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Marine Mammal Observer Report

sse Renewables

Client	**Sure Partners Limited**
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REVISION HISTORY

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00	30/08/2023	Issue for Client	TS	MT	TH	TH
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DISCLAIMER

REVISION SUMMARY

Rev	Date	Section(s)	Detail of Change
00	30/08/2023	All	For issue to client
01	07/09/2023	All	Rectification of errors identified in Rev00 pdf
02	04/10/2023	1.4, 2.5.2	Clarification that there was no ramp up procedure to follow due to the nature of the equipment utilised during the site investigation.

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EXECUTIVE SUMMARY

Sure Partners Ltd (SSE Renewables) commissioned Ground Investigation Ireland Ltd to perform Geotechnical Site Investigation operations within the nearshore limits of the Arklow Bank Wind Park site using Jack-up barge OCM 80 between July and August 2023. The site investigation area is approximately 2.5 km East of Arklow Town, off the east coast of Ireland for the Arklow Bank Wind Park.

The OCM 80 was mobilised in Arklow port from the 05th July 2023 to the 14th August 2023. The Ocean Navigator transited the barge to site on the 13th of July, to start survey operations on the 17th July 2023. Following completion of the boreholes (1, 2, and 3) site survey on 14th August 2023 the rig OCM 80 transited to the next borehole.

The geotechnical site investigation was carried out in accordance with the Marine Mammal Mitigation Plan (MMMP) described in the Arklow Bank Wind Park (ABWP) Marine Mammal Risk Assessment (MMRA) for Geotechnical Site Investigation which was produced in accordance with the National Parks and Wildlife Service (NPWS) (2014) 'Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters'.

One dedicated Marine Mammal Observer (MMO), Tania Marín Sánchez, was onboard the OCM 80 for the duration of the project. The MMO conducted visual pre-work watches for marine mammals. The MMO also carried out watches throughout operations.

A total of six marine mammal sightings were recorded during MMO observations during the geophysical site investigations while the equipment was operational. One grey seal milling was sighted during operations (Table 1-1).

There were no instances where the start-up of equipment was delayed due to the presence of marine mammals.

Table 1-1: Summary of survey activities and mitigation during the geophysical survey

Project duration	17/07/2023 – 14/08/2023
Total visual observation	22 hours and 12 minutes
Total PAM	0 hours and 0 minutes
No. of pre-work watches	16
No. of sightings or detections during pre-work watches	1
No. of delays due to marine mammals	1
No. of incidents of non-compliance	0

ABBREVIATIONS

Table 1-2: Table of Abbreviations

Term	**Definition**
ABWP	Arklow Bank Wind Park
CP	Cable Percussion
EEZ	Exclusive Economic Zone
LA	Lease Area
LAT	Lowest Astronomical Tide
MMMP	Marine Mammal Mitigation Plan
MMO	Marine Mammal Observer
MMRA	Marine Mammal Risk Assessment
MZ	Mitigation Zone
NPWS	National Parks and Wildlife Service
PAMO	Passive Acoustic Monitoring Operator
RC	Rotary Cone
SAC	Special Area of Conservation
SPT	Standard Penetration System
ZOI	Zone of impact

1 INTRODUCTION

1.1 PROJECT OVERVIEW

Sure Partners Ltd. (SSE Renewables) commissioned a Geotechnical Site Investigation across the proposed three boreholes:

- Borehole #1 on site: (52° 49' 53.218646", -6° 6' 32.1249646")
- Borehole #2 on site: (52° 49' 52.336000", -6° 6' 27.598655")
- Borehole #3 on site: (52° 49' 51.439767", -6° 6' 23.250427")

The three locations are situated in front of Ennereilly Beach, 2.5 km East of Arklow Town, off the east coast of Ireland. Following geophysical surveys that were completed in 2019, the requirement to further investigate the ground and geological conditions along a number of potential export cable routes (ECRs) between the Lease Area (LA) and landfall was defined and within the scope of work referred to as LOT 1A.

The Arklow Bank Wind Park Marine Mammal Risk Assessment for Geophysical Site Survey Marine Mammal Mitigation Plan (MMMP) (RPS, 2022) is aligned with the National Parks and Wildlife Service (NPWS) 'Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters' (DAHG, 2014), which outlines industry best practice approach to mitigate against any possible disturbance to marine mammals.

The MMMP identified that one experienced Marine Mammal Observer (MMO) was required per geotechnical site investigation to conduct marine mammal mitigation activities during the survey.

MMO observations were therefore conducted on-board the dedicated Jack-Up Barge OCM 80 (Section 2) for the geotechnical site investigation. This report is specific to the survey operations and mitigation measures, which took place on the Jack-Up Barge OCM 80 between the 17th July 2023 and the 14th August 2023.

The purpose of this report is to outline the marine mammal observations and detections recorded over the survey period and report on compliance with the NPWS approved MMMP (RPS, 2022) and the NPWS (2014) Guidance.

1.2 LEGISLATIVE BACKGROUND

The waters of Ireland's Exclusive Economic Zone (EEZ) represent one of the most important Cetaceans (whales, dolphins, and porpoise) habitats in Europe. To date, twenty four species of cetacean have been recorded in Irish waters. All cetacean species in Irish waters are protected by the Wildlife Acts 1976 to 2022 and Irish waters, including the entire EEZ, which was declared a Whale and Dolphin Sanctuary in 1991. All cetacean species are protected under Annex IV of the EU Habitats Directive (92/43/EEC), while harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*) are also listed under Annex II of the Directive requiring the designation of Special Areas of Conservation (SACs) for their protection. Two species of seal (common seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*) breed in Ireland and are also listed under Annex II of the Directive and have SACs designated for their protection.

Anthropogenic underwater noise has the potential to disturb, displace, injure, or even kill marine mammals (Southall, 2007). Since August 2007, there has been a requirement for all drilling, piling, dredging, blasting, seismic, multibeam, sidescan sonar, and sub-bottom profiling operations in the

Irish EEZ to adhere to guidelines to protect marine mammals from man-made sound. This was first outlined in the Code of Practise for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters (2007). This has since been superseded by The Guidance to Manage Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (2014). These documents were produced by the National Parks and Wildlife Service of the Department of the Environment, Heritage and Local Government. The guidance requires that qualified and experienced Marine Mammal Observers (MMOs) must be present on board all vessels conducting the listed activities at all times throughout the survey, and that a pre-start watch and soft start protocol be adhered to.

1.3 SURVEY AREA

Arklow Bank is a shallow water sandbank in the Irish Sea, 13 km to the east of Arklow, County Wicklow. Arklow Bank covers an area approximately 27 km long by 2.5 km wide. Water depths on the Bank generally vary between 2 m and 25 m, although there are areas that have water depths of less than 1 m. The existing turbines are located towards the centre of the Bank, where water depths vary from between 2m to 5m (all depths referenced to Lowest Astronomical Tide (LAT)).

There are no designated Special Areas of Conservation (SACs) in the immediate vicinity of the survey area. Therefore, there were no direct impacts on any Natura 2000 sites protected under the Habitats Directive associated with the works. However, there was potential for harbour porpoises which are protected under Annex II of the Habitats Directive and are qualifying interests of Rockabill to Dalkey Island SAC, to be present in the survey area. A known haul-out and pupping site for grey seals exists at Brides Head, County Wicklow, and SACs designated for the protection of grey and common seals, harbour porpoise and bottlenose dolphin can be found in the Irish Sea in Irish waters (seeFigure 1-1).

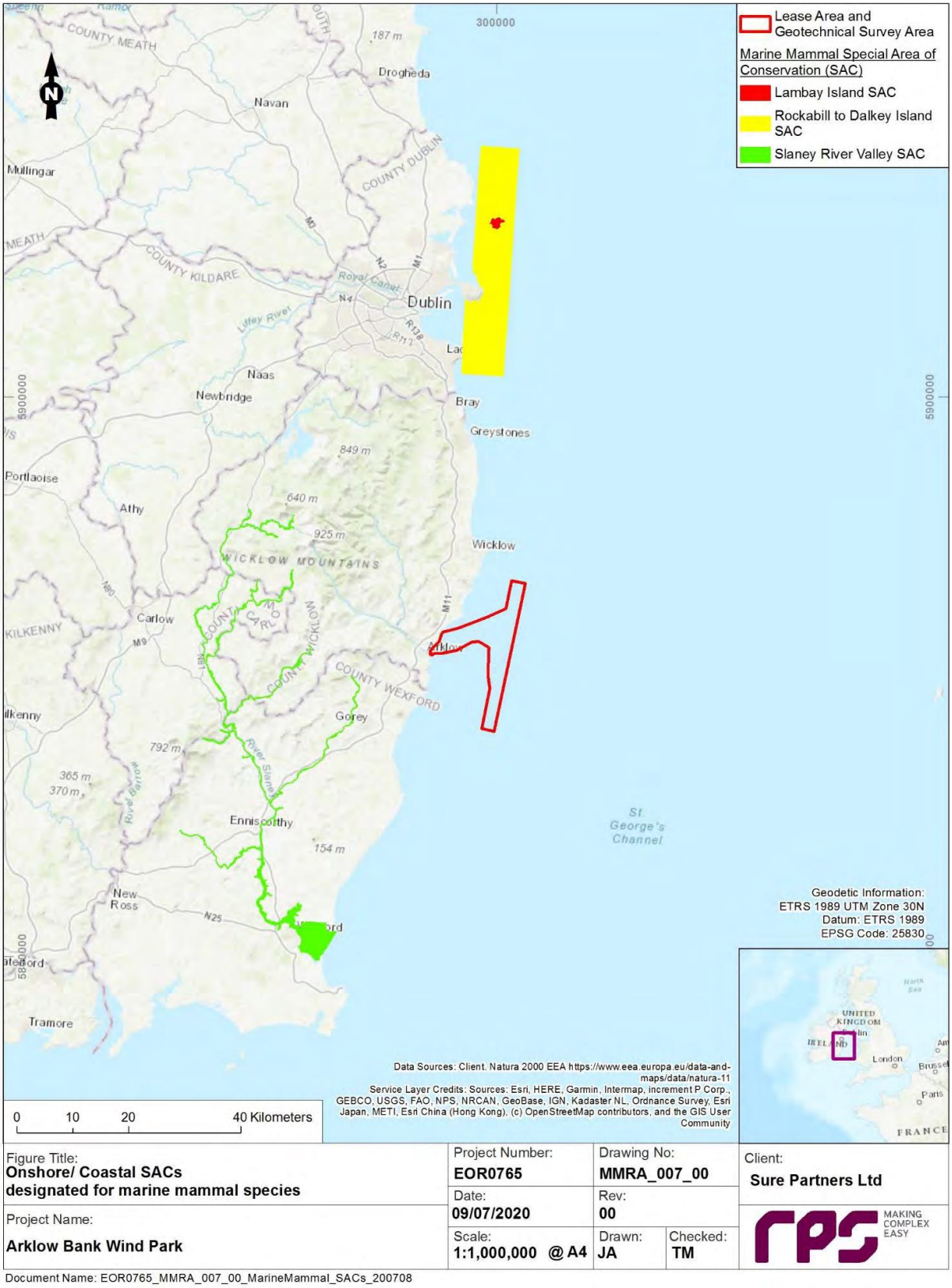

Figure 1-1 Proposed geotechnical survey area relative to the closest SACs designated for marine mammal species.

1.4 MITIGATION REQUIREMENTS SUMMARY

The following mitigation measures for marine mammals have been implemented during and after the survey, following the MMMP.

- Mitigation team and rota:
  - The crew of the geophysical site investigation rig will include a qualified and experienced marine mammal observer (MMO) to cover visual observations that will be carried out during daylight hours/good visibility.
- Pre-start monitoring:
  - Pre-start monitoring will be carried out during daylight hours/good visibility.
  - Before the start of geotechnical site investigation activities where sound may represent a risk of injury to marine mammals, an MMO will monitor marine mammal activity for a period of 30 minutes and log all relevant events using standardised data forms. Standard data forms are available for download from the NPWS website at https://www.npws.ie/marine/best-practice-guidelines.
  - Geotechnical site investigation operations will not commence if marine mammals are detected (via MMO) within a 200 m radial distance of the vessel. The 200 m monitoring distance proposed is conservative and adequately accounts for the maximum likely zone of influence (ZoI) for permanent injury, which is 62 m (ZoI described in Section 3.2.1 and discussed in Section 3.3.4 of the MMRA).
  - Survey operations will only commence in daylight hours during periods where effective visual monitoring within a 200 m radial distance of the rig has been achieved. Where effective monitoring, as determined by the MMO operative is not possible, the geophysical activities will be postponed until effective monitoring has been completed.
- Ramp-Up Procedure:
  - During standard penetration testing (SPT) operations, geophysical analysis or filled-up boreholes there are no ramp-up procedures to follow due to the nature of the equipment utilised during the site investigation i.e. the equipment is either on or off.
- Breaks in sound output:
  - During SPT only if there is a swap from Cable Percussion (CP) to rotary that causes a break in sound output in excess of 30 minutes, the MMO operative will be required to check that no marine mammals are present within the monitored zone prior to recommencement of the sound sources at full power.
  - During drilling operations only if there is a break in sound output for a period of 5-10 minutes (e.g. due to equipment failure, shut-down, or station change) the MMO operative will be required to check that no marine mammals are present within the monitored zone prior to recommencement of the sound sources at full power.
  - Where a marine mammal is present within the 200 m monitored zone during such a break then all pre-start monitoring will recommence as in a normal start-up operation.
  - If there is a break in sound output for a period greater than 30 minutes, then all pre-start monitoring/mitigation will be undertaken.
- Operations report:

The Operations report will be provided to NPWS by Sure Partners Limited on completion of the surveys and will include:

- Details of the Client/Contractor involved in the plan/project.
- Details of the Platform/Vessel type(s) participating in the plan/project.
- The survey reference number supplied by the Regulatory Authority or other statutory body.
- Date and location of the plan/project.
- Latitudes, Longitudes or Grid references for the area of operations.
- Specifications and acoustic characteristics of all sound-producing equipment used.
- A daily log of how and when the sound-producing equipment was used.
- Information on any technical problems encountered during Pre-start-up procedures or during full scale.

2 SURVEY AND MMO ACTIVITY

2.1 VESSEL SUMMARY

Survey work was completed on-board the Jack-Up Barge OCM 80 (see Table 2-1 and Figure 2-2).

Table 2-1: Summary of vessel specifications for the OCM 80

General Information		Dimensions	
Vessel Name	OCM 80	**Length (m)**	18.0
Call Sign	N/A	**Breadth (m)**	12
MMSI	N/A	**Draft (m)**	0.5 / Jack-up barge
IMO	N/A	**GRT**	N/A
Flag	Irish	**Accommodation**	Arklow Bay Hotel & Leisure Spa
Class	C5 combi float	**Deck Space**	216 m^2
Built	N/A	**Endurance (Survey)**	40 days

Figure 2-1: Jack-up Barge OCM 80

2.2 SURVEY EQUIPMENT

The equipment used in the survey is listed below. Information on equipment and operations employed were taken from system specifications, supplied by surveyors onboard and from the *Marine Mammal Risk Assessment* (RPS, 2022).

- Standard Penetration Testing, Drilcorp, DCR 12, Beretta T44, 81 dB re 1µPa @1m
- Cable Percussion, Dando 2000 investigator MK2 Drilling Rig, 80 – 100 dB 1µPa @1m
- Acoustic Imager (Televiewer) Tool
- Caliper tools
- Full wave sonic tool (FWS)
- Natural gamma tool
- P&S Wave (micro)Seismic Tool
- Packers, using the engine Beretta T44, 81 dB re 1µPa @1m
- Electric concrete mixer, 92 dB

Potential impacts of noise from these systems on cetaceans vary depending on the following: the sound's propagation characteristics in the environment into which it is introduced, its intensity, frequency, duration, and distance from an animal.

2.3 MITIGATION TEAM

The OCM 80 operated on a 12-hour basis with one dedicated MMO on board to provide mitigation for operations throughout daylight and periods of good visibility. There was no PAMO on board the rig so survey operations could not commence at night-time or during periods of poor visibility. Acting as a consultant to the client at all times, the MMO liaised directly with the operations manager and marine crew with regards to the NPWS Guidelines (2014) and the MMMP (RPS, 2022). It was the MMO's responsibility to ensure that the contractors were aware of the mitigation procedures.

2.4 MITIGATION PROCEDURES

The MMMP (RPS, 2022), which was developed in line with the latest NPWS Guidelines *Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters* (NPWS, 2014), was utilised during operations. The mitigation focussed only on geophysical activities, which produced a measurable sound and are listed in the NPWS guidance, for example:

Table 2-4: Drilling underwater sound (based on information in Hildebrand; Richardson et al., OSPAR, Nedwell & Howell.

Source	Sound Pressure Level	Sound Exposure Level	Sound Duration	Peak Frequency	Bandwidth	Direction
Drilling (Ship/Semi-submersible)	145-191	-	Constant	-	1-600	Omni

Packers and filled-up the boreholes were not considered due to not producing noise underwater.

2.4.1 Pre-Start Monitoring

Pre-start monitoring of 30 minutes was conducted before operations commenced. A visual pre-watch was carried out by the MMO during daylight hours, where visibility was good and the WMO Sea State <4 / Beaufort Force<4.

2.5 Mitigation Zone

The Mitigation Zone or Monitoring Zone (MZ) is the body of water surrounding the location of the noise source, which the observer monitors visually for the presence of marine mammals before and during operations. The extent of this zone represents the distance at which a marine mammal could still be exposed to sound levels capable of causing disturbance or injury. An MZ with a 200 m radius was adopted in accordance with the MMMP within the Arklow Bank Wind Park Marine Mammal Risk Assessment for Geophysical Site Survey (RPS, 2022).

2.5.1 Delay If Marine Mammals Detected Within MZ

As outlined in the MMMP, sound producing activities should not commence if marine mammals are detected within the mitigation zone (MZ) or until 30 minutes after the last visual detection has elapsed. If marine mammals are detected in the MZ the MMO should track the marine mammals detected and ensure they are satisfied the animals have left the mitigation zone before any sound producing activities commence.

One grey seal was detected in the MZ prior to sound producing activities commencing, therefore, a delay of five minutes was required. There were a total of 30 minutes of pre-watch before the activities commenced with no sightings.

2.5.2 Ramp-up Procedure

The MMMP states that in accordance with the NPWS Guidelines (2014), in section 4.3.4 (ii) where it states that ramp-up shall take place “where it is possible according to the operational parameters of the equipment concerned, the device’s acoustic energy output shall commence from a lower energy start-up”.

A ramp-up procedure was not possible during these geotechnical site investigation activities due to the nature of the equipment utilised i.e. the equipment is either on or off.

2.5.3 Break in sound output

As outlined in the MMMP, where a marine mammal is observed within the 300 m MZ during a break in sound output from the acoustic devices (e.g., due to equipment failure, shut-down, survey line or station change) of 5-10 minutes, the MMO operative will be required to check that no marine mammals are present within the monitored zone prior to recommencement of the sound sources at full power. Where a marine mammal is present within the 200 m monitored zone during such a break then all pre-start monitoring will recommence as in a normal start-up operation. If there is a break in

sound output for a period greater than 30 minutes then all pre-start monitoring/mitigation will be undertaken.

No marine mammal was observed within the MZ during any breaks in sound output from the acoustic devices.

2.6 VISUAL OBSERVATION AND PASSIVE ACOUSTIC MONITORING

NPWS Guidelines recommend that as a minimum, 30 minutes of pre-start monitoring prior to operations commencing should be conducted in favourable conditions. The MMO should be confident that there are no marine mammals within the MZ prior to the commencement of operations and be aware of marine mammals within the surrounding area outside the MZ.

MMO effort continued after the dedicated pre-watch, even though operations were considered continuous, in order to assess marine mammal distribution and behaviour towards the operations, and in the event of a breakdown or stop to operations.

There was no PAMO onboard the vessel so survey operations did not commence at night-time or during periods of poor visibility.

2.6.1 VISUAL OBSERVATION PLATFORM

Observations were carried out by an MMO from a platform 7,5m height above sea level (being considered the eye height of the MMO) at borehole number 3; 5,8m height above sea level at borehole number 2; and 7,1m height above sea level at borehole number 1. The rig offered a 180-degree view from the west side and a 180-degree view from the east side of the platform, which covered the full 360-degree range. The MMO maintained visual observations during daylight hours. Bearings and distances to sightings were recorded using reticular binoculars, and in combination with a distance stick. Data was collected using standard Joint Industry Programme (JIP) 22 deck forms as recommended by the NPWS Guidelines (2014). Environmental data were recorded every hour and when weather and/or activity changed.

2.6.2 MMO EQUIPMENT

The MMO was equipped with:

- *Hutact* 10x50mm binoculars
- Range finding distance stick
- Camera *Nikon Coolpix P950* with 83X zoom
- Outdoor clothing and PPE
- JIP22 deck forms

3 RESULTS

3.1 GEOTECHNICAL SITE INVESTIGATION OPERATIONS

Over the course of the eleven days of 12-hour geotechnical site investigation operations, 56 hours and 29 minutes of combined acoustic output was generated. Full details of operational times can be found in the Appendix 1.

3.2 VISUAL OBSERVATION EFFORT

A dedicated MMO was based on the Jack-Up Barge OCM 80 to provide mitigation throughout operational hours. 22 hours and 12 mins of visual monitoring effort was conducted over the course of the site investigations. Pre-start monitoring was carried out before all operations commencing. 16 visual pre-watches were carried out, totalling 13 hours and 17 mins of effort. Full details of the monitoring effort can be found in the Appendix 1.

3.3 WEATHER CONDITIONS

SW and W were the most frequent wind directions recorded throughout the monitoring effort, at 37% and 18% respectively. SW winds of Beaufort 3 were the most frequently recorded direction and force throughout the survey.

Wind forces (Beaufort force) 2 – 4 were seen throughout the monitoring effort with force 2 being the most frequently recorded followed by force 4, at 8.86% and 39.64% respectively. The sea state was recorded as slight 84% of the time. Swell was less than 2 in height 100% of the time.

Visibility was good (>5km) 100% of the time and sun glare was weak for 13% of the time, followed by strong 9% of the time. A full summary of all weather data is shown in the tables and figures below. Full details of weather conditions can be found in Appendix 1.

Table 3-1 Summary of wind direction data

Wind Direction	Time (HH: MM)	Percent (%)
N		
NNE		
NE	02:25	10.88
ENE		
E	00:46	3.45
ESE		
SE	02:05	9.38
SEE		
S	01:47	8.03
SSW		
SW	08:13	37.02
WSW		
W	04:06	18.47
WNW		
NW	02:50	12.76
NNW		

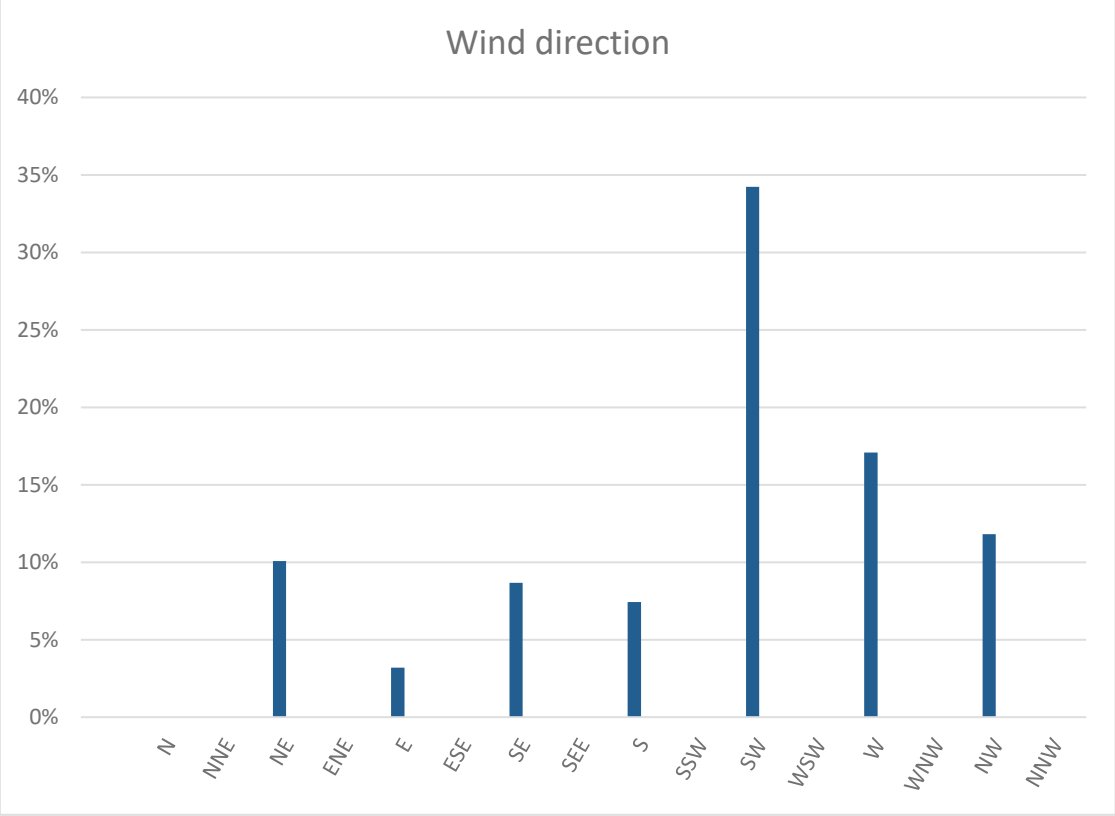

Figure 3-1 Summary of wind direction data

Table 3-2 Summary of wind force data

Wind force (Beaufort scale)	Time (HH:MM)	Percent (%)
1	00:00	0
2	08:48	39.64
3	11:26	51.5
4	01:58	8.86
5	00:00	0
6	00:00	0

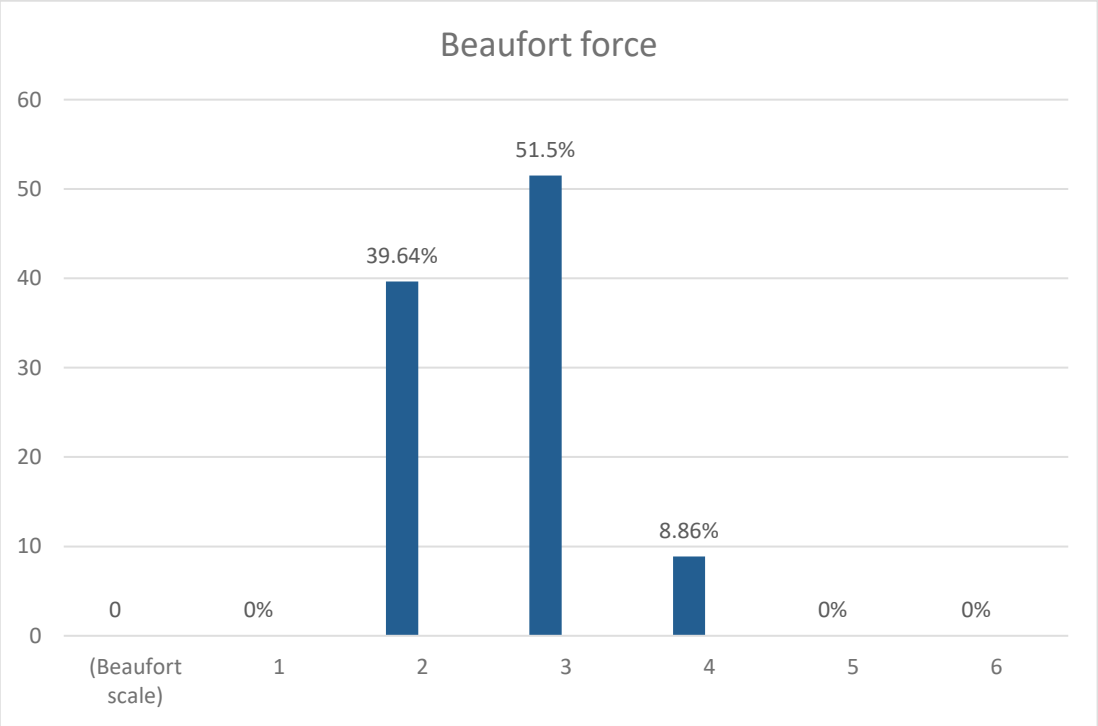

Figure 3-2 Summary of wind force data

Table 3-3 Summary of sea state data

Sea State	Time (HH:MM)	Percent (%)
g = glassy	01:56	9
s = slight	19:37	84
c = choppy	01:33	7
r = rough	00:00	0

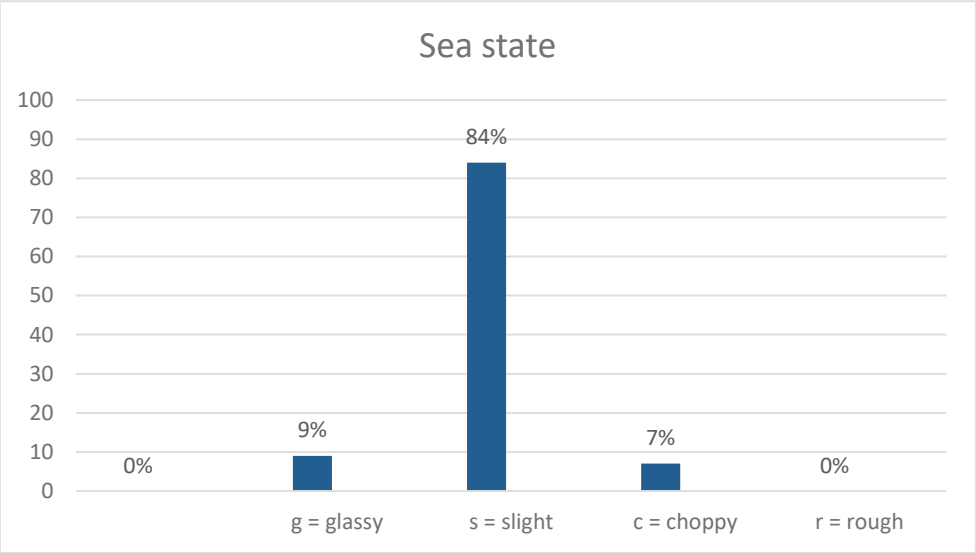

Figure 3-3 Summary of sea state data

Table 3-4 Summary of swell data

Swell	Time (HH:MM)	Percent (%)
o = low (<2m)	22:12	100
m = medium (2-4m)	00:00	0
l = large (>4m)	00:00	0

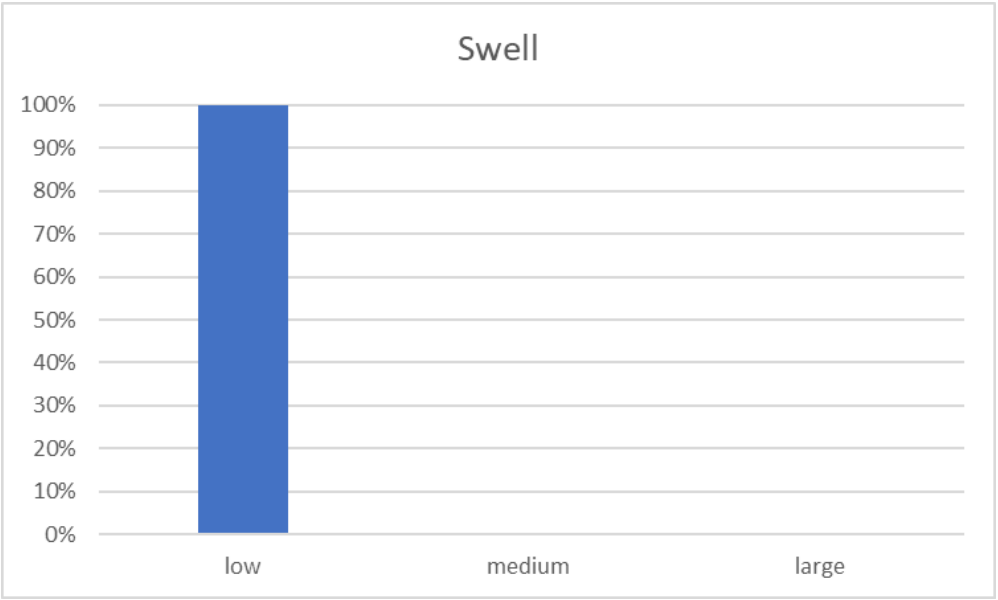

Figure 3-4 Summary of swell data

Table 3-5 Summary of visibility data

Visibility	Time (HH: MM)	Percent (%)
p = poor (< 1 km)	00:00	0
m = moderate (1-5 km)	00:00	0
g = good (> 5 km)	22:12	100

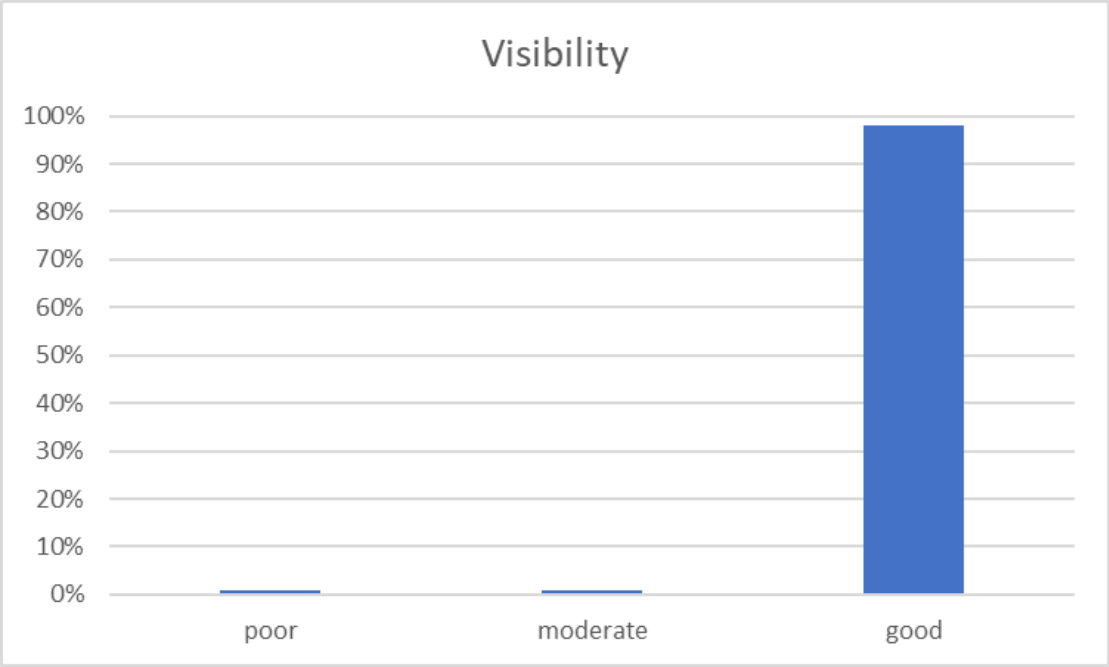

Figure 3-5 Summary of visibility data

Table 3-6 Summary of Sun glare data

Sunglare	Time (HH: MM)	Percent (%)
n = no glare	17:45	78
w = weak glare	02:51	13
s = strong glare	01:54	9

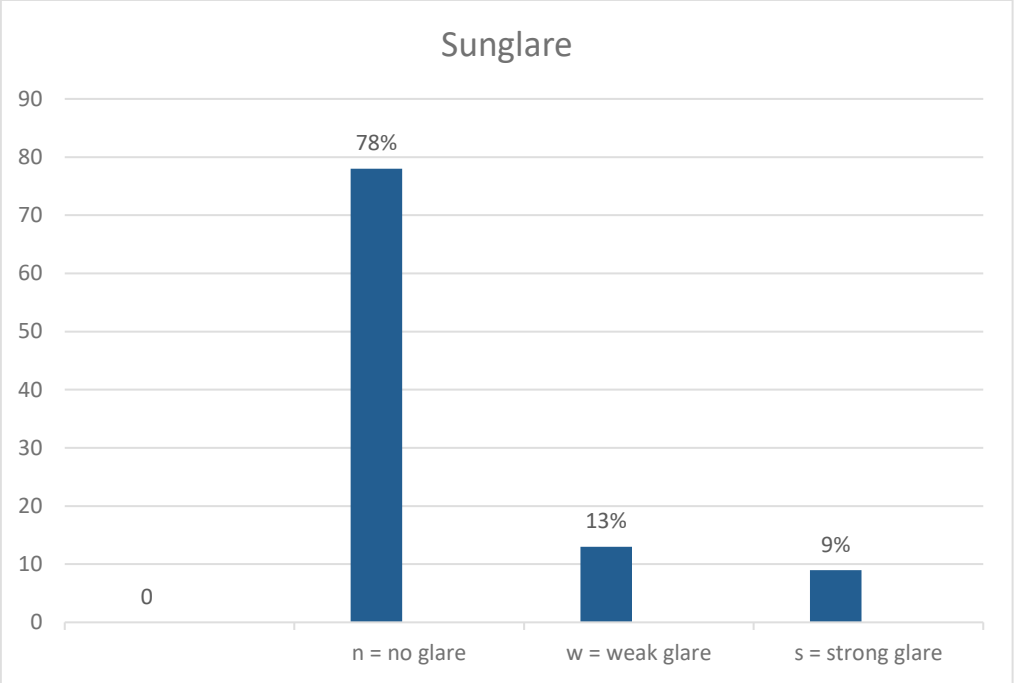

Figure 3-6 Summary of sun glare data

3.4 MARINE MAMMAL SIGHTINGS

A total of six marine mammal sightings were recorded during MMO observations during the geophysical site investigations while the equipment was operational. Four sightings of one grey seal were recorded, one of them being an incidental sighting. Two sightings of unidentified seals were recorded while the equipment was operational. Five sightings were observed when the equipment was operational on-site, meanwhile, one sighting was recorded during the pre-watch. According to NPWS Guidelines (2014), if an animal enters the mitigation zone during operations a shut-down requirement is not necessary as operations are said to be continuous once started.

Distances of sightings on site ranged from 100-500 m, the closest being 100m, where one grey seal, an adult (sighting number 1) was observed 'milling' and exhibiting a relaxed mood from the Jack-Up Barge while operations were underway. Sighting number 3 was a grey seal, which was observed 'milling' inside the MZ during the pre-watch and started to move away once it heard the first sounds of the instruments on board. Sighting number 4 was two seals, travelling in a contrary way.

Marine mammal sightings data is summarised in Table 3-7 and Table 3-8, and the distribution of these sightings are visually represented in Figure 3-7. A full list of sightings, and operational and effort data are provided in the Appendix 1.

Table 3-7 Summary of marine mammal sightings. Incidental sightings during weather-down are shown in parentheses.

Species	Total Observations	Group Size	Number of Individuals	Number of adults
Grey Seal	4	1	1	1
Unidentified seal + Grey seal	1	2	2	2
Unidentified seal	1	1	1	1

Table 3-8 Details of marine mammal sightings

Sighting Number	Date	Species	Number	Range of Animal	Bearing to Animal	The direction of Travel (compass points)	Operation activity Y/N	Mitigation (details)
1	19/07/23	Grey seal	1	2m	100m	Any	Y	Any
2	20/07/23	Grey seal	1	2m	300m	South (170°)	N	Any
3	08/08/23	Grey seal	1	2m	190m	South (150°)	Y	5 minute delay
4	08/08/23	Unidentified seal + Grey seal	2	2m	500m	Unidentified seal North (350°) Grey seal South (150°)	Y	Any
5	09/08/23	Grey seal	1	2m	210m	Any	Y	Any
6	10/08/23	Unidentified seal	1	2m	359m	South (235°)	Y	Any

There was a total of six sightings of marine mammals. This included four sightings of grey seals and two sightings of unidentified seals; one of which was sighted incidentally by someone else from the barge. Only six sightings were observed during the ground investigation. five sightings were recorded with one animal present while one sighting was recorded with a total number of two animals present.

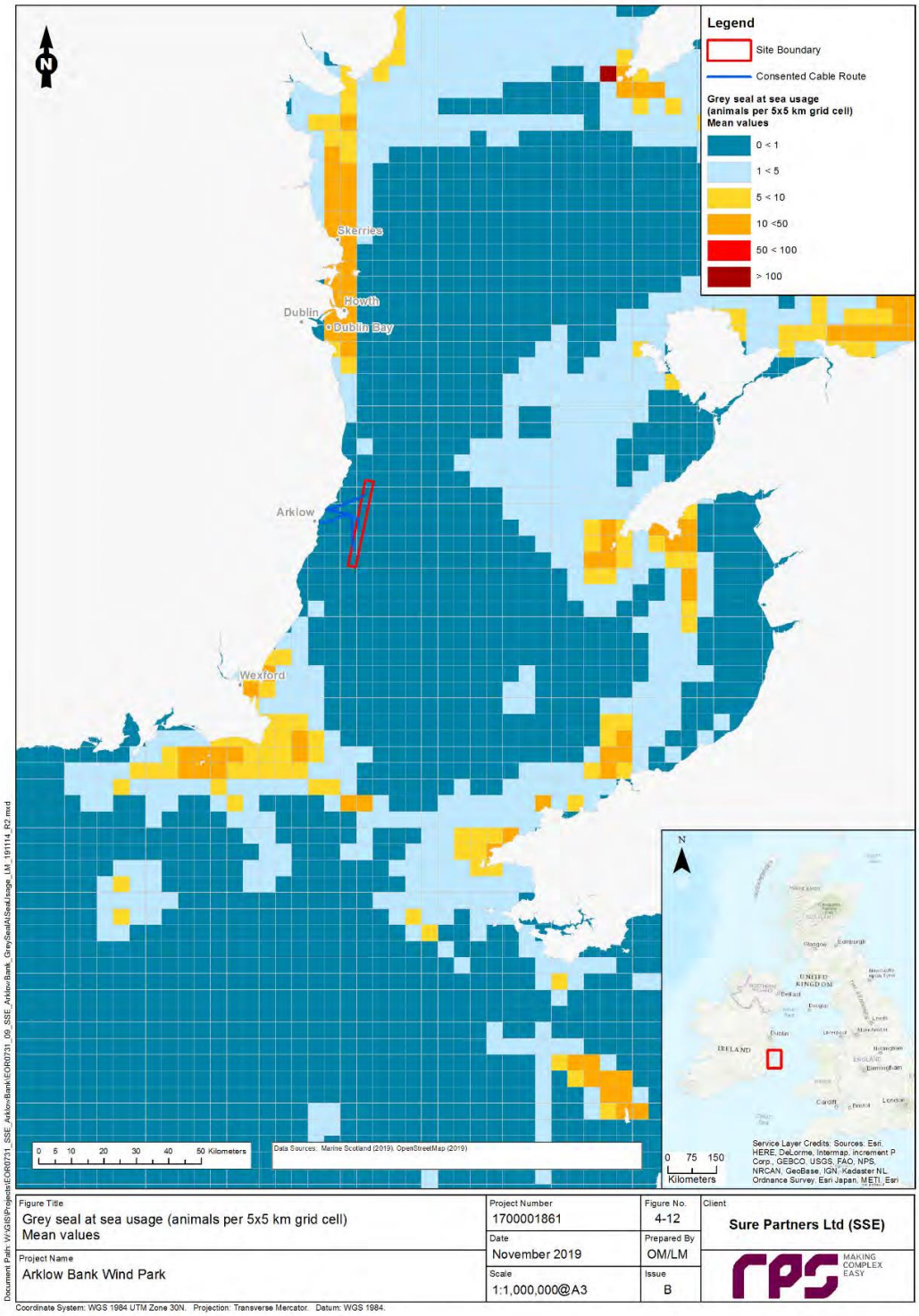

Figure 3-7 : The distribution and predicted number of grey seals in 5x5 km grid cells (mean) within the Irish Sea (source: SMRU grey seal at-sea usage maps)

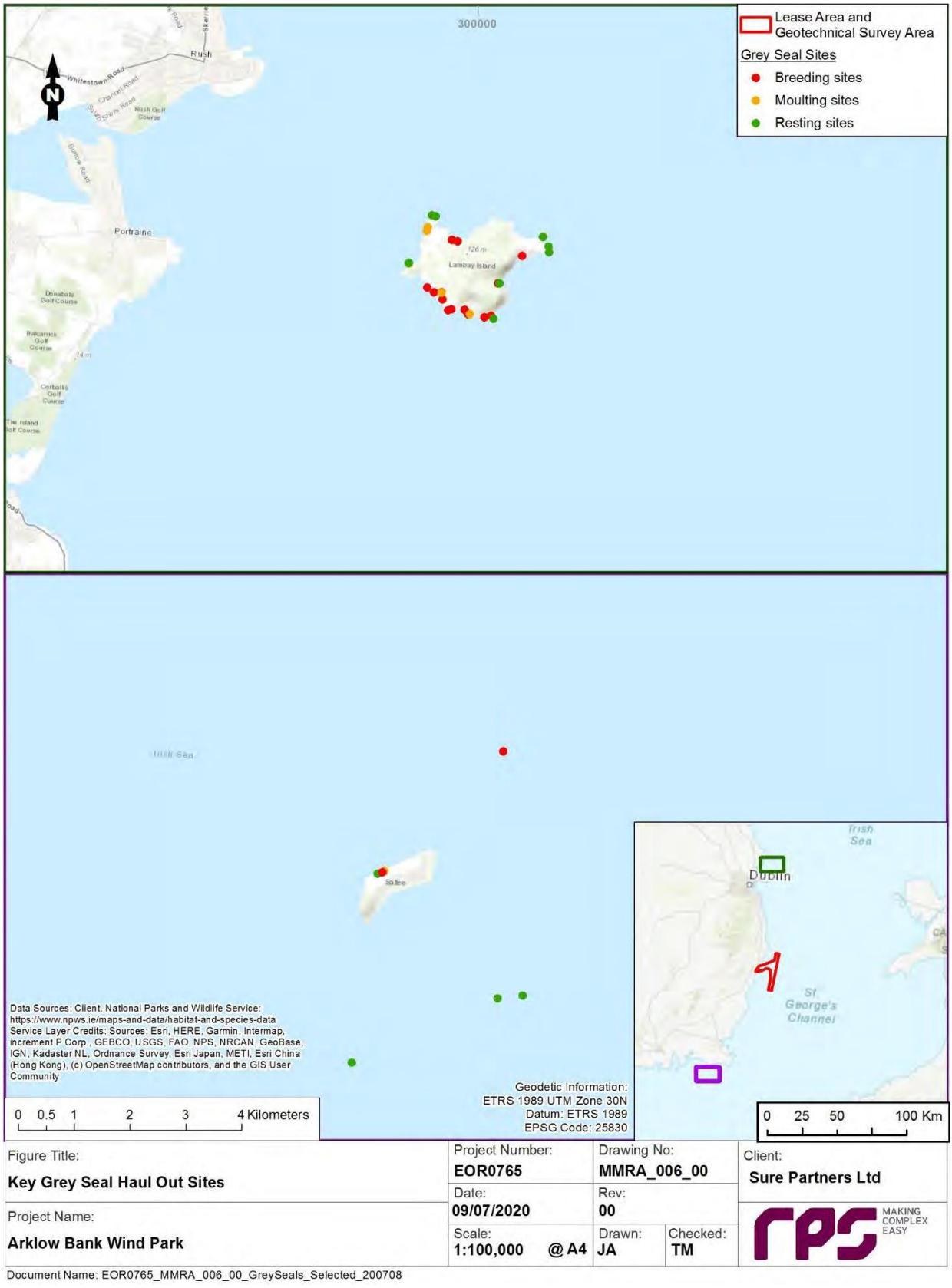

Figure 3-8 : Key grey seal haul-out sites relative to the proposed geotechnical survey area

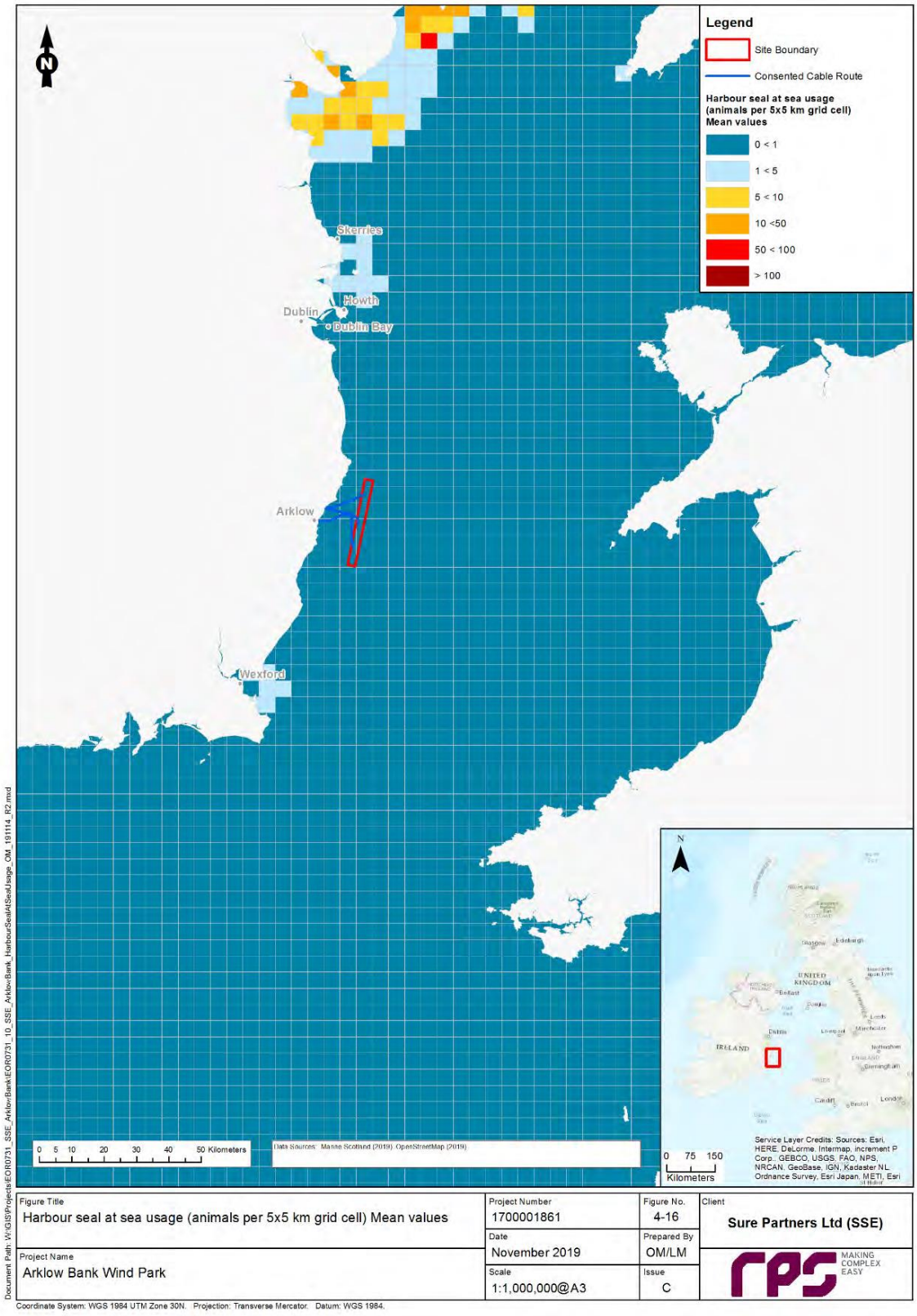

Figure 3-9 : The distribution and predicted number of harbour seals in 5x5 km grid cells (mean) within the Irish Sea (source: SMRU harbour seal at-sea usage maps)

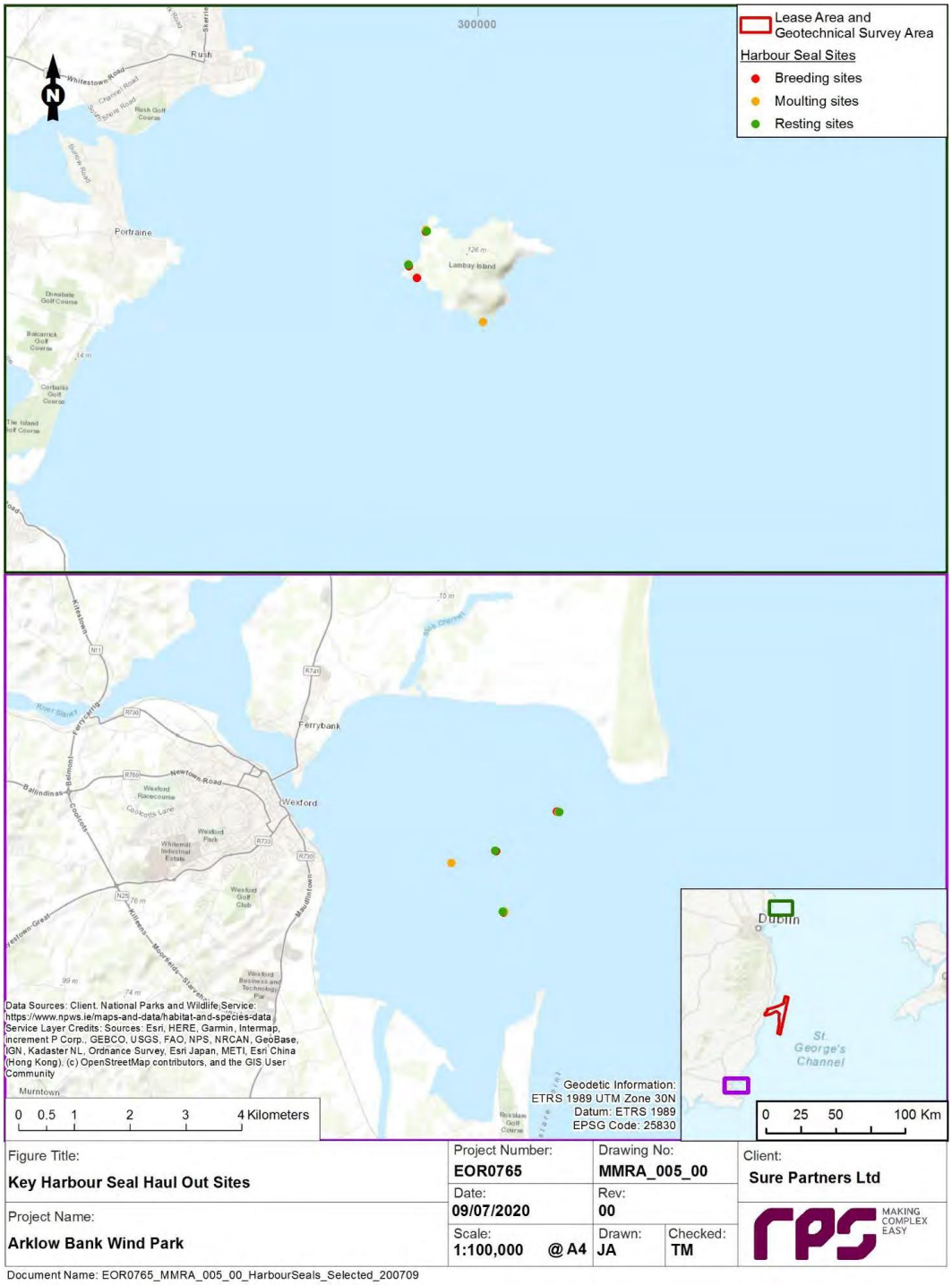

Figure 3-10 : Key harbour seal haul-out sites relative to the proposed geotechnical survey area

Table 3-9: Summary of Marine Mammal Monitoring Effort.

Marine Mammal Monitoring Effort Summary		
Monitoring Effort(hrs/min)	Total Visual Monitoring (hrs/min)	22:12
Pre-Start Monitoring	Number Visual Pre-Start	16
	Total Pre-Start Visual Monitoring (hrs/min)	13:17

3.5 Marine Mammal Delays and Mitigation

There was one delay of 5 minutes to operations as one Grey seal was detected within the mitigation zone during the 30-minute pre-watch period. Delays are not inclusive of the mandatory 30-minute pre-watch, or time from the MMO's initial go-ahead to the actual start of operations.

4 Discussion

4.1 Visual Observations and Marine Mammals

A total of 6 sightings were recorded during MMO observations throughout the site investigations and during transit. Grey seals were the most abundant species observed, taking into account that other seals were sighted but not identified at all. A total of four sightings were observed while operations were at full power and non-operational, less two sightings that were recorded on standby. In one of those sightings was needed to delay the operation of drilling for 5 minutes.

The distances of marine mammal observations ranged from 100-500 m. There were six sightings at Arklow during geophysical survey operations, a total of two sightings were inside the MZ from the vessel, meanwhile, there were a total of four sightings outside the MZ.

The NPWS Guidelines (2014) and the MMMP were correctly applied during operations and given the sound outputs of the various devices they should continue to be applied for any future operations.

4.2 Mitigation Procedures

Procedures were underpinned by MMMP (RPS, 2022) and the recommended NPWS Guidelines (2014). There was no delay in operations as a result of the implementation of the mitigation procedures.

4.3 Compliance with MMMP

There were no breaches in compliance with the MMMP (RPS, 2022) or the NPWS Guidelines (2014) during the project with all necessary delays observed by the operations team, and who should be commended for their cooperation.

5 REFERENCES

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APPENDICES

The following appendices have been issued as separate documents to this report:

Appendix 1: JIP23_MMO_Recording_Spreadsheet_Final_23136

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