PROJECT: # Arklow Wind Farm Phase 2 MMO Report

SCOPE: Marine Mammal Observation Report

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CLIENT: Green Rebel

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Executive Summary

Mizen Archaeology Ltd. was contracted by *Green Rebel* to undertake Marine Mammal Observation of hydrographic and seismic operations as part of the Arklow Bank Wind Farm 2 works relating to Foreshore Licence FS007555. The proposed development by SSE Renewables is an off-shore wind farm, located off the coast of Arklow, Co. Wicklow. Survey operations were carried out by *Green Rebel.*

Sound producing works were carried out over 26 days during the period between 14 June and 03 August 2024. Testing of equipment occurred on the 14 June and all primary works occurred from the 05 July to 03 August. The operations comprised of hydrographic and seismic activities at the Arklow Sand Bank. A total observation effort of 194 hours and 12 minutes was accrued over the course of the project by dedicated MMOs trained to JNCC standards.

Survey operations were carried out by two vessels; *Roman Rebel* and the *Lady Kathleen* and consisted of hydrographic and seismic sound-producing operations on both vessels. Operations onboard *Roman Rebel* took place on a 24-hour basis. Only one MMO shift was required. Operations onboard the *Lady Kathleen* took place during daylight hours only, requiring only one MMO shift. Planned stoppages occurred for crew changes and bunkering, while unplanned stoppages occurred due to foul weather.

Following *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters* (2014), a 30-minute pre-start watch took place before every sound-producing operation. If marine mammals were observed within the mitigation zone (1000m for seismic/ 500m for hydrographic), operations were delayed until the mitigation zone was clear for 30 minutes. Once operations began, no mitigation was required if mammals entered the mitigation zone.

There was a total of 18 marine mammal sightings recorded. Common dolphins were the most frequently sighted species and occurred within and beyond the mitigation zone in 7 sightings. Other species sited include grey seals (with 5 sightings), unidentified dolphin species (2 sightings), unidentified seal species (2 sightings), bottlenose dolphin (1), harbour porpoise (1), and minke whale (1). Sound-producing operations were delayed once throughout the project due to mammals entering the mitigation zone.

One single non-compliance in accordance with National Parks and Wildlife Service (NPWS) guidelines and project permit conditions was recorded. This occurred when full ramp up procedures were not adhered to, due entirely to a miscommunication on the part of the MMO's. The MMO was carrying out a watch during this time and no marine mammals were recorded in the mitigation zone. Therefore no harm or negative impact was caused to marine mammals as a result of the non-compliance. Compliance with said guidelines and permits conditions was otherwise achieved for the site investigation works between 14 June and 03 August 2024. Further details can be found in Section 7.

1. Introduction

This report relates the results of Marine Mammal Observation (MMO) of hydrographic and seismic operations associated with Arklow Bank Wind Park 2 project under foreshore licence FS007555. The proposed development by SSE Renewables is an off-shore wind farm, located off the coast of Arklow, Co. Wicklow . *Mizen Archaeology* was engaged by *Green Rebel Ltd.* to undertake marine mammal observation (MMO) during the project. Survey operations were carried out by *Green Rebel.*

1.1 Project Duration

The project ran over 26 days from 14 June to 03 August 2024 and included hydrographic and seismic operations.

Two MMO shifts were required, split between the *Roman Rebel* and *Lady Kathleen*. The sound producing operations on *Roman Rebel* took place on a 24-hour basis. All sound producing operations on *Lady Kathleen* took place during daylight hours and returned to port at 12-hour intervals. Stoppages occurred due to unexpected breakdowns, inclement weather and other environmental considerations on the 11th, 18th, 19th, 22nd ,24th ,28th July and 2nd August 2024.

1.2 Legislation

Legislation relating to the protection of marine mammals is set out by the Minister for Arts, Heritage and the Gaeltacht as official guidelines and codes of practice under Regulation 71 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). The Habitats Directive applies within Ireland's 200 nautical mile limit for the protection of species and to the Continental Shelf for habitats.

All marine mammals are protected wild animals under the Fitch Schedule, which includes all cetacean and seal species, of the Wildlife Act (39 of 1976) and Amendments. Under Section 23 (as amended in 2000), it is an offence to kill, injure or wilfully interfere with or destroy the breeding or resting place of any protected wild animal. Under these regulations all marine mammal species normally occurring in Ireland must be given protection and Special Areas of Conservation (SACs) must be given proper conservation actions.

Due to potential detrimental effect on these animals from certain types of sound production, the National Parks and Wildlife Service (NPWS) advise *the reduction of unnecessary artificial sound signals and associated energy into the marine environment every effort should be made by marine users and operators to (a) minimise the duration and power/energy output of their sound-producing activity, and*

(b) seek greater technical efficiencies for the removal of unnecessary or unwanted signals/frequencies and for the benefit of the aquatic acoustic environment.

Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (2014) published by the National Parks and Wildlife Service (NPWS) sector of Department of Arts, Heritage and the Gaeltacht outline source sound work types, risks associated with them, and proper mitigation. The Guidelines associated with activities undertaken for hydrographic and seismic operations are reproduced hereunder:

The measures outlined below are applicable to

- *(i) all seismic surveys (including the testing and full operational use of airguns, water guns, sparkers, boomers and vertical seismic profiling [VSP] or checkshot systems) in inshore and offshore Irish waters;*
- *(ii) all multibeam, single beam, side-scan sonar and sub-bottom profiler (e.g., pinger or chirp system) surveys within bays, inlets or estuaries and within 1,500m of the entrance of enclosed bays/inlets/estuaries;*
- *(iii) or as advised by the relevant Regulatory Authority. 4.3.4*

(i). Seismic surveys

1. A qualified and experienced marine mammal observer (MMO) shall be appointed to monitor for marine mammals and to log all relevant events using standardised data forms (Appendix 6).

2. Unless information specific to the location and/or plan/project is otherwise available to inform the mitigation process (e.g., specific sound propagation and/or attenuation data) and a distance modification has been agreed with the Regulatory Authority, seismic surveying shall not commence if marine mammals are detected within a 1,000m radial distance of the sound source intended for use, i.e., within the Monitored Zone.

Pre-Start Monitoring

3. Sound-producing activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring, as determined by the MMO, is not possible the sound-producing activities shall be postponed until effective visual monitoring is possible.

4. An agreed and clear on-site communication signal must be used between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break (see below). It shall only proceed on positive confirmation with the MMO.

5. In waters up to 200m deep, the MMO shall conduct pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.

6. Where operations occur in waters greater than 200m depth (i.e., >200m), pre-start-up monitoring shall be conducted at least 60 minutes before the activity is due to commence. Sound-producing

activity shall not commence until at least 60 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.

7. This prescribed Pre-Start Monitoring shall subsequently be followed by a Ramp-Up Procedure which should include continued monitoring by the MMO.

Ramp-Up Procedure

8. In commencing a seismic survey operation, the following Ramp-up Procedure (i.e., "soft-start") must be used, including during any testing of seismic sound sources, where the output peak sound pressure level from any source exceeds 170 dB re: 1µPa @1m:

> *(a) Seismic energy output shall commence from a lower energy start-up (i.e., starting with a single seismic device/airgun which is the smallest in the array and gradually adding others; In the case of sparkers/boomers, starting with the lowest electric discharge. Seismic survey activity in coastal waters should be planned to commence at the innermost part of any bay, inlet or estuary to be surveyed and thereafter work outwards, to ensure that marine mammals are not driven into or artificially confined within an enclosed comparatively shallow area. Survey activity should be planned to commence at the innermost part of any bay, inlet or estuary to be surveyed and thereafter work outwards, to ensure that marine mammals are not driven into or artificially confined within an enclosed comparatively shallow area. Except during certain line changes as outlined in point 11*
>
> *(b). 26 possible) and thereafter be allowed to gradually build up to the necessary maximum output over a period of 40 minutes. (b) This controlled build-up of seismic energy output shall occur in consistent stages to provide a steady and gradual increase over the ramp-up period.*

9. In all cases the delay between the end of ramp-up (i.e., the necessary full seismic output) and the start of a survey line or station must be minimised to prevent unnecessary high-level sound introduction into the environment.

10. Once the Ramp-Up Procedure commences, there is no requirement to halt or discontinue the procedure at night-time, nor if weather or visibility conditions deteriorate nor if marine mammals occur within a 1,000m radial distance of the sound source, i.e., within the Monitored Zone.

Line Changes

11. Where the duration of a survey line or station change will be greater than 40 minutes the activity shall, on completion of the line/station being surveyed, either

> *(a) shut down and undertake full Pre-Start Monitoring, followed by a Ramp-Up Procedure for recommencement, or*
>
> *(b) undergo a major reduction in seismic energy output to a lower energy state where the output peak sound pressure level from any operating source is 165-170 dB re: 1µPa @1m, and then undertake a full Ramp-Up Procedure for recommencement.*

12. Where the duration of a survey line or station change will be less than 40 minutes the activity may continue as normal (i.e., under full seismic output).

Breaks in sound output

13. If there is a break in sound output for a period of 5-10 minutes (e.g., due to equipment failure, shut-down, survey line or station change), MMO monitoring must be undertaken to check that no marine mammals are observed within the Monitored Zone prior to recommencement of the sound source at full power.

14. Where a marine mammal is observed within the Monitored Zone during such a break of 5-10 minutes, then all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) shall recommence as in a normal start-up operation.

15. In any case, if there is a break in sound output for a period greater than 10 minutes (e.g., due to equipment failure, shut-down, survey line or station change) then all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) must be undertaken.

Reporting

16. Full reporting on MMO operations and mitigation undertaken must be provided to the Regulatory Authority as outlined in Appendix 6. It is important that this significant reduction in sound output is to a minimum point (i.e., minimum peak sound pressure level) that in theory remains audible above most ambient sound (NWPS 2014, 25-26).

<u>(ii). Multibeam, single beam, side-scan sonar & sub-bottom profiler surveys</u>

1. A qualified and experienced marine mammal observer (MMO) shall be appointed to monitor for marine mammals and to log all relevant events using standardised data forms (Appendix 6).

2. Unless information specific to the location and/or plan/project is otherwise available to inform the mitigation process (e.g., specific sound propagation and/or attenuation data) and a distance modification has been agreed with the Regulatory Authority, acoustic surveying using the above equipment shall not commence if marine mammals are detected within a 500m radial distance of the sound source intended for use, i.e., within the Monitored Zone.

Pre-Start Monitoring

3. Sound-producing activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring, as determined by the MMO, is not possible the sound-producing activities shall be postponed until effective visual monitoring is possible.

4. An agreed and clear on-site communication signal must be used between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break (see below). It shall only proceed on positive confirmation with the MMO.

5. In waters up to 200m deep, the MMO shall conduct pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence. Sound-producing activity shall

not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.

6. This prescribed Pre-Start Monitoring shall subsequently be followed by a Ramp-Up Procedure which should include continued monitoring by the MMO.

Ramp-Up Procedure

7. In commencing an acoustic survey operation using the above equipment, the following Ramp-up Procedure (i.e., "soft-start") must be used, including during any testing of acoustic sources, where the output peak sound pressure level from any source exceeds 170 dB re: 1µPa @1m:

> *(a) 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 (i.e., a peak sound pressure level not exceeding 170 dB re: 1µPa @1m) and thereafter be allowed to gradually build up to the necessary maximum output over a period of 20 minutes.*
>
> *(b) This controlled build-up of acoustic energy output shall occur in consistent stages to provide a steady and gradual increase over the ramp-up period.*
>
> *(c) Where the acoustic output measures outlined in steps (a) and (b) are not possible according to the operational parameters of any such equipment, the device shall be switched "on" and "off" in a consistent sequential manner over a period of 20 minutes prior to commencement of the full necessary output.*

8. In all cases where a Ramp-Up Procedure is employed the delay between the end of ramp-up and the necessary full output must be minimised to prevent unnecessary high-level sound introduction into the environment.

9. Once the Ramp-Up Procedure commences, there is no requirement to halt or discontinue the procedure at night-time, nor if weather or visibility conditions deteriorate nor if marine mammals occur within a 500m radial distance of the sound source, i.e., within the Monitored Zone.

Breaks in sound output

10. If there is a break in sound output for a period greater than 30 minutes (e.g., due to equipment failure, shut-down, survey line or station change) then all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) must be undertaken.

11. For higher output survey operations which have the potential to produce injurious levels of underwater sound (see sections 2.4, 3.2) as informed by the associated risk assessment, there is likely to be a regulatory requirement to adopt a shorter 5-10 minute break limit after which period all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) shall recommence as for start-up.

Reporting

12. Full reporting on MMO operations and mitigation undertaken must be provided to the Regulatory Authority as outlined in Appendix 6.

1.3 Location

Site investigation works are located in the area of Arklow Wind Farm, approximately 15km from the town of Arklow in Co. Wicklow. The wind farm is not currently operational and the site is scheduled for redevelopment. The farm is located on a shallow sand bank, with an exclusion zone on the shallowest area of the bank to prevent the stranding of vessels. The *Roman Rebel* and *Lady Kathleen* were also required to test equipment while berthed in Cork and Crosshaven respectively before proceeding to site.

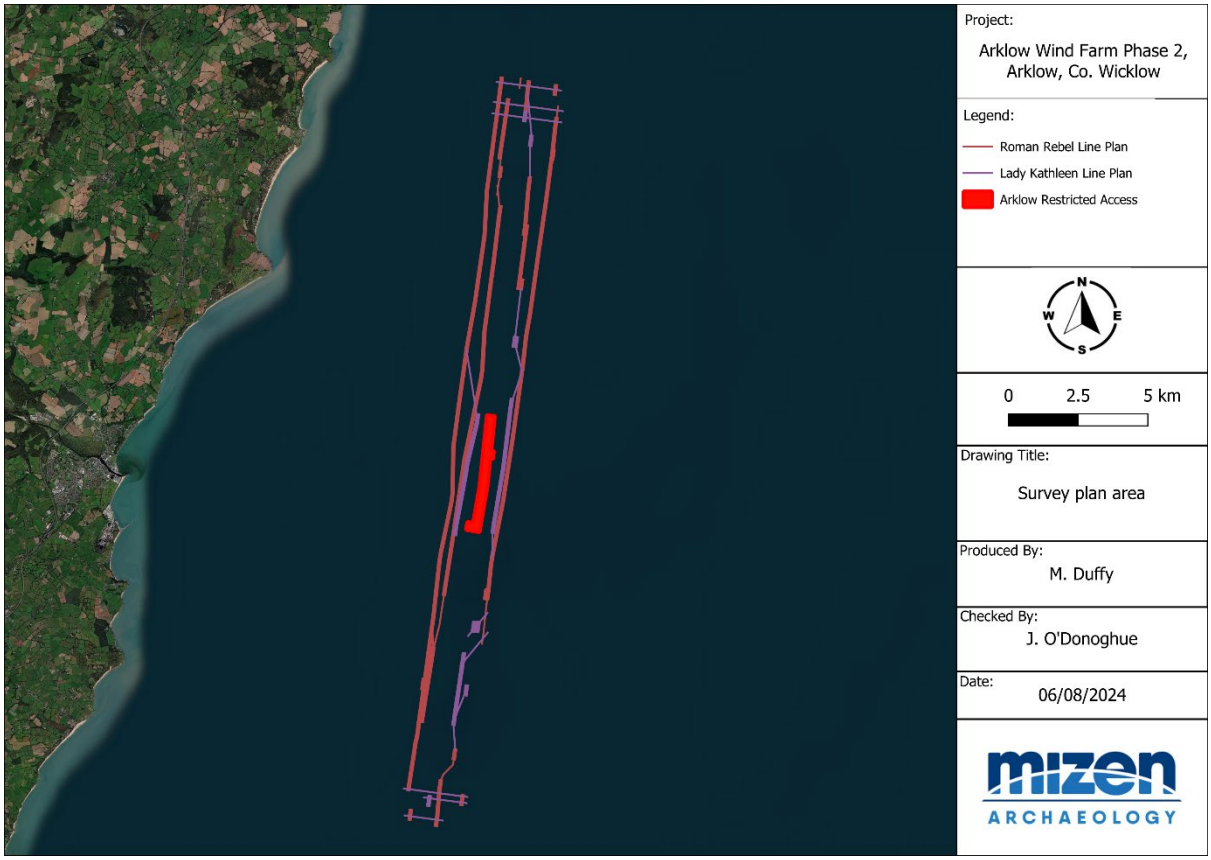

Figure 1 Location of works relating to FS007555.

1.4 Scope of Works

Both geophysical and geotechnical operations comprised of acoustic survey operations and were carried out by *Green Rebel.* Geophysical equipment included multi-beam echo sounder (MBES) and sub-bottom profiler (SBP). Geotechnical equipment included a set of Ultra-High Resolution Seismic (sparkers) towed behind the vessel.

Geophysical operations and geotechnical operations commenced once the MMO had completed a pre-watch survey of 30 minutes and deemed the 500m exclusion zone and 1000m exclusion zone respectively to be free of marine mammals. Any marine mammals within the exclusion zone resulted

in a delay until the mammal moved outside the zone or 30 minutes had passed and the mammal was not seen again within the zone.

Once operations began, any breaks in sound of 30 minutes or longer required a pre-start watch. The MMO maintained contact with the site staff through direct verbal communication throughout operations.

1.5 Equipment

A variety of equipment was utilized to collect data. The equipment used, and its frequencies, are listed in Table 1. Mitigation for the equipment followed the *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters* (2014, pp.25).

Table 1: Equipment utilised by Roman Rebel *during Arklow Wind Farm Survey operations in Irish waters under the period from 14 June 2024 to 03 August 2024*

Type	Equipment	Operational frequencies
Multi-Beam Echo Sounder (MBES)	Teledyne T50 Seabat	190-420 kHz
Sub-bottom profiler	SES Innomar 2000	dual frequency <230 kHz and >900kHz
Ultra-High Resolution Seismic (UHRS)	GeoMarine Sparker 200 x 3	100-200Hz – 5000Hz

Table 2: Equipment utilised by Lady Kathleen *during Arklow Wind Farm Survey operations in Irish waters under the period from 14 June 2024 to 03 August 2024*

Type	Equipment	Operational frequencies
Multi-Beam Echo Sounder (MBES)	Teledyne T50 Seabat	190-420 kHz
Sub-bottom profiler	SES Innomar Standard	dual frequency <4-15 kHz and >100kHz
Ultra-High Resolution Seismic (UHRS)	Geo-Spark Model 1000x	100-200Hz – 5000Hz

2. Marine Mammal Observation at Arklow Sand Bank

2.1 Risk Assessment for marine mammals

An Annex IV Species Risk Assessment was compiled by *RPS Consulting*. The assessment concluded that the risk to marine mammals was low;

> *In summary, the potential for injury or disturbance to occur to Annex IV species as a result of the proposed geophysical and geotechnical surveys is considered to be low. This risk will be*

further reduced by the implementation of mitigation, as outlined in section 5. It is concluded that the proposed surveys will not give rise to significant impacts to species listed under Annex IV of the Habitats Directive.

Specifically, the surveys will not impact any of the Annex IV species' ability to maintain its population on a long-term basis as a viable element of its natural habitats, nor will the natural range of the species be reduced or likely to be reduced for the foreseeable future as a result of the surveys. The habitat available to Annex IV species will also continue to be sufficiently large to maintain its populations on a long-term basis.

Therefore, it can be concluded that the geophysical and geotechnical surveys undertaken within the FLAA will not impact the FCS of any Annex IV species assessed.

2.2 Project specific mitigation

Conditions laid out in the foreshore license FS007555 for the hydroacoustic and seismic works are reproduced hereunder:

31.15 Ensure that the application of "Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters" (DAHG 2014 guidance) to be implemented in full.

31.16 Ensure that a qualified Marine Mammal Observer (MMO) will be appointed to monitor for marine mammals and to log all relevant events using the relevant data forms in the DAHG 2014 guidance.

31.17 Ensure that the MMO will be located at a suitable vantage point, providing good all-round visibility.

31.18 Ensure that geophysical and drilling Operations will only commence in daylight hours.

31.19 Delays to the commencement of the site investigations and Operations will be recommended by the MMO should any of the Annex II marine mammal species be detected within the relevant monitored zone.

31.20 An agreed and clear on-site communication signal must be used between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break. The Licensee shall ensure that it shall only proceed on positive confirmation with the MMO.

31.21 The MMO shall conduct pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence. The Licensee shall ensure that sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.

31.22 Ensure that procedures for drilling Operations included prescribed Pre-Start Monitoring and breaks in sound output in section 4.3.2. of the DAHG2014 guidance shall be strictly adhered to.

31.23 Ensure that in the case of geophysical surveys the prescribed Pre-Start Monitoring shall subsequently be followed by a Ramp-up Procedure which should include continued monitoring by the MMO. The process laid out in Sections 4.3.4 (i) and 4.3.4 (ii) of the DAHG 2014 guidance shall be strictly adhered to.

31.25 Ensure that an MMO report to be submitted to the Licensor within 30 days of completion of any geophysical and drilling survey activity and Operations. Copies will also be provided to NPWS and IFI.

Conditions laid out in the derogation license DER-CETACEAN-2024 – 127 for the hydroacoustic and seismic works are reproduced hereunder:

8. The applicant and those acting on their behalf during surveys must ensure that they adhere to the Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters published in 2014 (or any updates as may be relevant in due course).

9. A qualified and experienced Marine Mammal Observer (MMO) will be appointed to monitor for marine mammals to act in accordance with the provisions of Section 2.9 of supporting document to the Regulation 54 application.

10. Visual (MMO) observations will be conducted for a pre-soft-start search of 30 minutes i.e. prior to the commencement of marine operations (MBES, SSS, sub-bottom profiling).

11. Passive acoustic monitoring may be used to supplement visual observation but it cannot be the primary method used to validate the exclusion zone.

12. The exclusion zone will be monitored and validated as being clear of marine mammals as per DAHG guidance.

13. Soft-start procedures will be applied as appropriate.

14. *If Line changes are required that exceed 40 minutes the output will be reduced to below 170 dB re 1 µPa @ 1 m or if stopped completely then a full restart procedure will be required.*
15. *If there is a break in sound output from survey equipment for a period greater than 10 minutes then all pre-start monitoring measures and ramp-up procedures will recommence prior to re-starting.*
16. *Where suitable to achieve the data collection targets it is preferable to use frequencies that are higher than the acoustic range of the likely marine mammals within the acquisition area.*
17. *On completion of the activities which this licence authorises, all recordings of whales, dolphins, turtles or porpoises affected will be made using the standardised data form provided below and must be submitted to the NPWS to the following email address: wildlife.reports@npws.gov.ie. within four weeks of the expiry date of this licence.*

2.3 Special Areas of Conservation (SACs)

The EU Habitats Directive lists certain habitats and species that must be protected within Special Areas of Conservation. Protected habitats include bogs, sand dunes, heaths, lakes, rivers, woodland, estuaries and sea inlets. Of the EU Habitats Directive protected species, 25 are found in Ireland and mammals include otter (*Lutra lutra*), bottlenose dolphin (*Tursiops truncates*), grey seals (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*).

There are five Irish SACs within close proximity to the survey areas:

Table 3: Special Areas of Conservation (SAC) located in proximity to Arklow Wind Farm Survey 2024 in Irish waters.

Site Name	Site Code	Species of qualifying interest
Murrough Wetlands	002249	n/a
Wicklow Reef	002274	n/a
Magherabeg Dunes	001766	n/a
Buckroney-Brittas Dunes and Fen	000729	n/a
Kilpatrick Sandhills	001742	n/a

2.4 Datasets

Three main datasets for marine mammals in Irish waters were utilized to establish the distribution and occurrence of species likely to be sighted during the period of works:

- The National Biodiversity Data Centre compiles various data sources, including citizen scientist sightings, to create constantly updated species distribution maps (accessed at *www.biodiversityireland.ie* on 07 August 2024).
- Online databases of sightings of marine mammals from Ireland-specific marine mammal research groups (accessed *www.iwdg.ie* on 08 August 2024).
- The National Parks and Wildlife Service (NPWS) database of seal sightings, which collects data on all seal sightings and seal population surveys from 1960-2013 with over 5,450 sightings recorded for the island.

Other documents which provided accurate and site-specific information were utilized during the period of works:

- Appendix 4 of the National Parks and Wildlife Service (NPWS) guidance document (2013) which provides generalised maps of marine mammal distribution and habitat in Irish waters.

2.5 Marine mammals at Arklow Wind Farm

2.5.1 Cetaceans

There are 24 known cetacean species which frequent Irish waters. Ten are considered year-round residents, while six are considered seasonal, and six others are considered vagrant or rare (Reid *et al.*, 2003). Harbour porpoise and bottlenose dolphins are listed on the EU Habitats Directive Annex II, while all other cetaceans are listed on the EU Habitats Directive Annex IV (Habitats Directive, 2020).

Table 2 List of Cetacean species that have been recorded in Irish waters. Species that may be sighted at Arklow Wind Farm] are highlighted in bold. Data from Reid, et al., 2003.

Species	Presence in Irish waters	Reference
Harbour porpoise	**Year round**	**Reid 2003; NPWS.ie, n.d.**
Bottlenose dolphin	**Year round**	**Reid 2003; NPWS.ie, n.d.**
Common dolphin	**Year round**	**Reid 2003; NPWS.ie, n.d.**
Risso's dolphin	Year round	Reid 2003; NPWS.ie, n.d.
White beaked dolphin	Year round	Reid 2003; NPWS.ie, n.d.
Atlantic white sided dolphin	Year round	Reid 2003; NPWS.ie, n.d.
Killer whale	Year round	Reid 2003; NPWS.ie, n.d.
Northern bottlenose whale	Year round	Reid 2003; NPWS.ie, n.d.
Long finned pilot whale	Year round	Reid 2003; NPWS.ie, n.d.

Sperm whale	Year round	Reid 2003; NPWS.ie, n.d.
Cuvier's beaked whale	Possibly year round	Reid 2003; NPWS.ie, n.d.
Sowerby's beaked whale	Possibly year round	Reid 2003; NPWS.ie, n.d.
Minke whale	**Seasonal**	**Reid 2003; NPWS.ie, n.d.**
Blue whale	Seasonal	Reid 2003; NPWS.ie, n.d.
Fin whale	Seasonal	Reid 2003; NPWS.ie, n.d.
Sei whale	Seasonal	Reid 2003; NPWS.ie, n.d.
Humpback whale	Seasonal	Reid 2003; NPWS.ie, n.d.
Striped dolphin	Seasonal	Reid 2003; NPWS.ie, n.d.
Northern right whale	Rarely occurring/vagrant	Reid 2003; NPWS.ie, n.d.
Bowhead whale	Rarely occurring/vagrant	IWDG 2023
Beluga	Rarely occurring/vagrant	Reid 2003; NPWS.ie, n.d.
False killer whale	Rarely occurring/vagrant	Reid 2003; NPWS.ie, n.d
Gervais' beaked whale	Rarely occurring/vagrant	Reid 2003; NPWS.ie, n.d.
True's beaked whale	Rarely occurring/vagrant	Reid 2003; NPWS.ie, n.d.
Pygmy sperm whale	Rarely occurring/vagrant	Reid 2003; NPWS.ie, n.d.

2.5.1.1 Bottlenose dolphin (Tursiops truncates)

Bottlenose dolphins are a large, robust dolphin and are the most prevalent dolphin species to be seen along the Irish east coast. They seem to be attracted to vessel activity, making them potentially vulnerable to physical harm from industrial activities. Results from SCANS III estimated that there were 288 bottlenose dolphins in the Irish and Celtic seas (Hammond, et al. 2017).

There has been 4 reported sighting of bottlenose dolphins in proximity to Arklow during the 12 months prior to this survey (Irish Whale and Dolphin Group 2024).

Plate 1 Bottlenose dolphins (NWPS National Biodiversity Data Centre 2023)

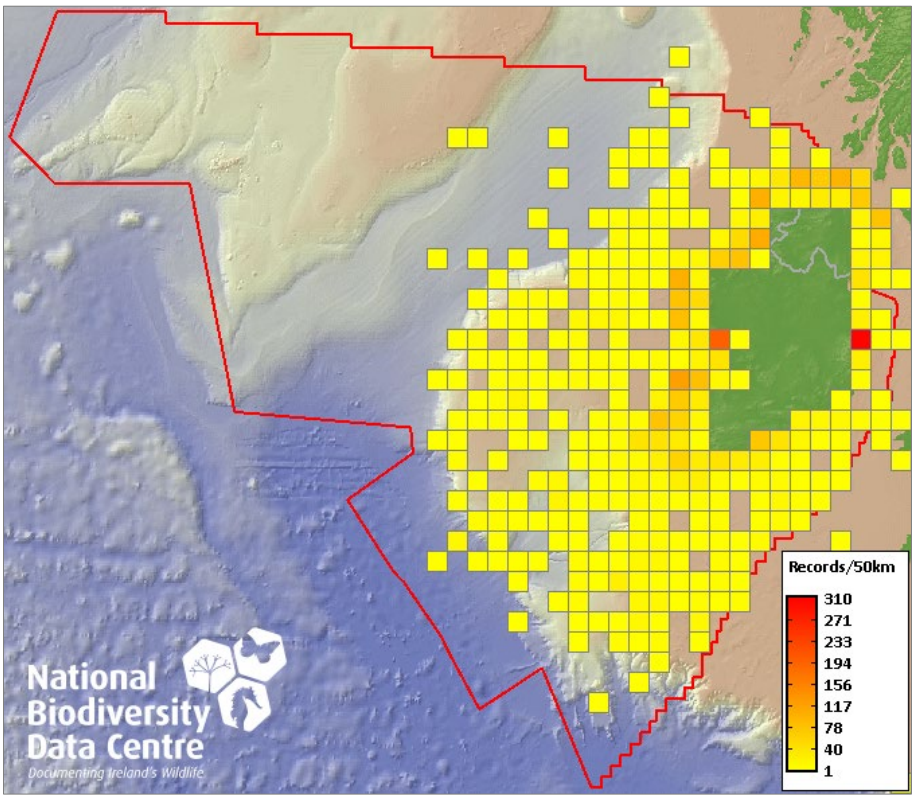

Figure 2 Distribution of recorded bottlenose dolphins in Irish waters (The National Biodiversity Data Centre 2024).

2.5.1.2 Common dolphin (Delphinus delphis)

Common dolphins are not a commonly occurring cetaceans in the waters around busy ports due to their typical avoidance behaviour to excessive ambient noise (Berrow, et al. 2009). Offshore, however, they are one of the more abundant and sighted mammals in Irish waters, particularly along the south

coast (Wall, et al. 2013). While there are greater concentrations of these dolphins in deeper waters offshore past the continental shelf, there are high levels of activity in shallower waters during winter months when they follow prey species inshore (Jones 2022).

There have been 2 reported sightings of common dolphins around Arklow in the 12 months prior to this survey (Irish Whale and Dolphin Group 2024).

Plate 2 Common dolphins (Mizen Archaeology 2022).

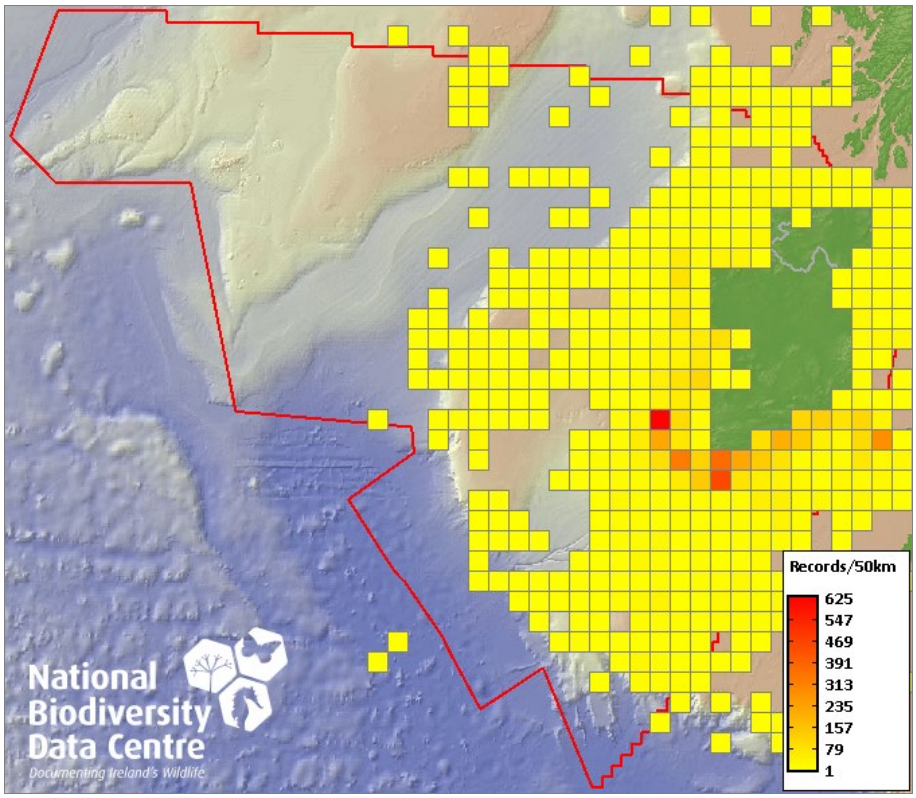

Figure 3 Distribution of recorded common dolphins in Irish waters (The National Biodiversity Data Centre 2024)

2.5.1.3 Harbour Porpoise *(Phocoena phocoena)*

The harbour porpoise is abundant inshore along the south and southwest coasts and they breed in Irish waters. Offshore movement between March and June may be linked to calving. Large numbers have been noted off the south coast of Ireland in the autumn months (O'Brien and Berrow 2015)**.**

12 reported sightings of harbour porpoises have been recorded in the last year around Arklow (IWDG, 2024).

Plate 3 Harbour Porpoise. Image from Photo from National Biodiversity Data Centre (NWPS National Biodiversity Data Centre 2018).

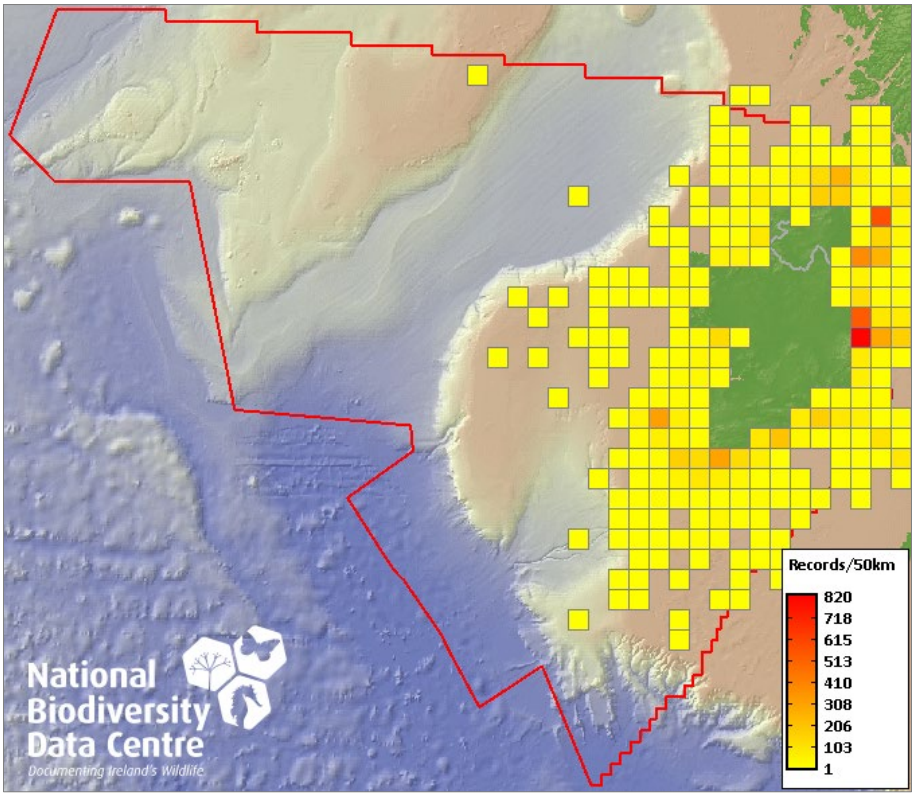

Figure 4 Distribution of recorded harbour porpoises in Irish waters (The National Biodiversity Data Centre 2024)

2.5.1.4 Minke Whale *(Balaenoptera acutorostrata)*

Minke whales are mainly present from April to November along all Irish coasts but tend to be predominantly located on the south and southwest of Ireland (Reid *et al.* 2003; Berrow *et al.* 2010). There were no recorded sightings of minke whales in the vicinity of Arklow in the 12 months prior to geophysical works (IWDG, 2024).

Minke whales are the most frequently recorded baleen whales in Irish waters and can be seen off most headlands around the whole island throughout the year, although they tend to be more prevalent in the south and west and during the months of May and October (Charif and Clark, 2009).

Plate 4: Minke whale (Mizen Archaeology 2022).

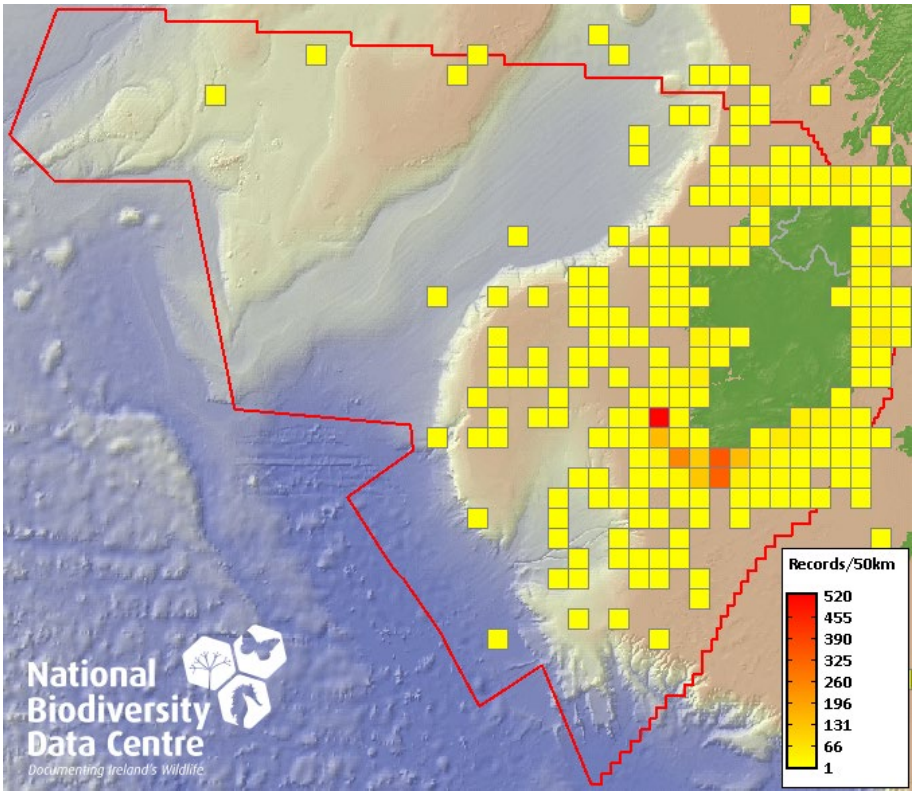

Figure 5 Distribution of recorded minke whales in Irish waters (The National Biodiversity Data Centre 2024)

2.5.1.5 Fin whale *(Balaenoptera physalus)*

Fin whales forage from June to February off the south coast of Ireland, generally moving eastwards over the season following the movements of sprat and herring (Marine Institute, 2020). The high level of site fidelity and inter-annual occurrence of individuals along the southern Irish coast indicate that these inshore waters are an important foraging habitat for fin whales (Whooley *et al.* 2011).

There were no recorded sightings of fin or other large whales in proximity to the survey area in the 12 months prior to the survey (IWDG, 2024).

Plate 5: Fin whale (Mizen Archaeology 2022).

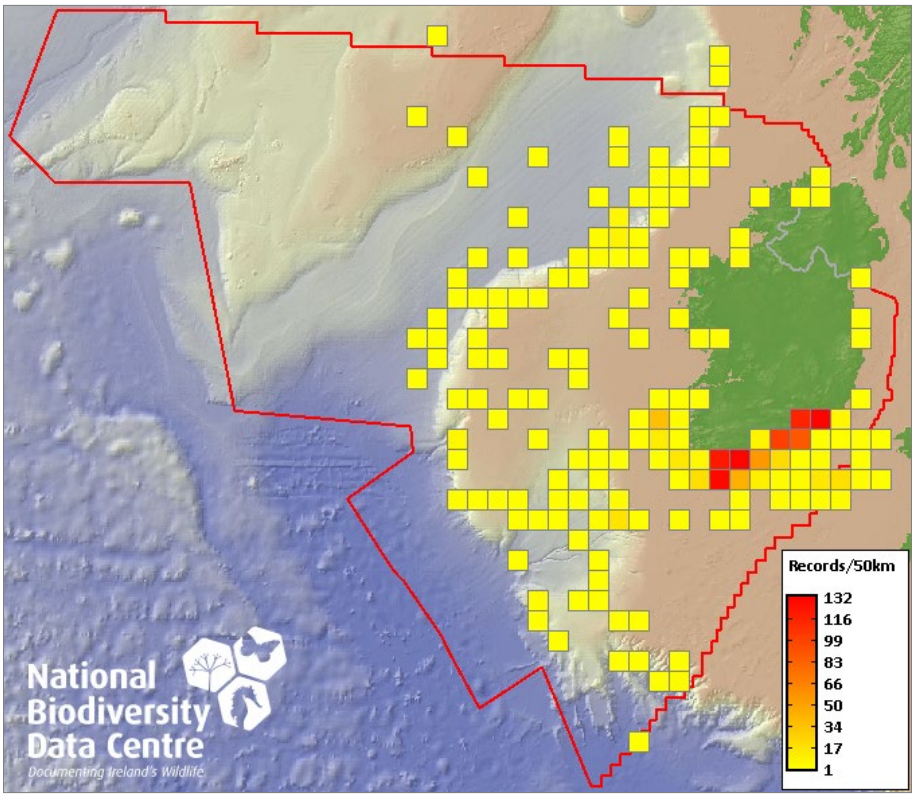

Figure 6 Distribution of recorded fin whales in Irish waters (The National Biodiversity Data Centre 2024)

2.5.2 Pinnipeds

The two main types of seals found in Ireland are the Grey seal (*Halichoerus grypus*) and the Harbour/Common Seal (*Phoca vitulina*). These two types make up a majority of findings all along the Irish coast. These mammals are listed as E.U. Directive Annex II species and are protected in all EU waters (Habitats Directive, 2020).

Grey seals prefer remote haul-out sites including rocky coasts, beaches, uninhabited islands and sea caves. Grey seal haul-outs can be found on all coasts of Ireland, although their distribution on the east coast is likely lower due to human disturbances. Grey seal pups are born between September to December, and moulting takes place between November and April (O'Cadhla & Strong 2008).

Harbour seals are the smaller of the two species and prefer sand or mudflats as their haul-out locations. Similar to grey seals, they prefer the west coast due to less human interference. Breeding takes place in June and moulting in July and August (*common seal*- NPWS, 2023).

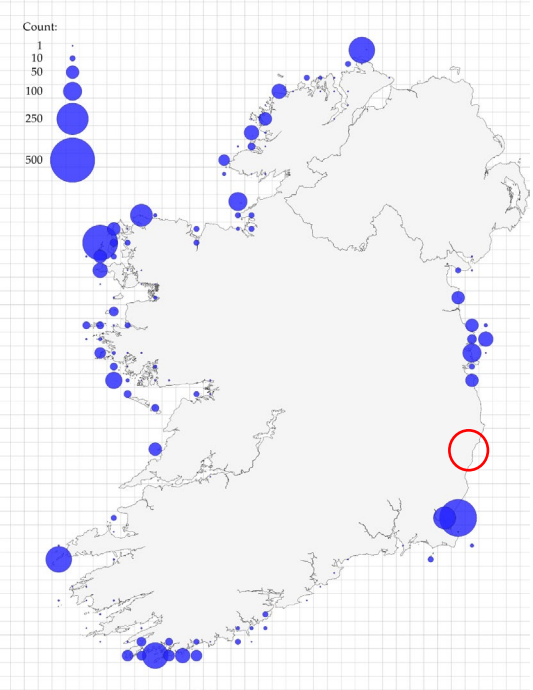

Figure 7 Grey seal survey seal distribution. General area of Arklow location highlighted in red. From Duck & Morris 2019, pp.20.

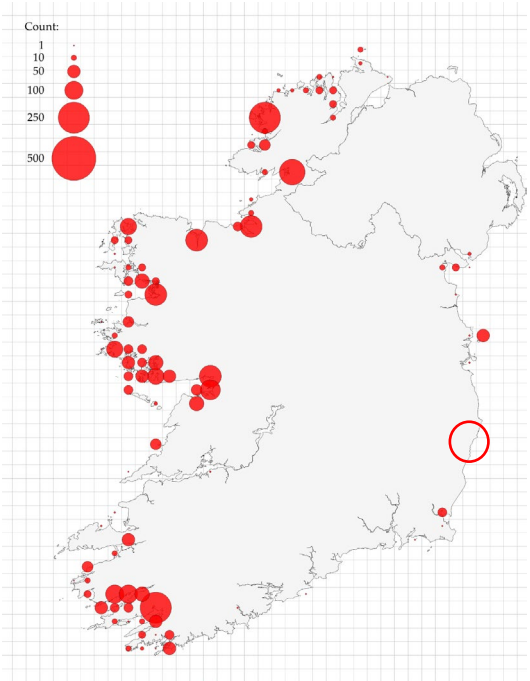

Figure 8 Harbour seal survey seal distribution. General area of Arklow location highlighted in red. From Duck & Morris 2019, pp.13

Table 3 Results of thermal-imaging seal survey and prior seal surveys encompassing Co. Wicklow. Table created from data in Duck & Morris 2019, pp.5.

Area	Harbour seals 2003	Harbour seals 2011/2012	Harbour seals 2017/2018	Grey seals 2003	Grey seals 2011/2012	Grey seals 2017/2018
East	123	90	131	262	223	418

The National Biodiversity Data Centre compiles various data sources, including citizen scientist sightings, to create constantly updated species distribution maps (National Biodiversity Centre 2024). Information for grey and harbour seal sightings reveal that grey seals sightings are much more abundant along the east coast compared to harbour seals.

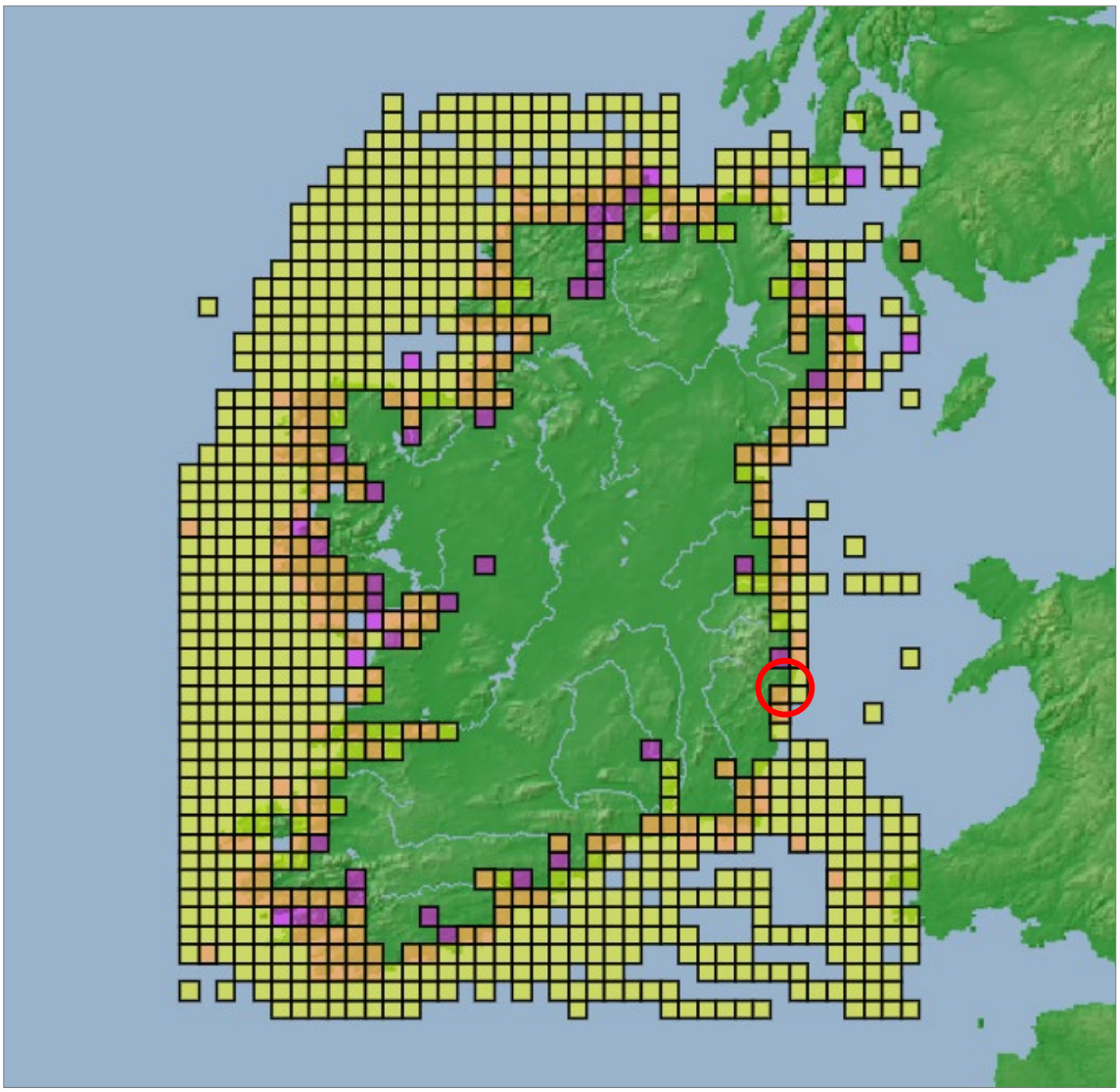

Figure 9 Grey seal (yellow) and harbour seal (purple) sightings distribution (NBDC 2024). Arklow area circled in red.

2.5.2.1 Harbour seal *(Phoca vitulina)*

Harbour seals are the smaller of the seal species found in Ireland. They prefer sandy beaches for hauling out and breeding. Harbour seals also prefer more isolate areas with lower human populations. Breeding takes place in June and moulting in July and August (*common seal*-NPWS, 2023). Surveys of harbour seal populations in 2003, 2012 and 2018 by Duck and Morris show that the harbour seal population decreased between the surveys from 2003 to 2011, but returned to pre-2003 numbers by 2017 (Duck & Morris 2019).

Plate 6 Harbour seal (Mizen Archaeology, 2023)

2.5.2.2 Grey seal *(Halichoerus grypus)*

Grey seals breed on exposed rocky shores, on sand bars or in sea caves with ready access to deep water. Other haul-out areas for the grey seal are located on exposed rocky areas or steeply shelving sandbanks (Ó Cadhla *et al*. 2008). Grey seals have a wide foraging range and distribution and have been known to use feeding/foraging sites more hundreds of kilometres from haul-out sites. Feeding sites are impacted by available prey (Cronin 2011). Duck and Morris note that grey seals continuously increased between the 2003, 2012 and 2017 survey seasons (Duck & Morris 2019).

Plate 7 Grey seal (Mizen Archaeology, 2020)

2.6 Details of Marine Mammal Observers

The observation was carried out by qualified and experienced JNCC marine mammal observers. This was undertaken by Matthew Duffy, Virginie Wyss, Malachy McLaughlin, Luca Caminti, and Clara Fequen Gomez.

3. Details of the observation platforms used for marine mammal monitoring

The survey vessel *Roman Rebel* and *Lady Kathleen* operated by *Green Rebel Marine* were utilised for hydrographic and seismic operations for this survey.

Plate 8: RV Roman Rebel (Mizen Archaeology 2022).

Plate 9 Lady Kathleen (Mizen Archaeology, 2023)

Monitoring shifts on *Roman Rebel* took place from the bridge and from the upper deck. The bridge and exterior deck have a height of 4.55m above the sea and offered unimpeded views of the mitigation zone.

Monitoring shifts on *Lady Kathleen* took place from the bow. The bridge and exterior deck have a height of 1.5m above the sea and offered unimpeded views of the mitigation zone.

4. Details of all sound-producing operations undertaken during the period of works

Sound producing activities consisted of multibeam and seismic operations, which were conducted to map the sandbank present at Arklow for a second phase of wind farm development.

A total of 43 sound-producing operations required a pre-start watch over the 26 days from 14 June to 03 August 2024. Testing of the equipment took place while the survey vessels were berthed in Cork Harbour on 14 June 2024. Operations took place during daylight hours on *Lady Kathleen*, while *Roman Rebel* operated on a 24-hour basis.

Works commenced once a pre-start of 30 minutes deemed the 1000m (seismic)/ 500m (hydrographic) mitigation zone clear of marine mammals. The MMO scanned the area by eye and 7x50 reticule binoculars. Verbal communication was utilized to keep in contact with the survey crew. Full details of all operations can be found in Appendix III.

5. Details of monitoring watches conducted for marine mammals

A total of 194 hours and 12 minutes of monitoring effort was completed for the project between the two vessels. On *Roman Rebel,* 100 hours and 47 minutes were logged, while 93 hours and 25 minutes were logged on *Lady Kathleen*. Of this, a total of 30 hours and 37 minutes of effort was conducted as pre-start operations. All other hours of monitoring effort were accrued either while sound producing operations were at full power or while ramping up to full power. Full details of monitoring effort carried out during the project can be found in Appendix II.

Marine mammal observations were undertaken during all operations during daylight hours for the entire duration of the project. A full list of all operations can be found in Appendix III. There was one record of non-compliance due to a ramp-up that was initiated early.

Environmental data was recorded at the beginning and end of each watch, including sea state using the Beaufort scale, wind directions, and speed. All relevant forms were completed at the end of each working day as well as a detailed log of operations.

5.1 Survey operations

A total of 194 hours and 12 minutes of monitoring effort was completed for survey operations. Operations were divided into hydrographic survey operations which included hydrographic operations utilising multibeam echo sounder and sub-bottom profiler; and seismic survey operations which were achieved with UHRS equipment.

Hydrographic and seismic operations were carried out simultaneously when possible, with the UHRS mitigation taking precedence during the pre-start monitoring. In some instances, only hydrographic survey works were undertaken due to poor conditions for UHRS deployment. While the hydrographic equipment was able to continue sound-production, a separate pre-start was required before starting UHRS sound operations.

Wind direction was generally variable throughout the project, with Force 3 winds being the most frequently encountered conditions. Force 5 winds were encountered during choppy conditions but marine mammals were still observable within the 1000m mitigation zone.

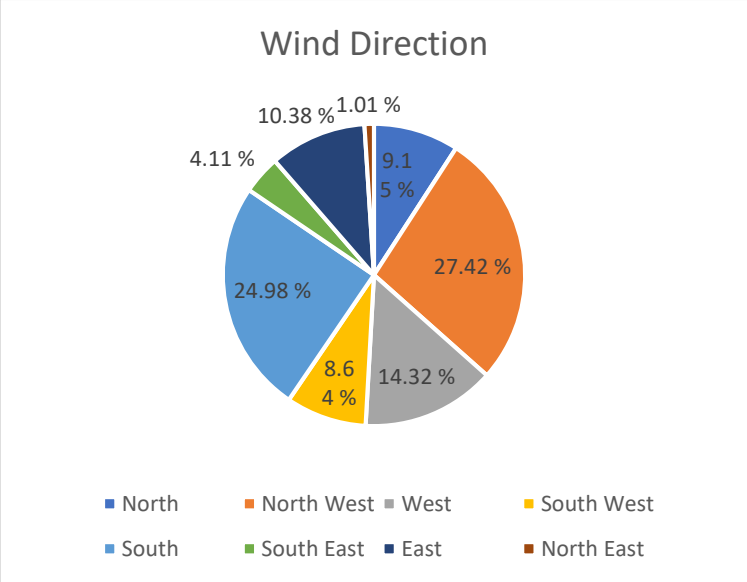

Figure 7 Wind direction during the period of works 14 June to 03 August 2024.

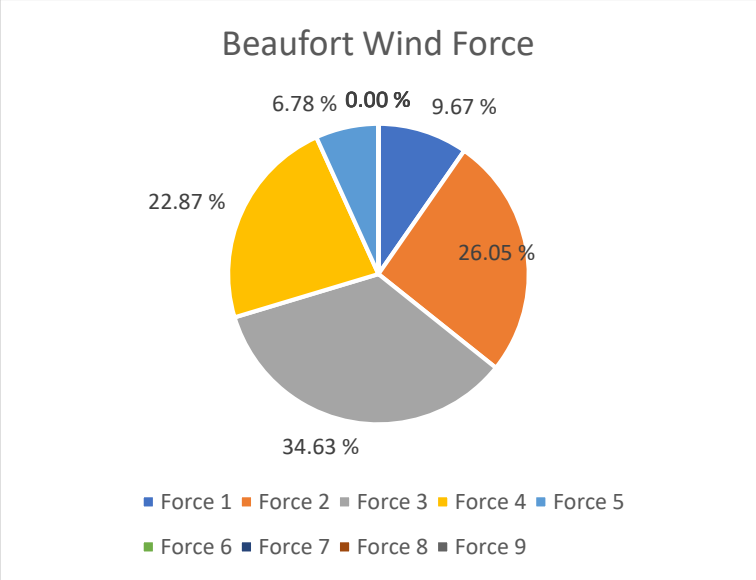

Figure 8 Beaufort wind speed during the period of 14 June to 03 August 2024

Visibility was generally good during the project with the mitigation zone always clear for observation. High visibility (>5km) accounted for 96% of operations. Moderate visibility was logged on 2.68% of occasions while geophysical operations were already ongoing. All poor visibility was logged after sound operations were at full power and no mitigation was required.

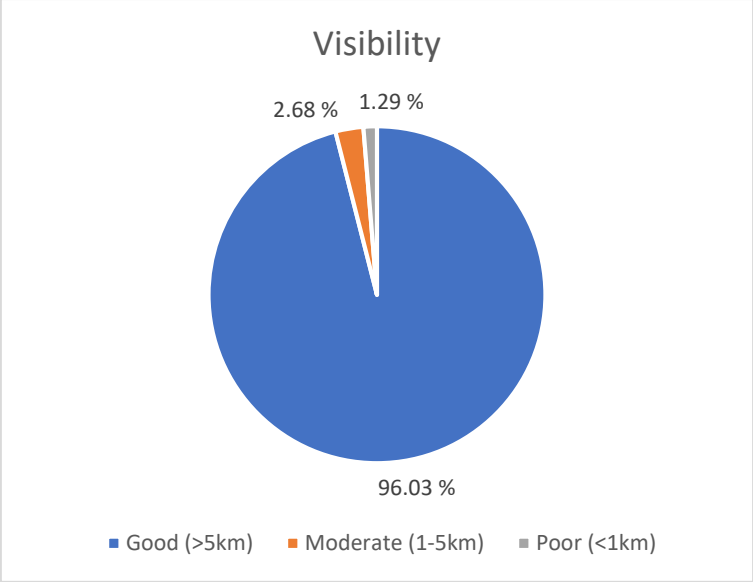

Figure 9 Visibility during the survey 14 June to 03 August 2024.

Sea state was classified as good for the majority of observations during the project. The majority of observations (81%) were carried out in sea states noted as glassy and slight, while 19% of observations were noted as choppy. Sea state was never recorded as higher than choppy, as rougher seas would preclude the ability of seismic operations to function effectively.

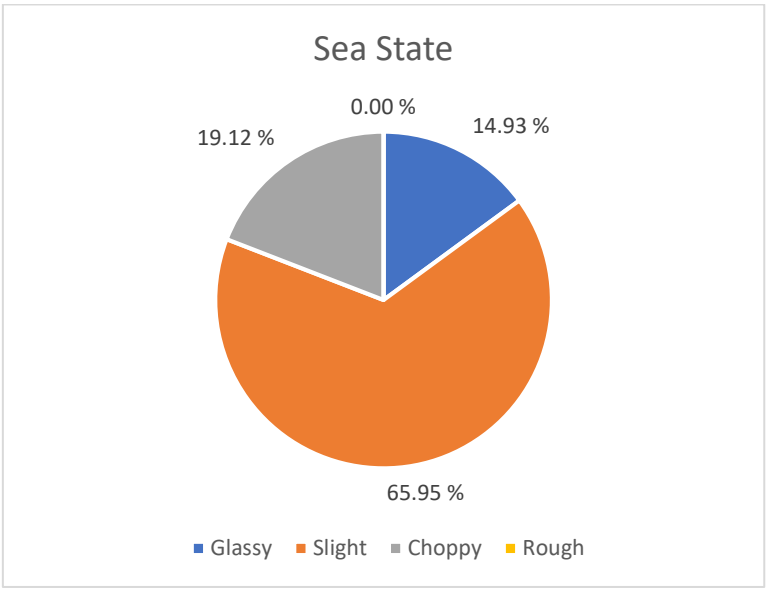

Figure 10 Sea state conditions from the period of 14 June to 03 August 2024

6. Details of all marine mammal sightings recorded

In total, there were 18 sightings of marine mammals over the duration of the project. These sightings were predominantly common dolphins, with 7 sightings recorded. There was a single sighting of a minke whale, harbour porpoise and a group of bottlenose dolphins. Grey seals made up the remainder

of sightings, with 5 sightings reported. There were 3 sightings of dolphin and seal species that could not be identified to species level due to distance or being reported by an incidental observer.

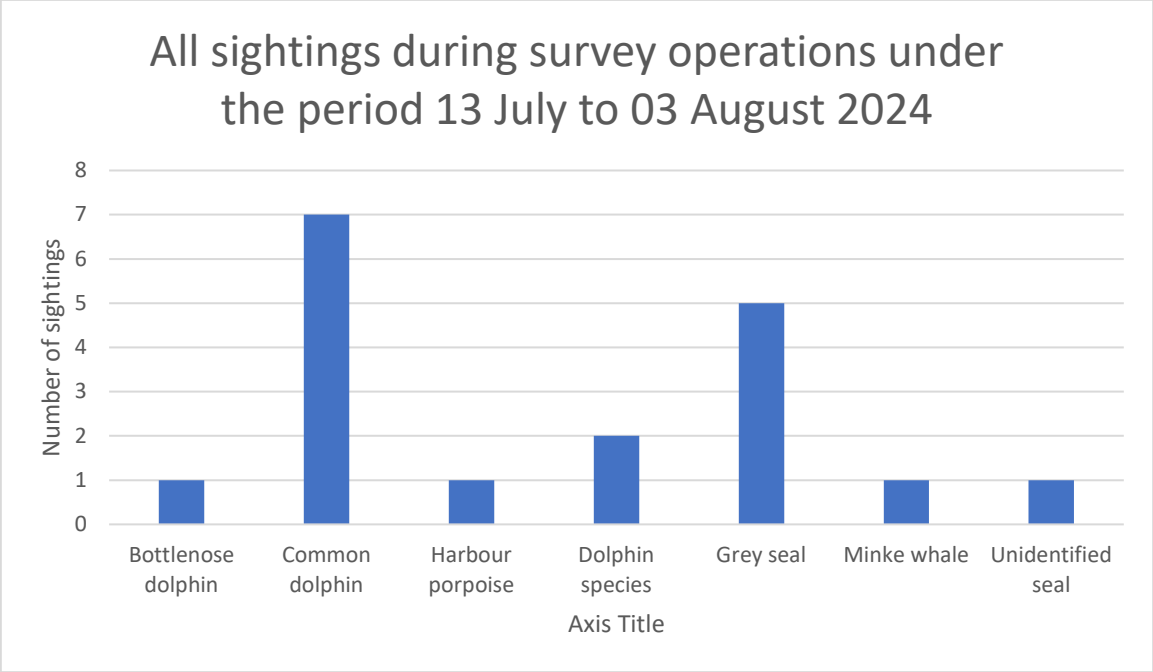

Figure 11 Marine mammal sightings during survey works from 14 June to 03 August 2024

Table 4 Sightings of marine mammal divided by individuals and groups under the period 14 June to 03 August 2023.

Species	Number of sightings	Number of individual sightings	Number of group sightings
Bottlenose dolphin	1	0	1
Common dolphin	7	2	5
Harbour porpoise	1	1	0
Dolphin species	2	1	1
Grey seal	5	5	0
Minke whale	1	1	0
Unidentified seal	1	1	0
TOTAL	**18**	**11**	**7**

Plate 10 Common dolphins spotted from Lady Kathleen

Plate 11 Common dolphins bowriding on Lady Kathleen

6.1 Details of all marine mammal sightings recorded during monitored watches

A total of 9 sightings were recorded during dedicated MMO watches. Common dolphins made up the majority of these sightings. There was one recorded delay on 13 July 2024 due to a minke whale sighting, where operations were delayed by 15 minutes.

6.2 Details of all marine mammal sightings recorded outside of monitoring watches (e.g., incidental observations), including records from additional personnel on board

6.2.1 Operations

There were 2 incidental sightings while hydrographic and seismic operations were in sound production. These were spotted by outside observers who reported the sighting to the MMO.

6.2.3 Sightings in transit

There were 7 incidental sightings that occurred while the vessel was in transit and there was no sound production. Of these, 5 were of grey seals and 2 were of common dolphins.

7. Details of any problems encountered during marine mammal monitoring, start-up procedures, ramp-up (soft-start) procedures or during full scale operations

One single non-compliance in accordance with National Parks and Wildlife Service (NPWS) guidelines and project permit conditions was recorded. This occurred when full ramp up procedures were not adhered to on the 13th July 2024 due entirely to a miscommunication on the part of the MMO's. On *Roman Rebel*, a ramp-up was started at 14:47 and stalled at 15:07 due to equipment failure. Instead of restarting the pre-watch and ramp-up, noise-producing operations recommenced and reached full power at 15:27. The MMO was carrying out a watch during this time and no marine mammals were recorded in the mitigation zone. Therefore no harm or negative impact was caused to marine mammals as a result of the non-compliance.

8. Conclusions

A total of 194 hours and 12 minutes of monitoring effort was completed over 26 days from 14 June to 03 August 2024. There were 43 pre-start watches carried out prior to hydrographic and seismic operations between the two vessels.

There were 18 sightings of marine mammals throughout the project, with common dolphins being the most frequently sighted mammal with 7 sightings.

Due to the limited timeframe of the hydrographic and seismic operations, it is highly unlikely that the sound-producing activities had any significant impact on marine mammals in the area during this period of works.

There was one non-compliance in accordance with National Parks and Wildlife Service (NPWS) guidelines and project permit conditions. Compliance with said guidelines and permits conditions was otherwise achieved for the site investigation works between 14 June and 03 August 2024.

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10. Appendices

Appendix I.I Lady Kathleen sightings

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** *Lady K*	**Sighting number** (start at 1 for first sighting of survey) 1	**Acoustic detection number** (start at 500 for first detection of survey)
Date 13/07/2024		**Time at start of encounter** (UTC, 24hr clock) 08:34	**Time at end of encounter** (UTC, 24hr clock) 08:34

Were animals detected visually and/ or acoustically? x visual □ acoustic □ both	**How were the animals first detected?** x visually detected by observer keeping a continuous watch □ visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name Matthew Duffy	**Position** (latitude and longitude) 52° 42.194 -5° 58.214	**Water depth** (metres) 23.4

Species/ species group Minke Whale		**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow)
Bearing to animal (when first seen or heard) 300	**Range to animal** (when first seen or heard) (metres) 700m	

Total number 1	**Number of adults** (visual sightings only) 1	**Number of calves** (visual sightings only)

Behaviour (visual sightings only)
Breaching

Direction of travel (relative to ship) □ towards ship □ away from ship x parallel to ship in same direction as ship □ travelling in opposite direction to ship □ crossing ahead of ship □ variable □ milling □ other	**Direction of travel** (compass points) x N □ S □ NE □ SW □ E □ W □ SE □ NW □ variable

Airgun (or other source) activity when animals first detected □ full power X not firing □ soft start □ reduced power (other than soft start)	**Airgun** (or other source) activity when animals last detected □ full power X not firing □ soft start □ reduced power (other than soft start)	**Closest distance of animals from airguns** (or other source) (metres) 700m	**Time of closest approach** (UTC, 24hr clock) 08:34
		If seen during soft start give: First distance Closest distance Last distance during soft start (metres)	

What action was taken? (according to requirements of guidelines/ regulations in country concerned) □ none required x delay start of firing □ shut-down of active source □ power-down of active source □ power-down then shut-down of active source	**Length of power-down and/ or shut-down** (if relevant) (length of time until subsequent soft start, in minutes) 15 minutes	**Estimated loss of production** (if relevant) due to mitigating actions (km) 1km

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** *Lady K/ Roman Rebel*	**Sighting number** (start at 1 for first sighting of survey) 2	**Acoustic detection number** (start at 500 for first detection of survey)
Date 13/07/2024		**Time at start of encounter** (UTC, 24hr clock) 10:21	**Time at end of encounter** (UTC, 24hr clock) 11:53

Were animals detected visually and/ or acoustically?	**How were the animals first detected?**
x visual □ acoustic □ both	□ visually detected by observer keeping a continuous watch x visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name Matthew Duffy/ Virgine Wyss	**Position** (latitude and longitude) 52°, 41.645 -5° 57.680	**Water depth** (metres) 34

Species/ species group Common dolphin		**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow)
Bearing to animal (when first seen or heard) 290	**Range to animal** (when first seen or heard) (metres) 250	

Total number 12	**Number of adults** (visual sightings only) 12	**Number of calves** (visual sightings only)

Behaviour (visual sightings only)
Feeding, milling

Direction of travel (relative to ship)		**Direction of travel** (compass points)	
□ towards ship	□ crossing ahead of ship	x N	□ S
□ away from ship	□ variable	□ NE	□ SW
x parallel to ship in same direction as ship	□ milling	□ E	□ W
□ travelling in opposite direction to ship	□ other	□ SE	□ NW
		□ variable	

Airgun (or other source) activity when animals first detected	**Airgun** (or other source) activity when animals last detected	**Closest distance of animals from airguns** (or other source) (metres) 250	**Time of closest approach** (UTC, 24hr clock) 10:23
x full power □ not firing □ soft start □ reduced power (other than soft start)	X full power □ not firing □ soft start □ reduced power (other than soft start)	**If seen during soft start give**: First distance Closest distance Last distance during soft start (metres)	

What action was taken? (according to requirements of guidelines/ regulations in country concerned) x none required □ delay start of firing □ shut-down of active source □ power-down of active source □ power-down then shut-down of active source	**Length of power-down and/ or shut-down** (if relevant) (length of time until subsequent soft start, in minutes) N/A	**Estimated loss of production** (if relevant) due to mitigating actions (km) N/A

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** *Lady K*	**Sighting number** (start at 1 for first sighting of survey) 3	**Acoustic detection number** (start at 500 for first detection of survey)
Date 13/07/2024		**Time at start of encounter** (UTC, 24hr clock) 11:37	**Time at end of encounter** (UTC, 24hr clock) 12:36

Were animals detected visually and/ or acoustically?	**How were the animals first detected?**
X visual □ acoustic □ both	X visually detected by observer keeping a continuous watch □ visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name Matthew Duffy	**Position** (latitude and longitude) 52° 43.477 -5° 57.306	**Water depth** (metres)

Species/ species group Common dolphin		**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow)
Bearing to animal (when first seen or heard) 330	**Range to animal** (when first seen or heard) (metres) 200	

Total number 12	**Number of adults** (visual sightings only) 12	**Number of calves** (visual sightings only)

Behaviour (visual sightings only)
Feeding, milling

Direction of travel (relative to ship)		**Direction of travel** (compass points)	
□ towards ship	□ crossing ahead of ship	□ N	□ S
□ away from ship	x variable	□ NE	□ SW
□ parallel to ship in same direction as ship	□ milling	□ E	x W
□ travelling in opposite direction to ship	□ other	□ SE	□ NW
		□ variable	

Airgun (or other source) activity when animals first detected	**Airgun** (or other source) activity when animals last detected	**Closest distance of animals from airguns** (or other source) (metres) 200	**Time of closest approach** (UTC, 24hr clock) 11:37
x full power □ not firing □ soft start □ reduced power (other than soft start)	X full power □ not firing □ soft start □ reduced power (other than soft start)	**If seen during soft start give**: First distance Closest distance Last distance during soft start (metres)	

What action was taken? (according to requirements of guidelines/ regulations in country concerned) x none required □ delay start of firing □ shut-down of active source □ power-down of active source □ power-down then shut-down of active source	**Length of power-down and/ or shut-down** (if relevant) (length of time until subsequent soft start, in minutes) N/A	**Estimated loss of production** (if relevant) due to mitigating actions (km) N/A

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** *Lady K*	**Sighting number** (start at 1 for first sighting of survey) 4	**Acoustic detection number** (start at 500 for first detection of survey)
Date 14/07/2024		**Time at start of encounter** (UTC, 24hr clock) 08:02	**Time at end of encounter** (UTC, 24hr clock) 08:24

Were animals detected visually and/ or acoustically?	**How were the animals first detected?**
X visual □ acoustic □ both	X visually detected by observer keeping a continuous watch □ visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name Matthew Duffy	**Position** (latitude and longitude) 52° 45.579 -5° 58.845	**Water depth** (metres) 36

Species/ species group Harbour Porpoise		**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow)
Bearing to animal (when first seen or heard) 20	**Range to animal** (when first seen or heard) (metres) 200	

Total number 1	**Number of adults** (visual sightings only) 1	**Number of calves** (visual sightings only)

Behaviour (visual sightings only)
Surfacing

Direction of travel (relative to ship)		**Direction of travel** (compass points)	
□ towards ship	□ crossing ahead of ship	X N	□ S
x away from ship	x variable	□ NE	□ SW
□ parallel to ship in same direction as ship	□ milling	□ E	□ W
□ travelling in opposite direction to ship	□ other	□ SE	□ NW
		□ variable	

Airgun (or other source) activity when animals first detected	**Airgun** (or other source) activity when animals last detected	**Closest distance of animals from airguns** (or other source) (metres) 200	**Time of closest approach** (UTC, 24hr clock) 08:02
□ full power X not firing □ soft start □ reduced power (other than soft start)	□ full power X not firing □ soft start □ reduced power (other than soft start)	**If seen during soft start give**: First distance Closest distance Last distance during soft start (metres)	

What action was taken? (according to requirements of guidelines/ regulations in country concerned) x none required □ delay start of firing □ shut-down of active source □ power-down of active source □ power-down then shut-down of active source	**Length of power-down and/ or shut-down** (if relevant) (length of time until subsequent soft start, in minutes) N/A	**Estimated loss of production** (if relevant) due to mitigating actions (km) N/A

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** *Lady K*	**Sighting number** (start at 1 for first sighting of survey) 5	**Acoustic detection number** (start at 500 for first detection of survey)
Date 16/07/2024		**Time at start of encounter** (UTC, 24hr clock) 08:39	**Time at end of encounter** (UTC, 24hr clock) 08:54

Were animals detected visually and/ or acoustically?	**How were the animals first detected?**
X visual □ acoustic □ both	X visually detected by observer keeping a continuous watch □ visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name Matthew Duffy	**Position** (latitude and longitude) 52° 40.414 -5° 58.287	**Water depth** (metres) 46.5

Species/ species group Common dolphins		**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow)
Bearing to animal (when first seen or heard) 350	**Range to animal** (when first seen or heard) (metres) 10	

Total number 10	**Number of adults** (visual sightings only) 9	**Number of calves** (visual sightings only) 1 juvenile

Behaviour (visual sightings only)
Surfacing

Direction of travel (relative to ship)		**Direction of travel** (compass points)	
□ towards ship	□ crossing ahead of ship	X N	□ S
□ away from ship	x variable	□ NE	□ SW
□ parallel to ship in same direction as ship	□ milling	□ E	□ W
□ travelling in opposite direction to ship	□ other	□ SE	□ NW
		□ variable	

Airgun (or other source) activity when animals first detected	**Airgun** (or other source) activity when animals last detected	**Closest distance of animals from airguns** (or other source) (metres) 10	**Time of closest approach** (UTC, 24hr clock) 08:32
□ full power X not firing □ soft start □ reduced power (other than soft start)	□ full power X not firing □ soft start □ reduced power (other than soft start)	**If seen during soft start give**: First distance Closest distance Last distance during soft start (metres)	

What action was taken? (according to requirements of guidelines/ regulations in country concerned) x none required □ delay start of firing □ shut-down of active source □ power-down of active source □ power-down then shut-down of active source	**Length of power-down and/ or shut-down** (if relevant) (length of time until subsequent soft start, in minutes) N/A	**Estimated loss of production** (if relevant) due to mitigating actions (km) N/A

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** Lady Kathleen	**Sighting number** (start at 1 for first sighting of survey) 6	**Acoustic detection number** (start at 500 for first detection of survey)
Date 19/07/2024		**Time at start of encounter** (UTC, 24hr clock) 08:15	**Time at end of encounter** (UTC, 24hr clock) 08:16

Were animals detected visually and/ or acoustically?	**How were the animals first detected?**
x visual □ acoustic □ both	□ visually detected by observer keeping a continuous watch x visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name Malachy McLaughlin	**Position** (latitude and longitude) 52° 47' 37.9176' 6° 8' 44.6208'	**Water depth** (metres) 3m

Species/ species group Grey Seal		**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow) Very large head, light grey spots. Could only see the head of the seal, again it seemed very big.
Bearing to animal (when first seen or heard) 280°	**Range to animal** (when first seen or heard) (metres) 10m	

Total number 1	**Number of adults** (visual sightings only) 1	**Number of calves** (visual sightings only) 0

Behaviour (visual sightings only)
Looked at the vessel for a short amount of time before diving and not being seen again. Seemed curious at the start, but quickly dived.

Direction of travel (relative to ship)		**Direction of travel** (compass points)	
□ towards ship	□ crossing ahead of ship	□ N	□ S
x away from ship	□ variable	□ NE	□ SW
□ parallel to ship in same direction as ship	□ milling	x E	□ W
□ travelling in opposite direction to ship	□ other	□ SE	□ NW
		□ variable	

Airgun (or other source) activity when animals first detected	**Airgun** (or other source) activity when animals last detected	**Closest distance of animals from airguns** (or other source) (metres) 10m	**Time of closest approach** (UTC, 24hr clock) 08:16
□ full power x not firing □ soft start □ reduced power (other than soft start)	□ full power x not firing □ soft start □ reduced power (other than soft start)	**If seen during soft start give**: First distance Closest distance Last distance during soft start (metres) N/A	

What action was taken? (according to requirements of guidelines/ regulations in country concerned)	**Length of power-down and/ or shut-down** (if relevant) (length of time until subsequent soft start, in minutes)	**Estimated loss of production** (if relevant) due to mitigating actions (km)
x none required □ delay start of firing □ shut-down of active source □ power-down of active source □ power-down then shut-down of active source		

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** Lady Kathleen	**Sighting number** (start at 1 for first sighting of survey) 7	**Acoustic detection number** (start at 500 for first detection of survey)
Date 20/07/2024		**Time at start of encounter** (UTC, 24hr clock) 17:40	**Time at end of encounter** (UTC, 24hr clock) 17:45

Were animals detected visually and/ or acoustically?	**How were the animals first detected?**
x visual □ acoustic □ both	□ visually detected by observer keeping a continuous watch x visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name Malachy McLaughlin	**Position** (latitude and longitude) 52° 42.912 -05° 57.578	**Water depth** (metres) 38.4

Species/ species group Grey seal		**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow) Large head, very brown/grey colour. Dived very quickly.
Bearing to animal (when first seen or heard) 330°	**Range to animal** (when first seen or heard) (metres) 300m	

Total number 1	**Number of adults** (visual sightings only) 1	**Number of calves** (visual sightings only) 0

Behaviour (visual sightings only)
Looked at the vessel briefly and then dived. Seen again five minutes later further away.

Direction of travel (relative to ship)		**Direction of travel** (compass points)	
□ towards ship	□ crossing ahead of ship	□ N	□ S
x away from ship	□ variable	□ NE	□ SW
□ parallel to ship in same direction as ship	□ milling	□ E	x W
□ travelling in opposite direction to ship	□ other	□ SE	□ NW
		□ variable	

Airgun (or other source) activity when animals first detected	**Airgun** (or other source) activity when animals last detected	**Closest distance of animals from airguns** (or other source) (metres) 330	**Time of closest approach** (UTC, 24hr clock) 17:40
□ full power x not firing □ soft start □ reduced power (other than soft start)	□ full power x not firing □ soft start □ reduced power (other than soft start)	**If seen during soft start give**: First distance Closest distance Last distance during soft start (metres)	

What action was taken? (according to requirements of guidelines/ regulations in country concerned)	**Length of power-down and/ or shut-down** (if relevant) (length of time until subsequent soft start, in minutes)	**Estimated loss of production** (if relevant) due to mitigating actions (km)
x none required □ delay start of firing □ shut-down of active source □ power-down of active source □ power-down then shut-down of active source		

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** Lady Kathleen	**Sighting number** (start at 1 for first sighting of survey) 8	**Acoustic detection number** (start at 500 for first detection of survey)
Date 21/07/2024		**Time at start of encounter** (UTC, 24hr clock) 08:23	**Time at end of encounter** (UTC, 24hr clock) 08:27

Were animals detected visually and/ or acoustically?	**How were the animals first detected?**
x visual □ acoustic □ both	x visually detected by observer keeping a continuous watch □ visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name	**Position** (latitude and longitude)	**Water depth** (metres)
Malachy McLaughlin	52° 42.554 -06° 00.046	39.3

Species/ species group Common dolphin	**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow) Seen only for a few moments, brown colour and only one dolphin.

Bearing to animal (when first seen or heard) 270°	**Range to animal** (when first seen or heard) (metres) 250

Total number 1	**Number of adults** (visual sightings only) 1	**Number of calves** (visual sightings only) 0

Behaviour (visual sightings only)
No behaviour of note, went away from the vessel.

Direction of travel (relative to ship)		**Direction of travel** (compass points)	
□ towards ship	□ crossing ahead of ship	x N	□ S
x away from ship	□ variable	□ NE	□ SW
□ parallel to ship in same direction as ship	□ milling	□ E	□ W
□ travelling in opposite direction to ship	□ other	□ SE	□ NW
		□ variable	

Airgun (or other source) activity when animals first detected	**Airgun** (or other source) activity when animals last detected	**Closest distance of animals from airguns** (or other source) (metres)	**Time of closest approach** (UTC, 24hr clock)
□ full power x not firing □ soft start □ reduced power (other than soft start)	□ full power x not firing □ soft start □ reduced power (other than soft start)	250	08:23

If seen during soft start give:
First distance Closest distance Last distance
during soft start (metres)

What action was taken? (according to requirements of guidelines/ regulations in country concerned)	**Length of power-down and/ or shut-down** (if relevant) (length of time until subsequent soft start, in minutes)	**Estimated loss of production** (if relevant) due to mitigating actions (km)
x none required □ delay start of firing □ shut-down of active source □ power-down of active source □ power-down then shut-down of active source		

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** Lady Kathleen	**Sighting number** (start at 1 for first sighting of survey) 9	**Acoustic detection number** (start at 500 for first detection of survey)
Date 23/07/2024		**Time at start of encounter** (UTC, 24hr clock) 08:22	**Time at end of encounter** (UTC, 24hr clock) 08:23

Were animals detected visually and/ or acoustically?	**How were the animals first detected?**
x visual □ acoustic □ both	□ visually detected by observer keeping a continuous watch x visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name Malachy McLaughlin	**Position** (latitude and longitude) 52° 54.211 -05° 55.006	**Water depth** (metres) 22.1

Species/ species group Dolphin species	**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow) Brown/black fin, seen very briefly within a 20 second period.

Bearing to animal (when first seen or heard) 270°	**Range to animal** (when first seen or heard) (metres) 130m

Total number 1	**Number of adults** (visual sightings only) 1	**Number of calves** (visual sightings only) 0

Behaviour (visual sightings only)
Swimming normally, very short encounter.

Direction of travel (relative to ship)

□ towards ship
x away from ship
□ parallel to ship in same direction as ship
□ travelling in opposite direction to ship
□ crossing ahead of ship
□ variable
□ milling
□ other

Direction of travel (compass points)

x N	□ S
□ NE	□ SW
□ E	□ W
□ SE	□ NW
□ variable	

Airgun (or other source) activity when animals first detected	**Airgun** (or other source) activity when animals last detected	**Closest distance of animals from airguns** (or other source) (metres) 130	**Time of closest approach** (UTC, 24hr clock) 08:22
x full power □ not firing □ soft start □ reduced power (other than soft start)	x full power □ not firing □ soft start □ reduced power (other than soft start)	**If seen during soft start give**: First distance Closest distance Last distance during soft start (metres)	

What action was taken? (according to requirements of guidelines/ regulations in country concerned) x none required	**Length of power-down and/ or shut-down** (if relevant) (length of time until	**Estimated loss of production** (if relevant) due to mitigating actions (km)

□ delay start of firing □ shut-down of active source □ power-down of active source □ power-down then shut-down of active source	subsequent soft start, in minutes)	

Appendix I.II Roman Rebel sightings

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** *Roman Rebel*	**Sighting number** (start at 1 for first sighting of survey) 1	**Acoustic detection number** (start at 500 for first detection of survey)
Date 14/07/2024		**Time at start of encounter** (UTC, 24hr clock) 7:16	**Time at end of encounter** (UTC, 24hr clock) 7:18

Were animals detected visually and/ or acoustically? x visual ϒ acoustic ϒ both	**How were the animals first detected?** x visually detected by observer keeping a continuous watch ϒ visually spotted incidentally by observer or someone else ϒ acoustically detected by PAM ϒ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name Virgine Wyss	**Position** (latitude and longitude) 52°52.308 5°54.727	**Water depth** (metres) 26

Species/ species group Tursiops truncatus		**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow) Thick dorsal fin and robust grey body
Bearing to animal (when first seen or heard) 300	**Range to animal** (when first seen or heard) (metres) 1500m	

Total number 3	**Number of adults** (visual sightings only) 3	**Number of calves** (visual sightings only)

Behaviour (visual sightings only)
Travelling

Direction of travel (relative to ship) ϒ towards ship ϒ away from ship ϒ parallel to ship in same direction as ship x travelling in opposite direction to ship	ϒ crossing ahead of ship ϒ variable ϒ milling ϒ other	**Direction of travel** (compass points) ϒ N x S ϒ NE ϒ SW ϒ E ϒ W ϒ SE ϒ NW ϒ variable

Airgun (or other source) activity when animals first detected x full power ϒ not firing ϒ soft start ϒ reduced power (other than soft start)	**Airgun** (or other source) activity when animals last detected x full power ϒ not firing ϒ soft start ϒ reduced power (other than soft start)	**Closest distance of animals from airguns** (or other source) (metres) 250	**Time of closest approach** (UTC, 24hr clock) 10:23
		If seen during soft start give: First distance Closest distance Last distance during soft start (metres)	

What action was taken? (according to requirements of guidelines/ regulations in country concerned)	**Length of power-down and/ or shut-down** (if relevant) (length of time	**Estimated loss of production** (if relevant)

x none required ϒ delay start of firing ϒ shut-down of active source ϒ power-down of active source ϒ power-down then shut-down of active source	until subsequent soft start, in minutes)	due to mitigating actions (km)

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** *Roman Rebel*	**Sighting number** (start at 1 for first sighting of survey) 2 (transit)	**Acoustic detection number** (start at 500 for first detection of survey)
Date 22/07/2024		**Time at start of encounter** (UTC, 24hr clock) 19:44	**Time at end of encounter** (UTC, 24hr clock) 19:46

Were animals detected visually and/ or acoustically?	**How were the animals first detected?**
x visual ϒ acoustic ϒ both	ϒ visually detected by observer keeping a continuous watch x visually spotted incidentally by observer or someone else ϒ acoustically detected by PAM ϒ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name	**Position** (latitude and longitude)	**Water depth** (metres)
VW/Captain	53°16.139 -6°07.748	

Species/ species group Dolphin sp		**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow) Small dolphins, fin with a triangular shape
Bearing to animal (when first seen or heard) 240	**Range to animal** (when first seen or heard) (metres) 400	

Total number 2	**Number of adults** (visual sightings only)	**Number of calves** (visual sightings only)

Behaviour (visual sightings only)

Surfacing close to a buoy

Direction of travel (relative to ship)		**Direction of travel** (compass points)	
ϒ towards ship	ϒ crossing ahead of ship	ϒ N	ϒ S
x away from ship	ϒ variable	ϒ NE	ϒ SW
ϒ parallel to ship in same direction as ship	ϒ milling	ϒ E	ϒ W
ϒ travelling in opposite direction to ship	ϒ other	ϒ SE	ϒ NW
		x variable	

Airgun (or other source) activity when animals first detected	**Airgun** (or other source) activity when animals last detected	**Closest distance of animals from airguns** (or other source) (metres)	**Time of closest approach** (UTC, 24hr clock)
ϒ full power x not firing ϒ soft start ϒ reduced power (other than soft start)	ϒ full power x not firing ϒ soft start ϒ reduced power (other than soft start)	**If seen during soft start give**: First distance Closest distance Last distance during soft start (metres)	

What action was taken? (according to requirements of guidelines/ regulations in country concerned) x none required ϒ delay start of firing ϒ shut-down of active source ϒ power-down of active source ϒ power-down then shut-down of active source	**Length of power-down and/ or shut-down** (if relevant) (length of time until subsequent soft start, in minutes)	**Estimated loss of production** (if relevant) due to mitigating actions (km)

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** *Roman Rebel*	**Sighting number** (start at 1 for first sighting of survey) 3	**Acoustic detection number** (start at 500 for first detection of survey)
Date 25/07/2024		**Time at start of encounter** (UTC, 24hr clock) 08:57	**Time at end of encounter** (UTC, 24hr clock) 09:01

Were animals detected visually and/ or acoustically? x visual ϒ acoustic ϒ both	**How were the animals first detected?** ϒ visually detected by observer keeping a continuous watch x visually spotted incidentally by observer or someone else ϒ acoustically detected by PAM ϒ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name Paul (P.C.)	**Position** (latitude and longitude)	**Water depth** (metres)

Species/ species group Unidentified seal		**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow) Small dolphins, fin with a triangular shape
Bearing to animal (when first seen or heard)	**Range to animal** (when first seen or heard) (metres) 300	

Total number 1	**Number of adults** (visual sightings only) 1	**Number of calves** (visual sightings only)

Behaviour (visual sightings only)

Spyhopping

Direction of travel (relative to ship)				**Direction of travel** (compass points)	
□ towards ship		□ crossing ahead of ship		□ N	□ S
□ away from ship		x variable		□ NE	□ SW
□ parallel to ship in same direction as ship		□ milling		□ E	□ W
□ travelling in opposite direction to ship		□ other		□ SE	□ NW
				x variable	

Airgun (or other source) activity when animals first detected	**Airgun** (or other source) activity when animals last detected	**Closest distance of animals from airguns** (or other source) (metres)	**Time of closest approach** (UTC, 24hr clock) 08:57

x full power □ not firing □ soft start □ reduced power (other than soft start)	x full power □ not firing □ soft start □ reduced power (other than soft start)	**If seen during soft start give**: First distance Closest distance Last distance during soft start (metres)
What action was taken? (according to requirements of guidelines/ regulations in country concerned) x none required □ delay start of firing □ shut-down of active source □ power-down of active source □ power-down then shut-down of active source		**Length of power-down and/ or shut-down** (if relevant) (length of time until subsequent soft start, in minutes)
		Estimated loss of production (if relevant) due to mitigating actions (km)

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** *Roman Rebel*	**Sighting number** (start at 1 for first sighting of survey) 4	**Acoustic detection number** (start at 500 for first detection of survey)
Date 26/07/2024		**Time at start of encounter** (UTC, 24hr clock) 09:37	**Time at end of encounter** (UTC, 24hr clock) 09:41
Were animals detected visually and/ or acoustically? x visual □ acoustic □ both	**How were the animals first detected?** □ visually detected by observer keeping a continuous watch x visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ both visually and acoustically before operators/ observers informed each other		
Observer's/ operator's name Luca Caminti	**Position** (latitude and longitude) 52°43.211 -5°57.607		**Water depth** (metres)
Species/ species group Grey seal		**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow) Small dolphins, fin with a triangular shape	
Bearing to animal (when first seen or heard) 240	**Range to animal** (when first seen or heard) (metres) 300		
Total number 1	**Number of adults** (visual sightings only) 1	**Number of calves** (visual sightings only)	
Behaviour (visual sightings only) Keeping head high out of water without moving			
Direction of travel (relative to ship) □ towards ship x away from ship □ parallel to ship in same direction as ship x travelling in opposite direction to ship	□ crossing ahead of ship □ variable □ milling □ other	**Direction of travel** (compass points) □ N □ S □ NE □ SW □ E □ W □ SE □ NW x variable	

Airgun (or other source) activity when animals first detected	**Airgun** (or other source) activity when animals last detected	**Closest distance of animals from airguns** (or other source) (metres)	**Time of closest approach** (UTC, 24hr clock)
x full power □ not firing □ soft start □ reduced power (other than soft start)	x full power □ not firing □ soft start □ reduced power (other than soft start)	**If seen during soft start give**: First distance Closest distance Last distance during soft start (metres)	
What action was taken? (according to requirements of guidelines/ regulations in country concerned) x none required □ delay start of firing □ shut-down of active source □ power-down of active source □ power-down then shut-down of active source		**Length of power-down and/ or shut-down** (if relevant) (length of time until subsequent soft start, in minutes)	**Estimated loss of production** (if relevant) due to mitigating actions (km)

MARINE MAMMAL RECORDING FORM – SIGHTINGS

Regulatory reference number (e.g. DECC no., MMS permit no., OCS lease no., etc.) FS007555	**Ship/ platform name** *Roman Rebel*	**Sighting number** (start at 1 for first sighting of survey) 5	**Acoustic detection number** (start at 500 for first detection of survey)
Date 01/08/2024		**Time at start of encounter** (UTC, 24hr clock) 19:44	**Time at end of encounter** (UTC, 24hr clock) 19:46
Were animals detected visually and/ or acoustically? x visual □ acoustic □ both	**How were the animals first detected?** □ visually detected by observer keeping a continuous watch x visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ both visually and acoustically before operators/ observers informed each other		
Observer's/ operator's name Luca Caminti	**Position** (latitude and longitude) 54°51.703 -5°54.878		**Water depth** (metres)
Species/ species group Common dolphins		**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow) Small dolphins, fin with a triangular shape	
Bearing to animal (when first seen or heard) 240	**Range to animal** (when first seen or heard) (metres) 400		
Total number 20	**Number of adults** (visual sightings only) 18	**Number of calves** (visual sightings only) 2	
Behaviour (visual sightings only) Bow riding			

<table>
<tr><td colspan="2">Direction of travel (relative to ship)

□ towards ship
□ away from ship
x parallel to ship in same direction as ship
x travelling in opposite direction to ship
□ crossing ahead of ship
□ variable
□ milling
□ other</td><td colspan="2">Direction of travel (compass points)
x N
□ NE
□ E
□ SE
□ variable
□ S
□ SW
□ W
□ NW</td></tr>
<tr><td>Airgun (or other source) activity when animals first detected

□ full power
x not firing
□ soft start
□ reduced power (other than soft start)</td><td>Airgun (or other source) activity when animals last detected

□ full power
x not firing
□ soft start
□ reduced power (other than soft start)</td><td>Closest distance of animals from airguns (or other source) (metres)</td><td>Time of closest approach (UTC, 24hr clock)</td></tr>
<tr><td colspan="2"></td><td colspan="2">If seen during soft start give:
First distance Closest distance Last distance

during soft start (metres)</td></tr>
<tr><td colspan="2">What action was taken?
(according to requirements of guidelines/ regulations in country concerned)
x none required
□ delay start of firing
□ shut-down of active source
□ power-down of active source
□ power-down then shut-down of active source</td><td>Length of power-down and/ or shut-down (if relevant) (length of time until subsequent soft start, in minutes)</td><td>Estimated loss of production (if relevant) due to mitigating actions (km)</td></tr>
</table>

Appendix II Sightings List

Sighting No.	Species	Inside mitigation zone Yes/No	Number of individuals	Date	Initials	Comments
1	Minke Whale	Yes	1	13/07/2024	M.D.	
2	Common dolphins	Yes	12	13/07/2024	M.D./ V.W.	Incidental
3	Common dolphins	Yes	12	13/07/2024	M.D.	Likely same group as sighting #2, but returned at a later time
4	Bottlenose dolphin	No	3	14/07/2024	V.W.	
5	Harbour Porpoise	Yes	1	14/07/2024	M.D.	
6	Common dolphins	Yes	10	16/07/2024	M.D.	
7	Grey seal	Yes	1	19/07/2024	M.L.	Incidental
8	Grey seal	Yes	1	20/07/2024	M.L.	Incidental
9	Common dolphin	Yes	1	21/07/2024	M.L.	
10	Dolphin Species	Yes	2	22/07/2024	V.W.	Incidental
11	Dolphin species	Yes	1	23/07/2024	M.L.	Incidental
12	Unidentified seal	Yes	1	25/07/2024	P.C.	Incidental
13	Grey seal	Yes	1	26/07/2024	L.C.	Incidental
14	Grey seal	Yes	1	29/07/2024	C.F.	
15	Common dolphin	Yes	12	29/07/2024	C.F.	Incidental
16	Grey seal	Yes	1	30/07/2024	C.F.	
17	Common dolphins	Yes	20	01/08/2024	L.C.	Incidental
18	Common dolphin	Yes	1	03/08/2024	C.F.	

Appendix III.I Lady Kathleen Monitoring Effort

Sea state
g = glassy (like mirror)
s = slight (no or few white caps)
c = choppy (many white caps)
r = rough (big waves, foam, spray)

MARINE MAMMAL RECORDING FORM - EFFORT

Regulatory reference number ..... FS007555..... **Ship/ platform name** .....*Lady Kathleen*.....
(e.g. DECC no., MMS permit no., OCS lease no., etc.)

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
14/06	v	M.D.	08:58	09:54	51° 48.343, -8° 17.731	4.8	51° 48.343, -8° 17.731	4.8	0	N	W	1	G	O	g	n
14/06	V	M.D.	09:54	10:18	51° 48.343, -8° 17.731	4.8	51° 48.343, -8° 17.731	4.8	0	S	W	1	G	O	G	N
14/06	V	M.D.	11:10	11:50	51° 48.343, -8° 17.731	4.8	51° 48.343, -8° 17.731	4.8	0	F	W	2	G	O	G	n
14/06	v	M.D.	13:10	14:05	51° 48.343, -8° 17.731	4.8	51° 48.343, -8° 17.731	4.8	0	f	W	1	G	o	g	N
8/07	V	V.W	7:55	8:15	52° 47.629 -6 03.768	4	52° 47.308 -05 58. 183	30	11	n	W	1	G	O	G	S
8/07	V	V.W	8:15	9:10	52° 48.119 -05 58.183	30	52° 48.119 -05 57.476	31.1	6	N	W	1	G	O	G	V
8/07	V	V.W	9:10	9:38	52° 48.119 -05° 57.476	31.1	52° 51.084 -05° 56.594	30	6	S	W	1	G	O	G	V
8/07	V	V.W	9:38	10:28	52° 51.084 -05°56.594	25	52° 54.216 -05° 55.864	23.9	6	F	W	1	G	O	G	V
8/07	V	V.W	10:28	11:21	52° 54.216 -05° 55.864	25	52° 50.642 -05° 55.726	15.6	9	F	W	2	G	O	G	V
8/07	V	V.W	11:30	12:30	52°50.642 -05° 55.726	12.4	52° 52.306 -05° 55.489	14	8.9	N	W	3	G	O	G	V

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
8/07	V	V.W	12:30	13:30	52 52.306 -05° 55.489	14	52° 44.769 -05° 57.170	16	7.4	N	W	3	G	O	G	V
8/07	V	V.W	13:30	15:30	52° 44.769 -05° 57.170	16	52°43.849 -05° 58.574	15	7	N	E	3	G	O	G	S
8/07	V	V.W	15:30	16:27	52° 43.849 -05° 58.574	16	52° 48.452 -05° 56.863	16	4.8	N	E	3	G	O	G	V
8/07	V	V.W	16:27	17:38	52° 48.452 -05° 56.863	22	52° 51.435 -05° 59.630	22	4.9	N	E	3	G	O	G	V
10/07	V	M.D	08:32	10:48	52° 45.218 -05° 55.621	40.6	52° 44.902 -05° 56.630	37.3	3.1	N	E	3	C	O	G	V
10/07	V	M.D	10:45	10:50	52° 44.902 -05° 56.630	37.3	52° 44.286 -05° 56.511	42.8	1.6	N	E	5	C	O	G	N
10/07	V	M.D	10:50	11:13	52° 44.286 -05° 56.511	42.8	52° 44.449 -05° 55.723	43.4	3.1	S	NE	5	C	O	G	N
10/07	V	M.D	11:13	11:28	52° 44.449 -05° 55.723	43.4	52° 44.988 -05° 56.597	38.5	3	S	N	5	C	O	G	N
10/07	V	M.D	11:56	12:32	52° 46.586 -05° 56.168	36.8	52° 47.992 -05° 55.826	35.1	2.1	N	NW	5	C	O	G	N
10/07	V	M.D	12:32	13:13	52° 47.992 -05° 55.826	35.1	52° 49.275 -05° 55.416	33.3	2.4	S	W	5	C	O	G	N
10/07	V	M.D	14:35	15:22	52° 45.100 -05° 56.688	36	52° 41.268 -05° 57.790	41.3	4.6	F	NW	5	C	O	G	N
12/07	V	M.D	13:47	14:21	52° 46.334 -05° 59.933	26.8	52° 46.583 -05° 57.555	13.4	6	F	W	5	C	O	G	N
12/07	V	M.D	14:21	14:43	52° 46.583 -05° 57.555	13.4	52° 46.478 -05° 57.754	21.3	1.6	S	W	5	C	O	G	N
12/07	V	M.D	15:34	16:06	52° 46.075 -05° 57.953	21.3	52° 46.083 -05° 57.950	21.3	4.9	F	W	5	C	O	G	N
13/07	V	M.D	07:11	08:54	52° 41.696 -06° 00.152	41.6	52° 42.009 -05° 57.615	43.1	1.5	N	N	3	C	O	G	N

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
13/07	V	M.D	08:54	09:15	52° 42.009 -05° 57.615	43.1	52° 41.619 -05° 58.485	23.2	2.4	S	N	3	G	O	G	N
13/07	V	M.D	09:15	09:36	52° 41.619 -05° 58.485	23.2	52° 42.170 -05° 57.788	37.2	2.8	S	N	3	G	O	G	N
13/07	V	M.D	10:22	11:27	52° 41.645 -05° 57.680	42.4	52° 42.788 -05° 57.561	37.4	4.1	F	N	3	G	O	G	V
13/07	V	M.D	12:36	13:55	52° 41.386 -05° 56.784	47.9	52° 41.039 -05° 57.436	46.5	4	F	N	2	G	O	G	S
13/07	V	M.D	14:51	15:40	52° 41.127 -05° 58.877	22.8	52° 40.915 -05° 58.934	26.5	3.2	F	N	3	G	O	G	S
14/07	V	M.D	07:48	08:59	52° 46.053 -05° 59.846	31.6	52° 47.750 -05° 57.403	23.6	4.9	N	N	3	G	O	G	N
14/07	V	M.D	08:59	09:21	52° 47.750 -05° 57.403	23.6	52° 48.702 -05° 57.194	28.7	2.6	S	N	3	S	O	G	N
14/07	V	M.D	09:21	09:40	52° 48.702 -05° 57.194	28.7	52° 48.920 -05° 57.194	22.5	2.7	S	SE	3	S	O	G	N
14/07	V	M.D	10:19	11:17	52° 46.813 -05° 57.639	19	52° 46.813 -05° 57.639	19	3.1	F	S	3	S	O	G	N
14/07	V	M.D	13:03	14:03	52° 46.036 -05° 57.838	17.8	52° 48.201 -05° 57.097	20.2	1.8	F	S	4	S	O	G	V
14/07	V	M.D	15:43	15:54	52° 48.731 -05° 56.942	22.9	52° 48.775 -05° 57.036	25.5	4.4	F	S	4	S	O	G	N
15/07	V	M.D	07:33	08:24	52° 41.894 -05° 57.697	40.5	52° 42.620 -05° 57.240	41.9	2	N	S	4	S	O	G	N
15/07	V	M.D	08:24	08:44	52° 42.620 -05° 57.240	41.9	52° 41.250 -05° 57.785	42.7	4	S	SW	4	S	O	G	N
15/07	V	M.D	08:44	09:04	52° 41.250 -05° 57.785	42.7	52° 41.233 -05° 58.102	38	3.2	S	SW	4	S	O	G	N
15/07	V	M.D	10:06	11:11	52° 42.749 -05° 57.987	27.4	52° 43.597 -05° 57.722	25.4	2.8	F	NW	4	S	O	G	N

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
15/07	V	M.D	12:57	13:53	52° 43.330 -05° 57.834	24.1	52° 42.456 -05° 58.105	24.1	4.6	F	NW	4	S	O	G	N
15/07	V	M.D	15:32	16:03	52° 42.056 -05° 57.569	23.3	52° 42.497 -05° 58.025	27.1	3.4	F	N	4	S	O	G	N
16/07	V	M.D	08:32	09:28	52° 40.809 -05° 58.800	26.9	52° 39.989 -05° 56.006	55.5	4.5	N	NE	4	C	M	G	W
16/07	V	M.D	09:28	09:42	52° 39.989 -05° 56.006	55.5	52° 39.668 -05° 56.605	54.6	3	S	NE	5	C	M	G	N
16/07	V	M.D	09:42	10:01	52° 39.668 -05° 56.605	54.6	52° 39.960 -05° 57.389	50.9	9.7	N	NE	5	C	O	G	N
16/07	V	M.D	10:01	10:31	52° 39.960 -05° 57.389	50.9	52° 41.083 -05° 57.839	43	3.1	N	NE	5	C	O	G	N
16/07	V	M.D	10:31	10:52	52° 41.083 -05° 57.839	43	52° 41.748 -05° 57.941	39.3	2.4	S	NE	4	S	O	G	N
16/07	V	M.D	10:52	11:11	52° 41.748 -05° 57.941	39.3	52° 42.244 -05° 58.152	25.8	3.3	S	N	4	S	O	G	N
16/07	V	M.D	12:34	13:35	52° 43.637 -05° 57.647	39.3	52° 43.482 -05° 57.566	31.8	3.2	F	NE	5	S	O	G	N
16/07	V	M.D	14:48	15:52	52° 42.910 -05° 57.649	35.7	52° 43.169 -05° 57.827	26.4	2.9	F	E	4	S	O	G	N
17/07	V	M.D	07:33	08:29	52° 41.481 -05° 58.284	31.8	52° 42.461 -05° 57.441	41.7	0.9	N	SE	3	S	O	G	N
17/07	V	M.D	08:29	08:55	52° 42.461 -05° 57.441	41.7	52° 42.716 -05° 57.722	35	7.5	N	SE	3	S	O	G	N
17/07	V	M.D	08:55	09:16	52° 42.716 -05° 57.722	35	52° 43.015 -05° 57.729	32.9	2.3	S	SE	3	S	O	G	N
17/07	V	M.D	09:16	09:36	52° 43.015 -05° 57.729	32.9	52° 43.399 -05° 57.775	25.4	2.3	S	SE	3	S	O	G	N
17/07	V	M.D.	10:42	11:32	52° 44.193 -05° 57.232	32.8	52° 44.796 -05° 57.058	32.9	2.3	F	S	3	S	O	G	N

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
17/07	V	M.D	13:31	13:43	52° 44.363 -05° 57.326	20.4	52° 44.447 -05° 57.147	27.2	4	F	S	5	R	M	G	N
20/07	V	MML	07:15	07:45	52° 44.278 -05° 56.824	41.4	54° 44.607 -05° 57.148	21.8	4.2	N	S	2	C	M	M	N
20/07	V	MML	08:18	08:50	52° 44.278 -05° 56.824	41.4	54° 44.607 -05° 57.148	21.8	4.2	N	S	2	C	M	M	N
20/07	V	MML	08:50	09:30	52° 44.278 -05° 56.824	41.4	54° 44.607 -05° 57.148	21.8	4.2	S	S	2	C	M	M	N
20/07	V	MML	10:25	11:38	52° 44.231 -05° 57.369	20.6	52° 44.497 -05° 57.321	14.7	6.5	F	WNW	2	C	M	M	N
20/07	V	MML	13:00	14:03	52° 44.202 -05° 57.369	22.4	52° 44.403 -05°57.295	19.1	3.9	F	WNW	2	C	M	M	N
20/07	V	MML	16:00	16:55	52° 44.628 -05° 57.152	20.8	52° 42.912 -05° 57.578	38.4	3.8	F/N	NW	3	C	M	M	N
21/07	V	MML	07:16	08:06	52° 42.584 -06° 00.046	39.3	52° 41.526 -05° 59.412	23.5	8.7	N	WSW	3	S	O	G	W
21/07	V	MML	08:06	09:03	52° 41.526 -05° 59.412	23.5	52° 41.398 -05° 58.812	18.9	9.6	S	WSW	3	S	O	G	W
21/07	V	MML	10:01	10:58	52° 41.295 -05° 58.800	23.7	52° 41.345 -05° 58.772	22.5	2.4	F	SSW	4	C	O	G	W
21/07	V	MML	11:26	12:05	52° 41.435 -05° 59.191	16.4	52° 42.409 -06° 00.706	36.0	2.3	N	SSW	4	C	M	G	W
23/07	V	MML	06:58	07:30	52° 54.259 -05° 55.761	23.5	52° 42.409 -05° 55.894	2.3	1.4	N	S	2	S	O	G	N
23/07	V	MML	07:30	07:50	52° 54.327 -05° 55.894	23.9	52° 54. 184 -05° 55.946	23.6	3.0	S	N	2	S	O	G	N
23/07	V	MML	08:25	09:16	52° 54.655 -05° 55.266	18.6	52° 54.704 -05° 55.105	23.9	0.5	N	N	3	S	O	G	W
23/07	V	MML	09:16	09:56	52° 54.704 -05° 55.105	23.9	52° 54.497 -05° 55.148	21.5	0.8	S	N	3	S	O	G	N

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
23/07	V	MML	11:42	13:00	52° 54.516 -05° 55.114	21.0	52° 54.554 -05° 55.486	23.4	3.1	F	E	3	S	O	G	W
23/07	V	MML	14:47	15:36	52° 54.210 -05° 55.229	17.4	52° 54.433 -05° 55.167	18.6	0.5	F	E	2	5	O	G	N
29/07	V	CF	11:10	12:30	52° 45.131 -05° 56.862	24.2	52° 44.443 -05° 57.108	27.3	0.8	N	W	3	C	O	G	W
29/07	V	CF	13:25	13:45	52° 44.347 -05° 57.384	23.8	52° 44.623 -05° 57.155	26	2.7	F	SW	3	C	O	G	N
29/07	V	CF	14:10	15:10	52° 44.521 -05° 57.152	24.5	52° 44.349 -05° 57.251	24.7	3.2	F	SE	2	C	O	G	W
29/07	V	CF	15:45	16:40	52° 44.338 -05° 57.187	28	52° 44.612 -05° 57.299	23.6	2.9	F	ESE	2	C	O	G	S
30/07	V	CF	08:15	09:25	52° 46.215 -05° 56.421	28.3	52° 47.671 -05° 56.054	23.4	1.9	N/S	NNW	2	C	O	G	W
30/07	V	CF	10:05	11:05	52° 48.714 -05° 55.933	18	52° 49.352 -05° 55.518	31.1	2.8	F	NNW	3	C	O	G	N
30/07	V	CF	11:35	12:35	52° 50.098 -05° 55.510	24	52° 50.094 -05° 55.623	20	3	F	NNW	3	C	O	G	N
30/07	V	CF	13:25	14:25	52° 50.165 -05° 55.697	24.2	52° 50.091 -05° 55.674	19.8	3	F	ESE	3	C	O	G	N
30/07	V	CF	14:40	15:20	52° 49.763 -05° 55.839	18	52° 50.165 -05° 55.697	21.5	2.7	F	E	3	C	O	G	N
31/07	V	CF	10:20	11:20	52° 49.311 -05° 55.769	23.8	52° 49.787 -05° 55.831	27	2.8	N	E	3	C	O	G	W
31/07	V	CF	11:55	12:55	52° 50.169 -05° 55.548	24.9	52° 49.785 -05° 55.819	11.9	3	S/F	E	3	C	O	G	N
31/07	V	CF	13:40	15:00	52° 50.209 -05° 55.708	21	52° 53.907 -05° 55.075	14	3.5	F	E	3	C	O	G	W
31/07	V	CF	15:30	16:00	52° 54.493 -05° 55.174	18.3	52° 54.233 -05° 55.085	18	1.5	F	E	2	C	O	G	S

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
01/08	V	CF	07:05	08:05	52° 54.886 -05° 55.019	27	52° 54.641 -05° 57.947	15.6	2	N/S	W	2	G	O	G	N
01/08	V	CF	08:35	09:35	52° 54.874 -05° 57.070	17	52° 54.416 -05° 54.132	29	3.2	S/F	W	2	S	O	G	N
01/08	V	CF	10:00	11:00	52° 54.650 -05° 56.556	22	52° 53.970 -05° 54.047	27.7	4	F	SW	2	S	O	G	N
01/08	V	CF	11:30	12:30	52° 54.322 -05° 55.143	18.2	52° 54.464 -05° 55.18	27	2.5	F	SW	3	S	O	G	W
01/08	V	CF	13:00	14:10	52° 54.319 -05° 55.645	24	52° 51.963 -05° 55.242	28	4	F	SW	3	S	O	G	S
01/08	V	CF	14:30	15:30	52° 50.629 -05° 55.567	22	52° 50.318 -05° 55.649	20	4	F	SW	3	S	O	G	S
01/08	V	CF	16:00	16:22	52° 52.975 -05° 54.918	29.4	52° 54.621 -05° 55.253	19	5	F	SE	3	S	O	G	S
03/08	V	CF	06:30	08:08	52° 51.953 -06° 00.180	18.4	52° 54.507 -05° 55.164	20.1	8	N/S/F	W	3	S	O	G	S
03/08	V	CF	08:50	10:05	52° 54.622 -05° 53.742	28.1	52° 42.687 -05° 57.642	38	12	N	S	4	C	O	G	S
03/08	V	CF	10:06	10:45	52° 42.687 -05° 57.642	38	52° 43.438 -05° 57.359	36.8	1.3	N	SW	3	C	O	G	W
03/08	V	CF	11:40	12:43	52° 44.560 -05° 56.900	34.7	52° 44.602 -05° 57.242	24.8	5.8	F	S	3	C	O	G	N
03/08	V	CF	13:45	14:20	52° 44.815 -05° 56.888	31	52° 44.025 -05° 57.442	29.2	1.5	F	S	4	C	O	G	N

MARINE MAMMAL RECORDING FORM - EFFORT

Sea state
g = glassy (like mirror)
s = slight (no or few white caps)
c = choppy (many white caps)
r = rough (big waves, foam, spray)

Regulatory reference number ..... FS007555..... **Ship/ platform name** .....*Roman Rebel*.....
(e.g. DECC no., MMS permit no., OCS lease no., etc.)

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
14/06	v	C.F.	09:30	11:45	51.898653, -8.462225	7	51.898653, -8.462225	8	0	N	SW	3	S	O	G	V
05/07	V	MD	15:54	16:55	52° 54.9102, -5° 52.8942		52° 52.486, -5° 54.647			N	W	4	S	O	G	N
05/07	V	MD	16:55	16:18	52° 52.486, -5° 54.647		52° 52.151, -5° 54.741			N	W	4	C	M	G	N
05/07	V	MD	16:18	16:40	52° 52.151, -5° 54.741		52° 51.722, -5° 54.856			S	W	4	C	M	G	N
06/07	V	MD	03:37	04:57	52° 42.605, -5° 56.579		52° 44.984, -5° 56.646			N	W	5	C	O	G	N
06/07	v	MD	04:57	05:06	52° 44.984, -5° 56.646		52° 44.660, -5° 56.517			S	W	5	C	O	G	N
06/07	V	MD	05:06	05:19	52° 44.660, -5° 56.517		52° 44.266, -5° 57.015			S	W	5	C	O	G	N
06/07	V	MD	05:19	05:47	52° 44.266, -5° 57.015		52° 43.108, -5° 57.410			S	W	5	C	O	G	N
06/07	V	MD	06:22	07:02	52° 41.849, -5° 57.655					N	NW	5	C	O	G	S
06/07	V	MD	07:02	08:19			52° 38.877, -5° 58.880			S	NW	5	C	O	G	S
06/07	V	MD	10:01	10:52	52° 43.318, -5° 57.210					N	NW	5	S	O	G	W
06/07	V	MD	10:52	11:47			52° 38.411, -5° 58.450			S	NW	5	S	O	G	W

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
06/07	V	MD	13:20	14:18	52° 42.0580, -5° 57.6000		52° 41.588, -5° 57.726			F	W	4	S	O	G	N
06/07	V	MD	15:18	16:13	52° 38.7903, -5° 58.6360		52° 41.296 -5° 57.802			F	W	4	S	O	G	N
06/07	V	MD	17:21	17:47	52° 40.794, -5° 57.638		52° 39.951, -5° 57.793			F	NW	4	S	O	G	N
06/07	V	MD	19:04	19:34	52° 38.264, -5° 58.057		52° 37.837, -5° 58.091			N	NW	4	C	M	G	N
06/07	V	MD	19:34	20:22	52° 37.837, -5° 58.091		52° 40.874, -5° 57.923			S	W	3	C	O	G	N
07/07	V	MD	04:03	04:33	52° 41.195, -5° 57.709		52° 42.022, -5° 57.397			N	W	2	S	O	G	N
07/07	V	MD	04:33	04:53	52° 42.022, -5° 57.397		52° 42.495, -5° 56.882			S	NW	2	G	O	G	N
07/07	V	MD	04:53	05:14	52° 42.495, -5° 56.882		52° 41.403, -5° 57.015			S	NW	2	G	O	G	N
07/07	V	MD	07:23	08:26	52° 41.829, -5° 57.466		52° 40.716, -5° 57.960			F	W	2	G	O	G	N
07/07	v	MD	10:26	11:06	52° 40.569, -5° 57.927		52° 43.476, -5° 57.387			F	S	2	S	O	G	W
07/07	V	MD	13:28	14:11	52° 42.447, -5° 57.755		52° 40.850, -5° 57.365			F	S	2	S	O	G	N
07/07	V	MD	15:44	16:18	52° 42.000, -5° 57.080		52° 40.712, -5° 57.347			F	SW	2	S	O	G	N
07/07	V	MD	20:04	20:48	52° 49.273, -5° 55.565		52° 52.623, -5° 54.621			F	SW	2	S	O	G	N
08/07	V	MD	05:56	06:31	52° 46.377, -5° 56.407		52° 48.459, -5° 55.758			F	S	2	S	O	G	S
08/07	V	MD	08:19	09:34	52° 54.962, -5° 53.247		52° 54.892, -5° 53.315			F	S	3	S	O	G	S

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
10/07	V	VW	12:11	13:20	53°18.287 -6°07.615	12	53°10.940 -5°59.039	54	9	N	SW	4	C	O	G	N
10/07	V	VW	14:09	14:30	53°03.408 -5°55.842	20	53°00.046 -5°54.605	60	12	N	SW	4	C	O	G	N
10/07	V	VW	14:30	15:06	53°00.046 -5°54.605	60	52°55.508 -5°55.434	18	12	N (PW)	SE	4	C	O	G	N
10/07	V	VW	15:06	15:26	52°55.508 -5°55.434	18	52°55.938 -5°54.479	45	1.9	S	W	3	S	O	G	N
10/07	V	VW	15:26	16:26	52°55.938 -5°54.479	45	52°52.452 -5°56.498	33	1.9	F (multibeam and SBP)	W	3	S	O	G	N
10/07	V	VW	17:05	18:26	52°49.493 -5°57.067	28	52°44.342 -5°58.630	29	4.3	F (multibeam and SBP)	S	3	C	O	G	N
10/07	V	VW	18:26	19:21	52°44.342 -5°58.630	30	52°41.417 -5°59.468	30	3.2	F (multibeam and SBP)	S	3	C	O	G	N
10/07	V	VW	19:21	20:45	52°41.417 -5°59.468	30	52°39.015 -6°00.196	47	2.9	F (multibeam and SBP)	S	3	C	O	G	N
11/07	V	VW	4:00	4:42	52°44.387 5°57.113	32	52°47.438 -5°56.127	30	4	F (multibeam and SBP)	NW	4	S	O	G	N
11/07	V	VW	4:42	6:15	52°47.438 -5°56.127	30	52°53.980 -5°55.086	18	4.4	F (multibeam and SBP)	NW	4	S	O	G	N
13/07	V	VW	5:00	6:07	52°52.938 -5°54.531	40	52°47.941 -5°55.824	37	4.8	N	N	3	S	O	G	N
13/07	V	VW	6:07	6:40	52°47.941 -5°55.824	39	52°45.187 -5°56.564	40	4.9	N	N	3	S	O	G	N
13/07	V	VW	7:07	8:00	52°45.187 -5°56.564	43	52°39.520 -5°58.092	41	4.7	N	N	2	S	O	G	V
13/07	V	VW	8:20	8:53	52°39.520 -5°58.092	41	52°40.192 -5°58.572	48	3.7	N (pre watch)	N	2	S	O	G	N
13/07	V	VW	8:53	9:34	52°40.192 -5°58.572	48	52°40.192 -5°58.572	47	3.5	S	N	2	S	O	G	N

Date	Visual watch or PAM v = visual watch p = PAM	Observer's/ operator's name(s)	Time of start of watch (UTC, 24hr clock)	Time of end of watch (UTC, 24hr clock)	Start position (latitude and longitude)	Depth at start (m)	End position (latitude and longitude)	Depth at end (m)	Speed of vessel (knots)	Source activity **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	Wind direction	Wind force (Beaufort scale)	Sea state	Swell o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	Visibility (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	Sunglare (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
13/07	V	VW	9:34	11:16	52°40.192 -5°58.572	47	52°40.192 -5°58.572	47	3.5	F(Seismic)	N	2	S	O	G	N
13/07	V	VW	11:53	13:13	52°46.649 -5°56.400	34	52°50.502 -5°55.186	29	2.8	N	N	2	S	O	G	N
13/07	V	VW	13:13	14:14	52°50.502 -5°55.186	29	52°53.622 -5°54.347	38	3	N (prewatch)	N	2	S	O	G	N
13/07	V	VW	14:14	14:42	52°53.622 -5°54.347	38	52°54.952 -5°53.945	34	2	N (prewatch)	N	2	G	O	G	N
13/07	V	VW	14:42	15:07	52°53.622 -5°54.347	34	52°56.089 -5°53.552	32	2	S	N	2	G	O	G	N
13/07	V	VW	15:07	15:27	52°56.089 -5°53.552	32	52°56.757 -5°54.074	57	2	F	N	2	G	O	G	N
13/07	V	VW	16:40	17:32	52°55.037 -5°53.434	28.2	52°54.397 -5°53.682	29	2.8	F	S	3	S	O	G	N
13/07	V	VW	18:49	19:44	52°52.578 -5°54.652	38	52°49.051 -5°55.639	40	4.4	F	S	3	S	O	G	N
14/07	V	VW	4:50	6:11	52°54.974 -5°53.554	26	52°51.246 -5°55.503	26	3.2	F(Seismic)	NW	2	G	O	G	N
14/07	V	VW	6:11	6:35	52°51.246 -5°55.503	26	52°50.846 -5°55.096		3.2	F	NW	2	G	O	G	N
14/07	V	VW	7:04	8:05	52°51.809 -5°54.868	26	52°53.409 -5°54.986	26	2.2	F	NW	2	G	O	G	N
14/07	V	VW	8:06	9:05	52°53.409 -5°54.986	26	52°50.506 -5°55.573	26	2.4	F	NW	1	G	O	G	N
14/07	V	VW	9:05	10:11	52°50.506 -5°55.573	26	52°50.860 -5°55.537	28	2.4	F	NW	1	G	O	G	N
14/07	V	VW	10:11	10:31	52°50.860 -5°55.537	28	52°51.670 -5°55.219	28	3.8	F	NW	1	G	O	G	N
14/07	V	VW	12:00	13:13	52°52.308 -5°54.727	28	52°52.837 -5°55.173	24	2.4	F	NW	1	S	O	G	S

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14/07	V	VW	13:13	14:15	52°52.837 -5°55.173	24	52°54.719 -5°55.931	26	3.5	F	NW	1	S	O	G	S
14/07	V	VW	14:15	15:29	52°54.719 -5°55.931	26	52°54.646 -5°55.083	30	3.5	F	NW	1	S	O	G	S
14/07	V	VW	15:29	16:07	52°54.646 -5°55.083	30	52°55.411 -5°54.879	30	3.1	F	NW	1	S	O	G	S
14/07	V	VW	16:46	17:19	52°55.169 -5°54.414	30	52°54.082 -5°54.739	28	4.3	N (Prewatch)	S	4	G	O	G	N
14/07	V	VW	17:19	17:59	52°54.082 -5°54.739	28	52°54.116 -5°55.072	28	2.5	S	S	4	S	O	G	N
14/07	V	VW	17:59	18:24	52°54.116 -5°55.072	28	52°53.900 -5°54.895	30	3.4	F	S	4	C	O	G	N
14/07	V	VW	18:37	20:30	52°52.990 -5°55.109	30	52°50.645 -5°55.386		3.4	F	S	4	C	O	G	N
15/07	V	VW	4:43	5:23	52°55.650 -5°54.548	28	52°54.933 -5°55.385	27	3.2	F	S	1	G	O	G	V
15/07	V	VW	5:23	6:21	52°54.933 -5°55.385	27	52°52.305 -5°56.512	25	3.1	F	S	1	G	O	G	V
15/07	V	VW	6:48	7:38	52°50.694 -5°56.935		52°47.649 -5°57.759		3.9	F	E	2	S	O	G	N
15/07	V	VW	7:38	8:34	52°47.649 -5°57.759		52°44.702 -5°58.517	27	3.3	F	E	2	S	O	G	N
15/07	V	VW	9:30	10:30	52°42.015 -5°59.278	27	52°41.836 -5°59.357	25	3.4	F	E	2	S	O	G	N
15/07	V	VW	10:30	10:56	52°41.836 -5°59.357	25	52°43.206 -5°58.952	25	3.4	F	E	2	S	O	G	N
15/07	V	VW	11:33	12:41	52°45.712 -5°58.317		52°49.679 -5°57.295		2.9	F	E	2	S	O	G	N
15/07	V	VW	13:27	14:30	52°52.540 -5°56.505		52°55.089 -5°55.695	27	3.9	F	E	2	S	O	G	N

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
15/07	V	VW	14:30	16:00	52°55.089 -5°55.695		52°53.830 -5°55.995		3.9	F	E	2	S	O	G	N
15/07	V	VW	17:27	18:12	52°53.407 -5°56.330		52°51.243 -5°56.809		2.7	F	E	3	S	O	G	N
15/07	V	VW	18:12	19:00	52°51.243 -5°56.809		52°51.243 -5°56.809		2.7	F	E	3	S	O	G	N
15/07	V	VW	19:00	20:00	52°51.243 -5°56.809		52°44.442 -5°58.623		2.7	F	E	4	S	O	G	N
15/07	V	VW	20:00	20:50	52°44.442 -5°58.623		53°15.799 -6°01.217		1.9	F	E	4	S	O	G	N
16/07	V	VW	4:37	5:47	52°50.928 5°56.919		52°54.275 5°56.119		3.2	F	NW	3	S	O	G	N
16/07	V	VW	6:03	6:30	52°55.351 -5°55.740		52°54.164 -5°55.379		3.9	F	NW	3	S	O	G	N
16/07	V	VW	7:20	8:05	52°55.318 -5°54.829		52°54.164 -5°55.379		5.3	F	NW	3	S	O	G	V
16/07	V	VW	8:05	9:03	52°54.164 -5°55.379		52°50.809 -5°56.953		5	F	NW	3	S	O	G	V
16/07	V	VW	9:03	10:02	52°50.809 -5°56.953		52°46.905 -5°57.901		3.8	F	NW	3	S	O	G	V
16/07	V	VW	10:08	10:56	52°46.270 -5°58.150		52°43.592 -5°58.879		3.8	F	NW	3	S	O	G	V

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
16/07	V	VW	12:07	13:01	52°40.902 -5°58.615		52°40.902 -5°58.614		2.4	F	NW	3	S	O	G	V
16/07	V	VW	13:01	14:06	52°40.902 -5°58.614		52°42.033 5°59.350		2.4	F	NW	3	S	O	G	V
16/07	V	VW	14:14	15:13	52°42.975 -5°59.069		52°47.084 -5°57.877		4.1	F	NW	3	S	O	G	V
16/07	V	VW	15:13	15:56	52°47.084 -5°57.877		52°50.028 -5°57.254		4.1	F	SE	3	S	O	G	V
16/07	V	VW	17:15	18:06	52°55.458 -5°55.648		52°54.483 -5°55.764		4.4	F	SE	3	S	O	G	V
16/07	V	VW	18:06	19:00	52°54.483 -5°55.764		52°54.382 -5°56.127		2.9	F	SE	3	S	O	G	V
16/07	V	VW	20:00	21:00	52°54.382 5°56.127		52°50.976 -5°56.937		4.4	F	SE	3	S	O	G	V
17/06	V	VW	4:30	5:41	52°49.395 -5°56.853		52°53.342 -5°56.071		4.3	F	W	2	G	O	G	V

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
17/06	V	VW	5:42	6:30	52°53.342 -5°56.071		52°54.755 -5°55.677		3.6	F	W	2	G	O	G	V
17/06	V	VW	7:10	8:20	52°53.408 -5°56.062		52°54.514 -5°56.053		2.6	N	W	2	G	O	G	V
17/06	V	VW	8:20	9:30	52°54.514 5°56.053		52°55.309 -5°55.951		0.4	N	W	3	S	O	G	V
17/06	V	VW	9:30	10:30	52°55.309 -5°55.951		52°55.751 -5°55.756		0.5	N	W	3	S	O	G	V
17/06	V	VW	10:30	11:00	52°55.751 -5°55.756		52°56.207 5°55.230		1	N	W	3	S	O	G	V
17/06	V	VW	12:08	13:08	52°59.719 -5°54.210		53°08.870 -5°56.932		9.1	N	S	4	C	O	G	V
17/06	V	VW	13:08	14:20	53°08.870 -5°56.932		53°08.870 -5°56.932		10.2	N	S	4	C	O	G	V
19/07	v	VW	20:00	21:00	53°18.329 -6°07.169	13	53°16.251 -6°00.635	28	4.6	n	NE	4	s	o	g	n

Date	Visual watch or PAM v = visual watch p = PAM	Observer's/ operator's name(s)	Time of start of watch (UTC, 24hr clock)	Time of end of watch (UTC, 24hr clock)	Start position (latitude and longitude)	Depth at start (m)	End position (latitude and longitude)	Depth at end (m)	Speed of vessel (knots)	Source activity **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	Wind direction	Wind force (Beaufort scale)	Sea state	Swell o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	Visibility (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	Sunglare (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
20/07	v	VW	4:40	5:58	52°38.434 -5°59.772	47	52°43.746 -5°58.977	36	5.6	n	S	4	c	o	p	n
20/07	v	VW	5:58	6:29	52°43.746 -5°58.977	36	52°47.050 -5°58.119	38	6.2	n	S	4	c	o	m	n
20/07	v	VW	7:30	8:26	52°52.592 -5°56.387	31	52°57.108 -5°54.892	20.5	5.5	n	S	4	s	o	m	n
20/07	v	VW	8:26	9:16	52°57.108- 5°54.892	20.5	52°55.796 -5°55.215	18	4.8	n (pre watch)	S	4	s	o	g	n
20/07	v	VW	9:16	09:25	52°55.796- 5°55.215	18	52°55.637 -5°55.294	19	0.9	n (pre watch)	S	4	s	o	g	n
20/07	v	VW	09:25	10:05	52°55.637- 5°55.294	19	52°55.313 -5°55.046	23.5	0.7	s	S	4	s	o	m	n
20/07	v	VW	10:05	10:20	52°55.313- 5°55.046	23.5	52°54.495 -5°55.773	25	2.9	f	S	4	s	o	m	n
20/07	v	VW	10:25	10:45	52°54.495- 5°55.773	25	52°53.377 -5°56.091	31	3.8	f	S	3	s	o	m	n

Date	Visual watch or PAM v = visual watch p = PAM	Observer's/ operator's name(s)	Time of start of watch (UTC, 24hr clock)	Time of end of watch (UTC, 24hr clock)	Start position (latitude and longitude)	Depth at start (m)	End position (latitude and longitude)	Depth at end (m)	Speed of vessel (knots)	Source activity **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	Wind direction	Wind force (Beaufort scale)	Sea state	Swell o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	Visibility (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	Sunglare (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
20/07	v	VW	12:03	13:02	52°47.854 -5°57.407		52°44.093 -5°58.61		4.6	f	S	3	s	o	g	n
20/07	v	VW	13:02	14:06	52°44.093 -5°58.61		52°43.655 -5°58.854		2.2	f	S	3	s	o	g	n
20/07	v	VW	14:06	15:12	52°43.655 -5°58.854		52°44.611 -5°59.044		2.2	f	S	3	s	o	g	n
20/07	v	VW	15:12	15:46	52°44.611 -5°59.044		52°43.573 -5°58.939		2.1	f	S	2	s	o	g	n
20/07	v	VW	16:58	17:44	52°42.950 -5°59.265		52°44.528 -5°58.867		3.2	f	SW	1	g	o	g	n
20/07	v	VW	17:44	18:33	52°44.528 -5°58.867		52°45.054 -5°58.247		4.6	f	SW	1	g	o	g	n
20/07	v	VW	18:33	18:57	52°45.054 -5°58.247		52°46.858 -5°57.713		4.1	f	NW	5	c	o	g	n
20/07	v	VW	18:57	19:39	52°46.858 -5°57.713		52°49.892 -5°56.745		4.5	f	NW	5	c	o	g	n

Date	Visual watch or PAM v = visual watch p = PAM	Observer's/ operator's name(s)	Time of start of watch (UTC, 24hr clock)	Time of end of watch (UTC, 24hr clock)	Start position (latitude and longitude)	Depth at start (m)	End position (latitude and longitude)	Depth at end (m)	Speed of vessel (knots)	Source activity **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	Wind direction	Wind force (Beaufort scale)	Sea state	Swell o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	Visibility (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	Sunglare (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
20/07	v	VW	19:39	20:43	52°49.892 -5°56.745		52°52.072 -5°56.543		2.6	f	NW	3	c	o	g	n
21/07	v	VW	5:20	6:32	52°46.483 -5°57.801		52°51.461 -5°56.347		4.8	f	W-SW	3	s	o	g	n
21/07	v	VW	6:57	7:35	52°53.224 -5°56.263		52°53.591 -5°55.956		0.8	f	W-SW	3	s	o	g	n
21/07	v	VW	7:35	8:05	52°53.591 -5°55.956		52°53.186 -5°56.255		3.8	N (pre watch)	SW	4	s	o	g	n
21/07	v	VW	8:05	8:45	52°53.186 -5°56.255		52°52.914 -5°56.117		4.2	s	SW	4	s	o	g	n
21/07	v	VW	8:45	8:54	52°54.719 -5°55.538		52°54.719 -5°55.538		4.1	f	SW	4	s	o	g	n
21/07	v	VW	8:54	9:30	52°54.719 -5°55.538		52°55.841 -5°55.050		4.1	n	SW	4	s	o	g	n
21/07	v	VW	9:30	11:00	52°55.841 -5°55.050		52°59.293 5°54.586		2	n	SW	4	c	o	g	n

Date	Visual watch or PAM v = visual watch p = PAM	Observer's/ operator's name(s)	Time of start of watch (UTC, 24hr clock)	Time of end of watch (UTC, 24hr clock)	Start position (latitude and longitude)	Depth at start (m)	End position (latitude and longitude)	Depth at end (m)	Speed of vessel (knots)	Source activity **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	Wind direction	Wind force (Beaufort scale)	Sea state	Swell o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	Visibility (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	Sunglare (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
21/07	v	VW	12:13	14:12	52°54.719 -5°55.538		53°10.906 -5°59.072	20	1.7	n	S	3	c	o	g	n
21/07	v	VW	14:12	15:14	53°10.906 -5°59.072	20	53°18.195 -6°06.502	9	8	n	S	4	c	o	g	n
22/07	v	VW	19:44	20:52	53°16.139 -6°07.748		53°15.799 -6°01.217	27.5	6	n	S	4	s	o	p	n
23/07	v	VW	5:27	6:31	52°51.292 -5°56.897	28	52°49.646 -5°57.315	27	2.4	n	S	5	c	o	g	n
23/07	v	VW	6:52	7:43	52°49.361 -5°57.379	27	52°49.025 -5°57.503	25	0.4	n	S	4	c	o	g	n
23/07	v	VW	7:43	8:20	52°49.025- 5°57.503	25	52°48.475 -5°57.658	31	0.3	N (pre watch)	S	4	c	o	g	n
23/07	v	VW	8:20	9:00	52°48.475- 5°57.658	31	52°47.565 -5°57.697	33	0.3	s	S	3	s	o	g	n
23/07	v	VW	9:00	9:20	52°47.565- 5°57.697	33	52°47.127 -5°57.825	33	1.5	f	S	3	s	o	g	n

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
23/07	v	VW	9:46	10:43	52°46.412 -5°58.132	33	52°44.745 -5°58.578		2.2	f	S	2	s	o	g	s
23/07	v	VW	12:36	13:11	52°45.055 -5°58.707		52°42.918 -5°58.961		4.1	f	S	2	s	o	g	v
23/07	v	VW	13:11	14:01	52°42.918 -5°58.961		52°42.112 -5°59.302		3.9	f	S	1	g	o	g	v
23/07	v	VW	14:01	14:54	52°42.112 -5°59.302		52°41.385 -5°59.515		4.2	f	S	1	g	o	g	v
23/07	v	VW	14:54	15:08	52°41.385 -5°59.515		52°41.162 6°00.186	40	4.2	N (prewatch started 14:38)	S	1	g	o	g	s
23/07	v	VW	15:08	15:48	52°41.1626°00.186	40	52°42.110 -5°59.539		4.4	s	S	1	g	o	g	s
23/07	v	VW	15:48	15:58	52°42.110 -5°59.539		52°41.451 -5°59.512		3.8	f	S	1	g	o	g	s
23/07	v	VW	17:38	18:55	52°42.856 -5°59.716	37	52°46.727 -5°58.309	34	2.1	n	S	1	g	o	g	n

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
23/07	v	VW	19:07	19:57	52°47.592 -5°58.033	34	52°56.362 -5°55.342	22	4.1	n	S	2	g	o	g	n
23/07	v	VW	19:57	20:45	52°56.362 - 5°55.342	22	53°06.059 -5°56.960	29	12.6	n	S	2	g	o	g	n
25/07	v	LC	5:14	6:12	52°50.352 - 5°56.925	25	52°47.437 - 5°57.907	28	3	n	SW	1	s	o	g	n
25/07	v	LC	6:12	7:02	52°47.437 - 5°57.907	28	52°45.968 - 5°58.157	35	1.3	s	SW	2	s	o	p	n
25/07	v	LC	7:02	7:47	52°45.968 - 5°58.157	35	52°44.802 - 5°58.270	15	1.3	s	SW	2	s	o	m	n
25/07	v	LC	8:33	9:40	52°48.154 - 5°57.257	24	52°53.717 - 5°56.000	28	4.1	f	S	1	g	o	g	v
25/07	v	LC	9:45	12:58	52°55.203 - 5°55.563	28	52°54.891 - 5°56.341	25	3.2	s	SW	2	g	o	m	v
25/07	v	LC	13:37	14:08	52°54.428 - 5°55.820	21	52°52.710 - 5°56.003	24	3.1	f	SW	2	g	o	g	n
25/07	v	LC	16:38	17:14	52°43.215 - 5°58.800	12	52°40.950 - 5°59.194	40	4.5	f	SW	4	c	o	g	v
25/07	v	LC	17:21	18:03	52°41.098 - 6°00.452	40	52°42.089 - 5°59.364	27	2.8	s	SW	6	s	o	p	v

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
25/07	v	LC	18:03	19:02	52°42.089 - 5°59.364	27	52°41.841 - 5°59.382	24	3	s	SW	2	g	o	g	v
25/07	v	LC	19:36	20:00	52°43.665 - 5°58.864	22	52°44.610 - 5°58.485	25	3.8	f	SW	3	g	o	g	v
26/07	v	LC	5:09	5:55	52°47.515 - 5°56.072	25	52°43.502 - 5°57.479	32	4.5	f	W	4	g	o	g	n
26/07	v	LC	6:20	7:15	52°42.177 - 5°58.103	25	52°43.204 - 5°57.503	31	2.0	f	WSW	4	g	o	g	v
26/07	v	LC	8:53	9:30	52°42.629 - 5°58.038	21	52°42.809 - 5°57.542	34	1.6	f	SW	3	g	o	g	v
26/07	v	LC	10:18	11:03	52°45.975 - 5°56.750	15	52°49.023 - 5°55.851	21	4	f	SW	2	g	o	g	n
26/07	v	LC	12:49	14:10	52°54.752 - 5°54.680	29	52°54.454 - 5°56.028	21	2	s	SW	5	s	o	g	v
26/07	v	LC	15:31	16:30	52°50.476 - 5°57.021	25	52°47.900 - 5°57.179	16	4.1	f	SSW	5	s	m	g	n
26/7	v	LC	17:51	18:45	52°42.265 - 5°59.363	27	52°43.162 - 5°59.058	29	2.1	f	SW	4	s	o	g	n
26/7	v	LC	19:27	19:57	52°45.336 - 5°58.842	32	52°46.667 - 5°57.655	18	4.2	r	SW	4	g	o	g	n
27/7	v	LC	5:01	5:57	52°44.727 - 5°56.834	29	52°45.576 - 5°56.713	23	1	f	SW	3	g	o	g	n

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
27/7	v	LC	7:06	8:20	52°40.205 - 5°52.972	28	52°44.268 - 5°56.992	34	3.9	f	SW	3	g	o	g	n
27/7	v	LC	10:18	11.27	52°49.044 - 5°55.834	19	52°54.861 - 5°54.534	31	4.2	f	SW	2	g	o	g	v
27/7	v	LC	12:31	13:41	52°43.939 - 5°54.968	23	52°54.031 - 5°54.954	22	4.2	f	SW	4	g	o	m	v
27/7	v	LC	14:43	15:36	52°54.712 - 5°54.401	31	52°53.824 - 5°54.599	38	4.2	f	SW	4	g	o	g	v
27/7	v	LC	16:36	17:42	52°53.555 - 5°55.132	16	52°51.663 - 5°54.853	27	5.4	r	SW	2	g	o	g	n
27/7	v	LC	18:41	19:40	52°46.499 - 5°56.535	29	52°43.109 - 5°57.296	40	5.1	f	S	3	g	o	g	n
28/7	v	LC	5:00	6:28	52°52.398 - 5°54.783	34	52°50.631 - 5°55.156	25	6.5	f	N	1	g	o	g	v
28/7	v	LC	7:15	8:14	52°46.342 - 5°56.549	24	52°41.710 - 5°57.773	40	5.1	f	SE	1	g	o	g	v
28/7	v	LC	9:59	10:56	52°41.046 - 5°58.548	29	52°41.853 - 5°58.373	19	3.1	f	SE	1	g	o	g	v
28/7	v	LC	12:15	12:33	52°41.287 - 5°58.602	14	52°40.687 - 5°58.426	31	2.4	f	S	3	g	o	p	n
28/7	v	LC	13:44	14:24	52°40.453 - 5°58.620	34	52°42.255 - 5°58.060	27	5.4	f	SW	2	g	o	g	w

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
28/7	v	LC	15:31	16:30	52°46.598 - 5°56.494	24	52°49.139 - 5°55.758	23	3.0	f	S	4	s	o	g	v
28/7	v	LC	16:32	17:12	52°49.321 - 5°55.651	25	52°50.911 - 5°55.477	22	1.3	s	S	4	s	o	g	v
28/7	v	LC	18:49	20:00	52°51.130 - 5°55.466	26	52°48.555 - 5°55.577	18	4.4	f	SW	4	s	o	g	v
29/7	v	LC	17:18	18:18	52°43.993 - 5°58.724	24	52°45.154 - 5°58.502	27	8.3	n	S	4	s	o	g	n
29/7	v	LC	19:56	21:25	52°46.736 - 5°58.258	33	52°47.504 - 5°58.033	32	0.8	n	SW	3	s	o	g	v
30/7	v	LC	4:40	5:54	52°48.592 - 5°57.037	23	52°48.910 - 5°56.980	21	2.5	n	NE	4	g	o	g	n
30/7	v	LC	7:20	8:16	52°51.343 - 5°56.415	21	52°51.710 - 5°56.681	33	2.4	f	N	4	g	o	g	n
30/7	v	LC	9:19	10:23	52°53.010 - 5°56.314	27	52°53.599 - 5°56.049	28	1.3	r	N	4	s	o	g	n
30/7	v	LC	11:36	12:35	52°53.206 - 5°56.026	23	52°53.476 - 5°56.097	29	3.2	f	N	4	s	o	g	n
30/7	v	LC	13:53	15:14	52°54.487 - 5°54.330	33	52°53.823 - 5°55.069	17	4.2	f	N	3	g	o	g	w
30/7	v	LC	16:37	17:40	52°54.159 - 5°54.790	37	52°52.762 - 5°55.229	18	4.3	f	NE	2	g	o	g	w

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
30/7	v	LC	18:56	19:46	52°50.779 - 5°55.609	20	52°46.852 - 5°56.413	26	4.7	f	N	2	g	o	g	n
31/7	v	LC	4:59	5:58	52°48.671 - 5°55.944	18	52°51.547 - 5°55.373	20	3.3	f	N	4	s	o	g	w
31/7	v	LC	7:06	8:03	52°52.179 - 5°55.250	21	52°52.047 - 5°55.269	21	1.2	f	N	4	s	o	g	w
31/7	v	LC	8:54	10:21	52°52.049 - 5°55.191	23	52°53.863 - 5°55.060	25	1.0	n	N	5	s	o	g	v
31/7	v	LC	11:21	12:20	52°52.509 - 5°57.661	20	52°48.370 - 5°57.031	18	5.6	s	N	4	s	o	g	v
31/7	v	LC	12:35	14:17	52°46.752 - 5°57.663	17	52°43.034 - 5°58.972	20	2.2	f	N	3	s	o	g	n
31/7	v	LC	16:27	17:39	52°41.309 - 5°58.541	27	52°45.030 - 5°58.170	17	2.6	f	N	4	s	o	g	w
31/7	v	LC	18:44	19:59	52°49.467 - 5°57.424	27	52°48.840 - 5°57.335	27	3.9	f	N	3	g	o	g	n
01/8	v	LC	4:30	5:44	52°44.649 - 5°58.610	26	52°47.315 - 5°57.476	16	4.4	n/s	N	1	g	o	g	n
01/8	v	LC	8:08	9:30	52°50.776 - 5°56.837	25	52°53.991 - 5°55.945	28	5.2	n/s	NE	2	g	o	g	n
01/8	v	LC	9:35	10:45	52°53.781 - 5°56.059	27	52°44.867 - 5°58.693	26	6	n/s	N	2	g	o	g	n

Date	**Visual watch or PAM** v = visual watch p = PAM	**Observer's/ operator's name(s)**	**Time of start of watch** (UTC, 24hr clock)	**Time of end of watch** (UTC, 24hr clock)	**Start position** (latitude and longitude)	**Depth at start** (m)	**End position** (latitude and longitude)	**Depth at end** (m)	**Speed of vessel** (knots)	**Source activity** **f** = full power **s** = soft start **r** = reduced power (not soft start) **n** = not active	**Wind direction**	**Wind force** (Beaufort scale)	**Sea state**	**Swell** o = low (< 2 m) m = medium (2-4 m) l = large (> 4 m)	**Visibility** (visual watch only) **p** = poor (< 1 km) **m** =mod. (1-5 km) **g** = good (> 5 km)	**Sunglare** (visual watch only) **n** = no glare **w** = weak glare **s** = strong glare **v** = variable
01/8	v	LC	14:40	15:48	52°48.161 - 5°57.431	25	52°51.676 - 5°57.165	25	2.4	n/s	SW	3	g	o	g	v

MARINE MAMMAL RECORDING FORM - OPERATIONS

Regulatory reference number ..... FS007555..... **Ship/ platform name** .....*Lady Kathleen*.....
(e.g. DECC no., MMS permit no., OCS lease no., etc.)

Complete this form every time the airguns are used, including overnight, whether for shooting a line or for testing or for any purpose.
Times should be in UTC, using the 24 hour clock.

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
14/06	x	10:54	11:16	N/A	N/A		14:19	08:58	11:20	N/A	N/A	d	N
08/07	T multibeam and sub bottom	9:10	9:38	9:38	11:30		11:30	8:15	9:10	N/a	N/a	D	N
09/07/2024	T			15:18:50						N/A	N/A	D	N
09/07/2024	T			15:19:16						N/a	N/a	D	N
09/07/2024	T			15:19:21						N/A	N/A	D	N
09/07/2024	T			15:52:17						N/a	N/a	d	N
09/07/2024	T			15:52:26						N/A	N/A	D	N
09/07/2024	T			16:00:15	16:00:36					N/a	N/a	D	N
10/07/2024	t	10:38	11:28	N\A	N/A		11:53	08:32	10:48	N/A	N/A	D	N
10/07/2024	T (sparker only)	12:32	13:13	N/A	N/A		16:44	11:54	12:32	N/a	N/a	D	N
12/07/2024	T(SBP only)	14:21	14:43	14:56:36	15:05:29			13:47	14:21	N/A	N/A	d	N
12/07/2024	T			15:10:11	15:20:48					N/a	N/a	D	N
12/07/2024	T			15:27:05	15:34:39					N/A	N/A	D	N

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
12/07/2024	T			15:40:27	15:53:07					N/a	N/a	D	N
12/07/2024	T			15:56:09	16:02:42					N/A	N/A	d	N
12/07/2024	T			16:06:26	16:17:23					N/a	N/a	D	N
12/07/2024	T			16:19:18	16:25:51					N/A	N/A	D	N
12/07/2024	T			16:28:32	16:37:53					N/a	N/a	D	N
12/07/2024	T			16:39:39	16:46:17					N/A	N/A		
12/07/2024	T			16:49:41	16:57:31		16:58			N/a	N/a		
13/07/2024	T	08:54	09:36	09:50:00	10:01:03			07:11	08:54	N/A	N/A	D	Y
13/07/2024	T			10:10:30	10:20:23					N/a	N/a	D	N
13/07/2024	T			10:23:23	10:23:45					N/A	N/A	D	N
13/07/2024	T			10:41:50	10:54:30					N/a	N/a	D	N
13/07/2024	T			11:00:48	11:08:28					N/A	N/A	D	N
13/07/2024	L			12:54:07	13:15:02					N/a	N/a	D	N
13/07/2024	L			13:30:12	13:41:28					N/A	N/A	D	N
13/07/2024	L			13:57:01	14:11:47					N/a	N/a	D	N
13/07/2024	L			14:23:14	14:27:46					N/A	N/A	D	N
13/07/2024	L			14:35:25	14:39:09					N/a	N/a	D	N
13/07/2024	L			14:48:27	14:54:25					N/A	N/A	D	N
13/07/2024	L			15:21:59	15:26:02					N/a	N/a	D	N
13/07/2024	L			15:34:29	15:39:25		15:40			N/A	N/A	D	N
14/07/2024	L	08:59	09:40	09:45:50	10:31:42			07:48	08:59	N/a	N/a	D	N
14/07/2024	L			10:41:12	11:16:39					N/A	N/A	D	N
14/07/2024	L			11:33:31	12:55:18					N/a	N/a	D	N
14/07/2024	L			13:06:23	13:37:24					N/A	N/A	D	N
14/07/2024	L			13:44:52	13:45:06					N/a	N/a	D	N
14/07/2024	L			13:50:54	14:58:00					N/A	N/A	D	N
14/07/2024	L			15:09:57	15:42:01		16:54			N/a	N/a	D	N

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
15/07/2024	L			09:19:09	09:34:25			07:33	08:24	N/A	N/A	D	N
15/07/2024	L			09:48:43	10:14:04					N/A	N/A	D	N
15/07/2024	L			10:14:24	10:14:47					N/A	N/A	D	N
15/07/2024	L			10:28:36	10:56:23					N/A	N/A	D	N
15/07/2024	L			11:04:54	11:27:41					N/A	N/A	D	N
15/07/2024	L			11:38:01	12:00:51					N/A	N/A	D	N
15/07/2024	L			12:10:15	12:38:06					N/A	N/A	D	N
15/07/2024	L			12:46:29	13:06:30					N/A	N/A	D	N
15/07/2024	L			13:16:11	13:48:04					N/A	N/A	D	N
15/07/2024	L			13:54:57	14:15:14					N/A	N/A	D	N
15/07/2024	L			14:26:24	14:56:30					N/A	N/A	D	N
15/07/2024	L			15:03:16	15:25:32					N/A	N/A	D	N
15/07/2024	L			15:34:30	16:02:16		16:03			N/A	N/A	D	N
16/07/2024	L	10:31	11:11	11:19:50	11:40:40			10:01	10:31	N/A	N/A	D	N
16/07/2024	L			11:47:11	11:50:45					N/A	N/A	D	N
16/07/2024	L			12:01:25	12:06:45					N/A	N/A	D	N
16/07/2024	L			12:14:19	12:18:51					N/A	N/A	D	N
16/07/2024	L			12:24:27	12:29:29					N/A	N/A	D	N
16/07/2024	L			12:50:12	12:54:45					N/A	N/A	D	N
16/07/2024	L			13:04:22	13:08:51					N/A	N/A	D	N
16/07/2024	L			13:17:34	13:22:25					N/A	N/A	D	N
16/07/2024	L			13:30:05	13:34:29					N/A	N/A	D	N

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
16/07/2024	L			13:44:14	13:49:33					N/A	N/A	D	N
16/07/2024	L			13:58:08	14:01:40					N/A	N/A	D	N
16/07/2024	L			14:10:46	14:16:15					N/A	N/A	D	N
16/07/2024	L			14:23:36	14:27:21					N/A	N/A	D	N
16/07/2024	L			14:37:39	14:43:37					N/A	N/A	D	N
16/07/2024	L			15:04:10	15:24:45					N/A	N/A	D	N
16/07/2024	L			15:35:30	16:05:57					N/A	N/A	D	N
16/07/2024	L			16:12:33	16:33:24		16:35			N/A	N/A	D	N
17/07/2024	L	08:55	09:36	10:06:00	10:33:22			07:33	08:55	N/A	N/A	D	N
17/07/2024	L			10:45:53	10:54:55					N/A	N/A	D	N
17/07/2024	L			11:02:03	11:05:19					N/A	N/A	D	N
17/07/2024	L			11:13:38	11:21:39					N/A	N/A	D	N
17/07/2024	L			11:36:07	11:40:20					N/A	N/A	D	N
17/07/2024	L			11:49:06	11:56:17					N/A	N/A	D	N
17/07/2024	L			12:10:24	12:14:08					N/A	N/A	D	N

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
17/07/2024	L			12:25:13	12:30:42					N/A	N/A	D	N
17/07/2024	L			12:37:45	12:37:48					N/A	N/A	D	N
17/07/2024	L			12:59:02	13:03:40					N/A	N/A	D	N
17/07/2024	L			13:11:56	13:16:16					N/A	N/A	D	N
17/07/2024	L			13:30:47	13:34:50		13:43			N/A	N/A	D	N
20/07/2024	L	09:50	10:30	09:36:47	09:47:05			08:50	09:50	N/A	N/A	D	N
20/07/2024	L			09:55:01	10:00:50					N/A	N/A	D	N
20/07/2024	L			10:13:32	10:17:12					N/A	N/A	D	N
20/07/2024	L			10:25:37	10:32:08					N/A	N/A	D	N
20/07/2024	L			10:37:08	10:41:04					N/A	N/A	D	N
20/07/2024	L			10:53:28	11:01:53					N/A	N/A	D	N
20/07/2024	L			11:15:50	11:18:44					N/A	N/A	D	N
20/07/2024	L			11:31:48	11:42:58					N/A	N/A	D	N
20/07/2024	L			12:02:06	12:04:38					N/A	N/A	D	N
20/07/2024	L			12:22:52	12:43:39					N/A	N/A	D	N

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
20/07/2024	L			13:01:55	13:19:41					N/A	N/A	D	N
20/07/2024	L			13:35:44	13:49:49					N/A	N/A	D	N
20/07/2024	L			14:02:07	14:12:59					N/A	N/A	D	N
20/07/2024	L			14:22:57	14:31:31					N/A	N/A	D	N
20/07/2024	L			14:43:06	14:50:29					N/A	N/A	D	N
20/07/2024	L			15:00:05	15:05:47					N/A	N/A	D	N
20/07/2024	L			15:09:52	15:13:24					N/A	N/A	D	N
20/07/2024	L			15:19:01	15:23:42					N/A	N/A	D	N
20/07/2024	L			15:28:45	15:32:13					N/A	N/A	D	N
20/07/2024	L			15:37:19	15:42:01					N/A	N/A	D	N
20/07/2024	L			15:45:57	15:50:00					N/A	N/A	D	N
20/07/2024	L			15:55:38	16:00:11					N/A	N/A	D	N
20/07/2024	L			16:07:31	16:11:14		16:13			N/A	N/A	D	N
21/07/2024	L	08:06	08:52	08:55:59	09:12:27			07:16	08:06	N/A	N/A	D	N
21/07/2024	L			09:26:12	09:32:59					N/A	N/A	D	N

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
21/07/2024	L			09:44:08	09:50:01					N/A	N/A	D	N
21/07/2024	L			09:57:51	10:01:17					N/A	N/A	D	N
21/07/2024	L			10:11:51	10:16:53					N/A	N/A	D	N
21/07/2024	L			10:24:26	10:28:22					N/A	N/A	D	N
21/07/2024	L			10:35:47	10:40:30					N/A	N/A	D	N
21/07/2024	L			10:47:13	10:51:36					N/A	N/A	D	N
21/07/2024	L			10:58:12	11:02:29					N/A	N/A	D	N
21/07/2024	L			11:17:09	11:23:03		11:24			N/A	N/A	D	N
29/07/2024	L	12:25	13:05	13:05:28	13:14:03			11:10	12:30	N/A	N/A	D	N
29/07/2024	L			13:29:50	13:33:41					N/A	N/A	D	N
29/07/2024	L			13:42:02	13:49:04					N/A	N/A	D	N
29/07/2024	L			13:56:28	14:00:18					N/A	N/A	D	N
29/07/2024	L			14:09:30	14:16:08					N/A	N/A	D	N
29/07/2024	L			14:35:21	14:39:21					N/A	N/A	D	N
29/07/2024	L			14:50:25	14:56:48					N/A	N/A	D	N
29/07/2024	L			15:10:21	15:14:27					N/A	N/A	D	N

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
29/07/2024	L			15:25:41	15:31:33					N/A	N/A	D	N
29/07/2024	L			15:42:20	15:46:35					N/A	N/A	D	N
29/07/2024	L			15:59:22	16:04:29					N/A	N/A	D	N
29/07/2024	L			16:17:05	16:21:38					N/A	N/A	D	N
29/07/2024	L			16:35:18	16:39:50		16:41			N/A	N/A	D	N
30/07/2024	L	09:25	10:05	10:12:42	10:15:26			08:15	09:25	N/A	N/A	D	N
30/07/2024	L			10:29:23	10:51:13					N/A	N/A	D	N
30/07/2024	L			11:07:18	11:23:13					N/A	N/A	D	N
30/07/2024	L			11:39:18	11:43:05					N/A	N/A	D	N
30/07/2024	L			11:51:43	11:56:47					N/A	N/A	D	N
30/07/2024	L			12:09:52	12:13:41					N/A	N/A	D	N
30/07/2024	L			12:22:08	12:26:12					N/A	N/A	D	N
30/07/2024	L			12:38:39	12:43:37					N/A	N/A	D	N
30/07/2024	L			12:52:59	12:56:38					N/A	N/A	D	N
30/07/2024	L			13:10:51	13:16:34					N/A	N/A	D	N
30/07/2024	L			13:28:38	13:32:17					N/A	N/A	D	N
30/07/2024	L			13:46:50	13:52:41					N/A	N/A	D	N

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
30/07/2024	L			14:04:57	14:08:33					N/A	N/A	D	N
30/07/2024	L			14:23:12	14:29:24					N/A	N/A	D	N
30/07/2024	L			14:42:57	14:46:29					N/A	N/A	D	N
30/07/2024	L			15:01:42	15:07:56					N/A	N/A	D	N
30/07/2024	L			15:20:23	15:23:50		15:25			N/A	N/A	D	N
31/07/2024	L	11:20	12:01	12:10:04	12:13:25			10:20	11:20	N/A	N/A	D	N
31/07/2024	L			12:28:38	12:35:25					N/A	N/A	D	N
31/07/2024	L			12:50:36	12:54:23					N/A	N/A	D	N
31/07/2024	L			13:24:51	13:30:04					N/A	N/A	D	N
31/07/2024	L			13:44:01	13:48:54					N/A	N/A	D	N
31/07/2024	L			14:02:35	14:20:34					N/A	N/A	D	N
31/07/2024	L			15:06:03	15:09:07					N/A	N/A	D	N
31/07/2024	L			15:32:57	15:46:34		15:49			N/A	N/A	D	N
01/07/2024	L	08:05	08:45	08:45:44	09:11:48			07:05	08:05	N/A	N/A	D	N
01/08/2024	L			09:34:36	09:58:51					N/A	N/A	D	N

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
01/08/2024	L			10:26:32	10:30:06					N/A	N/A	D	N
01/08/2024	L			10:39:14	10:52:57					N/A	N/A	D	N
01/08/2024	L			11:24:51	11:37:32					N/A	N/A	D	N
01/08/2024	L			11:56:06	12:06:25					N/A	N/A	D	N
01/08/2024	L			12:23:09	12:31:46					N/A	N/A	D	N
01/08/2024	L			12:47:01	12:54:52					N/A	N/A	D	N
01/08/2024	L			13:12:51	13:19:39					N/A	N/A	D	N
01/08/2024	L			13:35:45	13:39:28					N/A	N/A	D	N
	L			14:26:06	14:45:26					N/A	N/A	D	N
01/08/2024	L			14:56:15	15:00:00					N/A	N/A	D	N
01/08/2024	L			15:23:21	15:26:56					N/A	N/A	D	N
01/08/2024	L			16:16:44	16:19:46		16:21			N/A	N/A	D	N
03/08/2024	L	07:02	07:25	07:35:54	07:38:28			06:30	08:08	N/A	N/A	D	N
03/08/2024	L			07:57:54	08:19:57					N/A	N/A	D	N
03/08/2024	L			08:31:23	08:48:05					N/A	N/A	D	N

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
03/08/2024	L			11:25:07	11:34:54					N/A	N/A	D	N
03/08/2024	L			11:53:48	12:04:15					N/A	N/A	D	N
03/08/2024	L			12:29:09	12:43:26					N/A	N/A	D	N
03/08/2024	L			13:11:55	13:31:23					N/A	N/A	D	N
03/08/2024	L			13:57:28	14:00:51		14:03			N/A	N/A	D	N

MARINE MAMMAL RECORDING FORM - OPERATIONS

Regulatory reference number ..... FS007555..... **Ship/ platform name** .....*Roman Rebel*.....
(e.g. DECC no., MMS permit no., OCS lease no., etc.)

Complete this form every time the airguns are used, including overnight, whether for shooting a line or for testing or for any purpose.
Times should be in UTC, using the 24 hour clock.

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
14/06/2024	t	1145	1205	n/a	n/a			09:45	11:45			d	no
05/07/2024	T	16:54	17:34	17:34:35	17:38:18			15:54	16:55			d	no
05/07/2024	L			17:43:16	17:48:37							d	no
05/07/2024	L			18:12:42	18:19:45							d	no
05/07/2024	L			18:20:16	18:46:45							d	no
05/07/2024	L			18:50:52	20:24:29							d	no
05/07/2024	L			20:24:33	20:26:42							d	no
05/07/2024	L			20:27:38	20:42:46		20:48					d	no
06/07/2024	L	05:06	05:19	05:30:46	05:34:16			04:57	05:06			d	no
06/07/2024	L			05:48:02	05:53:57							d	no

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
06/07/2024	L			08:26:50	08:28:30							d	no
06/07/2024	L			11:13:24	11:56:54							d	no
06/07/2024	L			11:56:59	13:55:02							d	no
06/07/2024	L			14:15:35	14:28:29							d	no
06/07/2024	L			20:21:53	20:32:03							d	no
06/07/2024	L			21:44:46	21:49:20							d	no
06/07/2024	L			22:00:59	22:11:31							d	no
06/07/2024	L			22:31:01	22:35:35							d	no
06/07/2024	L			22:36:21	22:44:43							d	no
06/07/2024	L			23:58:32	00:03:44							d	no
07/07/2024	L	0l4:33	05:14	05:38:47	05:45:41			04:03	04:33			d	no
07/07/2024	L			06:22:51	06:29:52							d	no
07/07/2024	L			07:09:12	07:17:10							d	no
07/07/2024	L			08:30:07	08:34:48							d	no
07/07/2024	L			09:32:00	09:38:10							d	no
07/07/2024	L			10:31:25	10:38:32							d	no
07/07/2024	L			11:19:41	11:25:56							d	no

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
07/07/2024	L			11:31:04	11:36:03							d	no
07/07/2024	L			12:55:11	13:04:07							d	no
07/07/2024	L			13:08:40	13:23:44							d	no
07/07/2024	L			13:23:49	13:36:03							d	no
07/07/2024	L			13:36:08	13:51:18							d	no
07/07/2024	L			15:55:53	16:01:08							d	no
07/07/2024	L			16:56:22	17:03:02							d	no
07/07/2024	L			17:35:49	17:43:53							d	no
07/07/2024	L			18:07:27	18:14:25							d	no
07/07/2024	L			18:50:10	21:13:31							d	no
07/07/2024	L			22:10:36	22:16:28							d	no
07/07/2024	L			23:03:30	01:34:35							d	no
08/07/2024	L			02:01:23	02:10:08							d	no
08/07/2024	L			03:35:28	03:44:54							d	no
08/07/2024	L			04:32:01	04:42:00							d	no
08/07/2024	L			05:24:42	07:50:00							d	no
08/07/2024	L			09:57:09	09:57:21							d	no

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
08/07/2024	L			10:15:24	10:20:03							d	no
08/07/2024	L			11:32:44	11:39:27							d	no
08/07/2024	L			12:14:50	14:30:48							d	no
08/07/2024	L			14:43:29	14:58:16							d	no
08/07/2024	L			14:58:24	15:04:33							d	no
08/07/2024	L			15:08:30	16:16:53							d	no
08/07/2024	L			16:18:33	16:24:17							d	no
08/07/2024	L			16:28:08	17:17:19							d	no
08/07/2024	L			17:17:31	17:51:57							d	no
08/07/2024	L			18:03:24	20:34:28		20:36					d	no
10/07/2024	l (MBES and SBP)	15:06	15:26	15:59	17:38			14:30	15:06	N/A	N/A	d	no
10/07/2024	l (MBES and SBP)			17:49	19:36							d	no
10/07/2024	l (MBES and SBP)			20:35	21:17							k	no
10/07/2024	l (MBES and SBP)			21:21	21:41							n	no
10/07/2024	l (MBES and SBP)			21:49	22:04							n	no
10/07/2024	l (MBES and SBP)			22:11	22:42							n	no

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
10/07/2024	l (MBES and SBP)			22:49	23:07							n	no
10/07/2024	l (MBES and SBP)			23:14	23:53							n	no
11/07/24	l (MBES and SBP)			00:04	00:15							n	no
11/07/24	l (MBES and SBP)			00:26	00:48							n	no
11/07/24	l (MBES and SBP)			24:49	1:42					N/A	N/A	n	no
11/07/24	l (MBES and SBP)			2:01	2:33							n	no
11/07/24	l (MBES and SBP)			2:40	3:43							n	no
11/07/24	l (MBES and SBP)			3:45	5:12							w	no
11/07/24	l (MBES and SBP)			5:14	6:27		6:27					d	no
13/07/24	l (seismic)	8:53	9:34	10:05	10:27		11:40	8:20	8:53	N/A	N/A	d	no
13/07/24	l			11:20	11:28					N/A	N/A	d	no
13/07/24	l	14:42					14:43	13:13	14:42	N/A	N/A	d	no
13/07/24	l	15:07	15:27	16:06	16:13			13:13	15:07	N/A	N/A	d	no
13/07/24	l			17:06	17:14					N/A	N/A	d	no
13/07/24	l			18:16	18:21					N/A	N/A	d	no
13/07/24	l			18:24	20:47					N/A	N/A	d	no
13/07/24	l			21:18	21:25					N/A	N/A	d	no
13/07/24	l			21:50	22:00					N/A	N/A	n	no
13/07/24	l			22:25	22:38					N/A	N/A	n	no
14/07/24	l			22:58	01:29					N/A	N/A	n	no
14/07/24	l			2:40	2:46					N/A	N/A	n	no
14/07/24	l			3:34	3:40					N/A	N/A	n	no

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
14/07/24	l			4:22	4:28					N/A	N/A	w	no
14/07/24	l			5:11	5:17					N/A	N/A	d	no
14/07/24	l			5:39	6:14					N/A	N/A	d	no
14/07/24	l			8:08	8:44					N/A	N/A	d	no
14/07/24	l			9:12	9:21					N/A	N/A	d	no
14/07/24	l			9:45	9:51					N/A	N/A	d	no
14/07/24	l			10:10	10:17					N/A	N/A	d	no
14/07/24	l			10:38	10:45					N/A	N/A	d	no
14/07/24	l			11:03	11:22					N/A	N/A	d	no
14/07/24	l			11:48	11:49					N/A	N/A	d	no
14/07/24	l			12:22	12:26					N/A	N/A	d	no
14/07/24	l			12:58	13:21					N/A	N/A	d	no
14/07/24	l			13:23	13:45					N/A	N/A	d	no
14/07/24	l			14:37	14:45					N/A	N/A	d	no
14/07/24	l			15:15	15:37					N/A	N/A	d	no
14/07/24	l			16:10	16:28					N/A	N/A	d	no
14/07/24	l			16:59	17:13		17:13			N/A	N/A	d	No
14/07/24	l	17:18	17:58	18:04	18:19			16:20	17:18	N/A	N/A	d	No
14/07/24	l			18:33	19:15					N/A	N/A	d	No
14/07/24	l			19:43	19:49					N/A	N/A	d	No
14/07/24	l			20:19	20:25					N/A	N/A	d	No
15/07/24	l			20:49	21:37					N/A	N/A	d	No
15/07/24	l			21:56	22:22					N/A	N/A	k	No
15/07/24	l			22:40	23:06					N/A	N/A	n	No
15/07/24	l			23:44	0:07					N/A	N/A	n	No
15/07/24	l			0:44	1:43					N/A	N/A	n	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
15/07/24	l			2:08	2:31					N/A	N/A	n	No
15/07/24	l			2:45	2:57					N/A	N/A	n	No
15/07/24	l			3:26	4:03					N/A	N/A	n	No
15/07/24	l			4:15	4:30					N/A	N/A	w	No
15/07/24	l			4:52	5:05					N/A	N/A	d	No
15/07/24	l			5:38	9:40					N/A	N/A	d	No
15/07/24	l			10:18	14:01					N/A	N/A	d	No
15/07/24	l			14:34	15:24					N/A	N/A	d	No
15/07/24	l			15:47	16:10					N/A	N/A	d	No
15/07/24	l			16:40	20:50					N/A	N/A	d	No
15/07/24	l			20:53	21:00					N/A	N/A	d	No
15/07/24	l			21:13	21:50					N/A	N/A	n	No
15/07/24	l			22:19	22:25					N/A	N/A	n	No
15/07/24	l			22:30	22:49					N/A	N/A	n	No
15/07/24	l			23:10	23:34					N/A	N/A	n	No
15/07/24	l			23:42	23:56					N/A	N/A	n	No
16/07/24	l			00:20	00:29					N/A	N/A	n	No
16/07/24	l			00:36	1:07					N/A	N/A	n	No
16/07/24	t			1:35	1:45					N/A	N/A	n	No
16/07/24	l			1:58	5:57					N/A	N/A	n/d	No
15/07/24	l			6:14	6:21					N/A	N/A	d	No
15/07/24	l			6:37	7:05					N/A	N/A	d	No
16/07/24	l			7:22	7:27					N/A	N/A	d	No
16/07/24	l			8:05	11:41					N/A	N/A	d	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
16/07/24	t			12:00	12:39					N/A	N/A	d	No
16/07/24	l			13:02	13:28					N/A	N/A	d	No
16/07/24	l			13:47	17:11					N/A	N/A	d	No
16/07/24	l			17:42	17:49					N/A	N/A	d	No
16/07/24	l			18:15	18:24					N/A	N/A	d	No
16/07/24	l			18:41	22:40					N/A	N/A	d	No
17/07/24	l			22:43	22:51					N/A	N/A	n	No
17/07/24	l			23:18	23:24					N/A	N/A	n	No
17/07/24	l			23:59	0:07					N/A	N/A	n	No
17/07/24	l			0:34	0:42					N/A	N/A	n	No
17/07/24	l			1:09	1:18					N/A	N/A	n	No
17/07/24	l			1:41	1:48					N/A	N/A	n	No
17/07/24	l			2:09	2:14					N/A	N/A	n	No
17/07/24	l			2:44	3:09					N/A	N/A	d	No
17/07/24	l			3:19	4:58					N/A	N/A	w	No
17/07/24	l			5:08	5:18					N/A	N/A	d	No
17/07/24	l			5:42	6:06					N/A	N/A	d	No
17/07/24	l			6:31	7:06		7:10			N/A	N/A	d	No
20/07/24	l	9:25	10:05	10:20	10:41			8:55	9:25	N/A	N/A	d	No
20/07/24	l			10:52	12:45					N/A	N/A	d	No
20/07/24	l			13:54	14:05					N/A	N/A	d	No
20/07/24	l			14:10	14:21					N/A	N/A	d	No
20/07/24	l			14:43	14:53					N/A	N/A	d	No
20/07/24	l			15:26	15:37					N/A	N/A	d	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
20/07/24	l			15:44	15:56					N/A	N/A	d	No
20/07/24	l			16:27	16:46					N/A	N/A	d	No
20/07/24	l			17:12	17:34					N/A	N/A	d	No
20/07/24	l			18:17	20:16					N/A	N/A	d	No
20/07/24	l			20:44	20:45					N/A	N/A	d	No
20/07/24	l			20:57	21:24					N/A	N/A	k	No
20/07/24	l			21:29	21:58					N/A	N/A	n	No
20/07/24	l			22:14	22:40					N/A	N/A	n	No
20-21/07/24	l			22:45	00:53					N/A	N/A	n	No
21/07/24	l			1:06	1:31					N/A	N/A	n	No
21/07/24	l			2:32	2:37					N/A	N/A	n	No
21/07/24	l			3:14	3:26					N/A	N/A	n	No
21/07/24	l			4:01	4:11					N/A	N/A	w	No
21/07/24	l			4:31	4:58					N/A	N/A	d	No
21/07/24	l			5:09	6:45		7:35			N/A	N/A	d	No
21/07/24	l	8:05	8:45	8:47	8:53		8:54	7:35		N/A	N/A	d	No
23/07/24	l	8:20	9:00	9:17	9:33			7:50		N/A	N/A	d	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
23/07/24	l			9:58	10:17					N/A	N/A	d	No
23/07/24	l			10:37	10:50					N/A	N/A	d	No
23/07/24	l			11:14	11:28					N/A	N/A	d	No
23/07/24	l			11:54	12:01					N/A	N/A	d	No
23/07/24	l			12:05	12:12					N/A	N/A	d	No
23/07/24	l			12:41	13:15					N/A	N/A	d	No
23/07/24	l			13:49	13:53					N/A	N/A	d	No
23/07/24	l			13:54	13:57					N/A	N/A	d	No
23/07/24	l			13:58	14:03					N/A	N/A	d	No
23/07/24	l			14:08	14:14					N/A	N/A	d	No
23/07/24	l			14:47	14:53		14:54			N/A	N/A	d	No
23/07/24	l	15:08	15:48	15:56	16:02		16:02	14:38	15:48	N/A	N/A	d	No
25/07/24	l	7:05	7:45	7:50	9:29			6:35	7:45	N/A	N/A	d	No
25/07/24	l			9:37	9:41					N/A	N/A	d	No
25/07/24	l			9:47	9:51		9:52			N/A	N/A	d	No
25/07/24	l	10:47	11:17	11:23	11:24			9:57	11:17	N/A	N/A	d	No
25/07/24	l	11:42	12:28	12:31	12:41			11:07	12:28	N/A	N/A	d	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
25/07/24	l	12:48	13:28	13:32	13:39					N/A	N/A	d	No
25/07/24	l			13:50	13:56					N/A	N/A	d	No
25/07/24	l			13:57	14:03					N/A	N/A	d	No
25/07/24	l			14:09	16:08					N/A	N/A	d	No
25/07/24	l			16:21	16:53					N/A	N/A	d	No
25/07/24	l			17:03	17:10		17:14			N/A	N/A	d	No
25/07/24	l	17:21	18:02	18:11	18:19		18:20	16:53	18:02	N/A	N/A	d	No
25/07/24	l	18:23	19:02	19:07	19:14					N/A	N/A	d	No
25/07/24	l			19:19	19:24					N/A	N/A	d	No
25/07/24	l			19:27	19:36					N/A	N/A	d	No
25/07/24	l			19:40	19:46					N/A	N/A	d	No
25/07/24	t			20:06	20:38					N/A	N/A	d	No
25/07/24	l			21:16	21:20					N/A	N/A	n	No
25/07/24	l			21:27	21:32					N/A	N/A	n	No
25/07/24	l			21:40	21:44					N/A	N/A	n	No
25/07/24	l			21:51	21:55					N/A	N/A	n	No
25/07/24	l			22:02	22:06					N/A	N/A	n	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
25/07/24	t			22:13	22:18					N/A	N/A	n	No
25/07/24	l			22:23	22:27					N/A	N/A	n	No
25/07/24	l			23:56	00:01					N/A	N/A	n	No
26/07/24	l			00:32	00:55					N/A	N/A	n	No
26/07/24	l			01:07	01:17					N/A	N/A	n	No
26/07/24	l			01:35	01:44					N/A	N/A	n	No
26/07/24	l			02:14	02:27					N/A	N/A	n	No
26/07/24	l			02:55	03:32					N/A	N/A	n	No
26/07/24	l			03:54	03:57					N/A	N/A	n	No
26/07/24	l			04:05	04:11					N/A	N/A	n	No
26/07/24	l			04:15	04:19					N/A	N/A	n	No
26/07/24	l			04:25	04:28					N/A	N/A	n	No
26/07/24	l			04:35	04:39					N/A	N/A	n	No
26/07/24	l			04:43	04:51					N/A	N/A	n	No
26/07/24	l			5:00	5:05					N/A	N/A	d	No
26/07/24	l			5:12	5:16					N/A	N/A	d	No
26/07/24	l			5:25	5:30					N/A	N/A	d	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
26/07/24	l			5:33	5:38					N/A	N/A	d	No
26/07/24	l			5:56	6:02					N/A	N/A	d	No
26/07/24	l			6:29	6:45					N/A	N/A	d	No
26/07/24	l			7:10	7:22					N/A	N/A	d	No
26/07/24	l			7:42	7:48					N/A	N/A	d	No
26/07/24	l			8:03	8:10					N/A	N/A	d	No
26/07/24	t			8:26	8:29					N/A	N/A	d	No
26/07/24	l			8:44	8:57					N/A	N/A	d	No
26/07/24	l			9:13	9:19					N/A	N/A	d	No
26/07/24	l			9:36	9:40					N/A	N/A	d	No
26/07/24	l			10:01	10:08					N/A	N/A	d	No
26/07/24	l			10:20	11:03					N/A	N/A	d	No
26/07/24	t			11:07	11:11					N/A	N/A	d	No
26/07/24	l			11:21	11:26					N/A	N/A	d	No
26/07/24	l			11:34	11:38					N/A	N/A	d	No
26/07/24	l			11:46	11:50					N/A	N/A	d	No
26/07/24	l			11:55	12:01					N/A	N/A	d	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
26/07/24	l			12:05	12:07					N/A	N/A	d	No
26/07/24	l			12:11	12:15					N/A	N/A	d	No
26/07/24	l			13:12	13:18		13:20			N/A	N/A	d	No
26/07/24	l	13:26	14:09	14:14	14:24			12:56	14:09	N/A	N/A	d	No
26/07/24	l			14:38	14:46					N/A	N/A	d	No
26/07/24	l			15:04	15:10					N/A	N/A	d	No
26/07/24	l			15:22	15:29					N/A	N/A	d	No
26/07/24	l			15:39	15:44					N/A	N/A	d	No
26/07/24	l			16:18	16:59					N/A	N/A	d	No
26/07/24	l			17:31	17:38					N/A	N/A	d	No
26/07/24	l			17:43	17:47					N/A	N/A	d	No
26/07/24	l			18:37	18:45					N/A	N/A	d	No
26/07/24	l			19:43	20:28					N/A	N/A	d	No
26/07/24	l			20:48	21:05					N/A	N/A	n	No
26/07/24	l			21:39	21:44					N/A	N/A	n	No
26/07/24	l			22:11	22:41					N/A	N/A	n	No
26/07/24	l			22:49	22:53					N/A	N/A	n	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
26/07/24	l			23:03	23:06					N/A	N/A	n	No
26/07/24	t			23:15	23:20					N/A	N/A	n	No
26/07/24	l			23:56	00:17					N/A	N/A	n	No
27/07/24	l			00:28	00:43					N/A	N/A	n	No
27/07/24	l			00:53	01:12					N/A	N/A	n	No
27/07/24	l			1:35	01:43					N/A	N/A	n	No
27/07/24	l			1:48	1:55					N/A	N/A	n	No
27/07/24	t			2:03	2:10					N/A	N/A	n	No
27/07/24	l			2:27	2:36					N/A	N/A	n	No
27/07/24	l			2:41	2:47					N/A	N/A	n	No
27/07/24	l			2:50	2:56					N/A	N/A	n	No
27/07/24	l			3:04	3:09					N/A	N/A	n	No
27/07/24	l			3:31	3:35					N/A	N/A	n	No
27/07/24	l			3:44	3:48					N/A	N/A	n	No
27/07/24	l			3:52	4:23					N/A	N/A	n	No
27/07/24	l			4:27	4:30					N/A	N/A	n	No
27/07/24	l			4:33	4:37					N/A	N/A	n	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
27/07/24	l			5:14	5:41					N/A	N/A	d	No
27/07/24	l			5:57	6:17					N/A	N/A	d	No
27/07/24	l			6:50	6:55					N/A	N/A	d	No
27/07/24	l			7:15	7:31					N/A	N/A	d	No
27/07/24	l			7:42	7:54					N/A	N/A	d	No
27/07/24	l			8:00	8:26					N/A	N/A	d	No
27/07/24	l			8:35	8:44					N/A	N/A	d	No
27/07/24	l			8:59	9:08					N/A	N/A	d	No
27/07/24	l			9:25	9:31					N/A	N/A	d	No
27/07/24	l			9:36	10:16					N/A	N/A	d	No
27/07/24	l			10:33	10:38					N/A	N/A	d	No
27/07/24	l			11:03	11:17					N/A	N/A	d	No
27/07/24	l			12:28	12:33					N/A	N/A	d	No
27/07/24	t			13:25	13:32		13:32			N/A	N/A	d	No
27/07/24	l	13:45	14:25	14:22	14:30					N/A	N/A	d	No
27/07/24	l			15:01	15:26					N/A	N/A	d	No
27/07/24	l			15:57	16:02					N/A	N/A	d	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
27/07/24	l			16:29	16:35					N/A	N/A	d	No
27/07/24	l			17:15	17:20					N/A	N/A	d	No
27/07/24	t			17:31	17:34					N/A	N/A	d	No
27/07/24	l			17:41	17:46					N/A	N/A	d	No
27/07/24	l			17:53	17:58					N/A	N/A	d	No
27/07/24	l			18:13	18:51					N/A	N/A	d	No
27/07/24	l			18:55	19:00					N/A	N/A	d	No
27/07/24	l			19:17	19:22					N/A	N/A	d	No
27/07/24	l			20:03	20:10					N/A	N/A	d	No
27/07/24	l			20:36	20:54					N/A	N/A	d	No
27/07/24	l			21:57	22:01					N/A	N/A	n	No
27/07/24	l			22:13	23:13					N/A	N/A	n	No
27/07/24	l			23:46	00:06					N/A	N/A	n	No
28/07/24	l			00:33	00:39					N/A	N/A	n	No
28/07/24	l			01:09	01:13					N/A	N/A	n	No
28/07/24	l			01:18	01:23					N/A	N/A	n	No
28/07/24	l			01:45	02:07					N/A	N/A	n	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
28/07/24	l			02:32	02:41					N/A	N/A	n	No
28/07/24	l			02:48	02:56					N/A	N/A	n	No
28/07/24	l			3:23	3:34					N/A	N/A	n	No
28/07/24	l			3:41	3:49					N/A	N/A	n	No
28/07/24	l			4:12	4:18					N/A	N/A	n	No
28/07/24	l			4:45	4:52					N/A	N/A	n	No
28/07/24	l			5:15	5:46					N/A	N/A	n	No
28/07/24	l			6:05	6:08					N/A	N/A	d	No
28/07/24	t			6:16	6:19					N/A	N/A	d	No
28/07/24	l			6:26	6:30					N/A	N/A	d	No
28/07/24	l			6:38	6:42					N/A	N/A	d	No
28/07/24	l			6:52	6:56					N/A	N/A	d	No
28/07/24	l			7:05	7:09					N/A	N/A	d	No
28/07/24	l			7:21	7:23					N/A	N/A	d	No
28/07/24	t			7:35	7:33					N/A	N/A	d	No
28/07/24	l			7:57	8:10					N/A	N/A	d	No
28/07/24	l			8:28	8:41					N/A	N/A	d	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
28/07/24	l			8:53	8:56					N/A	N/A	d	No
28/07/24	l			9:14	9:23					N/A	N/A	d	No
28/07/24	l			9:37	9:43					N/A	N/A	d	No
28/07/24	l			9:49	9:55					N/A	N/A	d	No
28/07/24	l			10:01	10:08					N/A	N/A	d	No
28/07/24	l			10:24	10:30					N/A	N/A	d	No
28/07/24	l			10:37	10:42					N/A	N/A	d	No
28/07/24	l			11:03	11:17					N/A	N/A	d	No
28/07/24	l			11:54	12:16					N/A	N/A	d	No
28/07/24	l			12:49	12:57					N/A	N/A	d	No
28/07/24	l			13:25	13:40					N/A	N/A	d	No
28/07/24	l			14:01	14:06					N/A	N/A	d	No
28/07/24	l			14:11	14:16					N/A	N/A	d	No
28/07/24	l			14:58	15:06					N/A	N/A	d	No
28/07/24	l			15:22	16:25		16:27			N/A	N/A	d	No
28/07/24	l	16:30	17:11	17:11	17:30					N/A	N/A	d	No
28/07/24	l			17:51	17:56					N/A	N/A	d	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
28/07/24	l			18:48	18:53					N/A	N/A	d	No
28/07/24	l			19:07	19:12					N/A	N/A	d	No
28/07/24	l			19:44	19:56					N/A	N/A	d	No
28/07/24	t			20:31	21:16					N/A	N/A	d	No
28/07/24	l			21:31	21:37					N/A	N/A	n	No
28/07/24	l			22:01	22:10					N/A	N/A	n	No
28/07/24	l			22:14	23:02					N/A	N/A	n	No
28/07/24	l			23:32	23:49					N/A	N/A	n	No
29/07/24	l			00:11	00:16					N/A	N/A	n	No
29/07/24	t			00:37	00:55					N/A	N/A	n	No
29/07/24	l			01:13	01:17					N/A	N/A	n	No
29/07/24	l			01:30	01:36					N/A	N/A	n	No
29/07/24	l	20:45	21:25	21:34	22:24			20:15	21:25	N/A	N/A	n	No
29/07/24	l			22:57	23:33					N/A	N/A	n	No
29/07/24	l			23:52	23:57					N/A	N/A	n	No
30/07/24	l			00:08	00:08					N/A	N/A	n	No
30/07/24	l			00:08	00:13					N/A	N/A	n	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
30/07/24	l			00:51	00:57					N/A	N/A	n	No
30/07/24	l			01:19	01:52					N/A	N/A	n	No
30/07/24	l			02:23	02:46					N/A	N/A	n	No
30/07/24	l			03:14	03:35		03:55			N/A	N/A	n	No
30/07/24	l	5:10	5:50	6:01	6:09			04:40	5:50	N/A	N/A	d	No
30/07/24	l			6:24	6:29					N/A	N/A	d	No
30/07/24	l			6:48	7:02					N/A	N/A	d	No
30/07/24	l			7:15	7:29					N/A	N/A	d	No
30/07/24	l			7:46	7:50					N/A	N/A	d	No
30/07/24	l			8:22	8:41					N/A	N/A	d	No
30/07/24	l			8:54	9:09					N/A	N/A	d	No
30/07/24	l			9:26	9:31					N/A	N/A	d	No
30/07/24	l			9:58	10:16					N/A	N/A	d	No
30/07/24	l			10:33	10:33					N/A	N/A	d	No
30/07/24	l			10:42	10:47					N/A	N/A	d	No
30/07/24	t			11:02	11:13					N/A	N/A	d	No
30/07/24	l			11:32	11:39					N/A	N/A	d	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
30/07/24	l			11:58	12:06					N/A	N/A	d	No
30/07/24	l			12:34	12:42					N/A	N/A	d	No
30/07/24	l			12:54	13:00					N/A	N/A	d	No
30/07/24	l			13:29	13:48					N/A	N/A	d	No
30/07/24	t			14:27	14:33					N/A	N/A	d	No
30/07/24	l			15:12	15:17					N/A	N/A	d	No
30/07/24	l			15:50	15:54					N/A	N/A	d	No
30/07/24	l			16:26	16:34					N/A	N/A	d	No
30/07/24	l			17:04	17:10					N/A	N/A	d	No
30/07/24	l			17:42	17:49					N/A	N/A	d	No
30/07/24	l			18:07	18:15					N/A	N/A	d	No
30/07/24	l			18:34	18:40					N/A	N/A	d	No
30/07/24	l			18:51	18:56					N/A	N/A	d	No
30/07/24	l			19:18	19:23					N/A	N/A	d	No
30/07/24	l			19:35	19:40					N/A	N/A	d	No
30/07/24	l			19:51	19:56					N/A	N/A	d	No
30/07/24	l			20:01	20:06					N/A	N/A	d	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
30/07/24	l			20:30	20:43					N/A	N/A	d	No
30/07/24	l			21:14	21:19					N/A	N/A	n	No
30/07/24	l			21:48	21:53					N/A	N/A	n	No
30/07/24	l			22:27	22:32					N/A	N/A	n	No
30/07/24	l			22:37	23:01					N/A	N/A	n	No
30/07/24	l			23:19	23:33					N/A	N/A	n	No
30/07/24	l			23:42	23:56					N/A	N/A	n	No
31/07/24	l			00:06	00:18					N/A	N/A	n	No
31/07/24	l			00:24	00:39					N/A	N/A	n	No
31/07/24	l			00:51	01:05					N/A	N/A	n	No
31/07/24	t			01:41	01:52					N/A	N/A	n	No
31/07/24	l			02:24	02:30					N/A	N/A	n	No
31/07/24	l			02:43	02:49					N/A	N/A	n	No
31/07/24	l			03:10	03:19					N/A	N/A	n	No
31/07/24	l			03:48	03:55					N/A	N/A	n	No
31/07/24	l			04:12	04:20					N/A	N/A	n	No
31/07/24	t			4:58	5:05					N/A	N/A	n	No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
31/07/24	l			5:31	5:40					N/A	N/A		No
31/07/24	l			6:06	6:12					N/A	N/A		No
31/07/24	l			6:33	6:42					N/A	N/A		No
31/07/24	l			6:56	7:10					N/A	N/A		No
31/07/24	l			7:26	7:30					N/A	N/A		No
31/07/24	l			7:51	8:17					N/A	N/A		No
31/07/24	l			8:34	8:39		8:42	8:45	10:05	N/A	N/A		No
31/07/24	l	9:25	10:05	10:07	10:31		10:35	10:51	12:01	N/A	N/A		No
31/07/24	l	11:21	12:01	12:11	13:06					N/A	N/A		No
31/07/24	l			13:07	13:33					N/A	N/A		No
31/07/24	l			13:34	13:34					N/A	N/A		No
31/07/24	l			14:20	14:31					N/A	N/A		No
31/07/24	l			14:33	14:56					N/A	N/A		No
31/07/24	l			15:18	15:25					N/A	N/A		No
31/07/24	l			15:37	15:42					N/A	N/A		No
31/07/24	l			16:02	16:42					N/A	N/A		No
31/07/24	l			17:07	17:30					N/A	N/A		No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
31/07/24	l			17:49	17:59					N/A	N/A		No
31/07/24	l			18:06	18:17					N/A	N/A		No
31/07/24	l			18:22	18:31					N/A	N/A		No
31/07/24	l			18:42	18:53					N/A	N/A		No
31/07/24	l			19:10	19:45					N/A	N/A		No
31/07/24	t			20:06	20:15					N/A	N/A		No
31/07/24	l			20:22	20:31					N/A	N/A		No
31/07/24	l			20:52	21:07					N/A	N/A		No
31/07/24	l			21:10	*****					N/A	N/A		No
31/07/24	l			22:41	23:06					N/A	N/A		No
31/07/24	l			23:16	23:56					N/A	N/A		No
01/08/24	t			00:20	00:25					N/A	N/A		No
01/08/24	l			00:40	00:46					N/A	N/A		No
01/08/24	l			00:57	01:03					N/A	N/A		No
01/08/24	l			01:28	01:36					N/A	N/A		No
01/08/24	l			02:01	02:13					N/A	N/A		No
01/08/24	l			02:51	03:14					N/A	N/A		No

Date	**Reason for firing** l = line t = test x = test followed immediately by line	**Time soft start/ ramp-up began**	**Time of full power**	**Time of start of line**	**Time of end of line**	**Time of reduced output** (if relevant)	**Time airguns/ source stopped**	**Time pre-shooting search began**	**Time search ended**	**Time PAM began**	**Time PAM ended**	**Was it day or night in period prior to firing?** d = day n = night w = dawn k = dusk	**Was any mitigating action required?** (yes/ no)
01/08/24	l			03:30	03:43		03:45			N/A	N/A		No
01/08/24	l	5:00	5:40	05:45	05:50			04:30	05:44	N/A	N/A		No
01/08/24	l			06:27	06:33		6:35			N/A	N/A		No
01/08/24	l	7:40	8:20	08:31	8:37		8:37	7:10	7:40	N/A	N/A		No
01/08/24	l	10:05	10:45	10:46	10:53			9:30	10:45	N/A	N/A		No
01/08/24	l (MBES)	15:10	15:30	16:00	16:28			14:40	15:30	N/A	N/A		No
01/08/24	l (MBES)			17:21	17:37					N/A	N/A		No