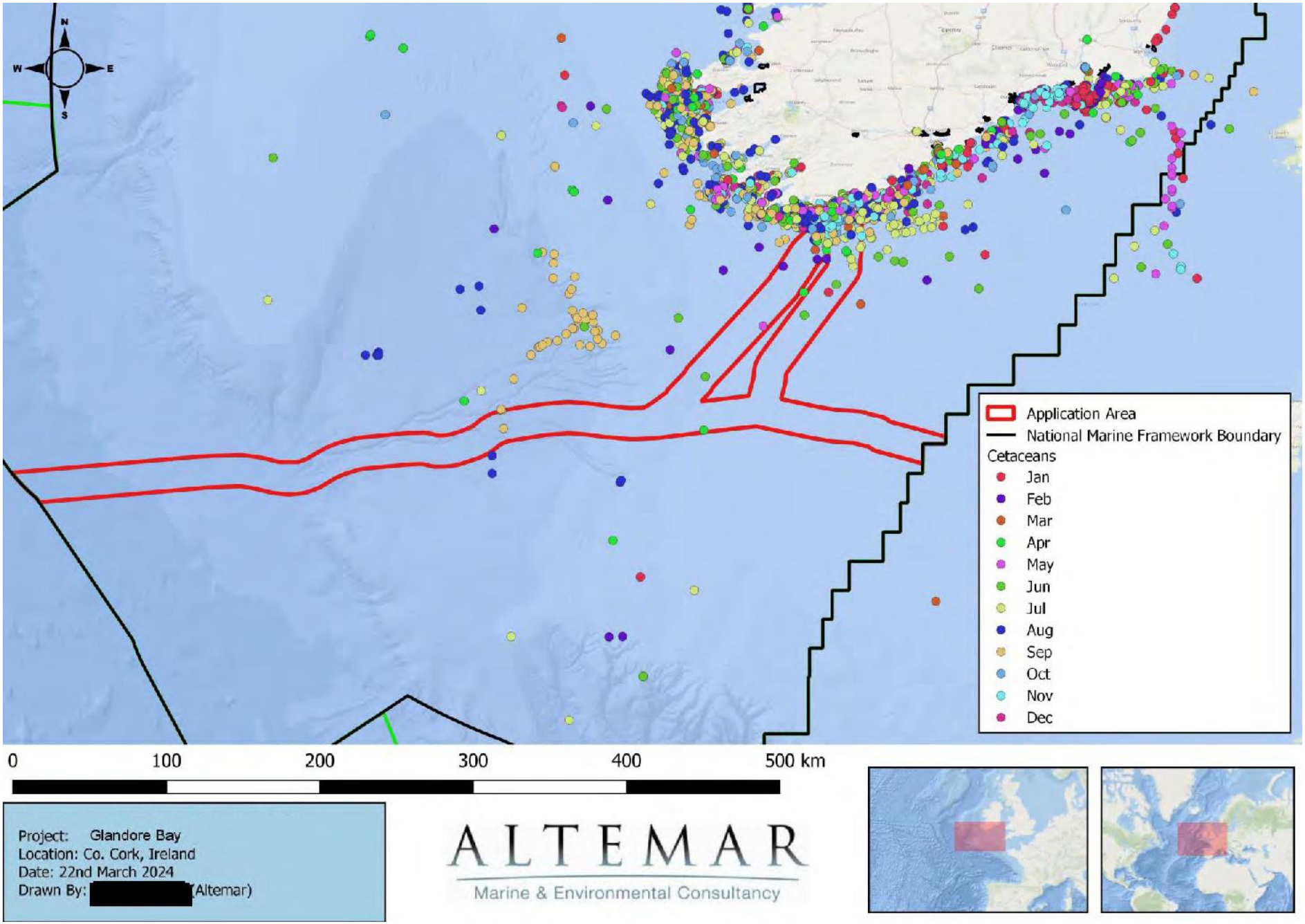


Figure 55c. Recorded Cetacean species sightings (months) (Source NBDC sightings data) within Irish EEZ

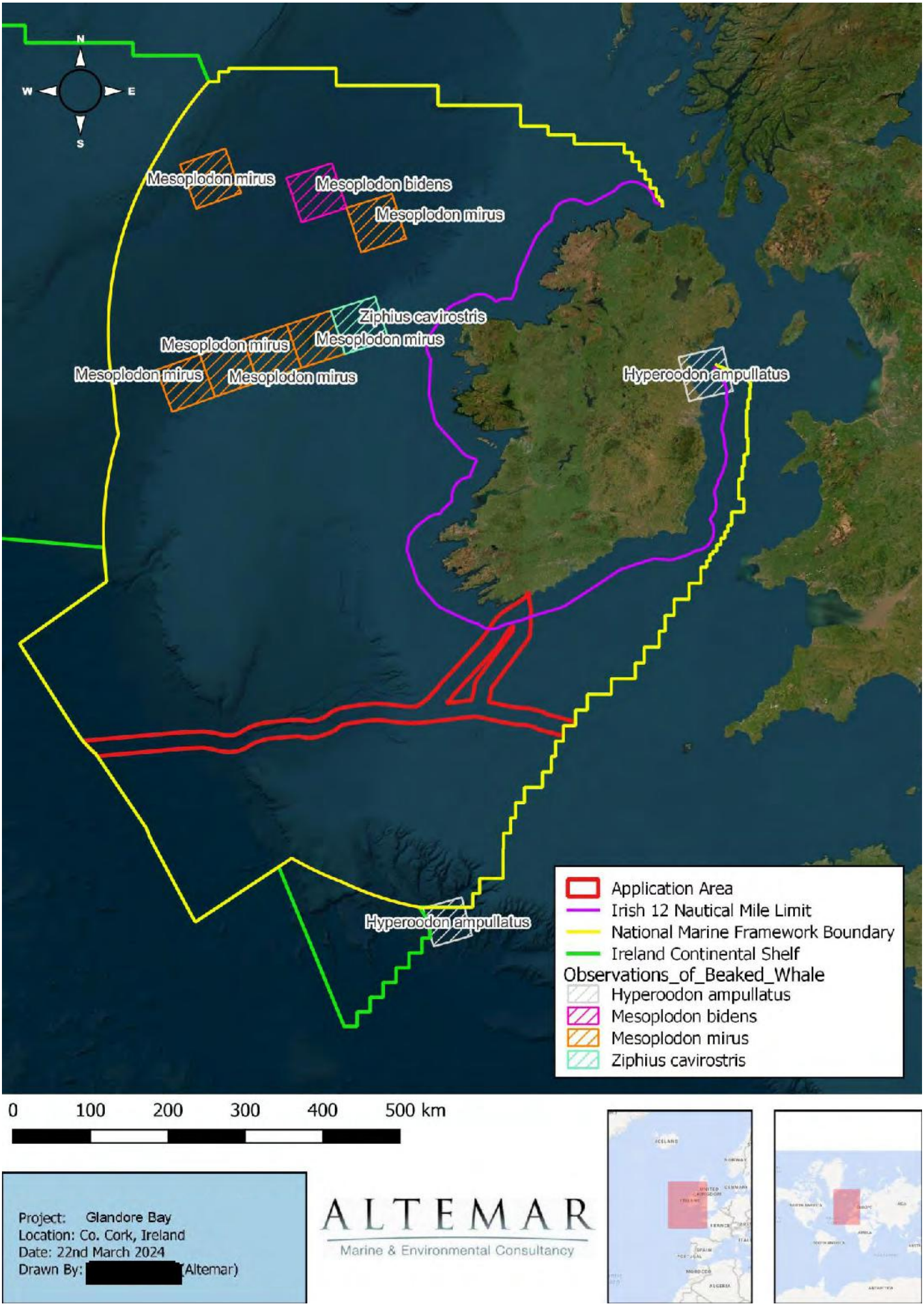


Figure 56. *Observations of Beaked Whales (Marine Institute data)*

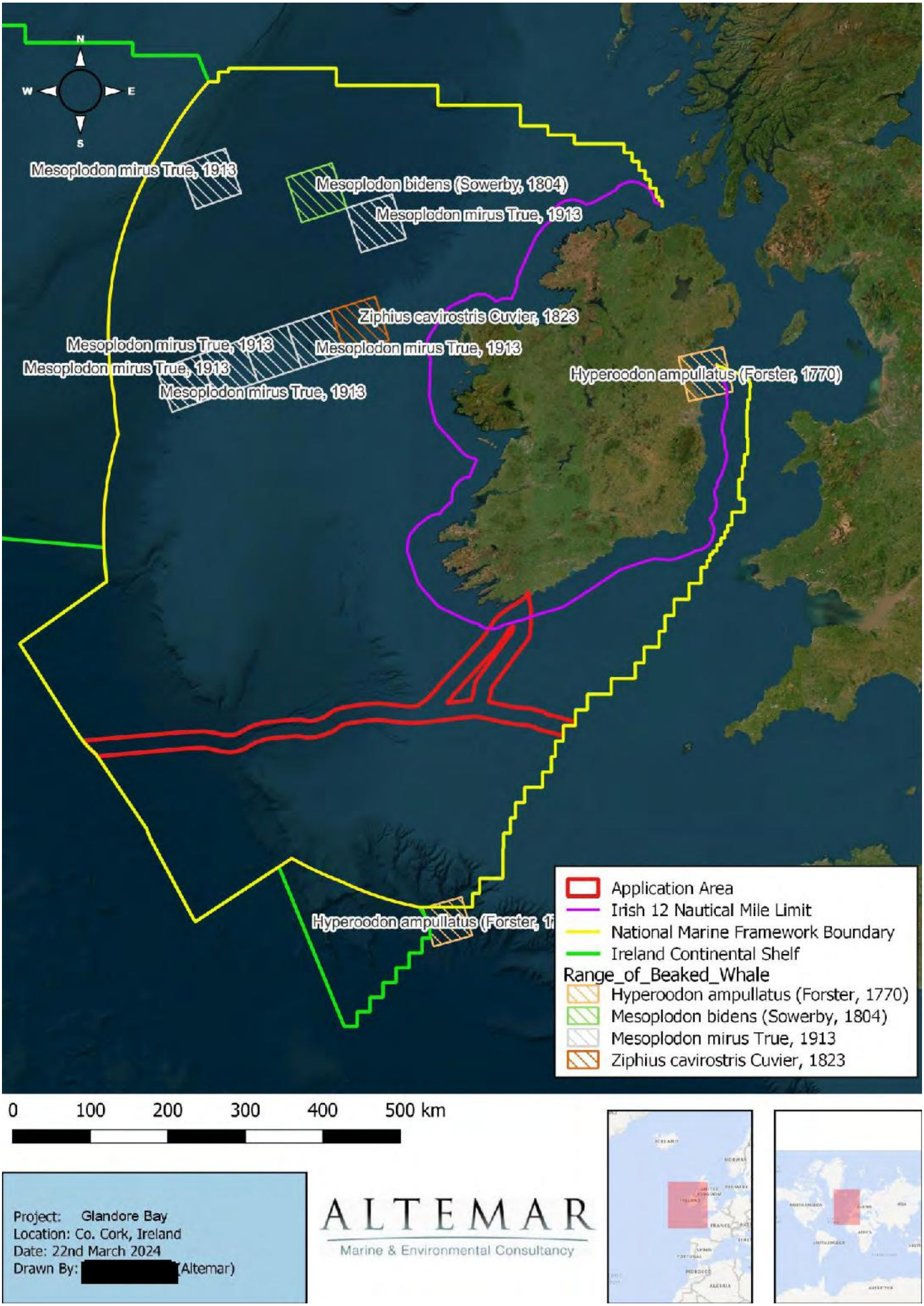


Figure 57. *Range of Beaked Whales (Marine Institute data)*

National Biodiversity Data Centre

The National Biodiversity Data Centre's online viewer was consulted in order to determine whether there have been recorded beaked whale sightings proximate to the Porcupine Seabight. This is visually represented in Figures 58 & 59.

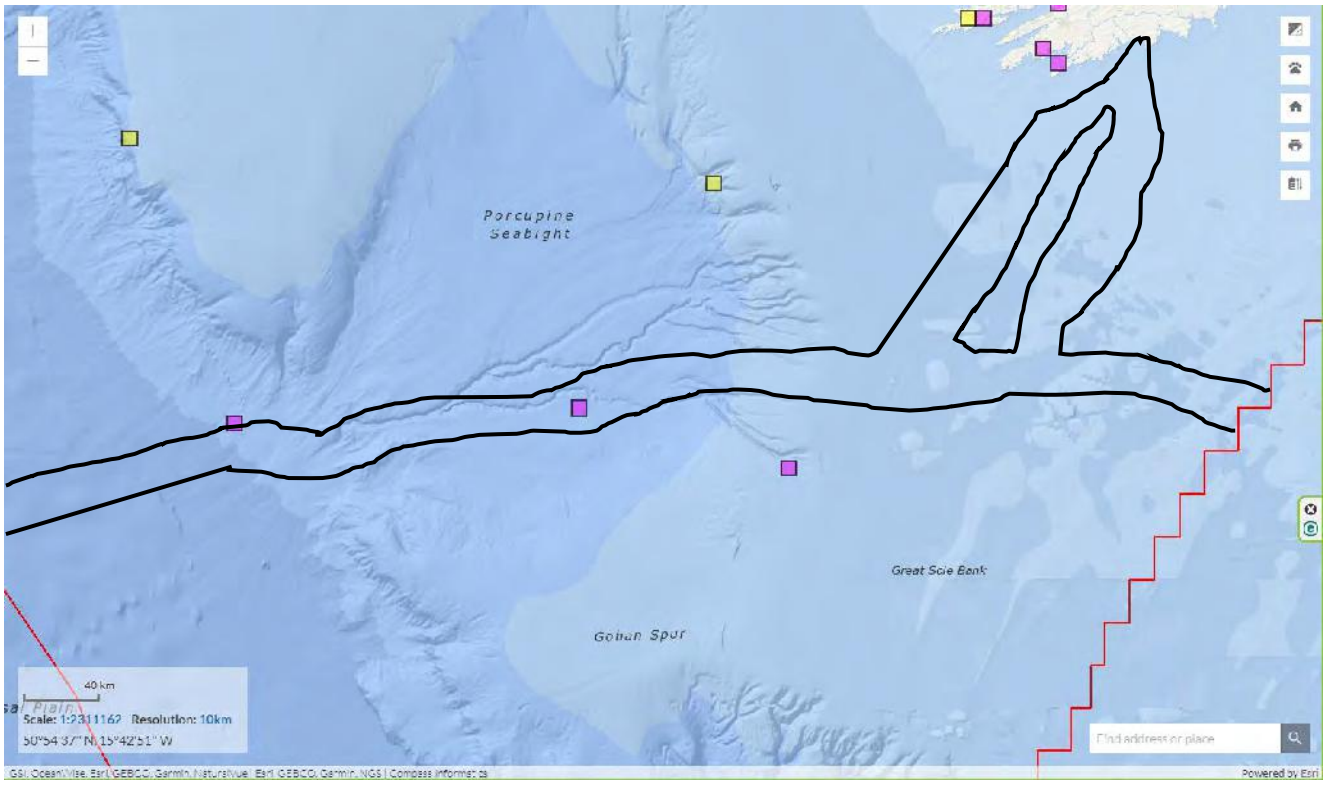


Figure 58. Northern bottlenose whale (*Hyperoodon ampullatus*) (purple) and Sowerby's beaked whale (*Mesoplodon bidens*) (yellow) (Source: NBDC) (Cable survey route: Black line (Approx.))

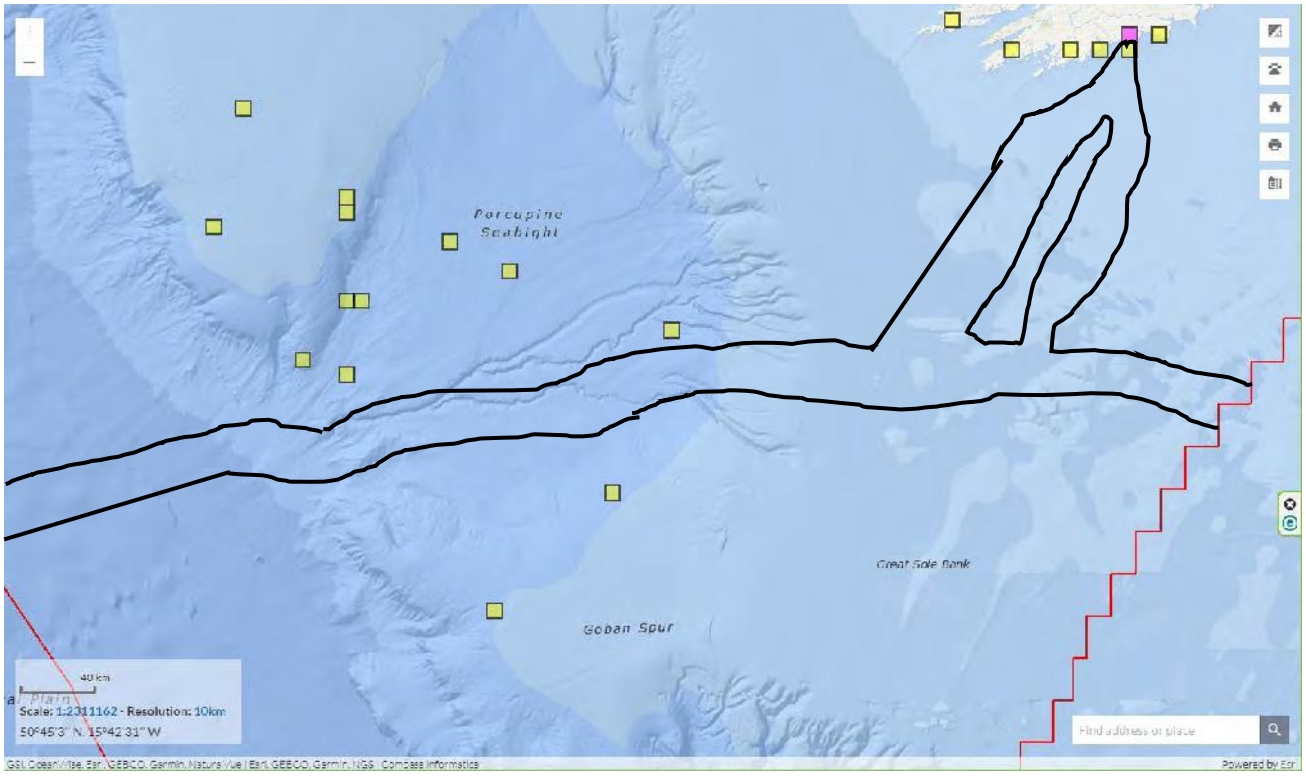


Figure 59. Cuvier's beaked whale (*Ziphius cavirostris*) (purple) and True's beaked whale (*Mesoplodon mirus*) (Source: NBDC) (Cable survey route: Black line (Approx.))

Specifically, NBDC noted the following recordings of beaked whales proximate to the proposed survey route:

1. Northern bottlenose whale (*Hyperoodon ampullatus*) noted in Ref. Grid 50°8'25.93" N, 12°18'42.7" W. Recorded on 18/02/2017 and located within the proposed survey area.
2. Northern bottlenose whale (*Hyperoodon ampullatus*) noted in Ref. Grid 50°6'9.08" N, 14°23'42.19" W. Recorded on 03/06/2016 and located 0.5km from the proposed survey area.
3. Cuvier's beaked whale (*Ziphius cavirostris*) noted in Ref. Grid 51°30'18.74" N, 8°57'17.48" W. Recorded on 27/12/2019 and located 2km from the proposed survey area.
4. Cuvier's beaked whale (*Ziphius cavirostris*) noted in Ref. Grid 51°29'58.61" N, 9°15'56.42" W. Recorded on 16/12/2019 and located 6.5km from the proposed survey area.
5. Cuvier's beaked whale (*Ziphius cavirostris*) noted in Ref. Grid 50°25'51.5" N, 11°42'55.36" W. Recorded on 18/06/2015 and located 8.5km from the proposed survey area.
6. Northern bottlenose whale (*Hyperoodon ampullatus*) noted in Ref. Grid 51°27'1.35" N, 9°27'22.02" W. Recorded on 03/09/2020 and located 9km from the proposed survey area.
7. Cuvier's beaked whale (*Ziphius cavirostris*) noted in Ref. Grid 51°35'24.42" N, 8°47'51.54" W. Recorded on 21/12/2019 and located 12km from the proposed survey area.
8. Cuvier's beaked whale (*Ziphius cavirostris*) noted in Ref. Grid 50°16'32.32" N, 13°44'24.65" W. Recorded on 03/06/2016 and located 15km from the proposed survey area.
9. Cuvier's beaked whale (*Ziphius cavirostris*) noted in Ref. Grid 50°21'42.06" N, 13°57'59.6" W. Recorded on 02/12/2015 and located 25km from the proposed survey area.
10. Northern bottlenose whale (*Hyperoodon ampullatus*) noted in Ref. Grid 49°57'0.6" N, 11°4'19.87" W. Recorded on 22/08/2013 and located 25km from the proposed survey area.
11. Cuvier's beaked whale (*Ziphius cavirostris*) noted in Ref. Grid 49°48'55.07" N, 12°3'43.66" W. Recorded on 15/02/2016 and located 35km from the proposed survey area.
12. Cuvier's beaked whale (*Ziphius cavirostris*) noted in Ref. Grid 50°32'32.74" N, 13°37'27.48" W. Recorded on 02/12/2015 and located 45km from the proposed survey area.
13. Cuvier's beaked whale (*Ziphius cavirostris*) noted in Ref. Grid 50°34'46.27" N, 13°42'21.76" W. Recorded on 29/05/2016 and located 55km from the proposed survey area.
14. Sowerby's beaked whale (*Mesoplodon bidens*) noted in Ref. Grid 51°1'59.14" N, 11°29'59.22" W. Recorded on 02/09/2014 and located 65km from the proposed survey area.

5. Habitats and Species – Onsite Fieldwork

During fieldwork, habitats in the vicinity of the intertidal and terrestrial route were classified according to Fossitt (2000) (Figure 60a & 60b). Observations on species were made on a receding tide, as well as at Low Water. It should be noted that the entire project was designed in consultation with Altemar in order to limit the potential impact of the proposed project. As a result, the footprint of the proposed works is small, using existing formal terrestrial routes, and involve the placing of machinery or personnel on existing paths and not within the dune systems. The only place where machinery will access areas will be on existing routes on the terrestrial and beach.

Site visits was carried out on at low tide on 17th December 2022 and 14th March 2024 by Bryan Deegan MCIEEM. The proposed terrestrial access route and location of trial pits was walked and photographed. Photographs of Long Strand and Rosscarbery Bay during the 2022 survey are demonstrated in Plates 1-8. Photographs of Long Strand and Rosscarbery Bay during the 2024 survey are demonstrated in Plates 9-16.

No works are proposed in the vicinity of the dunes and beach access is wide enough on the beaches to allow for machinery to enter the intertidal without impacting on the dune systems. As noted in plates 1-16 the sand on these beaches is course and there is a paucity of infauna. It would be expected that the trial pits would cause minor short-term effects on the beach and given the moderately exposed nature of the beaches and the coarse sand on site, effects on the beach would only last several tides. However, mitigation measures will need to be in place to ensure that the features of interest are not impacted by the proposed works, particularly while accessing the site.

LS2 Sand Shores

The intertidal access routes consists of Littoral Sediment- Sand shores. As seen in Plates 1-16 the sediment was coarse and appeared to be well trodden. No fauna or flora were noted along the intertidal route of both sites. There was a drift line at Long Beach. However, there was a minor and patchy drift line at Glandore Bay. No seagrass (*Zostera sp*) was seen. There was significant local pedestrian and canine activity at the restaurant and along the beaches. At Glandore Bay a stream was noted on site. This stream was in flood during the site assessment. Based on an examination of satellite and orthophotography imagery the location of the stream fluctuates significantly within the intertidal. As noted during the 2024 follow-up survey, sand on Rosscarbery Bay has since been shifted by tidal cycles and storms revealing a surface water outfall pipe that was not visible during the 2022 survey (Plate 14). It should also be noted that the route that the watercourse takes when traverses the intertidal had also changed from a meandering route in 2022 to a more direct linear route to the sea in 2024.

CD2 Marram Dunes and ED2 Bare Ground

The proposed works are in the Kilkeran Lake and Castlefreke Dunes SAC and the dune system form an important component of the qualifying interests. [1150] Coastal Lagoons*, [2110] Embryonic Shifting Dunes , [2120] Marram Dunes (White Dunes) and[2130] Fixed Dunes (Grey Dunes)are all features of interest of this SAC. Based on the conservation objectives supporting document [2110] Embryonic Shifting Dunes, [2120] Marram Dunes (White Dunes) and [2130] Fixed Dunes (Grey Dunes) and in the vicinity of the existing beach access at Long Strand. Species within the vicinity of the proposed project include Marram grass (*Ammophila arenaria),* Bracken *(Pteridium aquilinum), bramble (Rubus fruticosus agg.).* No invasive works are proposed in the vicinity of the dune systems. Works in the dune system relate to machinery and pedestrian access on existing paths and localised works in the intertidal.

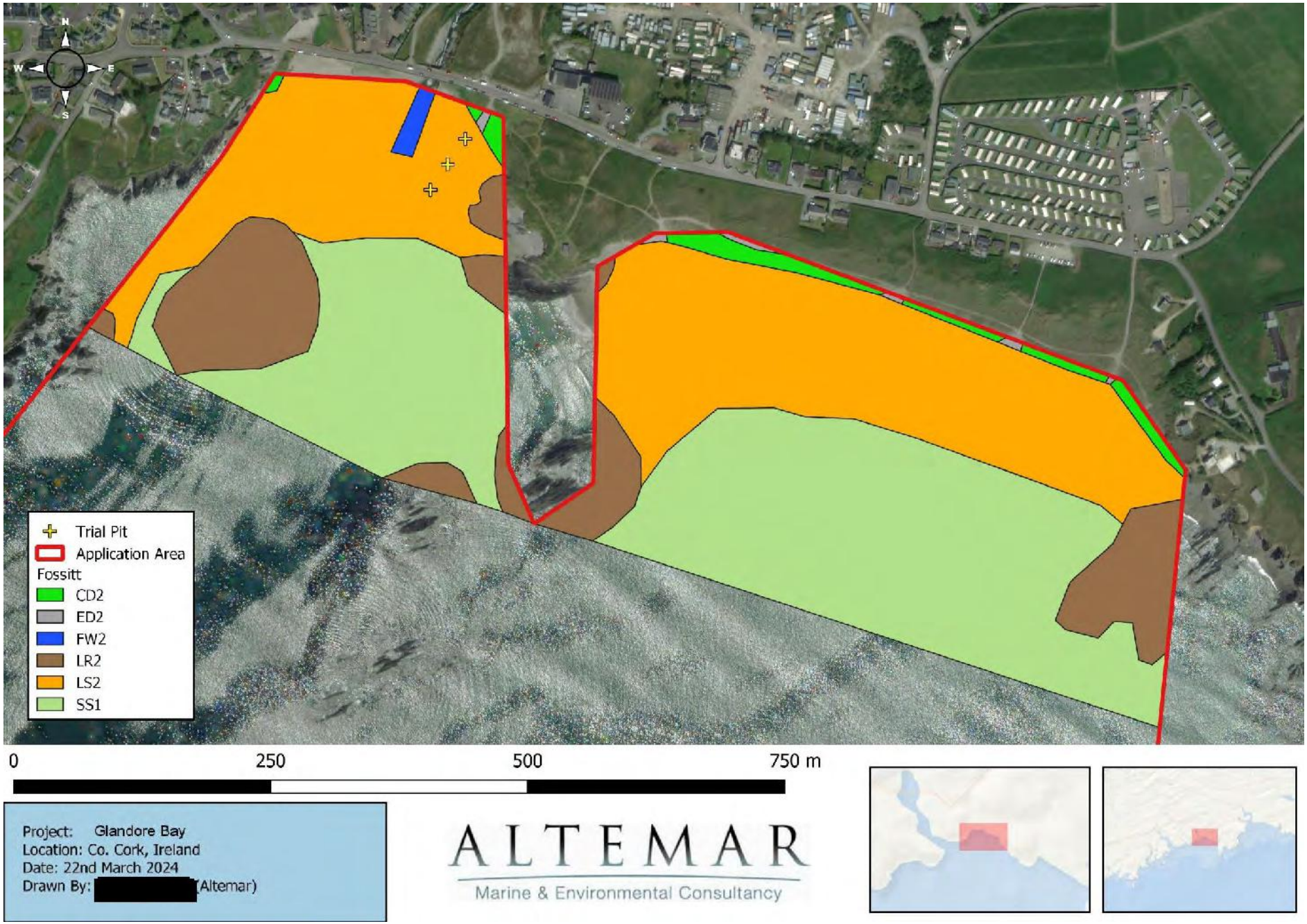


Figure 60a. Fossitt habitat map (Rosscarbery Bay)

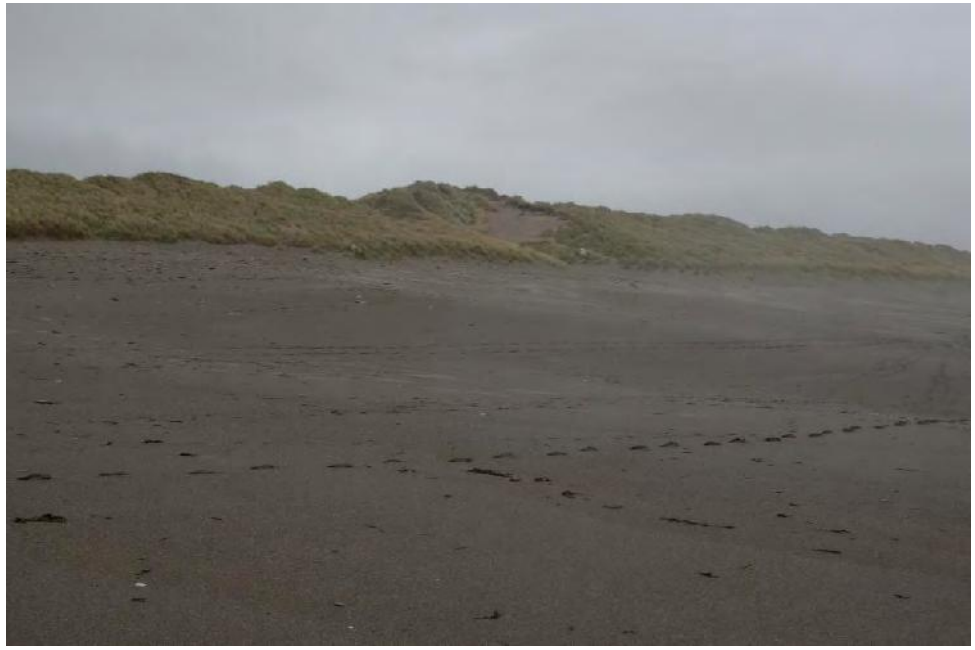
Figure 60b. Fossitt habitat map (Long Strand)




Plates 1-4. Long Strand (17th December 2022) (Clockwise from top left) Beach access at road(TL), Access to beach (TR), Area of trial pits (BL) & coarse sand at pit locations (BR)

Plates 5-8. Rosscarbery Bay (17th December 2022) (Clockwise from top left) Beach access (TL), Beach (TR), Coarse sandy/gravel lower shore (BL) & stream in flood (BR)



Plates 9-12 Long Strand (Clockwise from top left) Access to beach (TL), Area of trial pits (TR), Beach assess and Fish Basket (BL), & coarse sand and dune locations (BR) (14th March 2024)

Plates 13-16 Rosscarbery Bay (Clockwise from top left) Access to beach (TL), Exposed SW outfall (TR), Exposed SW outfall in beach (BL), & stream in flood (BR) (14th March 2024)

Species

Birds

The proposed survey works is not located within a SPA. The intertidal element of the survey works are on popular beaches with car parks, restaurants, and existing human and dog walking activity. These habitats are highly disturbed. The site was visited during the overwintering bird season (Dec. 2022 & March 2024). No birds were roosting on the shores during the site visit.

Amphibians

The common frog (*Rana temporaria*) was not observed in the surrounding terrestrial areas. NPWS records of rare and threatened species in addition to the NBDC sightings records were investigated and showed no records in proximity of the landfall or beach area. No drainage ditches were observed in the terrestrial element of the proposed survey works. However, the coastal lagoon and Long Strand drains into the sand near the site access. No amphibians of conservation importance are recorded on NPWS data.

Freshwater Biodiversity

It should be noted that a watercourse (identified as 'Owennashingaun' by the EPA) outfalls to the marine environment at Owenahincha Beach, Glandore Bay. This watercourse was observed in high flow during the site visits on 17th December 2022 and 14th March 2024 and no biodiversity was associated with this watercourse. It should be noted that this area is a highly mobile moderately exposed beach and based on an examination of satellite and orthophotography imagery the route that this watercourse takes in the intertidal alters regularly.

Terrestrial Mammals

No badger setts or evidence of terrestrial mammals of conservation importance were seen in the vicinity of the landfall areas. Records of sightings of the badger, pine marten, otter and hedgehog were examined from the NBDC and NPWS rare and threatened species records showed no records in proximity of the landfall areas.

It should be noted that otters (*Lutra lutra*) are a qualifying interest of the Roaringwater Bay and Islands SAC (8.1 km from the proposed survey works). Otters were not observed onsite. However, given the distance to this SAC (8.1 km), otter may be present at the time of the survey works. The survey works are solely in the terrestrial/intertidal elements of Glandore Bay and Long Strand, and the marine environment. Vessel speeds are slow (4 kn) for a limited period in Glandore Bay and Long Strand and impacts will be localised in nature. Following commencement of the survey works, underwater noise levels would increase gradually as the vessel approaches otter species. Otter would easily avoid the vessel as noise levels increase as speeds are slow. Vessel activity in the vicinity of this SAC is 8.1 km offshore in the deeper water off the coast of Glandore Bay / Long Strand. This temporary disturbance is deemed to be insignificant in relation to potential effects on otter from Roaringwater Bay. In the absence of mitigation measures, no significant impacts on otter species are foreseen as a result of the proposed survey works.

Cetacean Species

Figure 54 (a-c) shows all cetacean species and Figure 55 (a-c) shows monthly activity trends, in the vicinity of the proposed survey works, as recorded by IWDG sightings scheme. Cetacean activity has been seen in the vicinity of the proposed survey works. Species seen in the area include Fin Whale (*Balaenoptera physalus*), Risso's dolphin (*Grampus griseus*), common dolphin (*Delphinus delphis*), humpback whale (*Megaptera novaeangliae*), Sperm whale (*Physeter macrocephalus*), bottle-nosed dolphin (*Tursiops truncatus*), long-finned pilot whale (*Globicephala melas*), minke whale (*Balaenoptera acutorostrata*) and harbour porpoise (*Phocoena phocoena*).

Reptiles

The leatherback turtle (Dermochelys coriacea) is the only turtle species that is protected under Annex IV of the Habitats Directive in Ireland. This species has been recorded within both the marine and terrestrial aspects of the foreshore license area (NBDC, 2024). This species is another seasonal visitor, leatherback turtles migrate north during the summer months to more temperate waters, some visit the northeast Atlantic and Irish waters where they feed on jellyfish before turning south again in Autumn (NPWS, 2019). These sightings mostly range from the late 1970s to the early 2000s, however, there are some more recent sightings from 2018 and 2019 located within the application area. There is, therefore, a remote possibility that the leatherback turtle may be present at the time of survey works.

Historic Records of Biodiversity

The National Biodiversity Data Centre's online viewer was consulted in order to determine the extent of biodiversity and/or species of interest in the area. Appendix I provides a list of all species recorded in custom polygons drawn to the outline of the licence application area and 10km grid areas that possess a specific designation, such as Invasive Species or Protected Species.

6. Potential Effects

The marine and intertidal survey of a deep sea fibre-optic cable is a complex and challenging procedure. From the beginning of the planning stage to determining the final cable route, careful thought has gone into ensuring the longevity of the cable and uninterrupted service. This, in tandem with maritime licencing and environmental legislation results in the routing of the cable in as stable an environment as possible that will have minimal impact on the environment and threat of anthropogenic disturbance. The laying of a cable within the Irish EEZ involves burial in sediment, surface laying on hard substrate and elements of diver works in the shallow subtidal. The marine survey is to identify the optimal route for the cable. The survey elements will involve intertidal trial pits/bar probes and acoustic/geophysical survey offshore.

The terrestrial activities will involve the movement of personnel and machinery on existing wide worn paths (through dune habitats), roads and car park areas. No excavation works are proposed in the terrestrial areas. The principal elements of the terrestrial activities are the facilitation of access for machinery. Intertidal works involve excavation of trial pits and bar probes during a single falling tide on each beach. Temporary compaction would occur in localised areas, but these areas are on existing paths that have undergone compaction. The presence of machinery and personnel in the intertidal may temporally disturb wildlife. Disturbance of the sediments in the intertidal will occur due to trench works. Pollution generated from machinery/construction activities could potentially impact the intertidal and terrestrial habitats. Potential impacts on habitats and species and the extent of these impacts that could potentially be encountered during the construction phase are seen in Table 13a (habitats) and 13b (species).

In the subtidal the process will involve a ship moving at a speed of approximately 4kn and generating acoustic noise with the use of acoustic equipment. In addition, geotechnical sampling will also generate localised noise but also localised disturbance of sediment. However, as the vessel will be stationary during geotechnical sampling (cores grabs etc.) this disturbance of silt will be very localised. During the acoustic survey disturbance of cetaceans may occur due to the presence of the vessel and underwater noise.

Table 13a. Potential impacts on habitats during construction.

Habitat	Fossitt	Habitats Directive	Rating	Survey effects	Impact Significance in the absence of mitigation.
Moderately Exposed Infralittoral Rock	SR2	"Reef - 1170"	A	No geotechnical surveys will be carried out on reef habitat. Acoustic, geophysical surveys will not impact on this habitat.	Neutral/ localised/short-term/not significant. No mitigation is required.
Moderately Exposed Circalittoral Rock	SR5	"Reef - 1170"	A	No geotechnical surveys will be carried out on reef habitat. Acoustic, geophysical surveys will not impact on this habitat.	Neutral/ localised/short-term/not significant. No mitigation is required.
Sand Shores	*LS2*		A	Temporary displacement of birds may occur in the vicinity of the works. However, the beaches are highly disturbed by human and canine activity. Short term impacts would be expected on infauna due to compression/redistribution of sediments. The beaches are moderately exposed and consist of coarse sand and faunal densities would be expected to be very low. There is potential for pollution on site. Mitigation measures are required.	Minor Adverse/ localised/short-term/not significant. Mitigation is required.
Circalittoral gravels and Sands	SS5		D	Temporary disturbance will occur during geotechnical sampling. Short term impacts would be expected on infauna due to compression/redistribution of sediments. No mitigation measures are required.	Minor Adverse/ localised/short-term/not significant.
Circalittoral Mixed sediments	SS8		D	Temporary disturbance will occur during geotechnical sampling. Short term impacts would be expected on infauna due to compression/redistribution of sediments. No mitigation measures are required.	Minor Adverse/ localised/short-term/not significant.
Built Land	BL		E	Works and including access will not impact on build land.	Neutral

Table 13b. Potential impacts on species during construction.

Species	Rating	Survey Effect	Impact Significance
Mammal-Cetaceans		A detailed section on the impact of the proposed survey follows this table. Subtidal survey works may be carried out in vicinity of cetaceans. Localised disturbance may occur due to the presence of the vessel and acoustic noise generated from survey works on the sea floor. Vessel speeds are slow (4kn). Lurton (2016) modelled the sound field radiated by multibeam echosounders for acoustical impact assessment. He stated that "considering the injury criteria, the results illustrate that injury hazards are possible only at very short distances from the source: e.g. about 5 m for maximum Sound Pressure Level and 12 m for cumulative Sound Exposure Level in the case of a 240-dB source level, considering cetaceans. For behavioural response criteria, the corresponding values are 9 m and 70 m." Mitigation measures are required. The operations would comply with the NPWS (2014) "Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters".	Minor Adverse/ localised/short-term/Not significant. Mitigation measures are required.
Mammal-Seals	A	A detailed section on the impact of the proposed survey follows this table. Subtidal survey works may be carried out in vicinity of seals. Localised disturbance may occur due to the presence of the vessel and acoustic noise generated from survey works on the sea floor. Vessel speeds are slow (4kn). Lurton (2016) modelled the sound field radiated by multibeam echosounders for acoustical impact assessment. He stated that "considering the injury criteria, the results illustrate that injury hazards are possible only at very short distances from the source: e.g. about 5 m for maximum Sound Pressure Level and 12 m for cumulative Sound Exposure Level in the case of a 240-dB source level, considering cetaceans. For behavioural response criteria, the corresponding values are 9 m and 70 m." Mitigation measures are required. The operations would comply with the NPWS (2014) "Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters".	Minor Adverse/ localised/short-term/Not significant. Mitigation measures are required.
Mammal-Bats	A	There was no evidence of bat species at this site. Survey works in the intertidal will be carried out during daylight hours and will not involve additional lighting or noise after dusk. It will not impact on the food source for bat species or habitats important for roosting.	Neutral
Mammals-Terrestrial	A-D	Survey works will be carried out during daylight hours and any impacts would be primarily due to disturbance. There was no evidence of terrestrial mammal species at this site. However, otter could be present in the marine environment close to the shore. Mitigation measures are required in relation to mammals.	Minor Adverse/ localised/short-term
Birds-Over wintering	A	Survey works in the intertidal will be carried out during daylight hours and impacts would be primarily due to disturbance. During the survey period, the over wintering birds will be absent from the site. Based on the Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning & Construction Projects designed by Cutts et al. (2013)[1] the maximum likely distance at which disturbance will impact SCIs from this SPA is 300m (Cutts et	Minor Adverse/ localised/short-term/Not significant.

[1] https://gat04-live-1517c8a4486c41609369c68f30c8-aa81074.divio-media.org/filer_public/8f/bd/8fbdd7e9-ea6f-4474-869f-ec1e68a9c809/11367.pdf

Species	Rating	Survey Effect	Impact Significance
		al., 2013) from the proposed survey boundary. There are no SPAs located within 300m of the proposed survey works. No significant noise impacts on protected bird species are predicted from the proposed survey works.	Mitigation measures are required.
Birds-residential	D	Survey works in the intertidal and terrestrial area will be carried out during daylight hours and impacts would be primarily due to disturbance. The works are in an existing highly disturbed environment.	Minor Adverse/ localised/short-term/Not significant. Mitigation measures are required.
Amphibians-Frogs	B	The intertidal or subtidal area is not a habitat for amphibian species. Amphibians were not noted in the dune habitat. An ecologist will be on site to ensure species of conservation importance are not impacted.	Neutral
Terrestrial Flora	A-D	The terrestrial element of this project is solely in on existing paths. However, dune habitats are proximate to the site. Mitigation including supervision are required to ensure that this terrestrial flora are protected.	Minor Adverse/ localised/short-term/Not significant. Mitigation measures are required
Marine algae	D	Intertidal marine algae are not located proximate to the proposed survey works. Subtidal marine algae are primarily associated with hard substrata and will not be impacted by the proposed survey works. Subtidal geotechnical works (cores, grabs etc.) will not be in bedrock areas.	Neutral
Fish Species	A	Localised disturbance of marine species may occur due to survey activities. Vessel speeds are very slow and significant impacts on fish would be expected to be avoided during works. Important fishing areas and fishery areas are seen in Appendix II.	Minor Adverse/ localised/short-term. No mitigation measures are required.
Reptiles	A	There is a low possibility that the leatherback turtle may be present at the time of survey works. Mitigation including supervision are required to ensure turtles are protected.	Minor Adverse/ localised/short-term. Mitigation measures are required.

7. Potential Impacts on Cetaceans and Pinnipeds

All cetaceans are listed under Annex IV of the Habitats Directive, which means that they are protected wherever they occur. Bottle-nosed Dolphin and Harbour Porpoise are also listed under Annex II of the Directive. Annex II species require that core areas of their habitat are designated as sites of Community importance.

The proposed survey would be expected to impact on cetaceans primarily through the emission of noise due to the vessel and from survey equipment including multibeam. As outlined by O'Brien (2005), '*sound travels 4.5 times faster in water than in air and low frequency sounds travel farther underwater than high frequency sounds*.' Multi-beam can be defined as Low frequency (<1 kHz), Mid-frequency (1-10 kHz) and High Frequency (>10 kHz).

Southall *et al*. (2019) outlined in their publication "*Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects*" revised the marine mammal hearing groups, which are seen in Table 14.

Table 14. *Marine Mammal Functional Hearing Groups and Estimated Functional Hearing groups Proposed by Southall et al. (2019)*

Marine mammal hearing group	Auditory weighting function	Genera (or species) included
Low-frequency cetaceans	LF	*Balaenidae (Balaena, Eubalaenidae spp.); Balaenopteridae (Balaenoptera physalus, B. musculus)*
		Balaenopteridae (Balaenoptera acutorostrata, B. bonaerensis, B. borealis, 1 B. edeni, B. omurai; Megaptera novaeangliae); Neobalenidae (Caperea);Eschrichtiidae (Eschrichtius)
High-frequency cetaceans	HF	*Physeteridae (Physeter); Ziphiidae (Berardius spp., Hyperoodon spp., Indopacetus, Mesoplodon spp., Tasmacetus, Ziphius); Delphinidae (Orcinus)*
		Delphinidae (Delphinus, Feresa, Globicephala spp., Grampus, 2 Lagenodelphis, Lagenorhynchus acutus, L. albirostris, L. obliquidens, L. obscurus, Lissodelphis spp., Orcaella spp., Peponocephala, Pseudorca, Sotalia spp., Sousa spp., Stenella spp., Steno, Tursiops spp.); Montodontidae (Delphinapterus, Monodon); Plantanistidae (Plantanista)
Very high frequency cetaceans	VHF	*Delphinidae (Cephalorhynchus spp.; Lagenorhynchus cruciger, L. australis); Phocoenidae (Neophocaena spp., Phocoena spp., Phocoenoides); Iniidae (Inia); Kogiidae (Kogia); Lipotidae (Lipotes); Pontoporiidae (Pontoporia)*
Phocid carnivores in water	PCW	*Phocidae (Cystophora, Erignathus, Halichoerus, Histriophoca, Hydrurga,Leptonychotes, Lobodon, Mirounga spp., Monachus, Neomonachus, Ommatophoca, Pagophilus, Phoca spp., Pusa spp.)*

The Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NOAA, 2018) outlined the hearing groups of marine mammals including the generalised hearing range of these cetacean groups (Table 15). They also noted that "*Exposures exceeding the specified respective criteria level for any exposure metric are interpreted as resulting in predicted temporary threshold shift (TTS) or permanent threshold shift (PTS) onset*." The onset of PTS on marine mammals was also outlined in NOAA 2018 (Table 16). The updated figures for PTS and TTS for are outlined in Table 17.

The hearing ranges and sensitivity of marine mammals differ from one species to another depending on their audiogram. "*For example, harbour porpoises are sensitive from 3 kHz to 130 kHz, with peak sensitivity at 125-130 kHz, and bottlenose dolphins from 5-110 kHz, with peak sensitivity at 40 and 60-116 kHz*" (Southall *et al.,* 2007). Common seals are sensitive 4-45 kHz (peak sensitivity at 32 kHz) and grey seals 8-40 kHz. Humans are sensitive only to frequencies from 20 Hz to 16-18 kHz but with peak sensitivity from 2-4 kHz.

Table 15. Hearing Groups of Marine Mammals (NOAA, 2018)

Hearing Group	**Generalized Hearing Range***
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, Kogia, river dolphins, cephalorhynchid, Lagenorhynchus cruciger & L. australis)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz

***** Represents the generalized hearing range for the entire group as a composite (i.e., all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall et al. 2007) and PW pinniped (approximation).

Table 16. Onset of PTS in Marine mammals

	PTS Onset Thresholds (Received Level)	
Hearing Group	Impulsive[1]	Non-impulsive[2]
Low-Frequency (LF) Cetaceans	Cell 1 *Lpk,flat:* 219 dB *LE,LF,24h:* 183 dB	Cell 2 *LE,LF,24h:* 199 dB
Mid-Frequency (MF) Cetaceans	Cell 3 *Lpk,flat*: 230 dB *LE,MF,24h:* 185 dB	Cell 4 *LE,MF,24h*: 198 dB
High-Frequency (HF) Cetaceans	Cell 5 *Lpk,flat:* 202 dB *LE,HF,24h:* 155 dB	Cell 6 *LE,HF,24h:* 173 dB
Phocid Pinnipeds (PW) (Underwater)	Cell 7 *Lpk,flat:* 218 dB *LE,PW,24h*: 185 dB	Cell 8 *LE,PW*,24h: 201 dB
Otariid Pinnipeds (OW) (Underwater)	Cell 9 *Lpk,flat:* 232 dB *LE,OW,24h:* 203 dB	Cell 10 *LE,OW,24h:* 219 dB

[1]Impulsive: produce sounds that are typically transient, brief (less than 1 second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (ANSI 1986; NIOSH 1998; ANSI 2005).

[2]Non-impulsive: produce sounds that can be broadband, narrowband or tonal, brief or prolonged, continuous or intermittent) and typically do not have a high peak sound pressure with rapid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH 1998).

Table 17. Southall *et al.* (2019) TTS- and PTS-onset thresholds for marine mammals exposed to impulsive noise: SEL thresholds in dB re 1 µPa^{2}s under water and dB re (20 µPa)^{2}s; and peak SPL thresholds in dB re 1 µPa under water.

Hearing Group	**Impulsive Noise**		**Non-impulsive Noise**
	Unweighted SPLpeak(dB re 1 µPa)	Weighted SELcum (dB re 1 µPa^{2}s)	Weighted SELcum (dB re 1 µPa^{2}s)
PTS Criteria			
Low-frequency (LF) cetaceans	219	183	199
High-frequency (HF) cetaceans	230	185	198
Very-frequency cetaceans (VHF)	202	155	173
Phocid carnivores in water (PCW)	218	185	201
TTS Criteria			
Low-frequency cetaceans	213	168	179
High-frequency cetaceans	224	170	178
Very high-frequency cetaceans	196	140	153
Phocid carnivores in water	212	170	181

Most small cetaceans, excluding harbour porpoise, have an auditory bandwidth of 150 HZ to – 160 kHz, while harbour porpoise have an auditory bandwidth within 200 Hz to 180 kHz. Pinnipeds in water are thought to have an auditory bandwidth of between of 75 Hz to 75 kHz and from 75 Hz to 30 kHz in air (Southall et al. 2007)."

The proposed survey equipment and the noise frequency emissions are seen in Table 18. The estimated time and duration of survey activities is demonstrated in Figure 19.

Equipment Type	Purpose	Frequency Range	Duration	*Maximum* Source Pressure Level (re 1µPa at 1 m)	Reference
Multibeam Echo Sounder (MBES)	Measure detailed bathymetry by transmitting sound pulses (active sonar).	200 kHz to 500 kHz	0.05 - 10 ms	210 - 245 dB.	Danson 2005, Hopkins 2007, DECC 2011, Lurton and DeReutier 2011, Lurton 2016, BEIS 2020, Crocker & Fratantonio 2016
Deepwater Multibeam Echo Sounder (MBES)	Measure detailed bathymetry by transmitting sound pulses (active sonar).	12 kHz	2 – 15 ms	210 Db.	Kongsberg
Side Scan Sonar (SSS)	Determine surficial nature of the seabed and detect objects by transmitting sound pulse.	200 kHz to 700 kHz	0.4 - 1.0 ms	200 - 240 dB.	BOEM 2016, BEIS 2020, DAHG 2014, Crocker & Fratantonio 2016
Sub-bottom Profiler (SBP) - Pinger	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	2 kHz to 15 kHz	0.5 - 30 ms	214 dB.	Hartley Anderson 2020
Sub-bottom Profiler (SBP) - Chirper	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	2 kHz to 13 kHz	5 - 40 ms	185 - 215 dB.	Crocker & Fratantonio 2016, Hartley Anderson 2020
Sub-bottom Profiler (SBP) - Boomer	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	500 Hz to 15 kHz	0.5 - 1.0 ms	205 - 215 dB.	Crocker & Fratantonio 2016
Sub-bottom Profiler (SBP) - Parametric	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	4 to 15 kHz, 85 to 115 kHz	0.2 - 30 ms	238 - 247 dB. 200 - 206 dB.	Hartley Anderson 2020
Ultra-Short Base Line (USBL)	Subsea positioning.	20 kHz to 50 kHz	5 - 10 ms	194 - 207 dB.	Kongsberg
Magnetometer	Identify ferrous anomalies for metal obstructions, shipwrecks, etc. on and under the seabed.	Passive	N/A	Passive	N/A
Survey Vessels	Carry out the survey and deploy the equipment.	50 Hz to 300 Hz	N/A	160 - 190 dB.	DECC 2011

Table 18a. Details of the proposed types of acoustic equipment which emit sound.

Equipment Type	Purpose	Number of locations within Licence Application Area (up to)	Frequency Range	*Maximum Source Pressure Level (re 1µPa at 1 m)*	Reference
Cone Penetration Test (CPT)	Determine geotechnical engineering properties of seabed sediments.	96	28 Hz	*118 - 145 dB.*	BOEM 2012, EIRGRID 2014
Gravity Corer	Retrieve a seabed sediment sample by penetrating seabed with a steel core barrel under self-weight	48	N/A	*N/A*	N/A
Vibrocorer	Retrieve a seabed sediment sample by penetrating seabed with a vibrating steel core barrel	48	30 Hz	*187.4 dB.*	LGL 2010
Grab Samples	Collect small sediment samples from seabed surface with clamshell mechanism	26	N/A	*N/A*	N/A

Table 18b. Details of the proposed types of geophysical equipment which emit sound.

Activity	Typical Time Period Required for Activity	Total Number of Site Investigation Locations	Total Time for Survey Activity	Seabed Area per Location	Seabed Area per Activity (ha)	Total Area (ha)	Area Directly Affected as % of Maritime Usage Licence Application Area
Inshore Geophysical Survey	3 to 4 days (weather and sea state dependent)	500m cable route corridor	3 to 4 days (weather and sea state dependent)	N/A	1.9 km^2	1.9 km^2	0.0113%
Offshore Geophysical Survey	20 to 23 days (weather and sea state dependent)	500m cable route corridor	20 to 23 days (weather and sea state dependent)	N/A	294 km^2	294 km^2	1.7417%
Deepwater MBES Survey	7 to 9 days (weather and sea state dependent)	3 x Water Depth (10km maximum)	7 to 9 days (weather and sea state dependent)	N/A	3915 km^2	3915 km^2	23.1931%
CPT	30 minutes - 3 hours in any one location	96	192 hours within total 16 days of Site Investigations campaign (weather and sea state dependent, excluding transit between locations)	8m^2	0.0008 ha	0.076 ha	0.0002%
Gravity Corer	30 minutes - 3 hours in any one location	48	96 hours within total 16 days of Site Investigations campaign (weather and sea state dependent, excluding transit between locations)	1m^2	0.0001 ha	0.0048 ha	0.0000%
Vibro Corer	30 minutes - 3 hours in any one location	48	96 hours within total 16 days of Site Investigations campaign (weather and sea state dependent, excluding transit between locations)	8m^2	0.0008 ha	0.0384 ha	0.0001%
Grab Samples	20 minutes – 2 hours in any one location	26	26 hours within total 16 days of Site Investigations campaign (weather and sea state dependent, excluding transit between locations)	0.5m^2	0.00005 ha	0.0013 ha	0.0000%

Table 19. Estimated Time and Duration of Survey Activities

The cetacean species observed in the survey area are high frequency, mid-frequency and low frequency cetaceans. Grey and Common Seals may also be present. The proposed survey equipment and the noise frequency emissions are seen in Table 18. The high frequencies emitted from the equipment are above the auditory range of the mid frequency (150Hz-160 kHz) but within the hearing range of high frequency cetaceans (275Hz -160kHz)- observed and on the proposed survey area.

The Multibeam Echo Sounder (MBES) (200 kHz to 500 kHz) and Side Scan Sonar (SSS) (200 kHz to 700 kHz), single beam echo sounder and Multi Beam Echo Sounder (MBES) will emit noise above the hearing frequency of marine mammals. Deepwater MBES (12 kHz), the hull mounted Sub-bottom Profiler (SBP) – Pinger (2 kHz to 15 kHz) and Sub-bottom Profiler (SBP) – Chirper (2 kHz to 13 kHz), Sub-bottom Profiler (SBP) – Boomer (500 Hz to 15kHz), Sub-bottom Profiler (SBP) – Parametric (4 to 15 kHz, 85 to 115 kHz) and Ultra-Short Base Line (USBL) Subsea positioning. (20 kHz to 50 kHz) emits low and mid frequency noise, within the auditory range of all marine mammals including harbour porpoise, grey seal and harbour seal. However, all of the equipment (peak noise) at 1m from source emit noise above the onset of PTS for non-impulsive sounds for high, medium, low frequency cetaceans and Phocid Pinnipeds outlined by NOAA (2018) was 173 dB, 198 dB, 199 dB and 219dB respectively and the 198dB proposed injury levels indicated by Southall et al. (2019). As a result negative impacts may be foreseen if marine mammals are close enough to the equipment to receive sound levels above this indicative threshold. As outlined in Table 19 the inshore Geophysical Survey 3 to 4 days (weather and sea state dependent) offshore Geophysical Survey 20 to 23 days (weather and sea state dependent).

Lurton (2016) modelled the sound field radiated by multibeam echosounders for acoustical impact assessment. He stated that "considering the injury criteria, the results illustrate that injury hazards are possible only at very short distances from the source: e.g. about 5 m for maximum Sound Pressure Level and 12 m for cumulative Sound Exposure Level in the case of a 240-dB source level, considering cetaceans. For behavioural response criteria, the corresponding values are 9 m and 70 m."

The operations would comply with the NPWS (2014) "*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters*". These guidelines would be deemed adequate to mitigate the negative impacts of the proposed works. Cetaceans in the vicinity of the vessel during start up procedures would be given ample time to leave the site with the soft start procedures outlined in the guidelines. In addition, vessel speeds are extremely slow which would give marine mammals ample opportunity to move from the area.

Note: in relation to consistency between Southall (2019) and NOAA (2018)

The Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NOAA, 2018) (or National Marine Fisheries Service, 2018 (as quoted in Southall 2019)), outlines the hearing groups of marine mammals including the generalised hearing range of these cetacean groups (Annex II). NOAA (2018) also noted that "*Exposures exceeding the specified respective criteria level for any exposure metric are interpreted as resulting in predicted temporary threshold shift (TTS) or permanent threshold shift (PTS) onset.*" The thresholds for the onset of PTS on marine mammals were also outlined in NOAA 2018. The updated Southall (2019) figures for PTS and TTS for are outlined in Annex IV.

Southall (2019) outlined the main differences between their publication and previous publications including NOAA (2018) which was referenced as NMFS (2018) in Southall (2019). Southall (2019) states that "The noise criteria here represent the next step in a sequential process of evolution of the criteria proposed by Southall et al. (2007), substantially modified with new analytical methods by Finneran (2016), and recently adopted as U.S. regulatory guidance by the NMFS (2016, 2018). While the quantitative process described herein and the resulting exposure criteria here are based on, and in many respects are identical to, those derived by Finneran (2016) and adopted by the NMFS (2016, 2018), there are a number of significant distinctions. The exposure criteria here appear in a peer-reviewed publication and include all marine mammal species for all noise exposures, both under water and in air for amphibious species. NMFS (2016, 2018) provides regulatory guidance only for the subset of marine mammals under their jurisdiction and do not include criteria for aerial noise exposures, an important consideration in many locations for which some earlier assessments were made (Finneran & Jenkins, 2012). The exposure criteria here, while based on the Finneran (2016) quantitative method and consistent with the NMFS (2016, 2018) guidance where they overlap, are thus more broadly relevant, peer-reviewed, and less subject to potential changes in national regulatory policy."

Southall (2019) also stated that "It should be noted that this results in some proposed differences in the terminology of hearing groups relative to those used in Finneran (2016) and NMFS (2016, 2018). These proposed differences in nomenclature may be confusing, but we believe they are justified (see the "Marine Mammal Hearing Groups and Estimated Group Audiograms" section and Appendices 1-6) and will support future criteria as new information emerges."

The difference in nomenclature between NOAA 2018 and Southall (2019) is that NOAA (2018) classified cetaceans as Low-frequency (LF) cetaceans (baleen whales), Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales) and High-frequency (HF) cetaceans (true porpoises, Kogia, river dolphins, cephalorhynchid, Lagenorhynchus cruciger & L. australis) while Southall reclassified these groups to Low-frequency cetaceans, High-frequency cetaceans, Very high-frequency cetaceans. As outlined in Southall (2019) "*The distinction between HF and VHF cetacean groups (as opposed to mid- and high-frequency) reflects the regions of best hearing sensitivities within these groups, often including frequencies approaching or exceeding 100 kHz; these frequencies would be more appropriately described within marine bioacoustics as high to very high. Further, as discussed in more detail below, a number of anatomical and sound production properties suggest a potential distinction of very low-(VLF) and LF cetaceans among mysticetes. Some evidence also suggests a potential segregation of mid-frequency (MF) and HF cetaceans in addition to the distinction of HF and VHF cetaceans*." This is in effect a relabelling of Mid-Frequency (MF) Cetaceans and High-Frequency (HF) Cetaceans to High-frequency cetaceans and Very high-frequency cetaceans respectively. It should be clearly noted that the PTS values within the updated groups were identical between NOAA, 2018 and Southall 2019 and it was in effect a renaming of the groups.

8. Mitigation Measures and Monitoring

Specific controls will be incorporated into the proposed development project to minimise the potential negative impacts on the ecology within the Zone of Influence (ZoI) within / proximate to the subject site are outlined in below.

Route Planning within the landfall area.

A strict route selection process was carried out to assess the optimal route and landing sites, Owenhincha and Long Strand, which is within the Kilkeran Lake and Castlefreke Dunes SAC, taking into account the lowest environmental impact, highest resource efficiency and wave exposure on the basis of sound and comparable data. This included addressing engineering issues as well as environmental concerns and assessing existing infrastructure.

The potential landfall location is within two sites of conservation significance (Kilkeran Lake and Castlefreke Dunes SAC & pNHA). The conservation significance of the habitats, fauna and flora on both shores and within this SAC was assessed. The proposed survey route was deemed to be the optimal route of satisfying conservation significance based on the assessment of NPWS ratings data, the optimal from an engineering perspective and for the stability and longevity of the cable. All sand dune habitats were avoided as part of the route selection process.

Intertidal Works

As was seen during the fieldwork, the beach at which the intertidal works are proposed is to be carried out on is moderately exposed with coarse sand. Significant human activity was noted on the beach in blustery weather conditions during a site visit in December 2022. It would be expected that there is increased human activity on the beach during summer months and the main access to the beach is via the proposed access route. This route is well used. As a result, mitigation of impacts in the intertidal should concentrate on minimising the following:

Disturbance

The proposed survey route is within a popular beach which will have increased activity during summer months. As a result, the presence of additional personnel on the shore during summer would not be thought to cause a significant additional disturbance. However, there is potential for disturbance of the dune habitat and as a result the following mitigation measures would be carried out:

1. An ecologist would be onsite during the surveys in order to minimise disturbance and ensure site integrity is maintained.
2. A track will be marked out by the ecologist prior to machinery accessing the beach. This will be marked out to avoid features of interest of the SAC/dune habitats and the outlet from the lagoon in the upper shore.
3. Drift lines and vegetation on the shore in close proximity to the proposed route would contain the highest proportion of potential food source for bird species. If present, these should be avoided by machinery and personnel.
4. The surveys should commence on a receding tide. This is to ensure all operations are done within one tide. Operations must be completed before an incoming tide when many of the birds return to feed. This should result in the site investigations being imperceptible following a single or several tidal cycles.
5. Any temporary access arrangements or structures that are put in place to allow machinery access to the beach area should be prepared in consultation with an ecologist and the site should be fully reinstated post works.

Reinstatement

Reinstatement of the terrestrial and intertidal habitat should be carried out to pre-construction conditions. Any concerns in relation to the survey process or resulting reinstatement of the habitat to pre survey conditions will be raised with NPWS by the project ecologist prior to the removal of personnel from the site.

Subtidal

Mitigation impacts are primarily concerned with the survey and the following mitigation measures would be enforced.

1. Mitigation measures will include the presence of a MMO onboard the survey vessel. The purpose of the MMO is to ensure that there is no disturbance of seal /cetacean populations.
2. The NPWS Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters' (NPWS, 2014) should be followed throughout the survey.
3. The MMO should ensure that mitigation measures are carried out. Sufficient resources should be made immediately available on the survey vessel to deal with accidental oil spills including hydraulic hoses bursting etc. and reported to the on board ecologist.

9. Adverse Effects likely to occur from the project (post mitigation)

Standard and specific mitigation measures are proposed. These would ensure that any of the proposed survey works do not adversely affect any of the habitats or fauna inhabiting them throughout the duration of the survey works exclusively. However, early implementation of ecological supervision and consultation with NPWS, prior to surveying, is seen as an important element to the project.

With the successful implementation of standard and specific mitigation measures to limit impacts on the biodiversity, no significant impacts are foreseen from the survey works of the proposed project on terrestrial or aquatic ecology. Residual impacts of the proposed project will be localised to the immediate vicinity of the proposed works.

The mitigation proposed for the development satisfactorily addresses the mitigation of potential impacts on terrestrial biodiversity and aquatic biodiversity through the application of the standard controls as outlined above. In particular, mitigation measures to ensure compliance with the Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters. It is essential that these measures outlined are complied with, to ensure that the proposed survey does not have environmental impacts and significant impacts on local biodiversity.

Residual effect: Minor Adverse/ localised/short-term/Not significant.

10. Cumulative Effects

As outlined by (OSPAR, 2012) *"Cumulative effects, the combined effect of more than one activity, may reinforce the impacts of a single activity due to temporal and/or spatial overlaps".* The proposed landfall survey site at Long Strand is in a rural area with exception to the 'Fish Basket Café'. It is a location with a regular stream of dog walkers and pedestrians on the shore. The cable survey would not be seen to have an impact on water quality of the area including impacting the water quality status. The intertidal section of this project will involve trial pits (in SAC site) and machinery that will enter the upper shore (within the conservation sites).

Cork County Council planning permissions, Foreshore Applications, MARA Licence Applications, and EIA portal were examined, and the potential for in-combination effects due to development in the area.

Table 20. *Cork County Council Planning Permissions.*

Ref. No.	Address	Proposal
23642	Creganne, Rosscarbery, Co. Cork	Alterations and extensions to side and rear of existing dwellinghouse and all associated site works
23205	Little-Island, Owenhincha, Rosscarbery, Co. Cork	Permission for demolition of 1 no. house, 1 no. cabin style dwelling and 1 no. domestic shed and for construction of a dwellinghouse and garage and all associated site works
2282	Castlefreke-Warren, Rathbarry, Co. Cork	Construction of a new Coast Guard Station
20723	Creganne, Rosscarbery, Co. Cork	Permission for alterations to elevations, ground and first floor extensions with first floor terrace area all to existing dwelling with associated site works (change of plan from that permitted under 20/0150 located at the existing site)
2079	Little-Island (Townland), Owenhincha, Rosscarbery, Co. Cork	Permission for the demolition of the former hotel and the construction of 9 no. dwellings, realignment and widening of the Coast Road (R598) and all associated landscaping, car parking and site development works

Table 21. *Foreshore licence applications proximate to the proposed survey route corridor*

Applicant	FSL Application No.	Date	Status	Activity	Distance from Survey Area	Potential for In-Combination Effects	Screening In/Out
Irving Oil Whitegate Refinery Ltd	FS007111	21/02/2022	Applied	Construction of Catchment Basin on shoreline	approx 66 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Port of Cork	FS007126	23/02/2022	Applied	Maintenance Dredging	approx 64 km to disposal area	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Kinsale Offshore Wind Ltd	FS007354	10/01/2022	Applied	Site Investigations (Geophysical, Geotechnical, Environmental and Metocean) for the proposed Kinsale Project offshore wind farm array	approx 31 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Uisce Eireann	FS007376	30/09/2022	Applied	Strategic modelling study of water currents within Cork Harbour & environs.	Approx. 53km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Tulca Offshore Array Limited	FS007431	14/02/2022	Applied	Site Investigations - Geophysical, Geotechnical, Environmental and Metocean for wind farm	181 km^2 overlap with Survey Area	As outlined in the Foreshore Licence Application ORE for this project: '*The results of the Stage 1 Screening found significant effects on Annex II qualifying interests could not be ruled out for all potential impacts, therefore a Stage 2 Appropriate Assessment will be necessary. As a result of this we have prepared the accompanying Natura Impact Statement (NIS). The NIS concludes that, in view of best scientific evidence and methods, there will be no adverse effects from the proposed survey on the integrity of a Natura 2000 site, alone or in combination with other local*	OUT

Table 21. *Foreshore licence applications proximate to the proposed survey route corridor*

Applicant	FSL Application No.	Date	Status	Activity	Distance from Survey Area	Potential for In-Combination Effects	Screening In/Out
						projects. Further details on this conclusion can be found in the NIS report. *As outlined in the Risk Assessment for Annex IV Species Report, the employment of best practice measures will ensure that no marine mammals (non-qualifying interests) whose range overlap the survey area will be impacted by the proposed marine surveys.* *It has, therefore, been objectively concluded following examination, analysis, and evaluation of the relevant information, including, in particular, the nature of the predicted impacts from the proposed marine surveys, that the proposed marine surveys will not have a significant negative effect on any Natura 2000* *sites and will not adversely affect the integrity of a Natura 2000 site, having regard to the qualifying interests of the relevant Natura 2000 sites, either alone or in combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion.'* In relation to the timing of the proposed project, this report outlines the following: '*it is expected that survey works will be carried out on a phased basis between April and October of each year and over five years.'* Therefore, given the nature of activities proposed under this application, there would be no in-combination effects between them even if they were to occur at the same time.	
Floating Cork Offshore Wind Limited	FS007471	22/09/2022	Applied	Benthic Ecology Surveys for proposed Offshore Wind Farm export cable route	170 km^2 overlap with Survey Area	As outlined in the Foreshore Licence Application ORE for this project: '*Stage 1 Screening concluded that the proposed benthic ecology survey will not have a likely significant effect either alone or in combination with other plans or projects of any European sites*.' In terms of the nature of the proposed works, this report details the following: '*In the nearshore area, the proposed benthic ecology surveys will comprise a walkover survey of the landfall locations, which will involve 2-3 people walking on the foreshore and manually taking sediment samples with a hand corer. In the*	OUT

Table 21. *Foreshore licence applications proximate to the proposed survey route corridor*

Applicant	FSL Application No.	Date	Status	Activity	Distance from Survey Area	Potential for In-Combination Effects	Screening In/Out
						*offshore area, the benthic survey will consist of 1-2 vessels slowly transiting the area and extracting sediment material from the seabed using a grab sampler at set sampling location*s.' In relation to the duration of the proposed survey works, this report outlines the following: '*The typical time period for a subtidal benthic survey campaign takes up to 3 hours in any one location; the total duration of the proposed benthic ecology surveys within the application area is expected to be 5 to 6 weeks*'. Therefore, given the nature of activities proposed under this application, there would be no in-combination effects between them even if they were to occur at the same time.	
Department of Defense	FS007482	13/07/2023	Applied	• Maintenance dredging of the Naval Basin and Approach Channel. • Capital dredging of the Graving Dock.	Approx.. 55 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Seabed Sanctuary Collective	FS007497	04/04/2023	Applied	Seabed Sanctuary Collective Sub-marine Sculpture Garden	Approx. 38 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
John Renos	FS007503	11/03/2022	Applied	Benthic Surveys in Horse Island Channel for electrical cable installation	approx 16 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
RNLI Ireland	FS007552	28/02/2023	Applied	Site Investigation works to inform the design of a new RNLI jetty	Approx. 20km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT

Table 21. *Foreshore licence applications proximate to the proposed survey route corridor*

Applicant	FSL Application No.	Date	Status	Activity	Distance from Survey Area	Potential for In-Combination Effects	Screening In/Out
				and berth and to inform disposal options for dredged sediment material.			
Kinsale Offshore Wind Limited	FS007575	26/08/2022	Applied	Site Investigations (Geophysical, Geotechnical, Environmental and Metocean) for the proposed Kinsale Project export cable	approx 35 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Cork County Council	FS007620	02/05/2023	Applied	Installation of a pedestrian and cycle bridge across the Owenabue River in Carrigaline, County Cork	Approx.. 50km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Monica Gonzalez	FS007282	01/03/2021	Consultation	Seaweed Harvesting at Croslea and Lickowen, Castlehaven, Co. Cork	approx 5 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Irish Water	FS007027	17/02/2021	Consultation	Construct Marine Outfall and Wastewater Collection System - Aghada & Whitegate	approx 56 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT

Table 21. *Foreshore licence applications proximate to the proposed survey route corridor*

Applicant	FSL Application No.	Date	Status	Activity	Distance from Survey Area	Potential for In-Combination Effects	Screening In/Out
Cork County Council	FS007037	25/05/2021	Consultation	Ballycotton Harbour Dredging	approx 64 km to disposal area	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
UCD	FS007207	15/01/2021	Consultation	Soil and Vegetation Sampling - Fota Island	approx 60 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
UCD	FS007202	15/01/2021	Applied	Soil and Vegetation Sampling - Ballymacoda salt marsh	approx 80 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
EirGrid	FS006916	08/07/2021	Determination	Installation of Celtic Interconnector HVDC Electricity Cable - Claycastle Beach	approx 85 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Inis Ealga Marine Energy Park (IEMEP)	FS007404	30/07/2021	Consultation	Inis Ealga Marine Energy Park (IEMEP) Site Investigations - Geophysical, Geotechnical, Environmental and Metocean - for the export cable route from wind farm	approx 75 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
ORCA Ireland	FS007459	29/11/2021	Determination	Deployment of 1 Static Acoustic Monitoring (SAM) SmartBuoy off Toe Head to	approx 0.5 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT

Table 21. *Foreshore licence applications proximate to the proposed survey route corridor*

Applicant	FSL Application No.	Date	Status	Activity	Distance from Survey Area	Potential for In-Combination Effects	Screening In/Out
				listen to cetaceans in real-time.			
Emerald Offshore Wind Limited	FS007139	22/05/2020	Consultation	Site Investigations - Geophysical, Geotechnical, Environmental and Metocean for possible Floating Offshore Wind project off Kinsale	approx 37 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Irish Water	FS007022	02/04/2020	Consultation	Temporary Wall and Working Area at Ballycotton Pier	approx 72 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Irish Water	FS007258	01/04/2020	Determination	Construction of Marine outfall for Castletownshend wastewater treatment system	approx 7 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
DP Energy	FS006859	21/10/2019	Consultation	Site Investigations - Geophysical, Geotechnical, Environmental and Metocean at Inis Ealga wind farm project	approx 50 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Cork County Council	FS006970	14/10/2019	Consultation	Dredging at Glengarriff Pier, Cork and disposal on land	Approx. 40km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT

Table 21. *Foreshore licence applications proximate to the proposed survey route corridor*

Applicant	FSL Application No.	Date	Status	Activity	Distance from Survey Area	Potential for In-Combination Effects	Screening In/Out
Cork County Council	FS006969	14/10/2019	Determination	Dredging at Courtmacsherry Pier, Cork and disposal on land	approx 20 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Cork County Council	FS006971	14/10/2019	Determination	Dredging at Reen Pier, Cork	approx 10 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Dursey Island Cable Car	FS007068	11/10/2019	Applied	Construction of new cabel car system to Dursey Island	approx 55 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Irish Water	FS006985	01/08/2019	Determination	Storm Outfall Pipe at Gibbon's Quay, Kinsale	approx 35 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Greenlink Interconnector Ltd.	FS007050	03/09/2021	Determination	Subsea and underground electricity interconnector cable between Irish and UK electricity grids	Approx. 160km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Irish Water	FS007046	01/08/2019	Determination	Site Investigation for Storm Water Outfall Extension, Kinsale	approx 50 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Skibbereen Rowing Club	FS005806	14/04/2019	Applied	Construction of concrete wall, floating pontoon and three gangways	approx 13 km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT

Table 22. *MARA licence applications proximate to the proposed survey area*

Applicant	MARA Application No.	Activity	Distance from Survey Area	Potential for In-Combination Effects	Screening In/Out
Doyle Shipping Group	LIC230019	Site Investigation in the maritime area including reclaimed dockland and surrounding nearshore to aid the design of increased port facilities in support of the ORE industry	Approx. 55km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Microsoft Ireland Operations Ltd.	LIC230017	Geophysical survey and site investigations for a proposed subsea fibre optic cable having a landfall in Kilmore Quay, County Wexford and to evaluate options for the route traversing Ballyteige Bay, across the Celtic Sea and St Georges Channel to Pembrokeshire, Wales	Approx. 170km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Apollo Submarine Cable System Limited	LIC230033	Proposed installation and operation of the 2Africa Submarine Cable System within the Irish Exclusive Economic Zone (EEZ).	Passes through portion of Survey Route Corridor (0.386 km^2)	As outlined in the Natura Impact Statement (NIS) prepared for this project: '*This report presents a Natura Impact Statement for the proposed laying of a marine fibre optic cable. It outlines the information required for the competent authority to screen for appropriate assessment and to determine whether or not the proposed development, either alone or in combination with other plans or projects, in view of best scientific knowledge and in view of the sites conservation objectives, will adversely affect the integrity of the European site. On the basis of the content of this report, the competent authority is enabled to conduct an Appropriate Assessment and consider whether, either alone or in combination with other plans or projects, in view of best scientific knowledge and in view of the sites conservation objectives, will adversely affect the integrity of the European site*.' Therefore, given the nature of activities proposed under this application, there would be no in-	OUT

Table 22. *MARA licence applications proximate to the proposed survey area*

Applicant	MARA Application No.	Activity	Distance from Survey Area	Potential for In-Combination Effects	Screening In/Out
				combination effects between them even if they were to occur at the same time.	
Port of Waterford Company	LIC230025	Maintenance dredging of accumulated sediments to maintain the port's navigational trade areas	Approx. 150km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT
Department of the Environment, Climate & Communications	LIC240006	Deployment of the Marine Institute's R.V. to undertake a geophysical survey in the South Coast DMAP to inform future offshore renewable energy development	Approx. 40km	No spatial overlap and given the nature of activities proposed under each application, there would be no in-combination effects between them even if they were to occur at the same time.	OUT

This report pertains to the survey for a marine fibre optic cable in subtidal and intertidal habitats. As can be seen from using the Best Available Techniques and mitigation measures during survey, considerable effort has gone into minimising the potential environmental impact of the project. "*Generally all mitigation measures applied for individual cables also contribute to reduction of cumulative impacts*" (OSPAR, 2012).

From a review of the above, it is concluded that no projects in the vicinity of the proposed project would be seen to have a significant in combination effect on Natura 2000 sites.

11. Residual Impacts and Conclusion

The mitigation proposed for the survey works satisfactorily addresses the mitigation of potential impacts on the sensitive receptors through the application of standard controls. The overall impact on the ecology of the proposed development will result in a short term minor adverse not significant residual effect on the ecology of the area and locality overall.

12. References

1. Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1982
2. Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979
3. EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive) 1992
4. Marnell, F., Kingston, N. and Looney, D. 2009 *Ireland Red List No. 3: Terrestrial Mammals.* National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin
5. Racey, P.A. and Swift, S.M. 1986 The residual effects of remedial timber treatments on bats. *Biological Conservation* 35: 205 – 214
6. Smal, C.M. 1995 *The Badger & Habitat Survey of Ireland.* The Stationery Office, Dublin
7. Wildlife Act 1976 and Wildlife [Amendment] Act 2000. Government of Ireland.
8. NPWS (2016) Conservation Objectives: Kilkeran Lake and Castlefreke Dunes SAC 001061. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
9. NPWS (2014) Conservation Objectives: Clonakilty Bay SAC 000091. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
10. NPWS (2020) Conservation Objectives: Castletownshend SAC 001547. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
11. NPWS (2020) Conservation Objectives: Myross Wood SAC 001070. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
12. NPWS (2014) Conservation Objectives: Lough Hyne Nature Reserve and Environs SAC 000097. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
13. NPWS (2011) Conservation Objectives: Roaringwater Bay and Islands SAC 000101. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
14. NPWS (2022) Conservation objectives for Galley Head to Duneen Point SPA [004190]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.
15. NPWS (2014) Conservation Objectives: Clonakilty Bay SPA 004081. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
16. NPWS (2022) Conservation objectives for Sheep's Head to Toe Head SPA [004156]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.
17. NPWS (2022) Conservation objectives for Seven Heads SPA [004191]. First Order Site Specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.
18. ICES 2013. Report of the Herring Assessment Working Group for the Area South of 62 N (HAWG),12 - 21 March 2013, Copenhagen, Denmark. ICES Document, CM 2013/ ACOM:06: 1270.
19. NPWS (2022), Grey Seal, https://www.npws.ie/marine/marine-species/grey-seal.
20. Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtigall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P. and Tyack, P.L. (2019). Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals, 45(2), pp.125–232. doi:10.1578/am.45.2.2019.125.
21. Ó Cadhla, O., Keena, T., Strong, D., Duck, C. and Hiby, L. (2013) Monitoring of the breeding population of grey seals in Ireland, 2009 - 2012. Irish Wildlife Manuals, No. 74. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland.
22. IWDG (2017) Picton B.E., Emblow, C.S., Morrow, C.C., Sides, E.M., Tierney, P., McGrath, D., McGeough, G., McCrea, M., Dinneen, P., Falvey, J., Dempsey, S., Dowse, J. and Costello, M. J. Title and year: (2017). Marine sites, habitats and species data collected during the BioMar survey of Ireland. National Biodiversity Data Centre. Occurrence Dataset https://doi.org/10.15468/cr7gvs accessed via GBIF.org on 2017-07-19.
23. Wall D., Murray C., O'Brien J., Kavanagh L.,Wilson C., Ryan C., Glanville B.,Williams D., Enlander I., O'Connor I., McGrath D.,Whooley P. and Berrow S., 2013. Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011. Irish Whale and Dolphin Group, Merchants Quay, Kilrush, Co Clare.
24. NBDC (2024) Biodiversity Maps, Maps - Biodiversity Maps (www.biodiversityireland.ie)

25. NPWS (2019) Article 17 Summary, https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf
26. Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtigall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P. and Tyack, P.L. (2019). Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals, 45(2), pp.125–232. doi:10.1578/am.45.2.2019.125.
27. DECC, 2011, MARINE MAMMAL RISK ASSESSMENT. (n.d.). [online] Available at: https://assets.gov.ie/81605/f31029c5-5570-4b63-bdc3-d908aa37fc5b.pdf [Accessed 27th March 2024].
28. TLT, 2024, The Leatherback Trust, Life Cycle of Leatherbacks, https://www.leatherback.org/why-leatherbacks/life-cycle-of-leatherbacks#:~:text=Leatherbacks%20carve%20out%20an%20egg,to%20develop%20into%20an%20embryo.
29. EC, 2024, The European Commission, The Habitats Directive, https://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
30. Carter Matt I. D., Boehme Lars, Cronin Michelle A., Duck Callan D., Grecian W. James, Hastie Gordon D., Jessopp Mark, Matthiopoulos Jason, McConnell Bernie J., Miller David L., Morris Chris D., Moss Simon E. W., Thompson Dave, Thompson Paul M., Russell Debbie J. F. "Sympatric Seals, Satellite Tracking and Protected Areas: Habitat-Based Distribution Estimates for Conservation and Management", *Frontiers in Marine Science.* Vol. 9. (2022).
31. Rikardsen, A.H., Righton, D., Strøm, J.F. *et al.* Redefining the oceanic distribution of Atlantic salmon. *Sci Rep* **11**, 12266 (2021).

Appendix I-Recorded species, associated designations and grid references

Species Name	Record Count	Date of Record	Designation
Landfall Polygon			
Bottle-nosed Dolphin (Tursiops truncatus)	*1*	*30/12/2011*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Porpoise (Phocoena phocoena)	*2*	*14/06/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Grey Seal (Halichoerus grypus)	*1*	*27/06/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts*
Common Dolphin (Delphinus delphis)	*1*	*31/12/2006*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Long-finned Pilot Whale (Globicephala melas)	*1*	*15/03/1988*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Minke Whale (Balaenoptera acutorostrata)	*5*	*14/06/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Basking Shark (Cetorhinus maximus)	*5*	*09/06/2016*	*Threatened Species: OSPAR Convention*
10km Square – T10.31.37.751			
Bottle-nosed Dolphin (Tursiops truncatus)	*2*	*01/08/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Porpoise (Phocoena phocoena)	*21*	*28/08/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Grey Seal (Halichoerus grypus)	*20*	*03/10/2012*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts*
Common Dolphin (Delphinus delphis)	*52*	*06/12/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Fin Whale (Balaenoptera physalus)	*30*	*11/10/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Humpback Whale (Megaptera novaeangliae)	*12*	*01/10/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Minke Whale (Balaenoptera acutorostrata)	*70*	*11/10/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Risso's Dolphin (Grampus griseus)	*3*	*30/08/2014*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Leathery Turtle (Dermochelys coriacea)	*3*	*31/08/1990*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Eurasian Badger (Meles meles)	*3*	*31/12/2015*	*Protected Species: Wildlife Acts*

Peregrine Falcon (Falco peregrinus)	*1*	*31/12/2011*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species*
Black-legged Kittiwake (Rissa tridactyla)	*11*	*24/08/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Common Guillemot (Uria aalge)	*24*	*24/08/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Black-backed Gull (Larus marinus)	*1*	*14/10/1980*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*1*	*24/08/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*4*	*24/08/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*35*	*24/08/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Herring Gull (Larus argentatus)	*5*	*14/10/1980*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
Basking Shark (Cetorhinus maximus)	*33*	*12/06/2018*	*Threatened Species: OSPAR Convention*
10km Square – T10.32.59.591			
Bottle-nosed Dolphin (Tursiops truncatus)	*1*	*10/10/2013*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Porpoise (Phocoena phocoena)	*4*	*09/04/2017*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Grey Seal (Halichoerus grypus)	*12*	*16/10/2012*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts*
Common Dolphin (Delphinus delphis)	*64*	*29/09/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Fin Whale (Balaenoptera physalus)	*25*	*08/10/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Humpback Whale (Megaptera novaeangliae)	*9*	*29/09/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Minke Whale (Balaenoptera acutorostrata)	*50*	*03/10/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Risso's Dolphin (Grampus griseus)	*4*	*28/08/2018*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*

Leathery Turtle (Dermochelys coriacea)	*3*	*28/08/2018*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
European Storm-petrel (Hydrobates pelagicus)	*12*	*26/07/1980*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Atlantic Puffin (Fratercula arctica)	*1*	*26/07/1980*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-legged Kittiwake (Rissa tridactyla)	*27*	*17/01/2001*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Common Guillemot (Uria aalge)	*23*	*17/01/2001*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*2*	*26/07/1980*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*6*	*31/07/1996*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*41*	*17/01/2001*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Razorbill (Alca torda)	*1*	*09/12/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Herring Gull (Larus argentatus)	*2*	*26/07/1980*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
Basking Shark (Cetorhinus maximus)	*6*	*24/06/2020*	*Threatened Species: OSPAR Convention*
10km Square – T10.33.15.626			
Bottle-nosed Dolphin (Tursiops truncatus)	*1*	*27/05/2010*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Porpoise (Phocoena phocoena)	*25*	*26/11/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Grey Seal (Halichoerus grypus)	*33*	*16/10/2012*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts*
Common Dolphin (Delphinus delphis)	*40*	*27/09/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Fin Whale (Balaenoptera physalus)	*10*	*13/10/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*

Humpback Whale (Megaptera novaeangliae)	*10*	*09/10/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Minke Whale (Balaenoptera acutorostrata)	*39*	*31/10/2019*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Risso's Dolphin (Grampus griseus)	*1*	*28/05/2010*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Leathery Turtle (Dermochelys coriacea)	*1*	*31/07/2005*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Black-legged Kittiwake (Rissa tridactyla)	*3*	*17/01/2001*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Common Guillemot (Uria aalge)	*23*	*17/01/2001*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
European Shag (Phalacrocorax aristotelis)	*3*	*31/07/1991*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Black-backed Gull (Larus marinus)	*3*	*31/07/1991*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*2*	*13/11/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*12*	*31/07/1996*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Mew Gull (Larus canus)	*1*	*09/12/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*22*	*24/11/1999*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Razorbill (Alca torda)	*1*	*31/07/1991*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Herring Gull (Larus argentatus)	*3*	*31/07/1991*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
Basking Shark (Cetorhinus maximus)	*9*	*19/04/2019*	*Threatened Species: OSPAR Convention*
50km Square – T09.58.03.371			
Bottle-nosed Dolphin (Tursiops truncatus)	*6*	*21/04/2019*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Loggerhead Turtle (Caretta caretta)	*1*	*31/08/1989*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Porpoise (Phocoena phocoena)	*57*	*27/05/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*

Grey Seal (Halichoerus grypus)	*148*	*15/10/2012*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts*
Common Dolphin (Delphinus delphis)	*453*	*10/10/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Fin Whale (Balaenoptera physalus)	*129*	*04/10/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Humpback Whale (Megaptera novaeangliae)	*132*	*15/10/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Killer Whale (Orcinus orca)	*4*	*28/04/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Long-finned Pilot Whale (Globicephala melas)	*1*	*17/04/2010*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Minke Whale (Balaenoptera acutorostrata)	*328*	*10/10/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Risso's Dolphin (Grampus griseus)	*18*	*06/09/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
White-beaked Dolphin (Lagenorhynchus albirostris)	*2*	*20/11/1991*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Leathery Turtle (Dermochelys coriacea)	*12*	*12/08/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Common Tern (Sterna hirundo)	*1*	*26/07/1980*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Dunlin (Calidris alpina)	*2*	*20/11/1991*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
European Storm-petrel (Hydrobates pelagicus)	*82*	*29/09/1995*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Atlantic Puffin (Fratercula arctica)	*8*	*13/07/1994*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black Guillemot (Cepphus grylle)	*1*	*26/07/1980*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-legged Kittiwake (Rissa tridactyla)	*121*	*04/01/2017*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Common Guillemot (Uria aalge)	*198*	*12/10/2012*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
European Shag (Phalacrocorax aristotelis)	*6*	*13/07/1994*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Black-backed Gull (Larus marinus)	*36*	*12/10/2012*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Cormorant (Phalacrocorax carbo)	*3*	*26/07/1980*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Skua (Stercorarius skua)	*3*	*12/10/2012*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*45*	*11/05/2000*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*

Manx Shearwater (Puffinus puffinus)	*143*	*12/10/2012*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*322*	*16/01/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Razorbill (Alca torda)	*32*	*12/10/2012*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Herring Gull (Larus argentatus)	*32*	*12/10/2012*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
Sooty Shearwater (Puffinus griseus)	*6*	*12/10/2012*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
Basking Shark (Cetorhinus maximus)	*12*	*15/08/2020*	*Threatened Species: OSPAR Convention*
Spotted Ray (Raja montagui)	*3*	*23/11/2014*	*Threatened Species: OSPAR Convention*
Spurdog (Squalus acanthias)	*1*	*01/12/2011*	*Threatened Species: OSPAR Convention*
50km Square – T10.04.56.317			
Bottle-nosed Dolphin (Tursiops truncatus)	*3*	*04/01/2017*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Porpoise (Phocoena phocoena)	*5*	*22/02/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Common Dolphin (Delphinus delphis)	*8*	*04/10/2015*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Humpback Whale (Megaptera novaeangliae)	*1*	*26/09/2017*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Killer Whale (Orcinus orca)	*1*	*09/10/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Risso's Dolphin (Grampus griseus)	*1*	*18/06/2011*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Arctic Tern (Sterna paradisaea)	*1*	*06/06/2001*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
European Storm-petrel (Hydrobates pelagicus)	*22*	*06/06/2001*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Atlantic Puffin (Fratercula arctica)	*1*	*06/06/2001*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-legged Kittiwake (Rissa tridactyla)	*24*	*04/01/2017*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Common Guillemot (Uria aalge)	*2*	*13/05/1996*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Black-backed Gull (Larus marinus)	*7*	*15/04/1996*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Skua (Stercorarius skua)	*3*	*15/07/1994*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*1*	*15/07/1994*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*8*	*06/06/2001*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*

Northern Gannet (Morus bassanus)	*115*	*04/01/2017*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Herring Gull (Larus argentatus)	*1*	*15/07/1994*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
Skate (Dipturus batis)	*1*	*16/11/2009*	*Threatened Species: OSPAR Convention*
Spurdog (Squalus acanthias)	*2*	*19/11/2012*	*Threatened Species: OSPAR Convention*
Thornback Ray (Raja clavata)	*1*	*14/11/1997*	*Threatened Species: OSPAR Convention*
50km Square – T10.06.55.548			
Bottle-nosed Dolphin (Tursiops truncatus)	*1*	*04/01/2017*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Porpoise (Phocoena phocoena)	*6*	*15/02/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Common Dolphin (Delphinus delphis)	*3*	*19/11/2000*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Humpback Whale (Megaptera novaeangliae)	*1*	*31/05/2011*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Minke Whale (Balaenoptera acutorostrata)	*2*	*12/07/2005*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
European Storm-petrel (Hydrobates pelagicus)	*48*	*31/05/1997*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-legged Kittiwake (Rissa tridactyla)	*21*	*26/05/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Common Guillemot (Uria aalge)	*10*	*20/11/1991*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Skua (Stercorarius skua)	*1*	*31/05/1997*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*5*	*25/05/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*2*	*31/05/1997*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*74*	*26/05/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Razorbill (Alca torda)	*2*	*31/05/1997*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Sky Lark (Alauda arvensis)	*1*	*18/11/1994*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-headed Gull (Larus ridibundus)	*2*	*20/11/1991*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
Thornback Ray (Raja clavata)	*2*	*22/11/2013*	*Threatened Species: OSPAR Convention*
50km Square – T10.08.24.840			
Bottle-nosed Dolphin (Tursiops truncatus)	*2*	*12/07/2005*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Porpoise (Phocoena phocoena)	*18*	*19/01/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Common Dolphin (Delphinus delphis)	*8*	*19/01/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*

European Storm-petrel (Hydrobates pelagicus)	*2*	*31/05/1997*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black Guillemot (Cepphus grylle)	*1*	*21/08/1998*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-legged Kittiwake (Rissa tridactyla)	*14*	*19/01/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Common Guillemot (Uria aalge)	*1*	*10/04/1996*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*6*	*21/08/1998*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*3*	*10/04/1996*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*29*	*19/01/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Herring Gull (Larus argentatus)	*2*	*21/08/1998*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
50km Square – T10.09.56.753			
Common Dolphin (Delphinus delphis)	*6*	*19/01/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Fin Whale (Balaenoptera physalus)	*2*	*18/09/2009*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
European Storm-petrel (Hydrobates pelagicus)	*16*	*25/05/1995*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-legged Kittiwake (Rissa tridactyla)	*14*	*17/12/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Skua (Stercorarius skua)	*1*	*23/05/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*2*	*23/05/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*30*	*15/03/2017*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Skate (Dipturus batis)	*1*	*13/11/1997*	*Threatened Species: OSPAR Convention*
Spotted Ray (Raja montagui)	*2*	*13/11/1997*	*Threatened Species: OSPAR Convention*
Spurdog (Squalus acanthias)	*1*	*13/11/1997*	*Threatened Species: OSPAR Convention*
Thornback Ray (Raja clavata)	*3*	*10/11/2003*	*Threatened Species: OSPAR Convention*
50km Square – T10.11.18.168			
Common Porpoise (Phocoena phocoena)	*6*	*23/05/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Common Dolphin (Delphinus delphis)	*10*	*17/09/2009*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Humpback Whale (Megaptera novaeangliae)	*1*	*28/05/2020*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Cory's Shearwater (Calonectris diomedea)	*1*	*03/07/1992*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*

European Storm-petrel (Hydrobates pelagicus)	*72*	*03/07/1992*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Rock Pigeon (Columba livia)	*1*	*18/07/1989*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species*
Black-legged Kittiwake (Rissa tridactyla)	*24*	*31/05/1997*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Common Guillemot (Uria aalge)	*1*	*28/03/1992*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Black-backed Gull (Larus marinus)	*1*	*18/07/1989*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Skua (Stercorarius skua)	*11*	*23/05/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*11*	*31/05/1997*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*2*	*23/05/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*72*	*17/12/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Herring Gull (Larus argentatus)	*5*	*23/05/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
Sooty Shearwater (Puffinus griseus)	*1*	*03/07/1992*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
50km Square – T10.12.32.066			
Bottle-nosed Dolphin (Tursiops truncatus)	*1*	*23/05/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Porpoise (Phocoena phocoena)	*1*	*15/07/2015*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Common Dolphin (Delphinus delphis)	*4*	*17/09/2009*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
European Storm-petrel (Hydrobates pelagicus)	*63*	*18/07/1989*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-legged Kittiwake (Rissa tridactyla)	*10*	*16/01/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Skua (Stercorarius skua)	*1*	*15/07/2015*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*1*	*28/03/1992*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*1*	*23/05/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*34*	*23/05/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
50km Square – T10.13.35.736			

Bottle-nosed Dolphin (Tursiops truncatus)	*5*	*04/01/2017*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Dolphin (Delphinus delphis)	*1*	*15/07/2015*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Arctic Tern (Sterna paradisaea)	*1*	*29/04/1995*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Atlantic Puffin (Fratercula arctica)	*2*	*27/11/1991*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-legged Kittiwake (Rissa tridactyla)	*17*	*04/01/2017*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Common Starling (Sturnus vulgaris)	*1*	*27/11/1991*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*2*	*23/05/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*19*	*04/01/2017*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
50km Square – T10.14.42.615			
Common Porpoise (Phocoena phocoena)	*6*	*22/06/2015*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Grey Seal (Halichoerus grypus)	*1*	*02/06/2009*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts*
Common Dolphin (Delphinus delphis)	*7*	*06/11/1995*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Tern (Sterna hirundo)	*1*	*29/04/1995*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
European Storm-petrel (Hydrobates pelagicus)	*1*	*03/07/1995*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-legged Kittiwake (Rissa tridactyla)	*54*	*16/01/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Common Guillemot (Uria aalge)	*31*	*10/04/1996*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Black-backed Gull (Larus marinus)	*2*	*17/11/1994*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Skua (Stercorarius skua)	*13*	*10/04/1996*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*3*	*10/04/1996*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*9*	*10/04/1996*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*91*	*16/01/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*

Razorbill (Alca torda)	*1*	*06/11/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Herring Gull (Larus argentatus)	*1*	*11/05/1981*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
Sooty Shearwater (Puffinus griseus)	*1*	*17/11/1994*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
Spurdog (Squalus acanthias)	*2*	*10/11/1997*	*Threatened Species: OSPAR Convention*
50km Square – T10.16.03.939			
Bottle-nosed Dolphin (Tursiops truncatus)	*3*	*17/12/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Dolphin (Delphinus delphis)	*2*	*14/03/2010*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Minke Whale (Balaenoptera acutorostrata)	*1*	*14/03/2010*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
European Storm-petrel (Hydrobates pelagicus)	*19*	*18/07/2002*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-legged Kittiwake (Rissa tridactyla)	*21*	*17/12/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Black-backed Gull (Larus marinus)	*1*	*22/03/1991*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Skua (Stercorarius skua)	*4*	*06/11/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*1*	*01/04/1992*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*2*	*23/05/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*32*	*23/05/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Sooty Shearwater (Puffinus griseus)	*2*	*17/11/1994*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
Spotted Ray (Raja montagui)	*2*	*12/11/1997*	*Threatened Species: OSPAR Convention*
50km Square – T10.17.14.222			
Bottle-nosed Dolphin (Tursiops truncatus)	*9*	*15/03/2017*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Porpoise (Phocoena phocoena)	*5*	*18/06/2015*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Common Dolphin (Delphinus delphis)	*12*	*25/08/1998*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Long-finned Pilot Whale (Globicephala melas)	*1*	*06/04/2013*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Minke Whale (Balaenoptera acutorostrata)	*1*	*18/06/2015*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Cory's Shearwater (Calonectris diomedea)	*2*	*25/08/1998*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
European Storm-petrel (Hydrobates pelagicus)	*8*	*01/07/1994*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird*

			Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Black-legged Kittiwake (Rissa tridactyla)	*55*	*27/06/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Black-backed Gull (Larus marinus)	*4*	*17/11/1994*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Skua (Stercorarius skua)	*12*	*06/11/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*8*	*01/04/1992*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*2*	*15/03/2017*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*103*	*27/06/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Sooty Shearwater (Puffinus griseus)	*1*	*17/11/1994*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List*
50km Square – T10.18.14.897			
Bottle-nosed Dolphin (Tursiops truncatus)	*13*	*15/03/2017*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Porpoise (Phocoena phocoena)	*4*	*19/01/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Common Dolphin (Delphinus delphis)	*16*	*18/02/2017*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Long-finned Pilot Whale (Globicephala melas)	*9*	*13/03/2017*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Minke Whale (Balaenoptera acutorostrata)	*3*	*28/02/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Leathery Turtle (Dermochelys coriacea)	*1*	*03/09/2002*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention*
Common Tern (Sterna hirundo)	*1*	*17/05/1996*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
European Storm-petrel (Hydrobates pelagicus)	*19*	*17/05/1996*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Leach's Storm-petrel (Oceanodroma leucorhoa)	*1*	*10/06/2001*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-legged Kittiwake (Rissa tridactyla)	*88*	*19/01/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Common Guillemot (Uria aalge)	*4*	*18/06/2015*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Black-backed Gull (Larus marinus)	*1*	*23/03/1991*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*

Great Skua (Stercorarius skua)	*22*	*14/11/2000*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*8*	*17/05/1996*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Manx Shearwater (Puffinus puffinus)	*7*	*17/05/1996*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*212*	*15/03/2017*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Basking Shark (Cetorhinus maximus)	*1*	*15/06/2015*	*Threatened Species: OSPAR Convention*
Porbeagle (Lamna nasus)	*1*	*07/11/2007*	*Threatened Species: OSPAR Convention*
Skate (Dipturus batis)	*1*	*12/11/1997*	*Threatened Species: OSPAR Convention*
Spotted Ray (Raja montagui)	*2*	*12/11/1997*	*Threatened Species: OSPAR Convention*
Thornback Ray (Raja clavata)	*2*	*12/11/1997*	*Threatened Species: OSPAR Convention*
50km Square – T10.19.32.936			
Bottle-nosed Dolphin (Tursiops truncatus)	*1*	*13/07/2005*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Dolphin (Delphinus delphis)	*2*	*17/09/2010*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Long-finned Pilot Whale (Globicephala melas)	*2*	*18/02/2017*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Minke Whale (Balaenoptera acutorostrata)	*1*	*14/03/2010*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Striped Dolphin (Stenella coeruleoalba)	*2*	*20/10/1999*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Black-legged Kittiwake (Rissa tridactyla)	*12*	*13/03/2017*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Common Guillemot (Uria aalge)	*4*	*20/10/1999*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Great Skua (Stercorarius skua)	*10*	*26/11/2000*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Lesser Black-backed Gull (Larus fuscus)	*2*	*21/10/2000*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*37*	*10/06/2001*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Leafscraper Shark (Centrophorus squamosus)	*30*	*10/12/1999*	*Threatened Species: OSPAR Convention*
Portuguese Dogfish (Centroscymnus coelolepis)	*22*	*10/12/1999*	*Threatened Species: OSPAR Convention*
50km Square – T10.20.28.935			
Bottle-nosed Dolphin (Tursiops truncatus)	*2*	*19/01/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Atlantic White-sided Dolphin (Lagenorhynchus acutus)	*1*	*03/06/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Dolphin (Delphinus delphis)	*1*	*17/09/2010*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Fin Whale (Balaenoptera physalus)	*1*	*07/09/2012*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Cory's Shearwater (Calonectris diomedea)	*1*	*18/08/1998*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
European Storm-petrel (Hydrobates pelagicus)	*1*	*24/05/1995*	*Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird*

			Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Atlantic Puffin (Fratercula arctica)	*1*	*21/10/2000*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Black-legged Kittiwake (Rissa tridactyla)	*14*	*13/03/2017*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*18*	*18/02/2017*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
50km Square – T10.21.29.245			
Bottle-nosed Dolphin (Tursiops truncatus)	*5*	*07/07/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Dolphin (Delphinus delphis)	*3*	*11/08/2012*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Minke Whale (Balaenoptera acutorostrata)	*1*	*03/06/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Northern Bottlenose Whale (Hyperoodon ampullatus)	*1*	*18/02/2017*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Risso's Dolphin (Grampus griseus)	*1*	*13/03/2017*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Black-legged Kittiwake (Rissa tridactyla)	*2*	*24/05/1995*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
Northern Gannet (Morus bassanus)	*9*	*10/06/2001*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
50km Square – T10.22.27.730			
Long-finned Pilot Whale (Globicephala melas)	*1*	*15/06/2015*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Sperm Whale (Physeter macrocephalus)	*1*	*12/04/2010*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Black-legged Kittiwake (Rissa tridactyla)	*3*	*18/02/2017*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
50km Square – T10.23.21.793			
Bottle-nosed Dolphin (Tursiops truncatus)	*1*	*30/01/2011*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Grey Seal (Halichoerus grypus)	*3*	*24/09/2012*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts*
Long-finned Pilot Whale (Globicephala melas)	*2*	*21/05/2010*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Black-legged Kittiwake (Rissa tridactyla)	*1*	*15/02/2016*	*Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List*
50km Square – T10.24.25.533			
Bottle-nosed Dolphin (Tursiops truncatus)	*1*	*27/06/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Common Dolphin (Delphinus delphis)	*1*	*09/03/2010*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Sperm Whale (Physeter macrocephalus)	*5*	*24/06/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Striped Dolphin (Stenella coeruleoalba)	*1*	*03/11/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
50km Square – T10.25.15.163			
Common Dolphin (Delphinus delphis)	*1*	*09/03/2010*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Sperm Whale (Physeter macrocephalus)	*2*	*09/10/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*

50km Square – T10.26.09.285			
Common Dolphin (Delphinus delphis)	*1*	*24/06/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
Long-finned Pilot Whale (Globicephala melas)	*1*	*24/06/2016*	*Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts*
50km Square – T10.26.59.474			
None	*N/A*	*N/A*	*N/A*
50km Square – T10.27.57.000			
None	*N/A*	*N/A*	*N/A*
50km Square – T10.28.32.441			
None	*N/A*	*N/A*	*N/A*

An assessment of files received from the NPWS (Code No. 2022_120) which contain records of rare and protected species and grid references for sightings of these species was carried out as part of this EcIA. There are no recorded sightings within the site itself.

Appendix II-Fisheries Areas

Spawning Grounds

As outlined by Ellis et al. (2012)[1] "*There are numerous modes of reproduction in fishes, and broadcast spawning, which involves shedding the eggs and sperm into the water column, is one of the more frequent strategies (Balon, 1984). Such species may have more extensive spawning grounds than those species which deposit eggs on the sea floor or on biogenic structures. The presence of eggs and larvae of broadcast spawners can be indicative of spawning grounds, although it should be noted that later larval stages may have been advected away from the spawning site. Mature fish with running eggs or sperm can also be indicative of spawning grounds, although these data were not used in the current project, as not all areas have surveys at the right time of year in order to assess the spawning state*."

Nursery Grounds

As outlined by Ellis et al. (2012)[1] "*The grounds where juveniles are found are termed nursery grounds. It has been suggested that nursery grounds are those sites where juveniles occur at higher densities, have reduced rates of predation and have faster growth rates than in other habitats, which should result in nursery grounds providing a greater relative contribution to adult recruitment in comparison to non-nursery ground habitats (see Beck et al., 2003; Heupel et al., 2007). Whilst field data are available to highlight areas where juveniles occur at higher densities, comparable data to confirm that they avoid predation more successfully, have enhanced growth rates and provide greater relative contributions to recruitment are generally lacking*."

Proposed Route in relation to Fishery areas.

The proposed survey route corridor passes through a known black-bellied monkfish (*Lophius budegassa)* nursery area (*Figure 1*). This nursery ground spans for much of the Celtic shelf off the south of Ireland and therefore the area through which the survey route corridor is proposed is not of specific importance to this species.

The proposed survey route corridor passes through known blue whiting (*Micromesistius poutassou*) nursery grounds (*Figure 2*). Known blue whiting nursery grounds span large areas along the continental shelf in Ireland's western and southern Exclusive Economic Zone, and therefore the grounds through which the survey route corridor is proposed is not of specific importance to this species.

The proposed survey route corridor passes through known cod (*Gadus morhua*) nursery grounds (*Figure 3*). Known cod nursery grounds span large areas along Irish coastal waters, and therefore the grounds through which the survey route corridor is proposed is not of specific importance to this species.

The proposed survey route corridor passes through known haddock (*Melanogrammus aeglefinus*) spawning grounds (*Figure 4*). There is the potential for minor disturbances to haddock within their spawning grounds. These specific spawning grounds span a large proportion of the Celtic shelf of the south coast of Ireland, and so any disturbances to spawning activity due to the proposed survey route corridor would not be significant. The spawning period for haddock peaks in March and April.

The proposed survey route corridor passes through known hake (*Merluccius merluccius*) nursery and spawning grounds (*Figure 5*). Hake nursery grounds span a large portion of Irish waters, including the majority of the Celtic Sea and seas off southwest and northwest of Ireland, and so the grounds in which the survey route corridor is proposed are therefore not of specific importance to this species. There is the potential for minor disturbances to hake within their spawning grounds. These spawning grounds span from north to south along the continental shelf between Ireland and the Porcupine bank from off the northwest coast of Ireland towards the southern boundary of the exclusive economic zone, and so any disturbances to spawning activity due to the proposed survey route corridor would not be significant. The spawning period for hake peaks in February and March.

The proposed survey route corridor passes through horse mackerel (*Trachurus trachurus*) nursery and spawning grounds (*Figure 7*). Horse mackerel nursery grounds span a large proportion of Irish waters, including the majority

of the Celtic Sea, the entirety of the Irish Sea, and much of continental shelf to the north, west and south of Ireland, and so the grounds in which the survey route corridor is proposed are therefore not of specific importance to this species. There is potential for minor disturbances to horse mackerel within their spawning grounds. These spawning grounds span over a large proportion of the continental shelf to the west and south of Ireland, including much of the Celtic Sea, and so any disturbances to spawning activities due to the proposed survey route corridor would not be significant. Peak spawning period for horse mackerel occurs in May and June.

The proposed survey route corridor passes through known megrim (*Lepidorhombus whiffiagonis*) nursery and spawning grounds (*Figure 8*). Megrim nursery grounds span a large proportion of Irish waters, including a large proportion of the Celtic Sea, and much of the continental shelf (including Porcupine Bank) to the north, west and south of Ireland, and so the grounds in which the survey route corridor is proposed are therefore not of specific importance to this species. There is the potential for minor disturbances to megrim within their spawning grounds. These spawning grounds span a similar area and location to known nursery grounds, and so any disturbances to spawning activities from the proposed survey route corridor would not be significant. Peak spawning period for megrim occurs in February and March.

The proposed survey route corridor passes through known *Nephrops norvegicus* (Dublin Bay Prawn) grounds; Galley Head Southwest & Galley Head South (FU 19), Labadie (FU 20-21), and Southwest Slope (*Figure 9*). Given the scale of these grounds in comparison to the footprint of the proposed survey route corridor, no significant impact on these grounds is foreseen. Nephrops reproduction takes place throughout the months of August and September.

The proposed survey route corridor passes through a known white monkfish (*Lophius piscatorius*) nursery area (*Figure 10*). This nursery ground spans for much of the Celtic shelf off the northwest, west and south of Ireland and therefore the area covered by the proposed survey route corridor is not of specific importance to this species.

The proposed survey route corridor passes through known whiting (*Merlangius merlangus*) nursery and spawning grounds (*Figure 11*). These nursery grounds span large areas of Irish waters and therefore the grounds in which the survey works will take place are not of specific importance to this species. There is the potential for minor disturbances to whiting within their spawning grounds. These spawning grounds of relevance span across large areas off the south coast of Ireland and Celtic shelf, and so considering the scale of the survey route corridor in relation to this spawning area, any disturbances to spawning activities from activities related to the survey route corridor would not be significant. The spawning period for whiting ranges from February through June.

The proposed survey route corridor passes through the range of wild Atlantic salmon (*Salmo salar*) (*Figure 12*). Salmon native to catchments in Ireland, other European countries, and the UK utilise Irish waters as transitional habitat. Atlantic salmon will be present within the proposed survey route year-round, peaking in June when out-migrating smolts overlap with adults returning to spawn. Due to the extent of the range of Atlantic salmon and transitory nature of the species in this region, the area within the proposed survey route corridor is not of specific importance to this species.

The proposed survey route corridor passes through areas of lobster (*Homarus Gammarus*), crab and shrimp potting activity by the inshore fishing fleet (*Figure 19*). Due to the scale and nature of the proposed site investigations and seabed sampling within the proposed license application area in relation to the fishing area, no impact on the target species for this fishery is foreseen. Consultation with fisheries representatives and engagement with local fleets should be carried out prior to site investigations and sampling to avoid disruption to fisheries and prevent a direct overlap with potting activity.

The proposed survey route corridor passes through areas of beam trawl, bottom otter trawl, gill net, longline, pelagic trawl and seine fishing activity by offshore fishing fleets (*Figures 20-25, 27*). Due to the scale and nature of the proposed site investigations and seabed sampling within the proposed license application area in relation to the areas of fishing activity, no impact on the target species for these fisheries is foreseen. However, high activity levels of bottom otter trawl, gill net, longline, pelagic trawl and seine netting through the proposed survey route. Consultation with fisheries representatives and engagement with EU fleets should be carried out prior to site

investigations and sampling to avoid disruption to fisheries and prevent a direct overlap with fishing activity that may cause interruptions to survey and sampling associated with the proposed survey route corridor.

Mitigation

The proposed survey route corridor and associated activities should not result in the direct mortality of any fish species due to the slow-moving nature of the survey vessel. No significant impacts on fish nursery areas are predicted. Consultation with fisheries representatives and engagement with EU fleets should be carried out prior to site investigations and sampling to avoid disruption to fisheries and prevent a direct overlap with fishing activity that may cause interruptions to survey and sampling associated with the proposed survey route corridor.

References

Barry, J., Kennedy, R. J., Rosell, R., & Roche, W. K. (2020). Atlantic salmon smolts in the Irish Sea: first evidence of a northerly migration trajectory. Fisheries Management and Ecology, 27(5), 517-522.

Cohen, D.M.; Inada.T.; Iwamoto, T.; Scialabba N. (1990). FAO species catalogue. Vol. 10. Gadiform fishes of the world (Order Gadiformes). An annotated and illustrated catalogue of cods, hakes, grenadiers and other gadiform fishes known to date. *FAO Fisheries Synopsis*. No. 125, Vol. 10. Rome, FAO. 442 p.

Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2011). Science Series Spawning and nursery grounds of selected fish species in UK waters. [online] Available at: https://www.cefas.co.uk/publications/techrep/TechRep147.pdf.

Dransfeld, L., Dwane, O., McCarney, C., Kelly, C. J., Danilowicz, B. S., & Fives, J. M. (2004). Larval distribution of commercial fish species in waters around Ireland. *Marine Institute*.

Green, A., Honkanen, H.M., Ramsden, P. *et al.* Evidence of long-distance coastal sea migration of Atlantic salmon, *Salmo salar*, smolts from northwest England (River Derwent). *Anim Biotelemetry* **10**, 3 (2022). https://doi.org/10.1186/s40317-022-00274-2

Marine Institute (2019). Offshore Fishery Effort by Gear Type

ICES (2023). Stock Annex: Megrim (*Lepidorhombus whiffiagonis*) in divisions 7.b-k, 8.a-b, and 8.d (west and southwest of Ireland, Bay of Biscay. *ICES Stock Annexes*. Report. https://doi.org/10.17895/ices.pub.23261078.v1

O'Sullivan, D., Lordan, C., Doyle, J., Berry, A., & Lyons, K. (2014). Sediment characteristics and local hydrodynamics and their influence on the population of Nephrops around Ireland. Irish Fisheries Investigations No 26: *Marine Institute*. Retrieved from http://hdl.handle.net/10793/985

O'Sullivan, D., O'Keefe, E., Berry, A., Tully, O., and Clarke, M. (2013). An Inventory of Irish Herring Spawning Grounds. Irish Fisheries Bulletin No. 42: *Marine Institute*. Available at: http://hdl.handle.net/10793/874

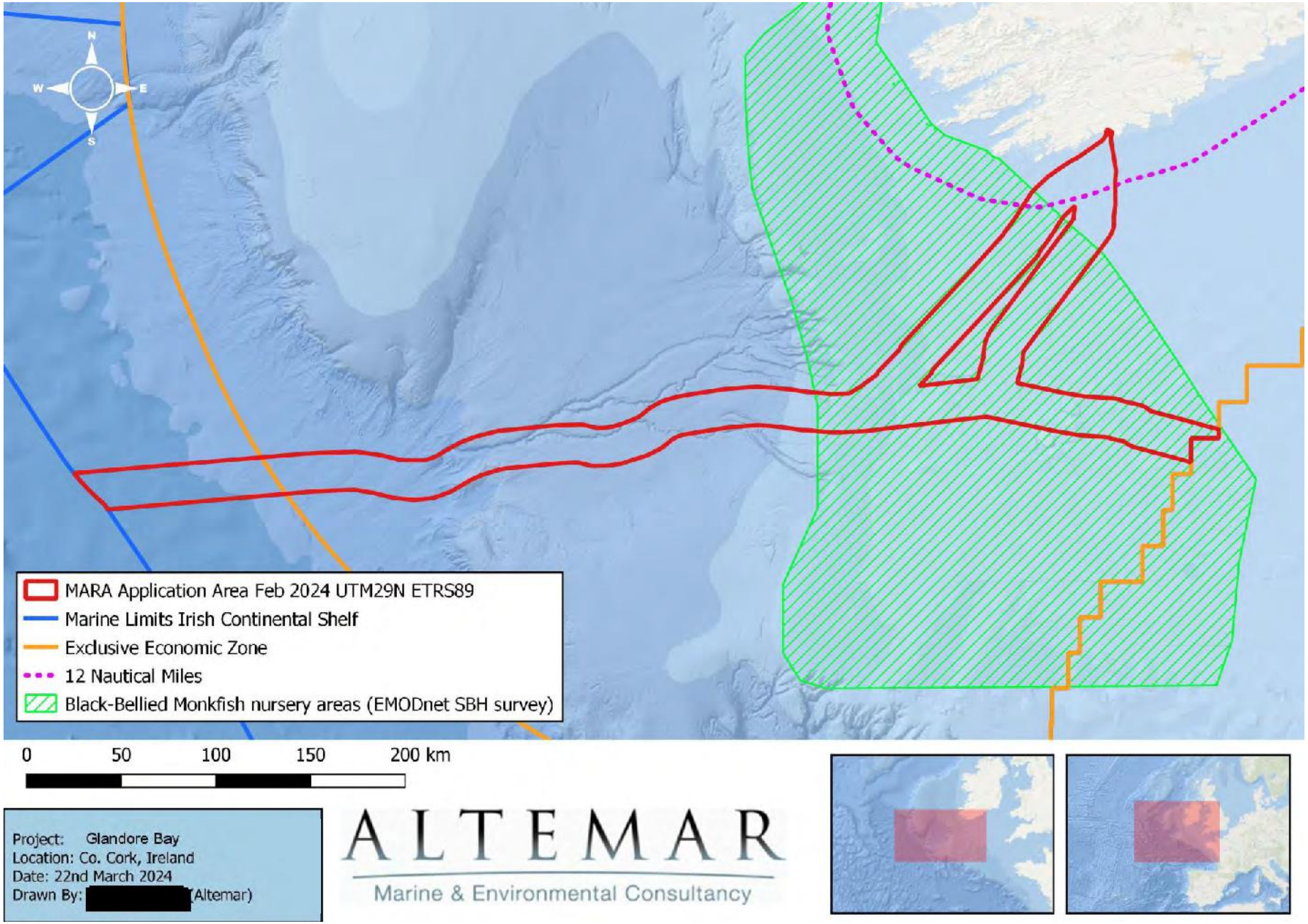


Figure 1. *Black-bellied monkfish nursery grounds in relation to the proposed survey corridor.*

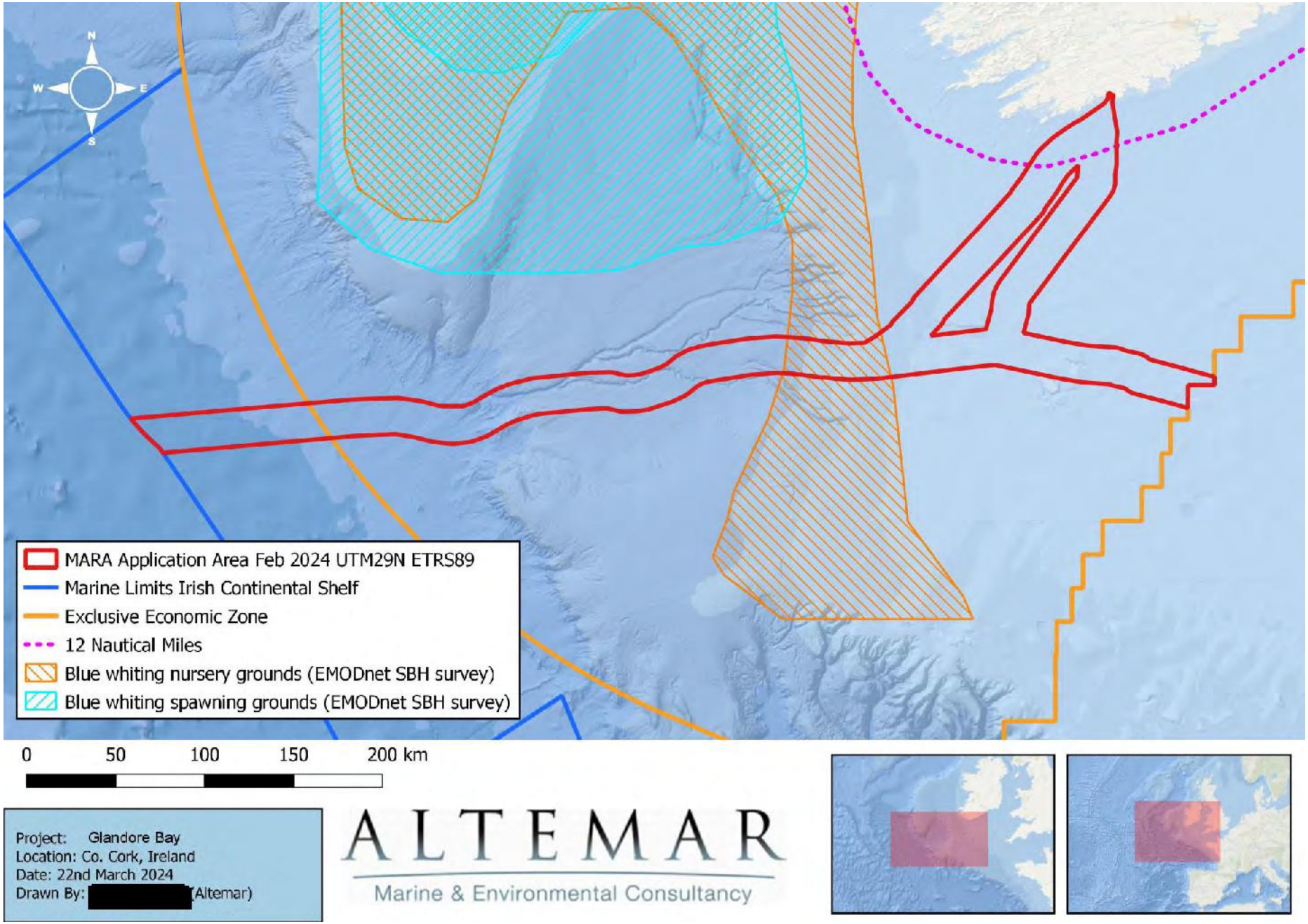


Figure 2. *Blue whiting spawn and nursery grounds in relation to the proposed survey corridor.*

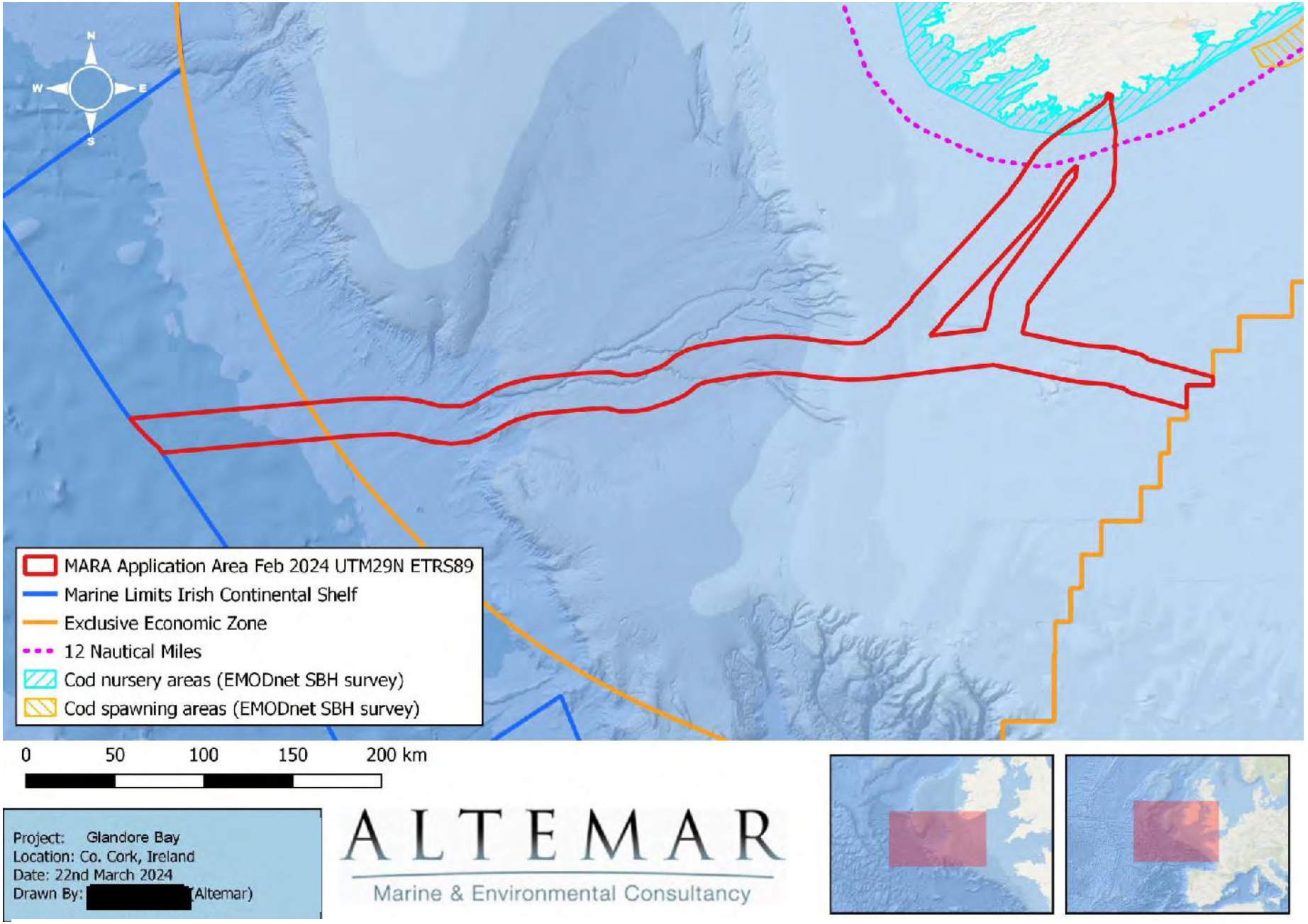


Figure 3. *Cod spawn and nursery grounds in relation to the proposed survey corridor.*

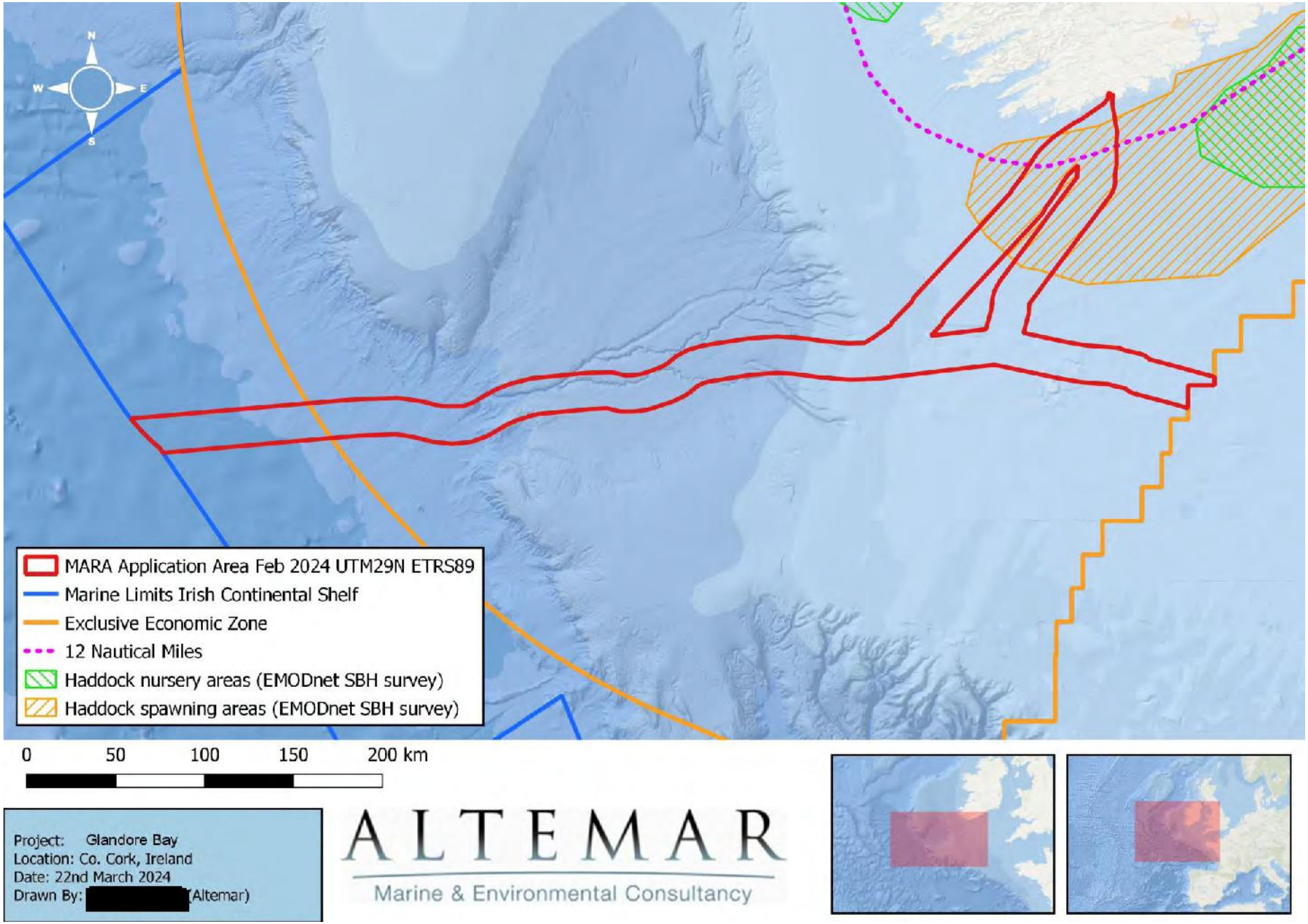


Figure 4. *Haddock spawn and nursery grounds in relation to the proposed survey corridor.*

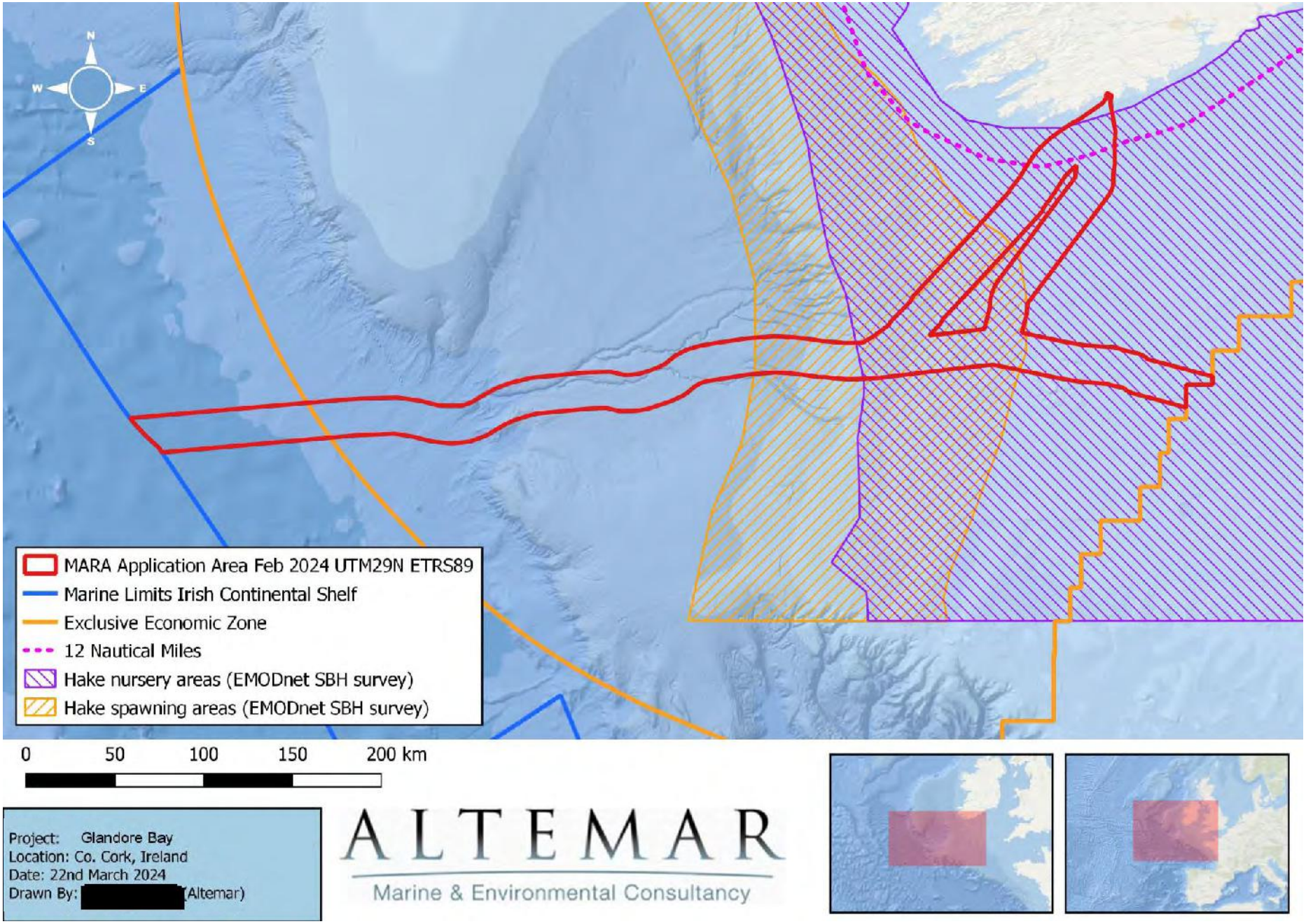


Figure 5. *Hake spawn and nursery grounds in relation to the proposed survey corridor.*

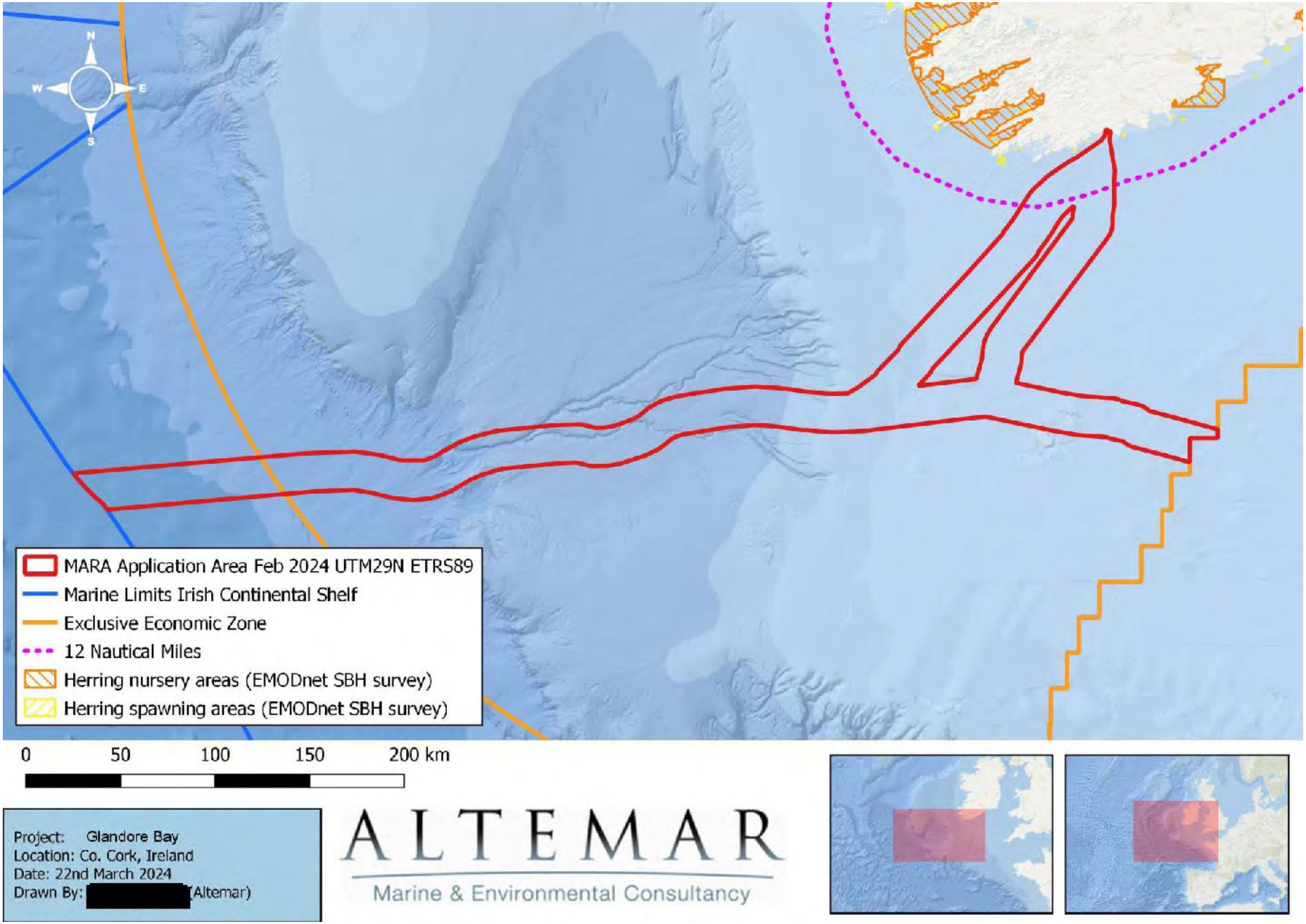


Figure 6. *Herring spawn and nursery grounds in relation to the proposed survey corridor.*

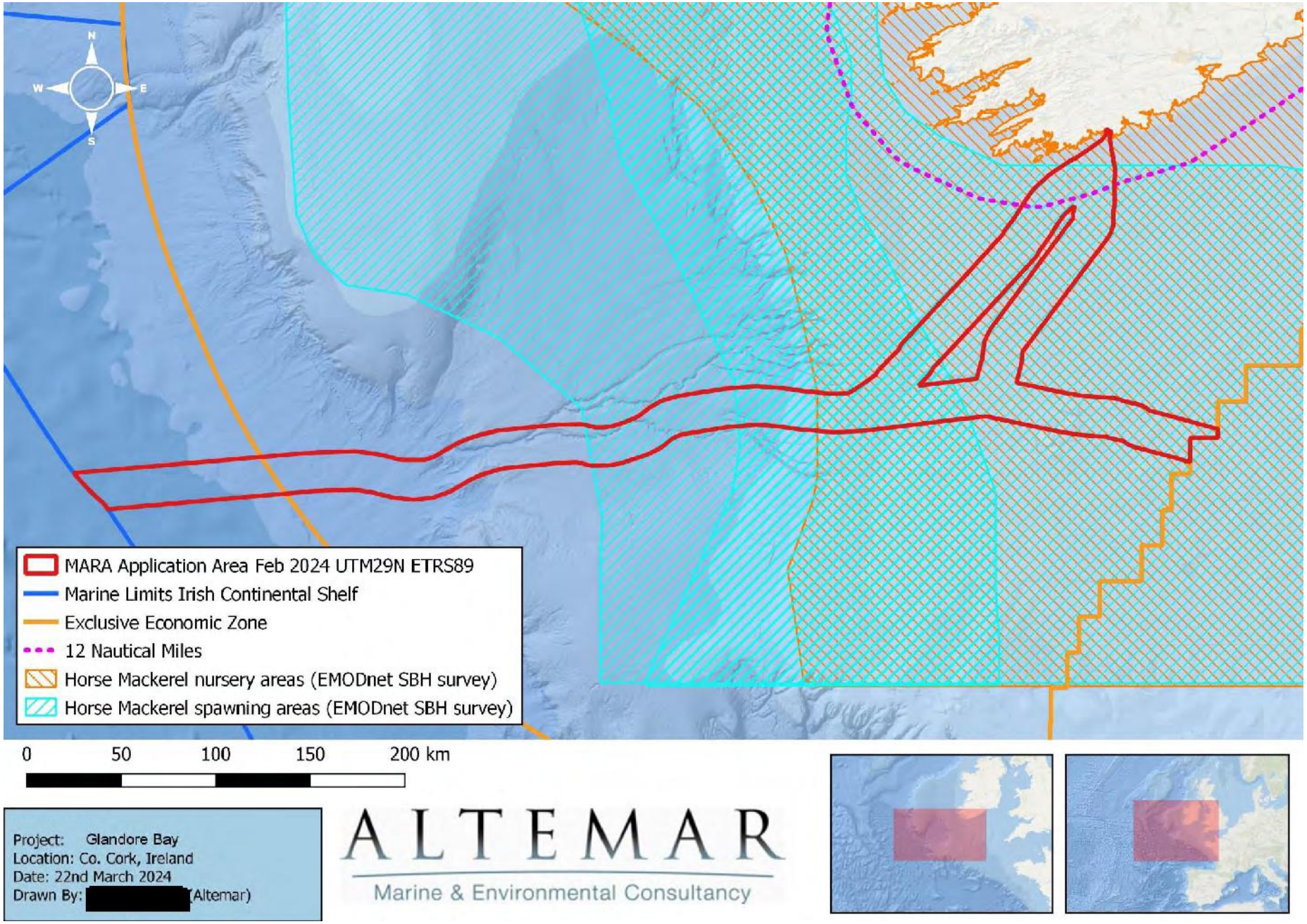


Figure 7. *Horse mackerel spawn and nursery grounds in relation to the proposed survey corridor.*

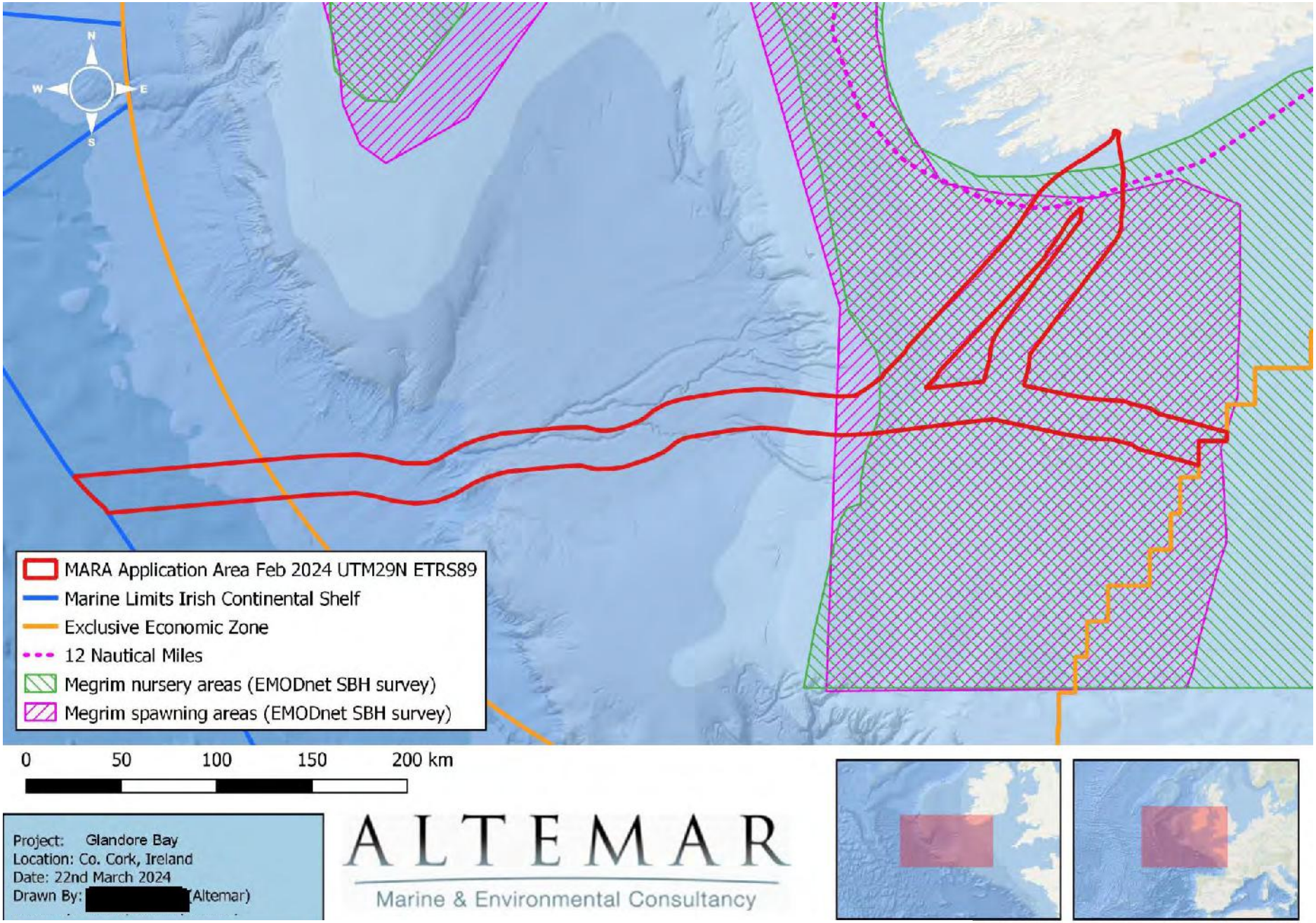


Figure 8. *Megrim spawn and nursery grounds in relation to the proposed survey corridor.*

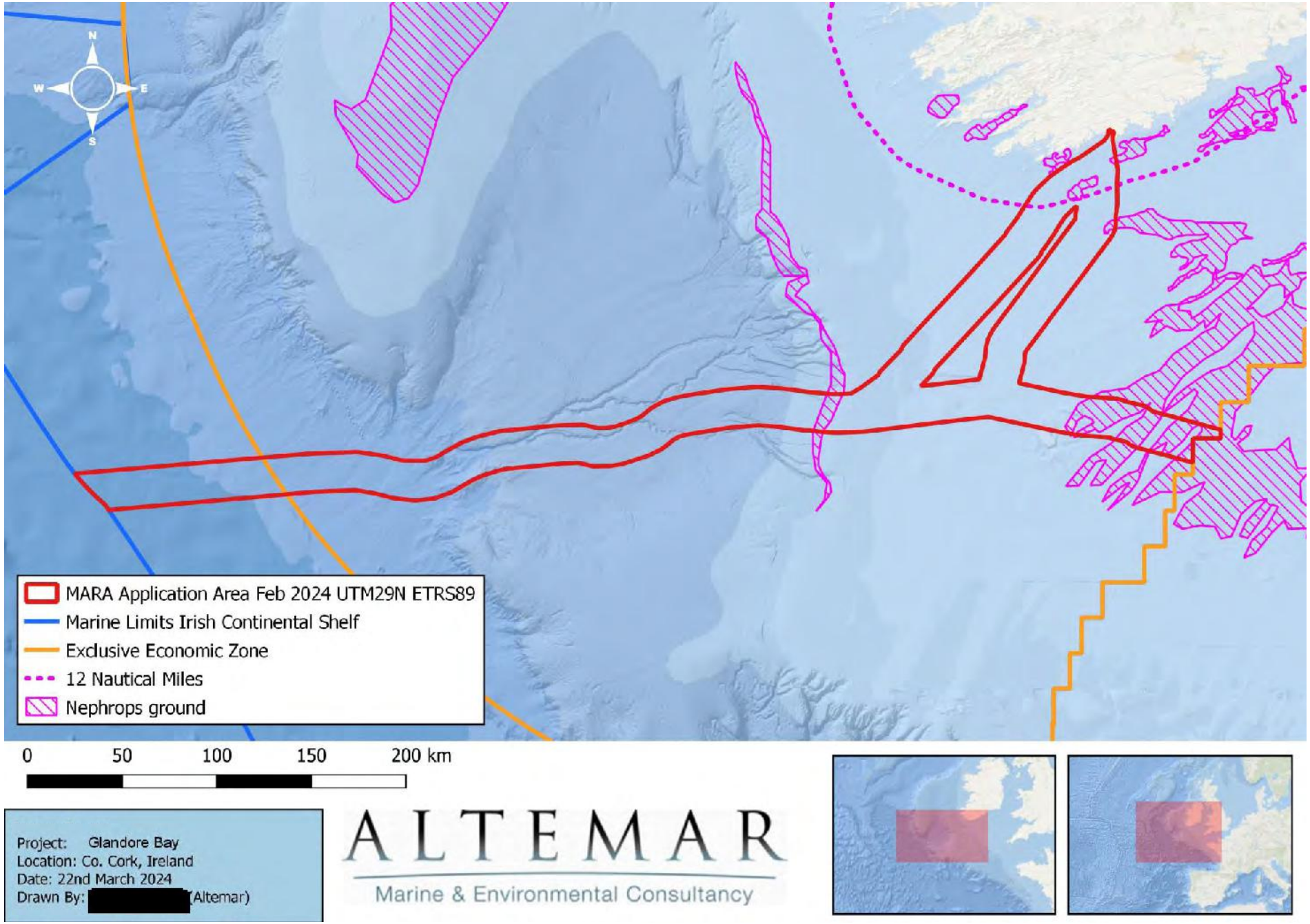


Figure 9. *Nephrops grounds in relation to the proposed survey corridor.*

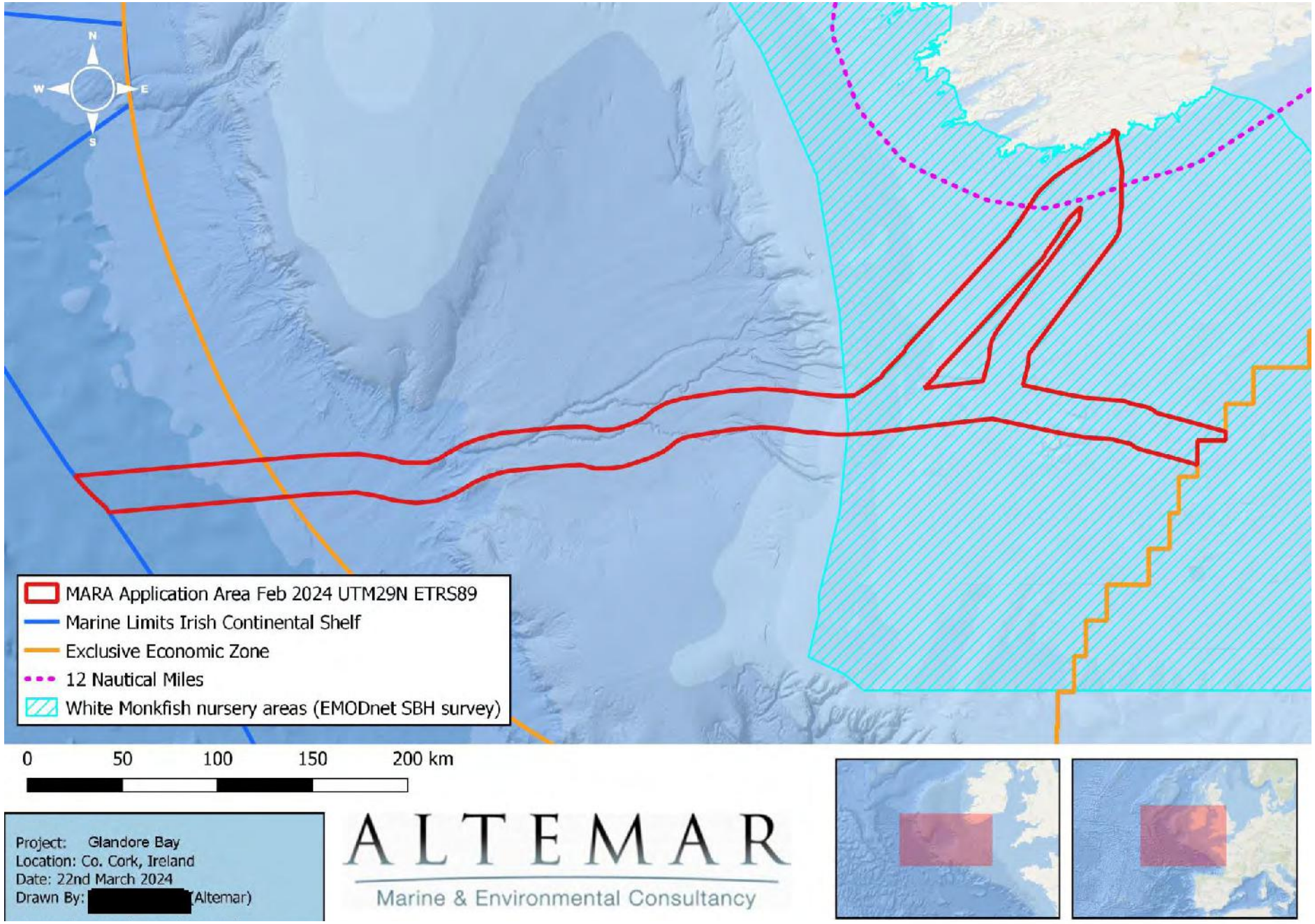


Figure 10. *White monkfish nursery grounds in relation to the proposed survey corridor.*

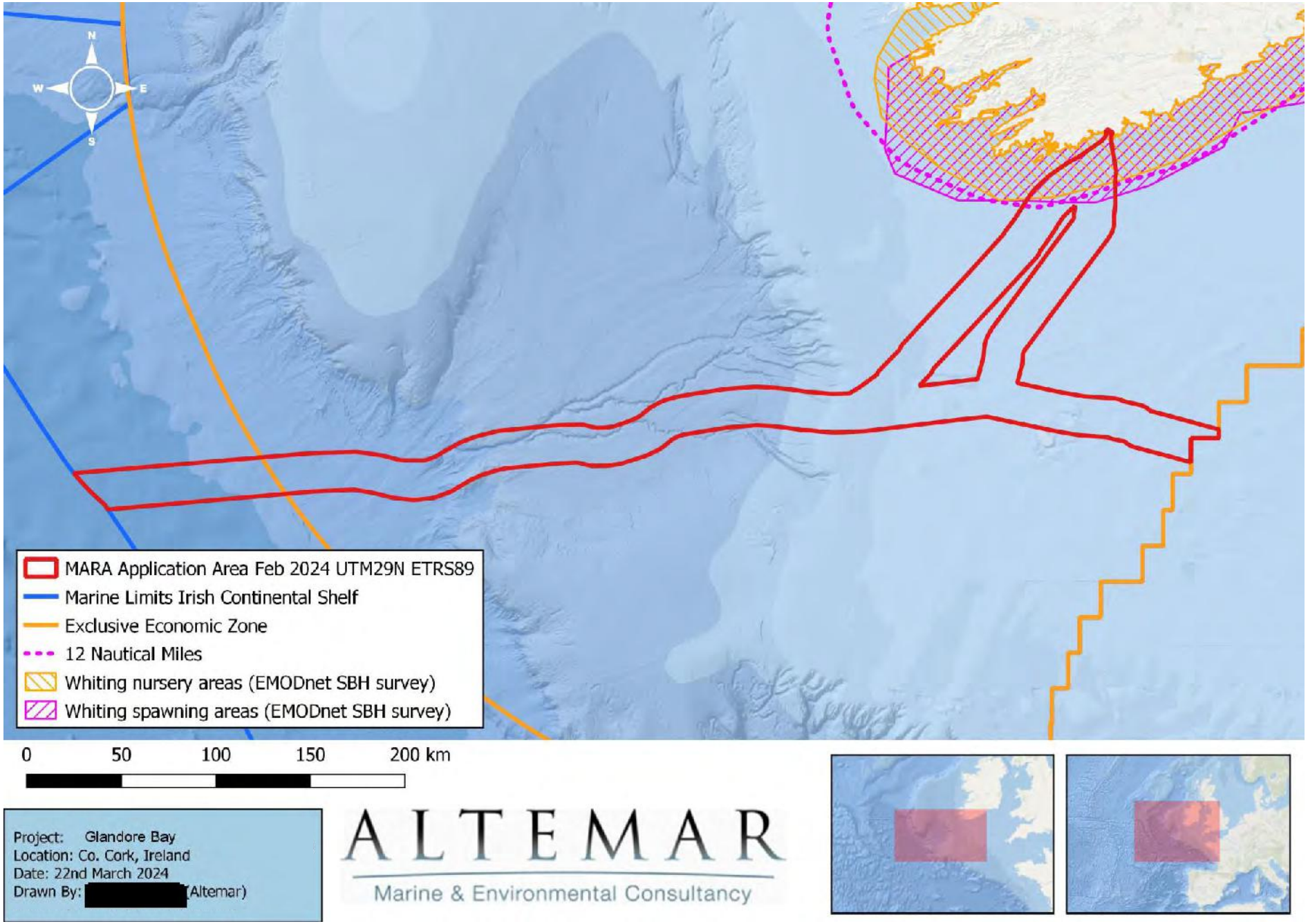


Figure 11. *Whiting nursery and spawning grounds in relation to the proposed survey corridor.*

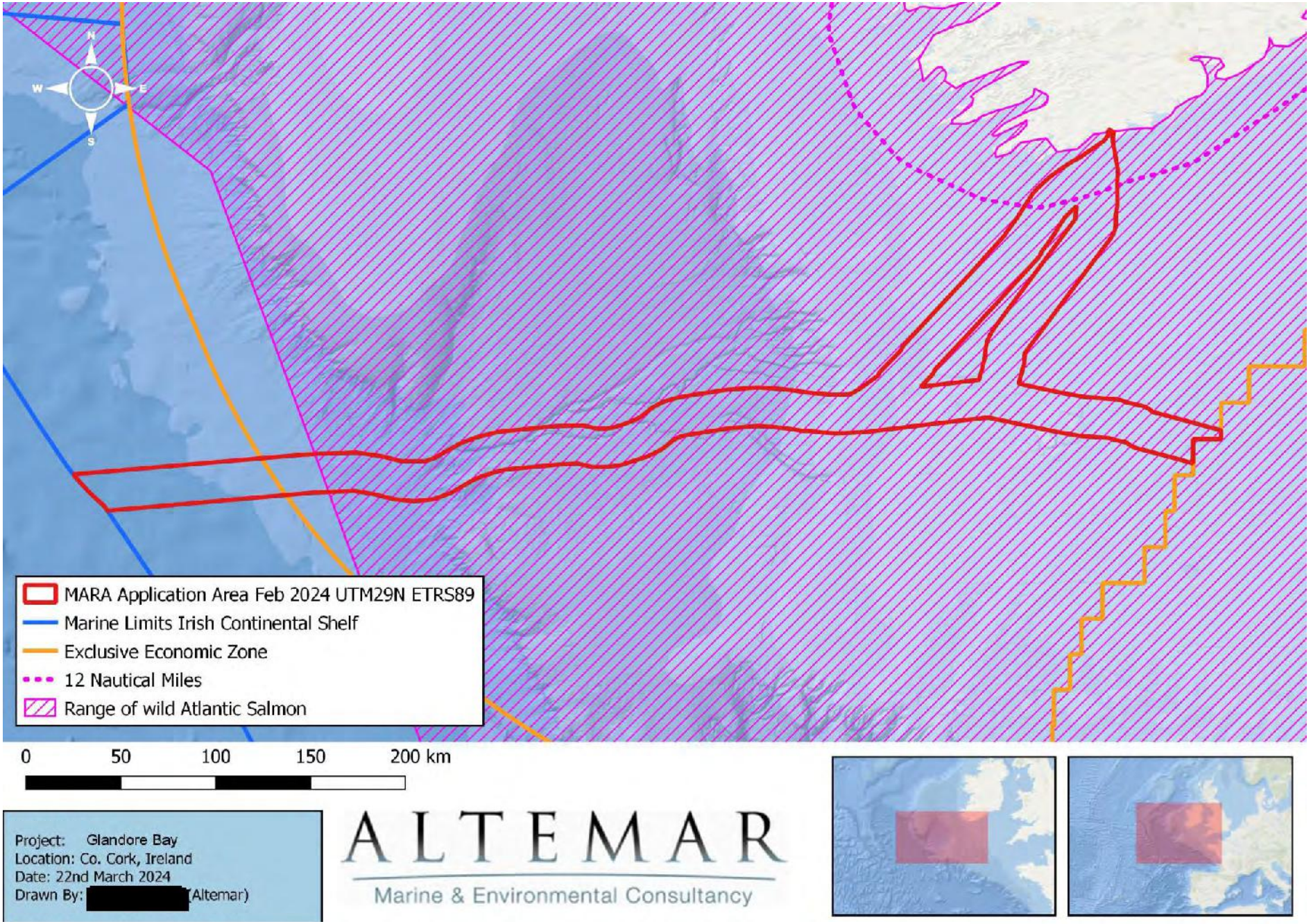


Figure 12. *Wild Atlantic Salmon range in relation to the proposed survey corridor.*

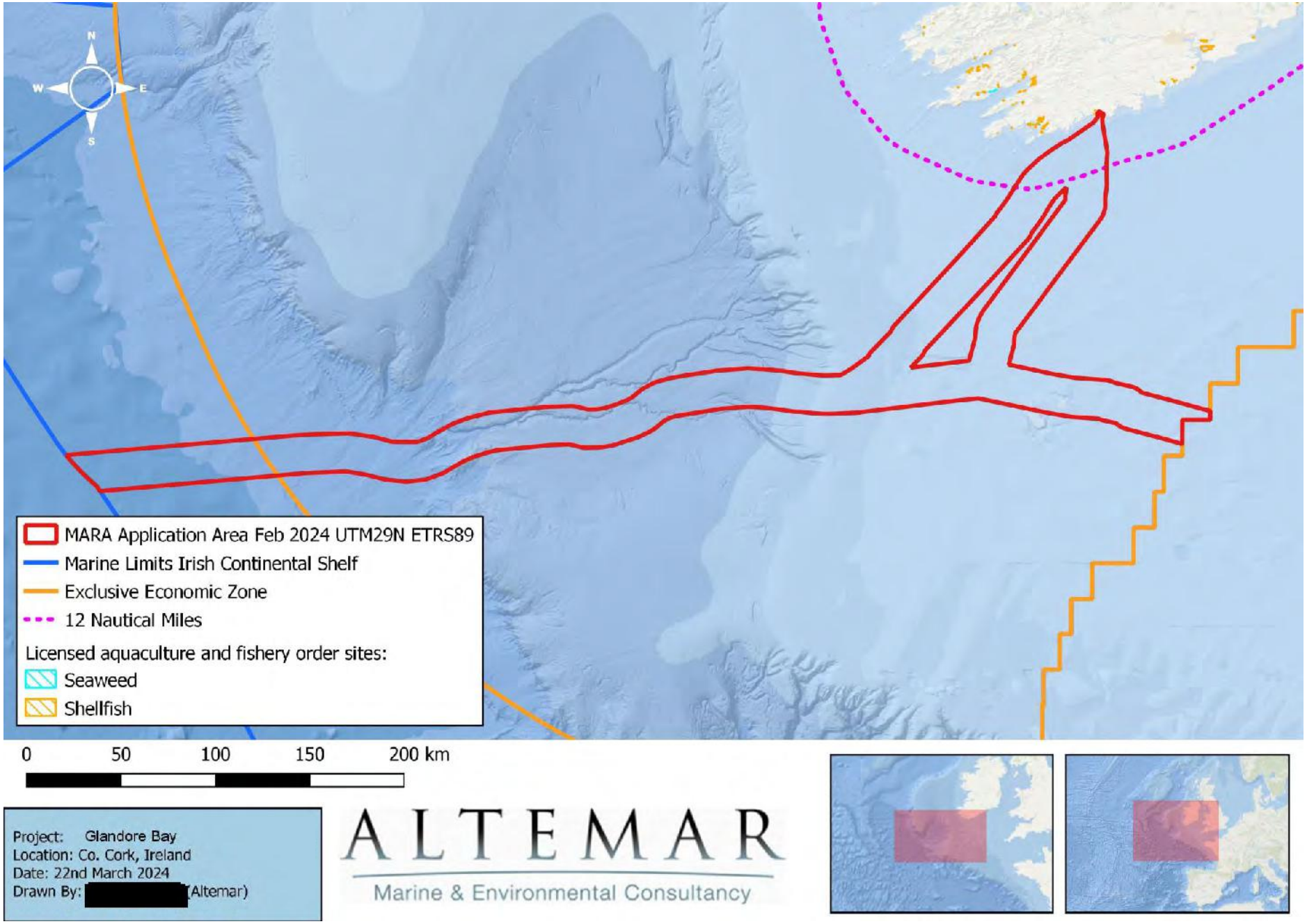


Figure 13. *Licensed aquaculture and fishery order sites in relation to the proposed survey corridor.*

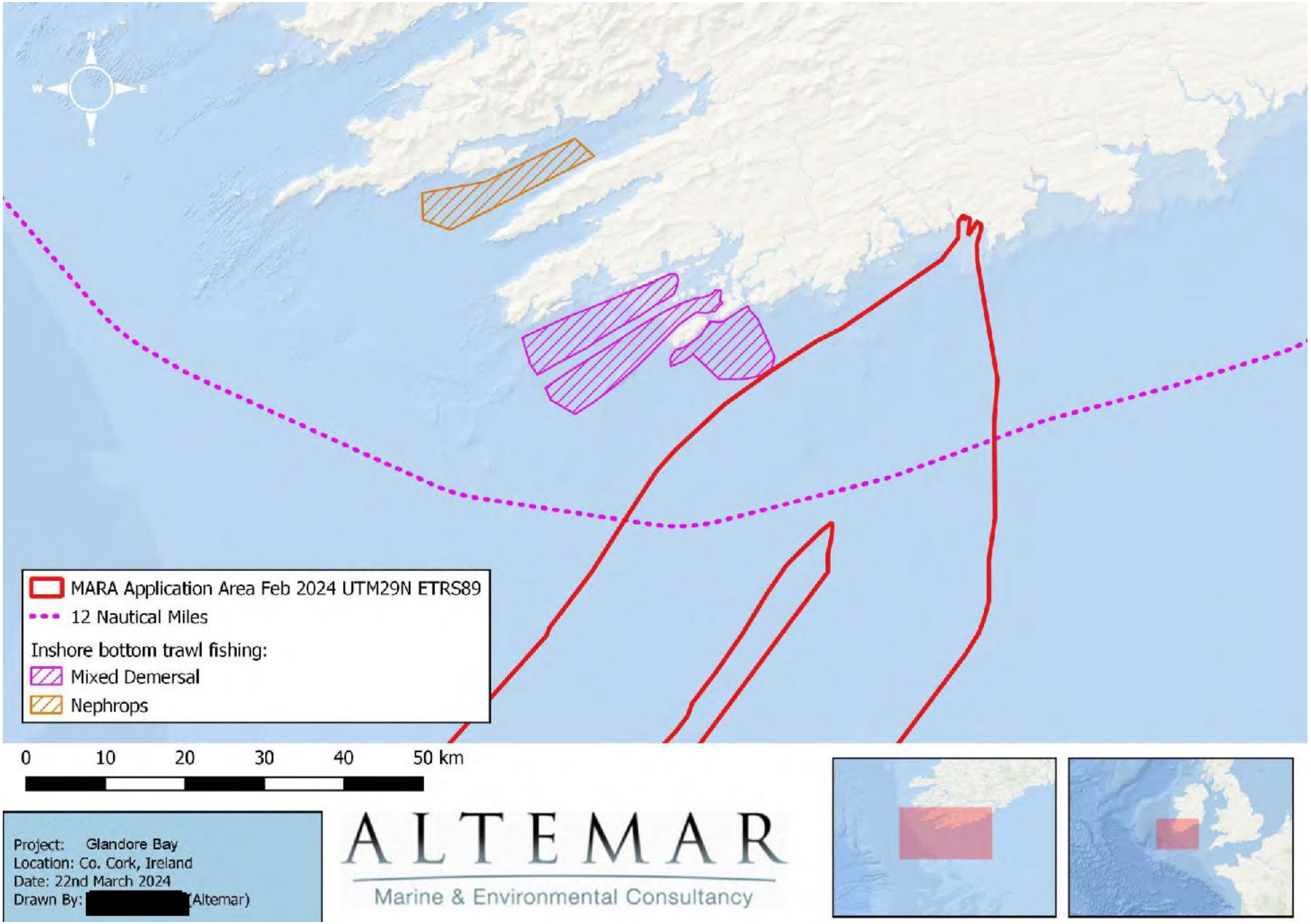


Figure 14. *Inshore bottom trawl fishing areas in relation to the proposed survey corridor.*

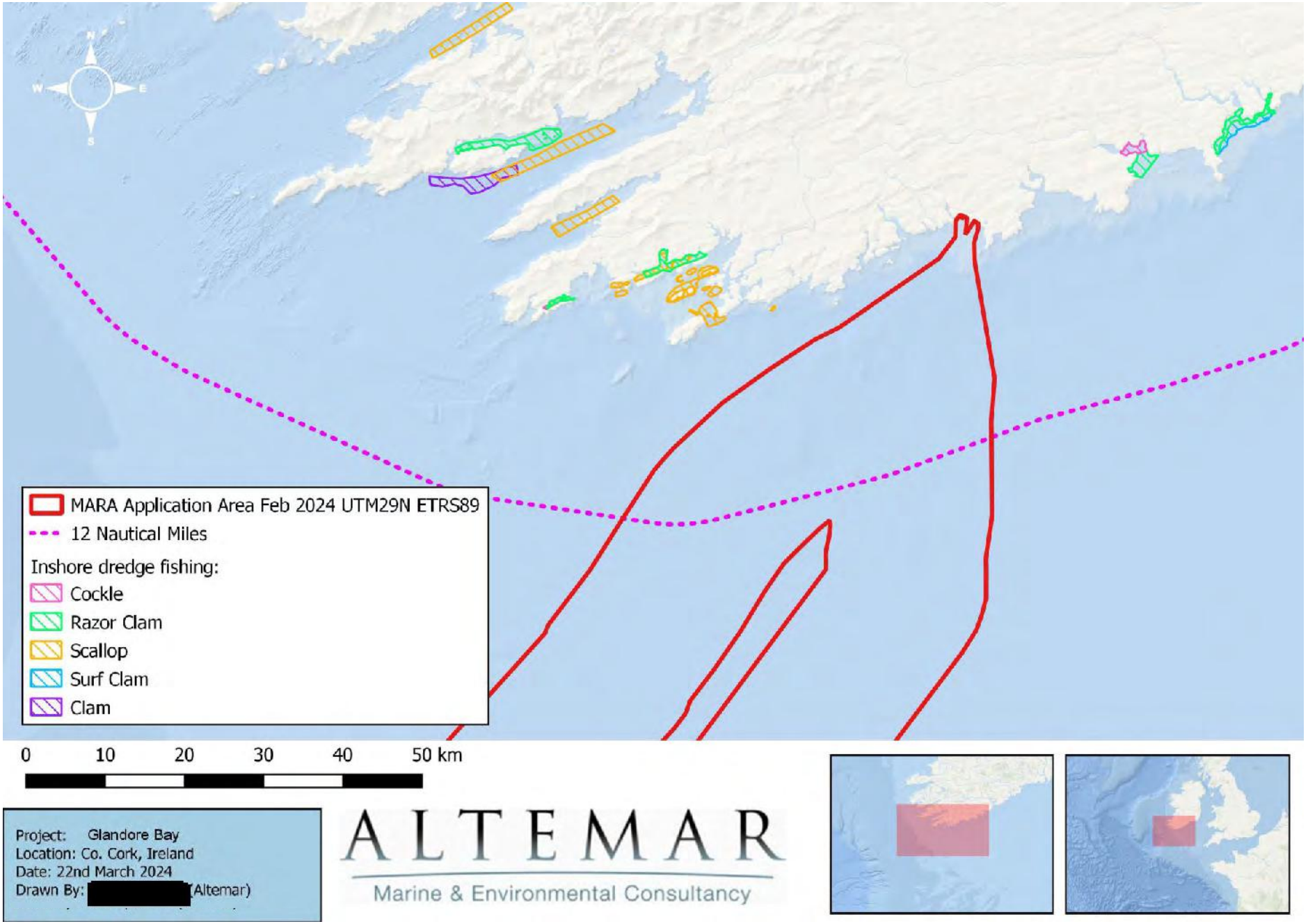


Figure 15. *Inshore dredge fishing areas in relation to the proposed survey corridor.*

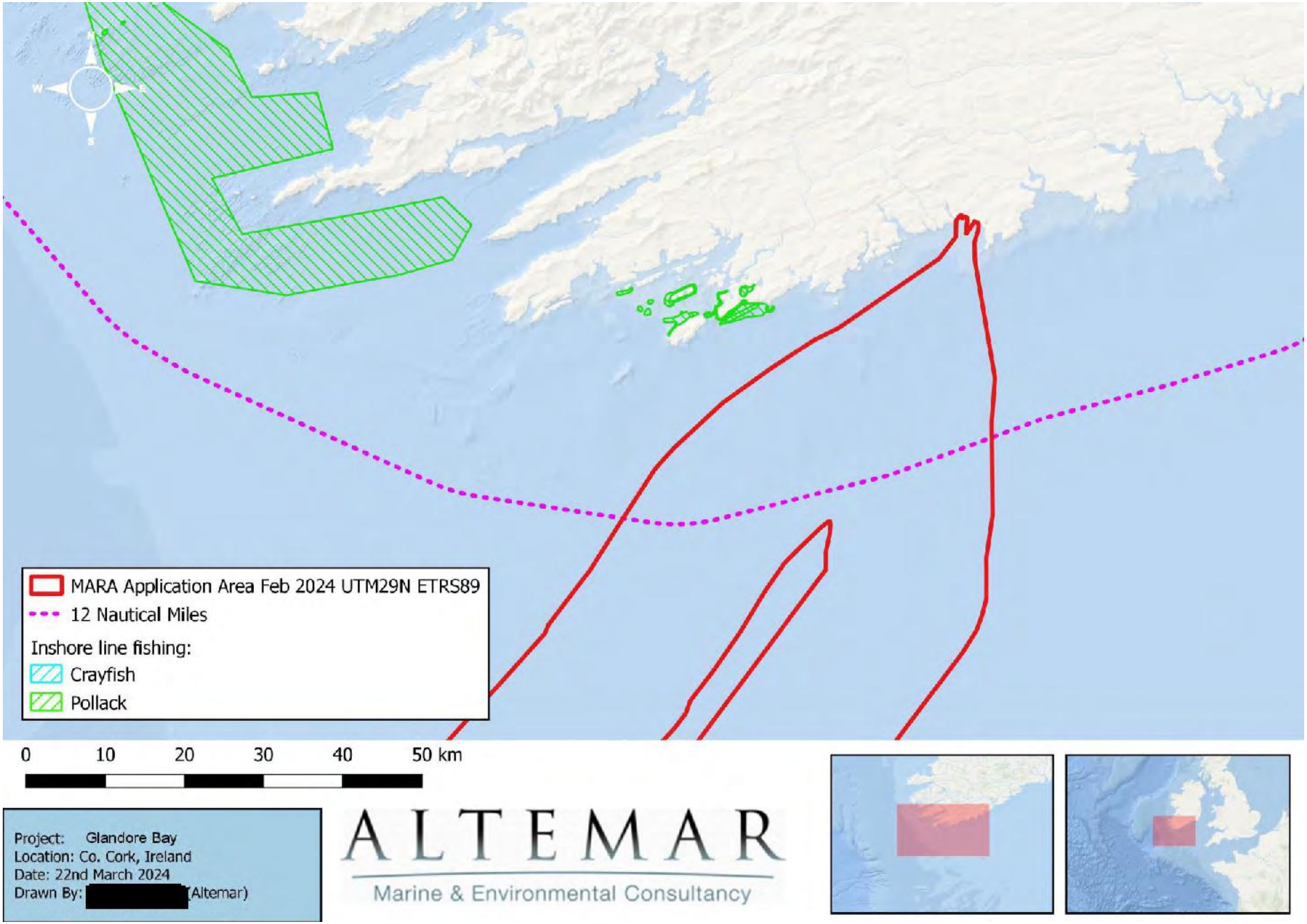


Figure 16. *Inshore line fishing areas in relation to the proposed survey corridor.*

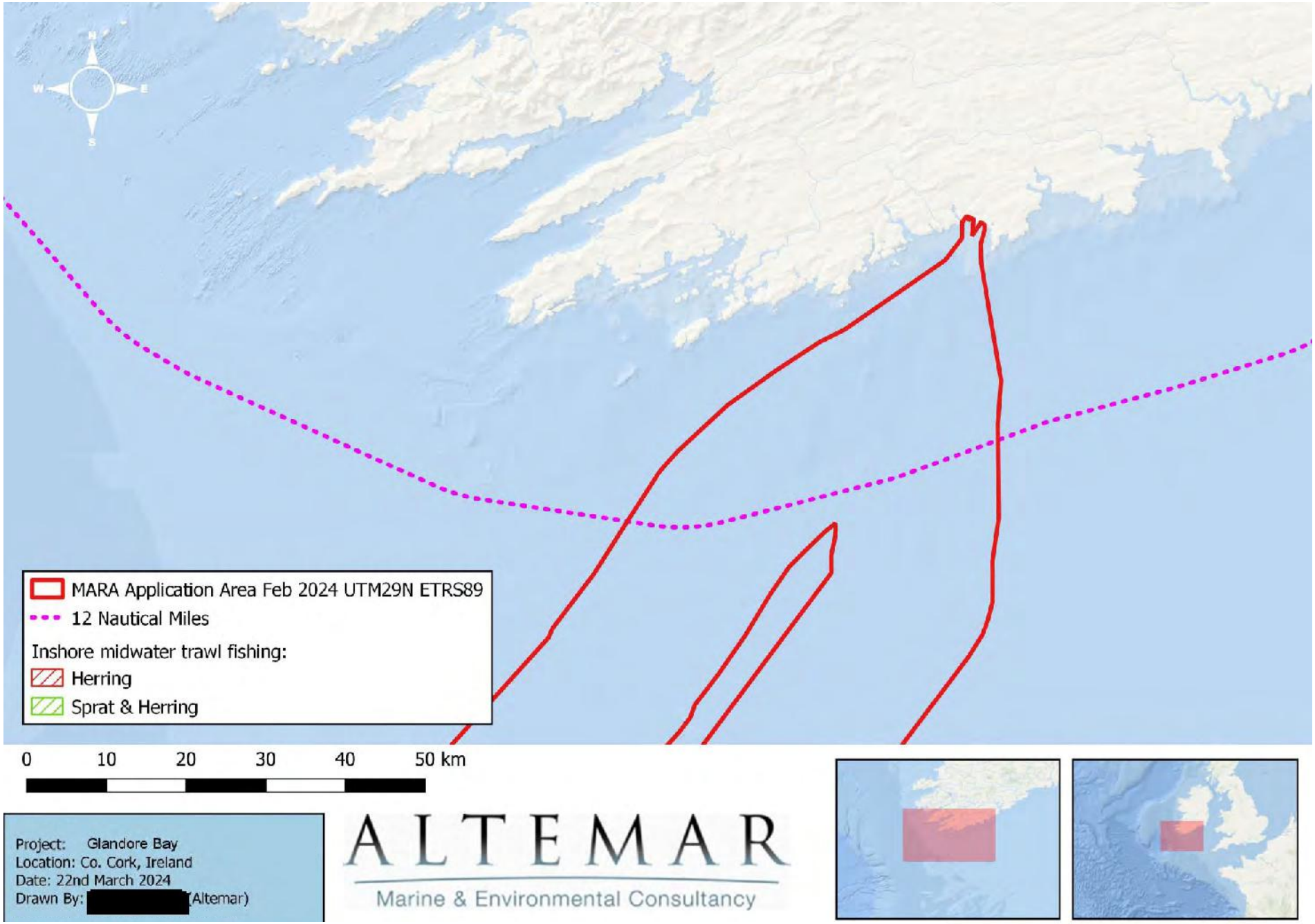


Figure 17. *Inshore midwater trawl fishing areas in relation to the proposed survey corridor.*

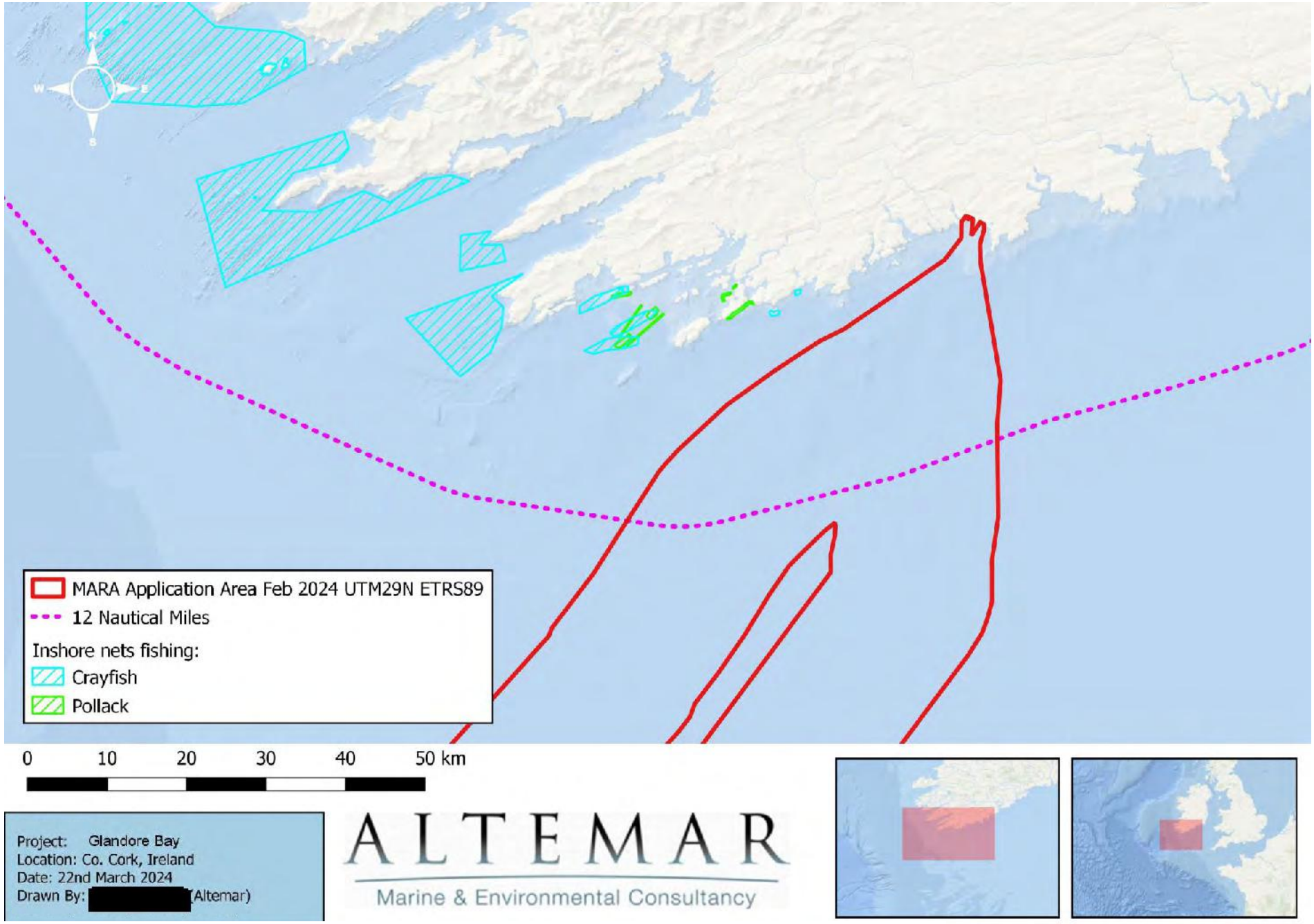


Figure 18. *Inshore nets fishing areas (crayfish & pollack) in relation to the proposed survey corridor.*

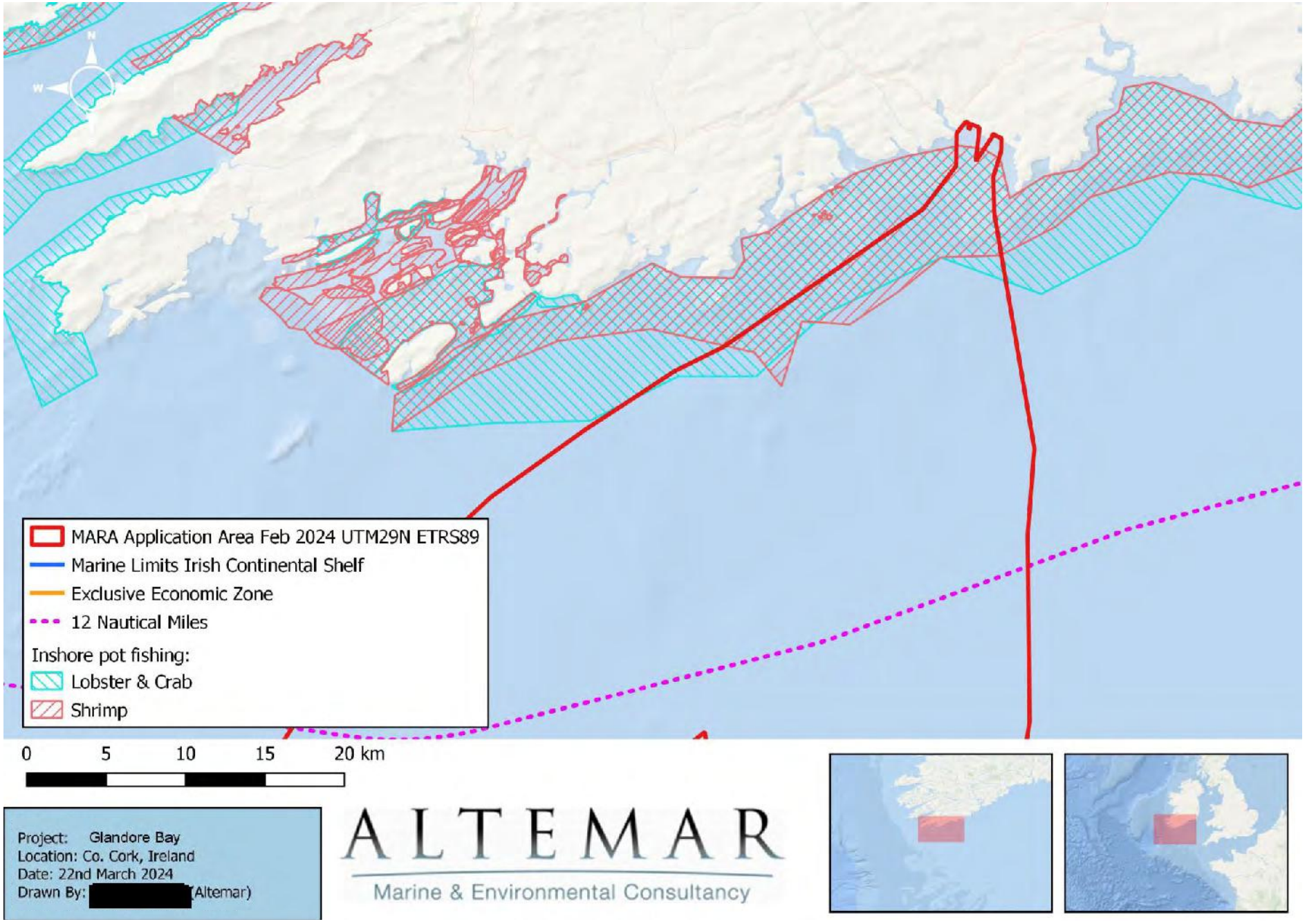


Figure 19. *Inshore pot fishing areas in relation to the proposed survey corridor.*

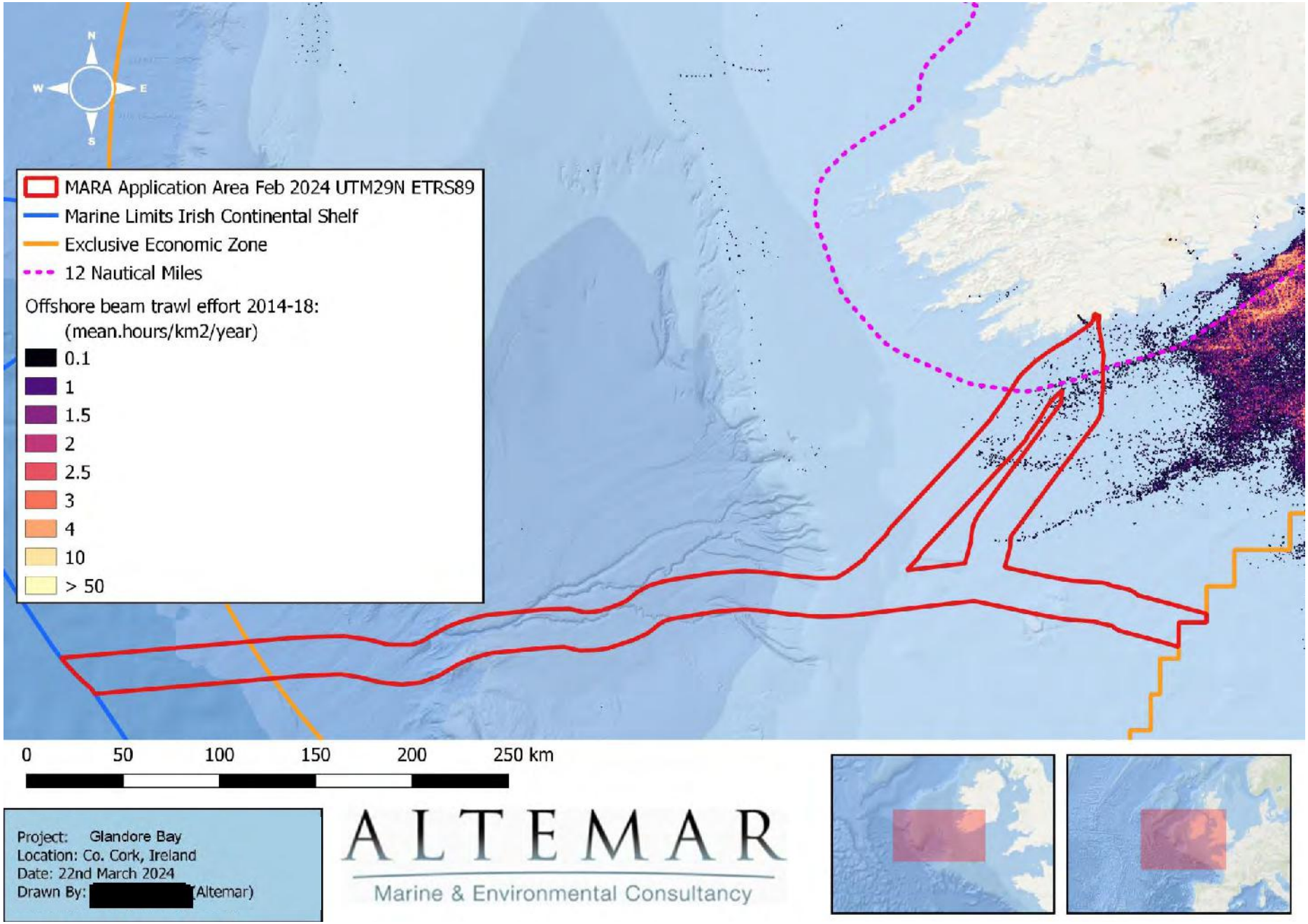


Figure 20. *Offshore beam trawl fishing effort in relation to the proposed survey corridor.*

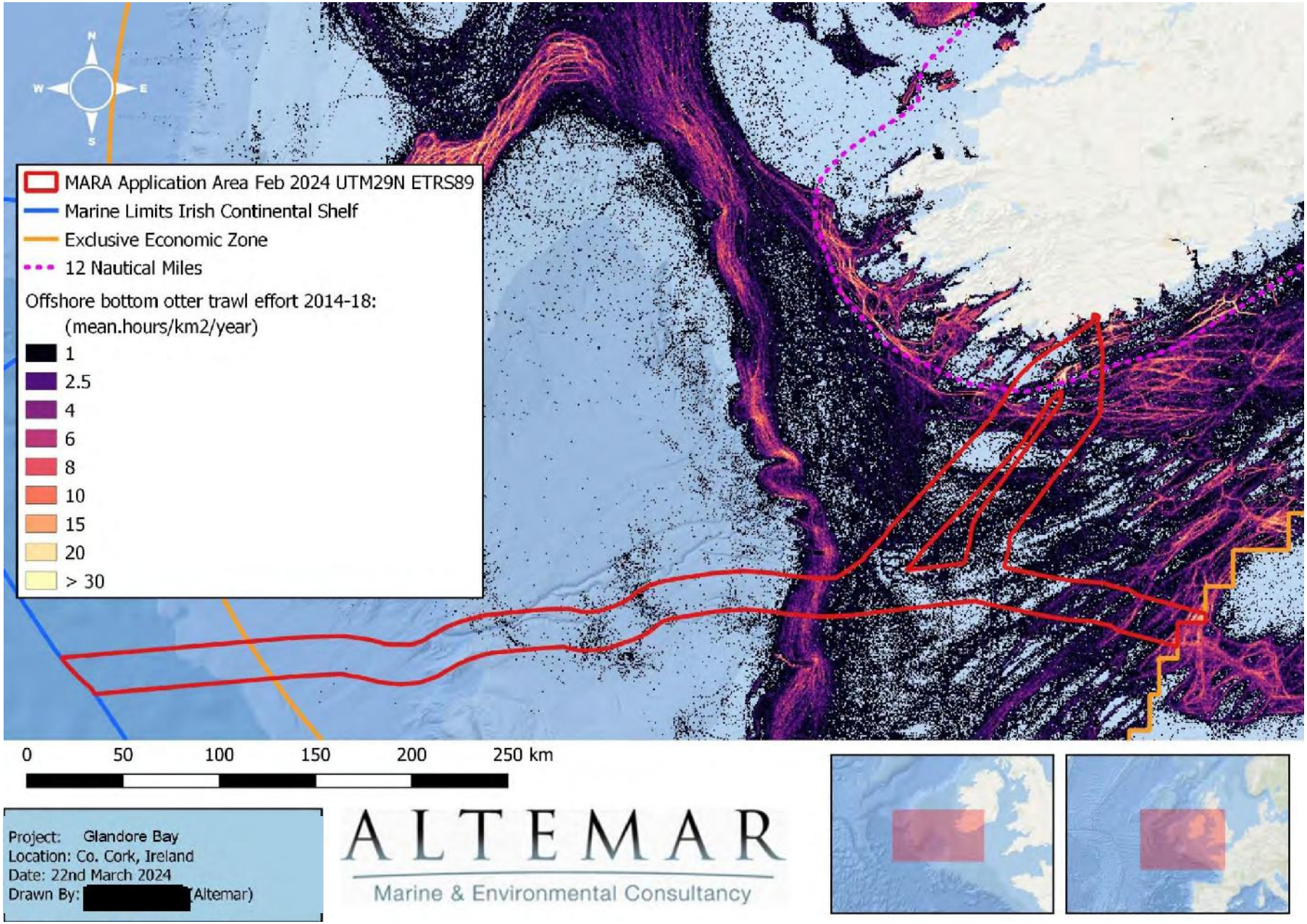


Figure 21. *Offshore bottom otter trawl fishing effort in relation to the proposed survey corridor.*

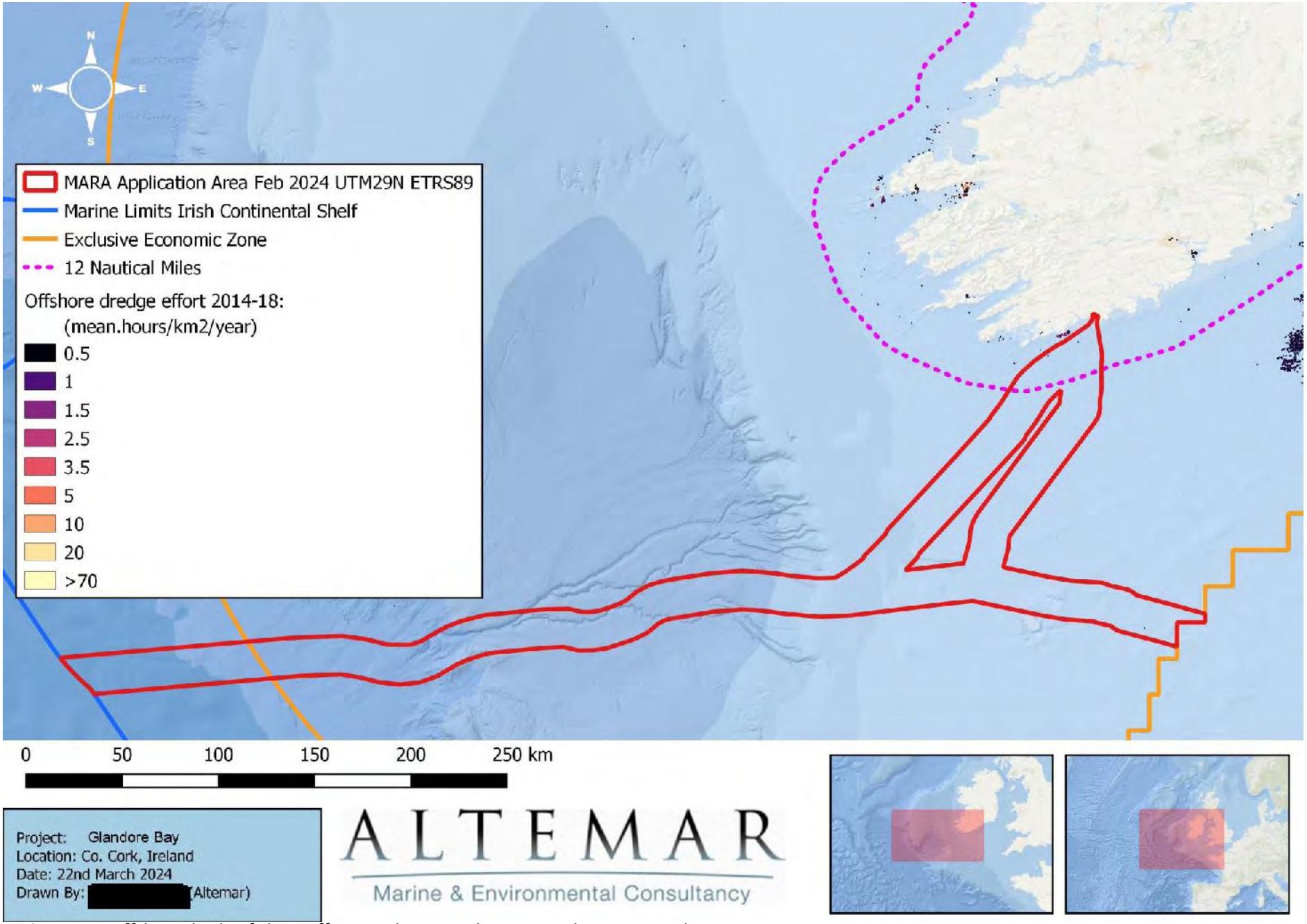


Figure 22. *Offshore dredge fishing effort in relation to the proposed survey corridor.*

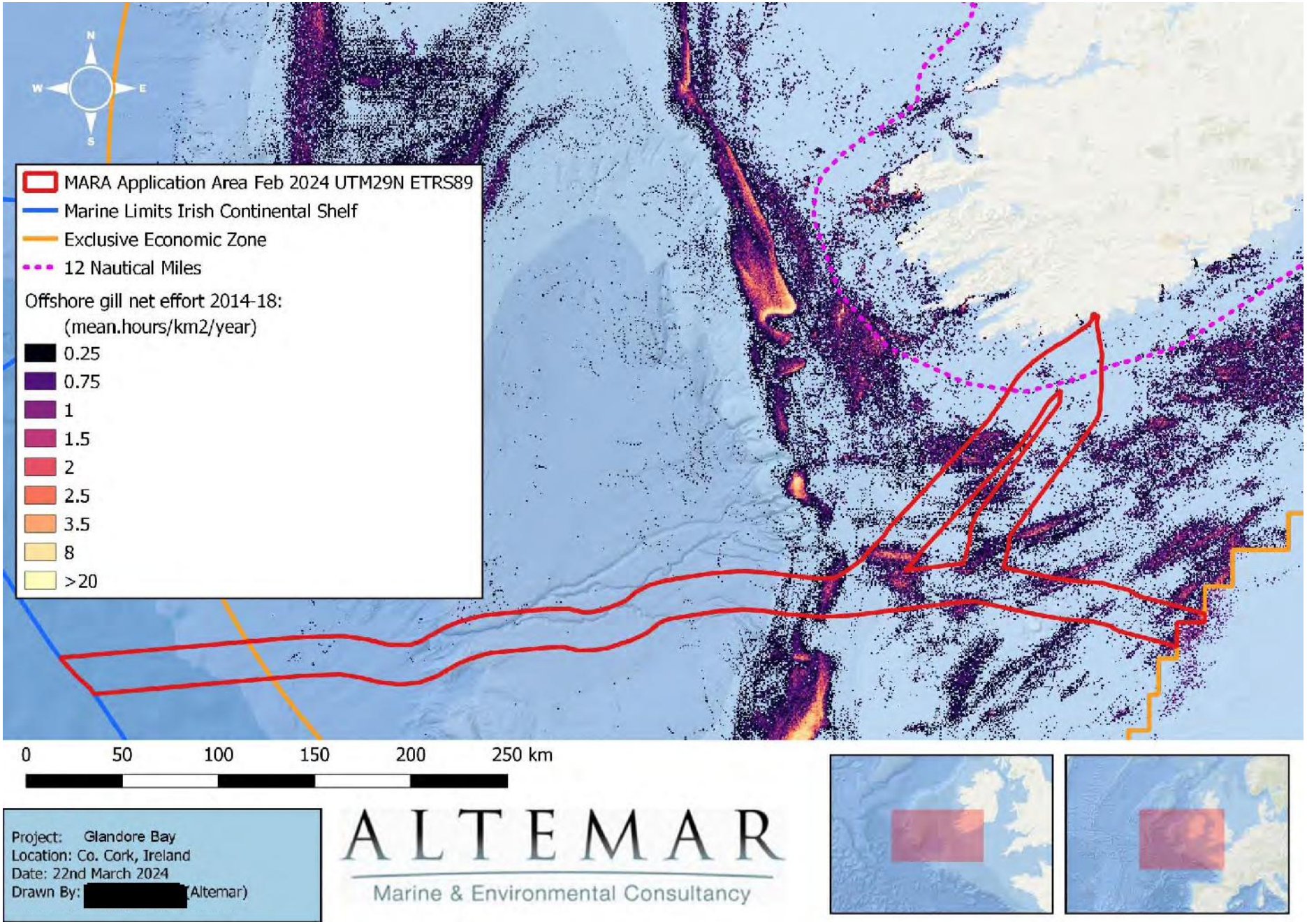


Figure 23. *Offshore gill net fishing effort in relation to the proposed survey corridor.*

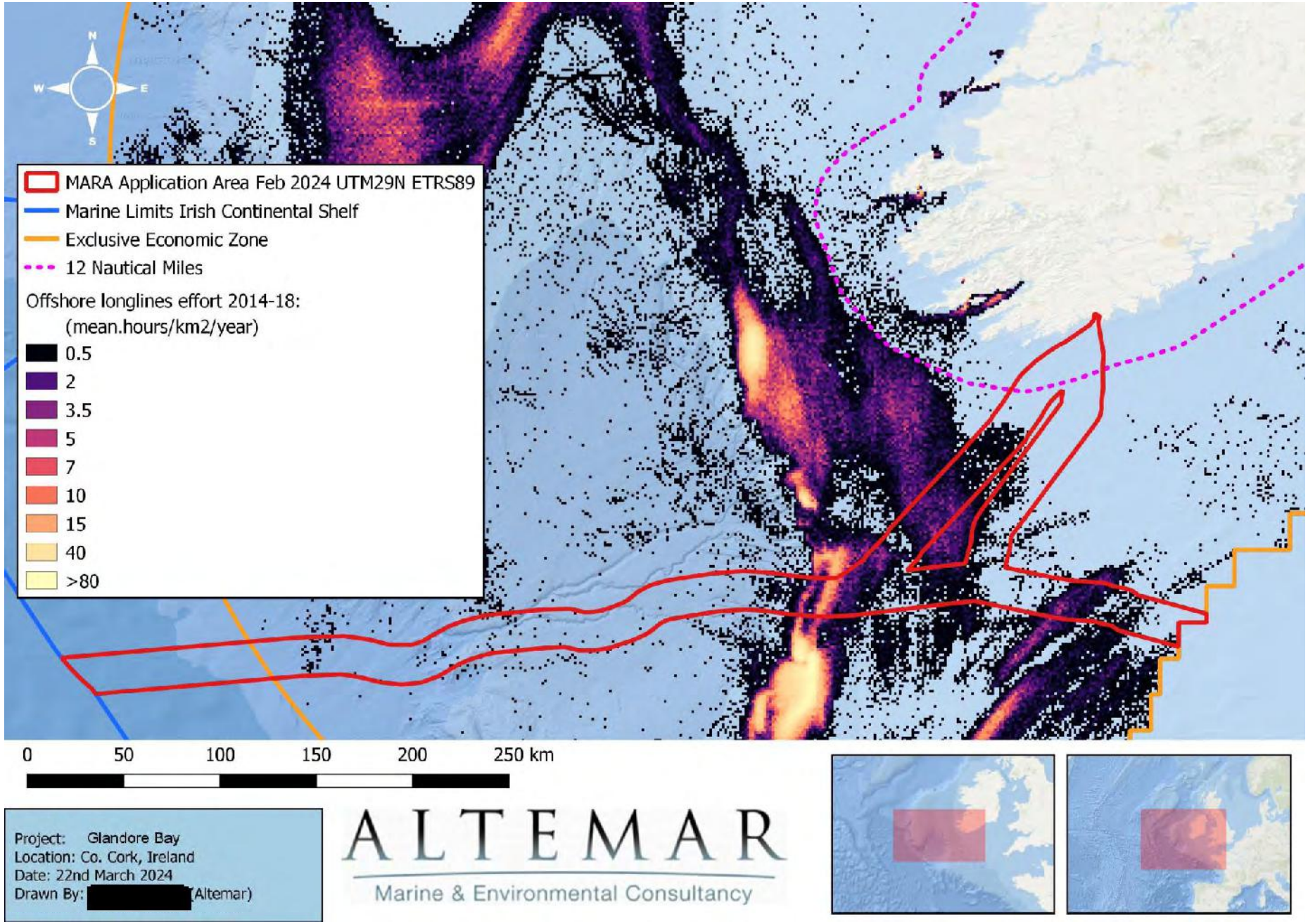


Figure 24. *Offshore longline fishing effort in relation to the proposed survey corridor.*

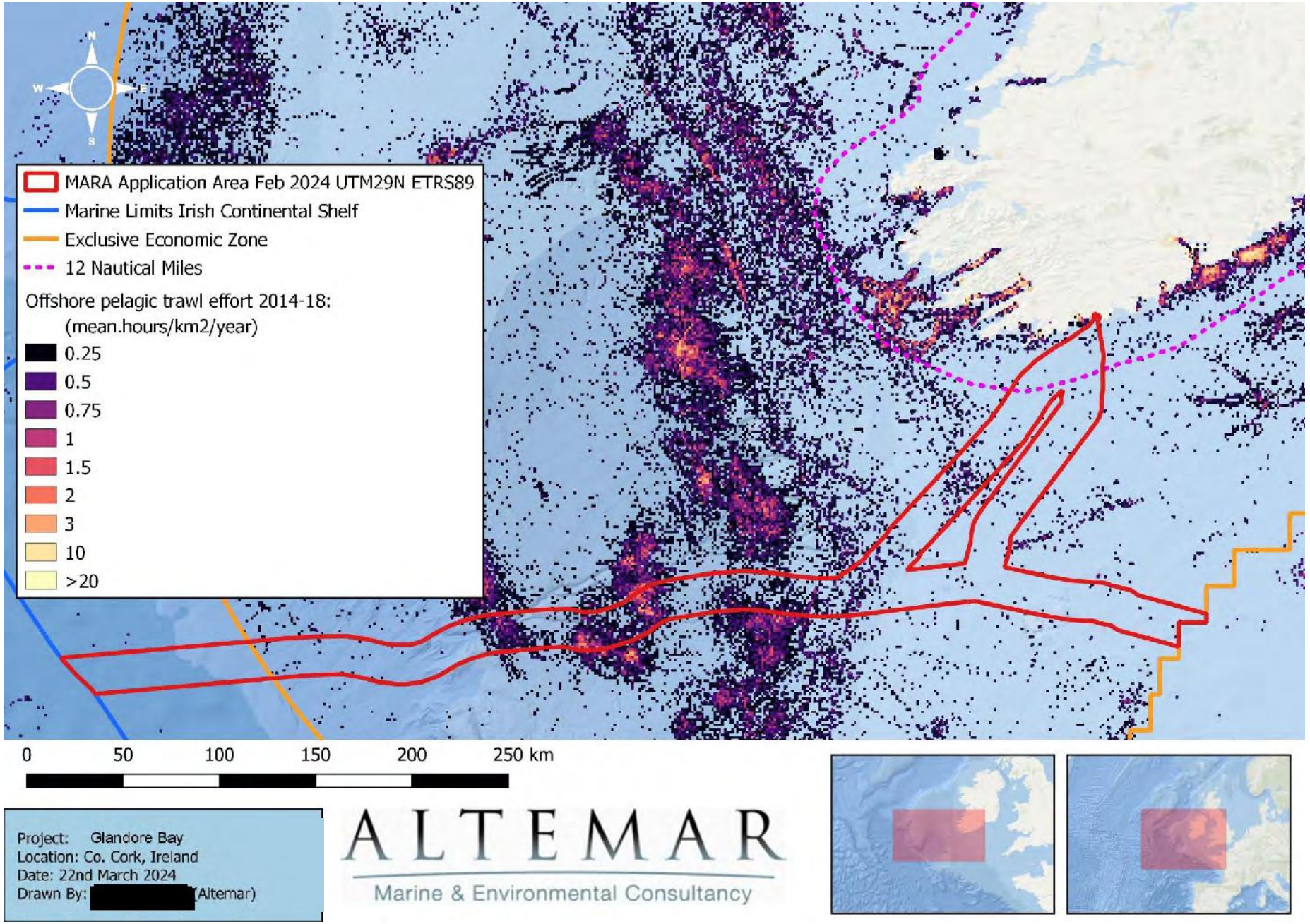


Figure 25. *Offshore pelagic trawl fishing effort in relation to the proposed survey corridor.*

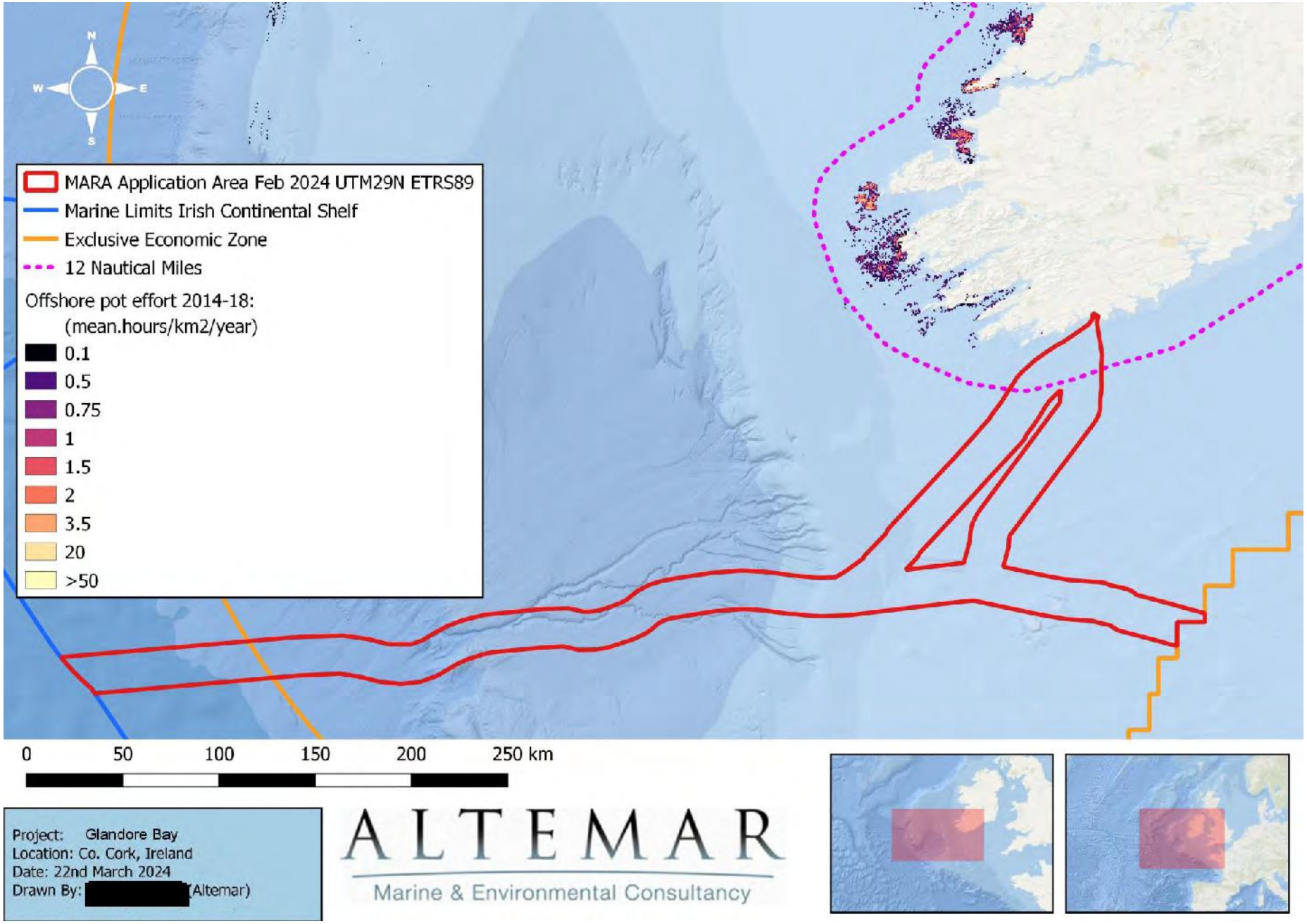


Figure 26. *Offshore pot fishing effort in relation to the proposed survey corridor.*

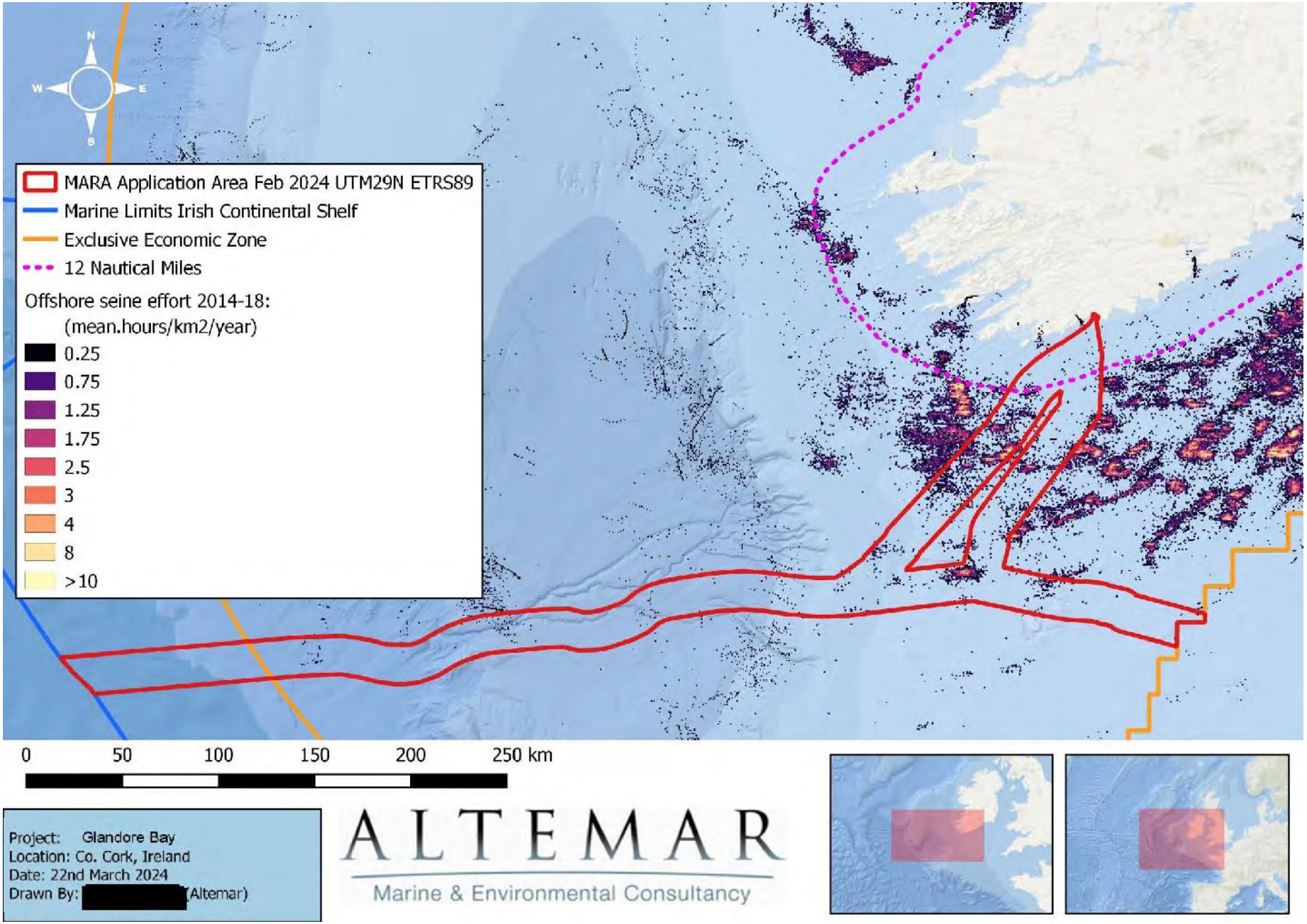


Figure 27. *Offshore seine fishing effort in relation to the proposed survey corridor.*

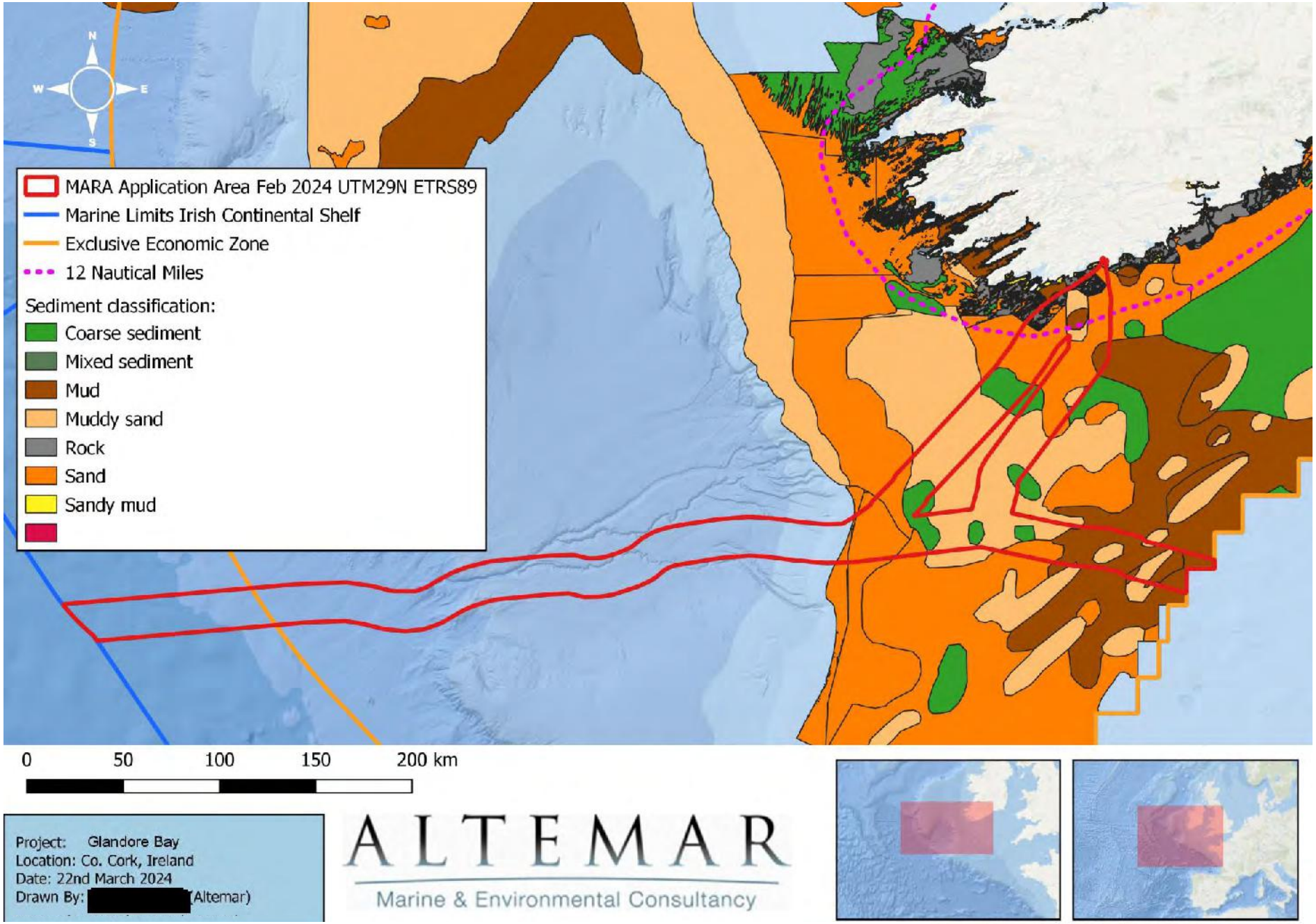


Figure 29. *Seabed habitats (INFOMAR) along the proposed survey corridor.*

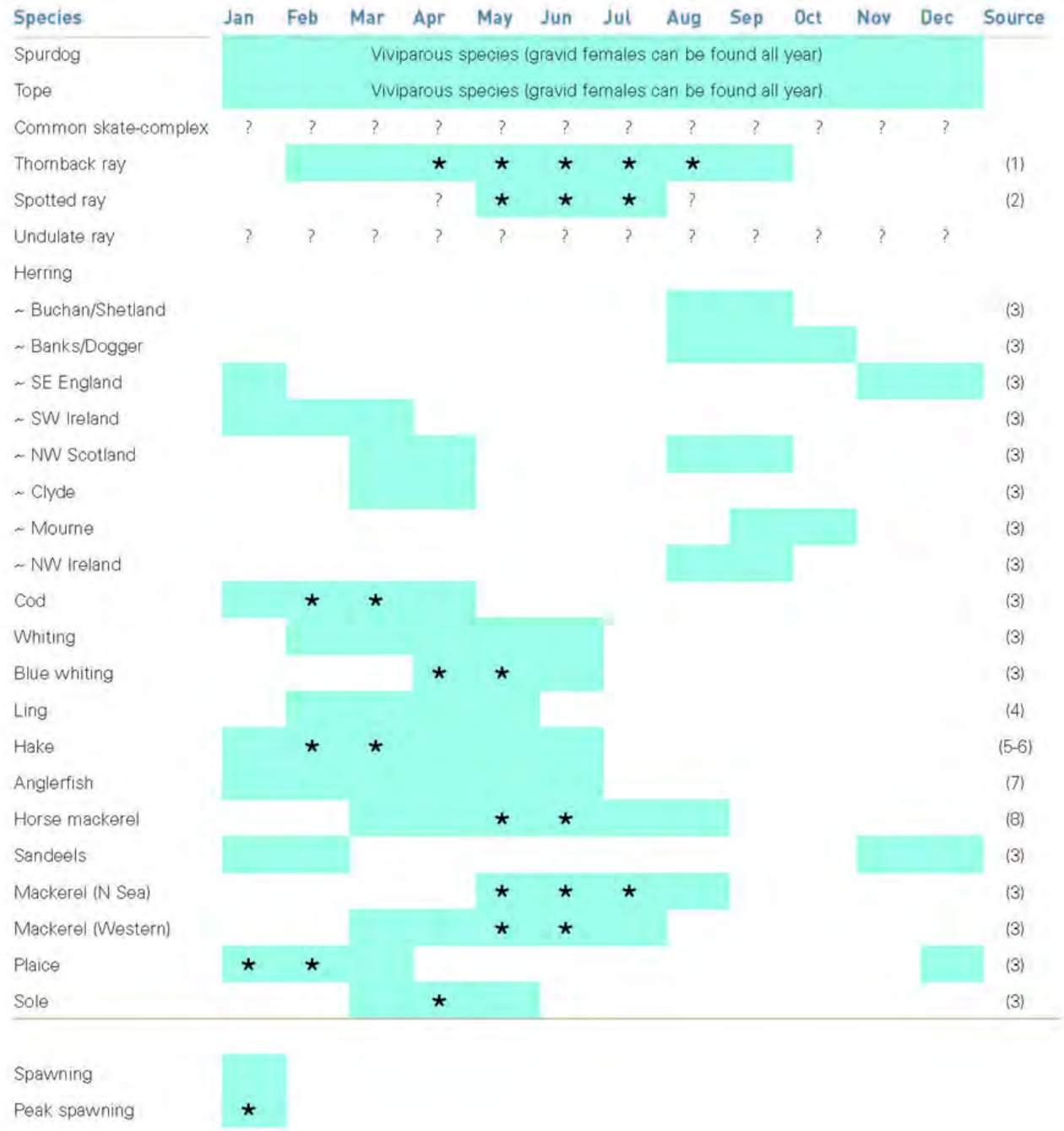


Figure 30. *Spawning times of various fish species in the British Isles (CEFAS)*