MARINE LICENCE APPLICATION – SURVEY METHOD STATEMENT

North Channel Wind

FEBRUARY 6, 2024

NORTH CHANNEL WIND
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Contents

1. Introduction

North Channel Wind Limited (NCW) has prepared this report in support of a Marine Construction Licence Application to carry out marine surveys under Part 4 of the Marine and Coastal Access Act 2009, to determine the suitability of the site for a floating wind farm development. The method statement for each survey has been fully assessed in the HRA, EPS risk assessment and shipping & navigation technical note accompanying the Marine Construction Licence Application.

SBM Offshore is the owner of NCW and recognised as a leading global contractor. SBM Offshore has partnered with Irish based developer NMK Renewables (NMK) to carry out the front-end development work for NCW. NMK is a niche project development company focused on delivering floating offshore wind projects. NCW intends to undertake marine surveys at the proposed North Channel Wind 1 site (NCW 1) in order to inform the location and design of the proposed offshore wind farm and cable route to shore. The marine surveys will include geophysical, environmental and metocean marine surveys.

A Marine Construction licence is required in order to complete the proposed marine surveys. This document is part of the Licence Application to the Department of Agriculture, Environment and Rural Affairs (DAERA).

The marine licence application and associated documents will be available to view on our website at www.northchannelwind.com/consultation.

1.1. Marine Construction Licence Application Area

The proposed NCW 1 project is located off the east coast County Antrim. Figure 1.1 shows the development area (DA) and export cable corridor (ECC) area of search (AoS). Table 1.1 gives the total area in square kilometres.

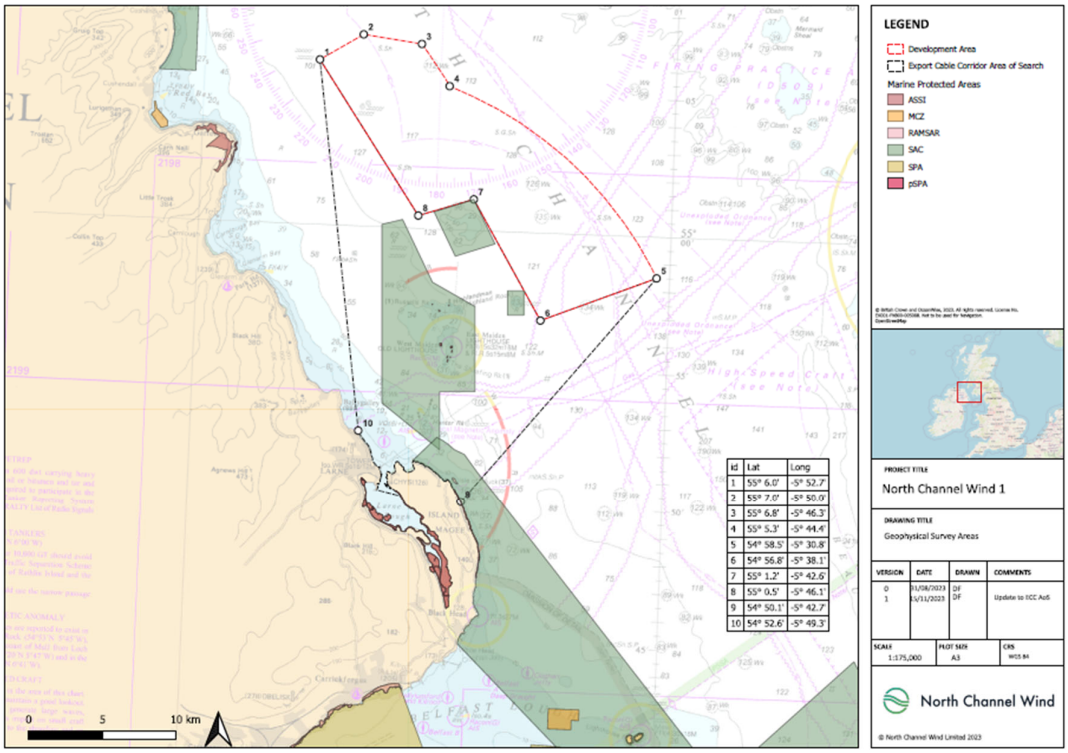

Figure 1.1 NCW1 DA and ECC AoS

Site	DA (km²)	ECC AoS (km²)
NCW1	176	260.6

Table 1.1 NCW1 total area

2. Survey Schedule

The survey works will be carried out following award of the Marine Construction License, ideally between the 24 months between Autumn 2024 to Autumn 2026 and subject to weather conditions. Indicative timings are as follows though may move and hence the request for an end date of Autumn 26:

- **Geophysical survey (including Archaeology)**: Spring 2025;
- **Metocean Surveys (water levels, currents and waves):** Winter 2024/25;
- **Offshore Benthic survey** Autumn 2024; and
- **Marine Mammal:** Winter 2024/25.

3. Vessel Operations

All vessels will be operated in accordance with international regulations, ensuring the safety of the crew, equipment, and environment. Crew members will hold the required certifications and undergo regular training and drills to maintain their skills and knowledge.

Vessels will be equipped with the necessary safety and communication equipment, including personal protective equipment (PPE), life rafts, life jackets, Emergency Position-Indicating Radio beacons (EPIRBs), and Global Maritime Distress and Safety System (GMDSS) equipment.

Regular maintenance and inspections will be performed on all vessels and equipment to ensure optimal performance and safety. Vessel operations will adhere to company policies and procedures, including environmental and safety management systems. Regular communication with local authorities, marinas, and other vessels operating in the vicinity will be maintained.

Tidal and weather conditions will be considered, and operations may be temporarily suspended in case of unfavourable conditions for safe navigation to ensure the safety of the crew and equipment.

Vessels operating in nearshore environments will follow guidelines and precautions to minimise environmental impact and ensure safe navigation.

4. Geophysical Survey

4.1. Objective:

The proposed geophysical survey aims to comprehensively investigate the site using a combination of techniques, including multibeam echosounder (MBES), side scan sonar, magnetometer, and seismic surveys. The objective of the proposed geophysical survey is to:

- Map the seabed and sub-surface to optimise positioning of moorage/anchoring and cable routing within the application area and to enable assessment of cable burial depth;
- Plan the scope and positioning of the geotechnical sampling programme in the application area;
- Identify sensitive marine habitats that may need to be avoided during geotechnical and environmental sampling, and infrastructure installation; and
- Provide the geophysical data from which a marine archaeological assessment can be undertaken as part of the consenting process.

4.2. Method Statement:

This method statement outlines the general procedures and operations to be followed for the planned geophysical survey of the NCW 1 DA and ECC AoS. This document will be reviewed and updated after the survey contractor has been appointed, and submitted to DAERA Marine Licencing Team for approval at least 8 weeks prior to the survey taking place.

All survey activities will be carried out using specialised equipment and vessels, following industry best practices, and adhering to relevant safety and environmental guidelines. The collected data will be processed and interpreted by experienced professionals to provide a comprehensive understanding of the site's characteristics.

4.3. Survey Design

The geophysical survey will be conducted using a systematic approach to ensure 100% data coverage of the site. A survey vessel, approximately 30-80 metres in length, will be utilised to perform transects across the DA (red dashed area in figure 1.1), with line spacing of 125 metres. These primary survey lines will be complemented by crosslines spaced at approximately 1,000-metre intervals, providing additional data and quality control (line plan is dependent on local characteristics and the final equipment set up).

For the ECC (grey dashed area in figure 1.1), an estimated area of approximately 1,500 metres in width will be surveyed to ensure the identification of the optimal route and the detection of any potential hazards. More than one potential cable corridor may be surveyed. This corridor (or corridors) will lie within the ECC AoS. The final corridor route (or routes) is currently being determined as part of a cable route assessment, and route dimensions quoted above may vary depending on several factors (e.g. seabed hazards, depth of sediment, landfall location).

There will be a 2 kilometre buffer for vessels transiting and potential surveying.

Preliminary arrangement of transect lines are shown in figures 1.2 and 1.3, to be finalised in advance of survey.

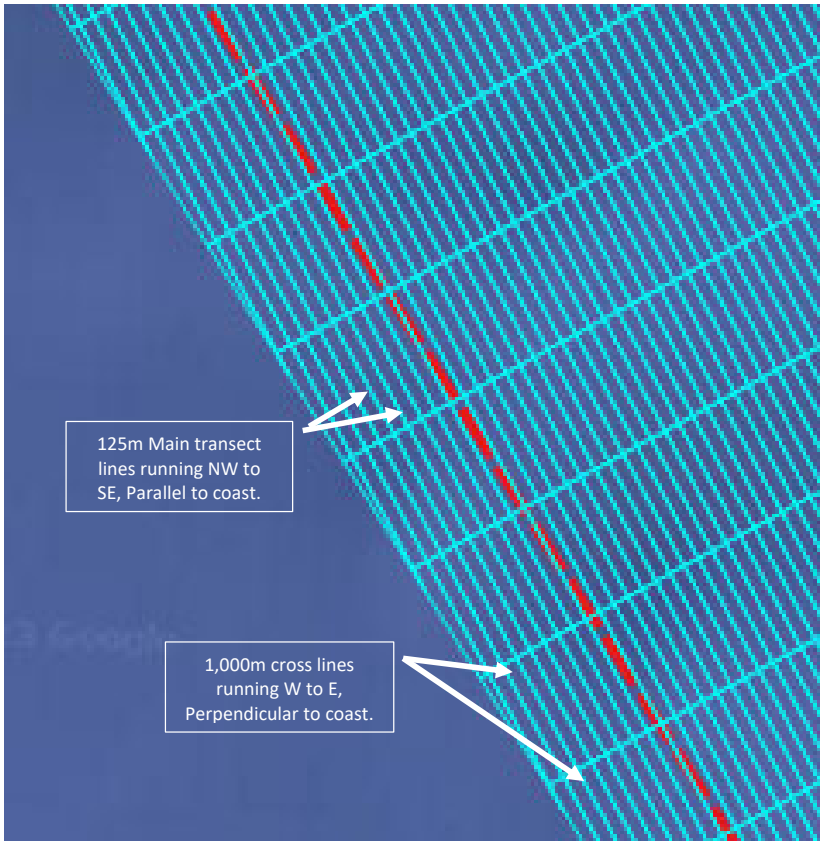

Figure 1.2 NCW1 DA example transects.

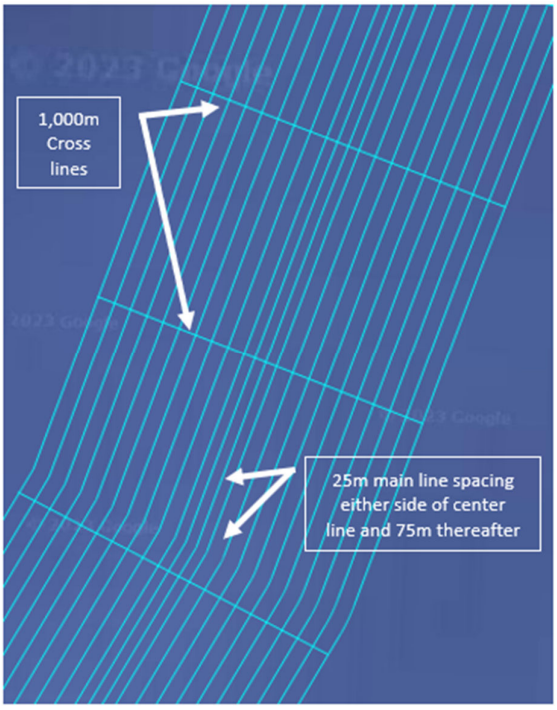

Figure 1.3 NCW1 ECC example transects.

In nearshore areas, a smaller vessel of approximately 15 meters in length will be used. This smaller vessel will allow for greater manoeuvrability and access to shallow waters, ensuring complete data coverage.

A support/guard vessel may also be utilised during the survey to assist with operations, provide logistical support, and ensure the safety and security of the primary survey vessels and their crew. This vessel will help to maintain efficient operations and provide a rapid response in the event of any incidents or issues during the survey.

Unmanned vessels of approximately 4-metre length may also be used for some data collection activities, which will be monitored and controlled by onshore operators.

The total estimated duration of the survey is 18 days, but actual timeline may be affected by weather conditions and other operational factors. This will be split between 15 days for the larger offshore vessel, and three days for the nearshore smaller vessel.

4.4. Mobilisation

Equipment and personnel will be mobilised as per standard procedures and manufacturer's instructions. The chosen port for mobilisation, crew changes, and demobilisation will be confirmed after survey contractor has been appointed.

Calibrations and verifications of the survey equipment will take place during mobilisation and before the commencement of operations.

Mobilisation is considered complete when all systems, tests, trials, calibrations, equipment, personnel, documentation, permits, and consents are in place and functioning correctly.

4.5. Data Acquisition Equipment

- **Surface Positioning:** Differential GPS (DGPS) systems will be used for high-accuracy positioning;
- **Subsea Positioning:** Ultra-Short Baseline (USBL) systems will be employed for subsea positioning;
- **Multibeam Echosounder (MBES):** A system for collecting detailed topographical data of the seabed. Determines depth and nature of the seabed by transmitting sound pulses;
- **Side Scan Sonar (SSS):** Uses sound pulses to generate images of the seabed. Hull mounted or towed at specific depth to optimise output;
- **Magnetometer:** Towed magnetometers will be used for magnetic data collection, ensuring proper altitude and navigational accuracy;
- **Sub-Bottom Profiling (SBP):** Hull mounted parametric device to identify and measure sediment layers below the seabed; and
- **Ultra High Resolution Seismic (UHRS):** Towed seismic source (e.g. sparker) identifies and characterises the deeper layers of sediment/bedrock underneath the seafloor.

The surveyor will be responsible for real-time quality control of all data gathered. Data processing and analysis will be conducted by the geophysicist onboard, using appropriate software tools.

4.6. Transect Execution

The survey vessel will navigate along each transect line according to the pre-determined plan, maintaining a constant speed and heading.

Survey equipment, such as MBES, SSS, and SBP, will be deployed and operated in accordance with manufacturer guidelines and project requirements. Real-time monitoring of equipment performance, data quality, and vessel position will be conducted throughout the transect.

Any deviations from the planned transect line or adjustments to the survey equipment settings will be documented and communicated to the project team.

4.7. Towed Equipment

For towed equipment (magnetometers, SSS and UHRS), the tow line will be made from high strength materials, with length to be determined based on the desired depth or position, as well as the survey objectives and local environmental conditions. A combination of floats and weights will be used to maintain the desired depth and position, with the risk of snagging or entanglement carefully considered. NCW will work to minimise the potential for snagging and entanglement on static fishing gear. We will be identifying and engaging with potentially affected fishermen through our Fisheries Liaison Officer (FLO) in the months in advance of the surveys taking place.

Deployment and recovery of towed equipment will be performed using winches, launch and recovery systems, and handling equipment designed for safe and efficient operation.

Personnel involved in handling towed equipment will be trained and experienced in the proper procedures and safety measures.

The sparker system uses a high-voltage electrical discharge to generate a brief acoustic pulse in the water. The energy source settings, such as voltage and pulse rate, will be selected based on equipment specifications, survey objectives, and local environmental conditions. The settings will be adjusted as necessary during the survey to optimize data quality and penetration.

5. Acoustic Doppler Current Profilers (ADCP) Survey

5.1. Objective:

The proposed Acoustic Doppler Current Profilers (ADCP) survey aims to investigate the offshore wind site by deploying ADCPs in seabed frames to measure waves, water levels, and currents. The acquired data will be essential for understanding the site's hydrodynamic conditions and informing the design and positioning of the offshore wind farm infrastructure and to investigate their potential impact on sediment transport and coastal processes. This may be augmented by a transect survey, where a vessel mounted, downward facing ADCP records current profiles while the vessel transects the area of interest in a repeated pattern over the course of a flood/ebb cycle (approximately 12 hours). This can be completed both during spring and neap tides to provide greater spatial coverage (at lower temporal resolution than seabed mounted ADCPs).

5.2. Method Statement

This method statement outlines the general procedures and operations to be followed for the planned ADCP deployment within the DA. This document will be reviewed and updated once the survey contractor has been appointed and submitted to DAERA for approval at least 8 weeks prior to the survey.

All survey activities will be carried out using specialised equipment and vessels, following industry best practices, and adhering to relevant safety and environmental guidelines. The collected data will be processed and interpreted by experienced professionals to provide a comprehensive understanding of the site's hydrodynamic conditions.

5.3. Survey Design

The ADCP survey will be designed to ensure optimal data coverage. A survey vessel, approximately 20-60 metres in length, will be utilised to transport and deploy the ADCP seabed frames at two predetermined locations within the DA (red dashed line in figure 1.1). The locations will be selected based on factors such as water depth, seabed characteristics, and distance from existing or planned infrastructure. The proposed deployment locations illustrated in Figure 5.1 below are indicative and the final locations will be submitted to DAERA for approval prior to the surveys taking place.

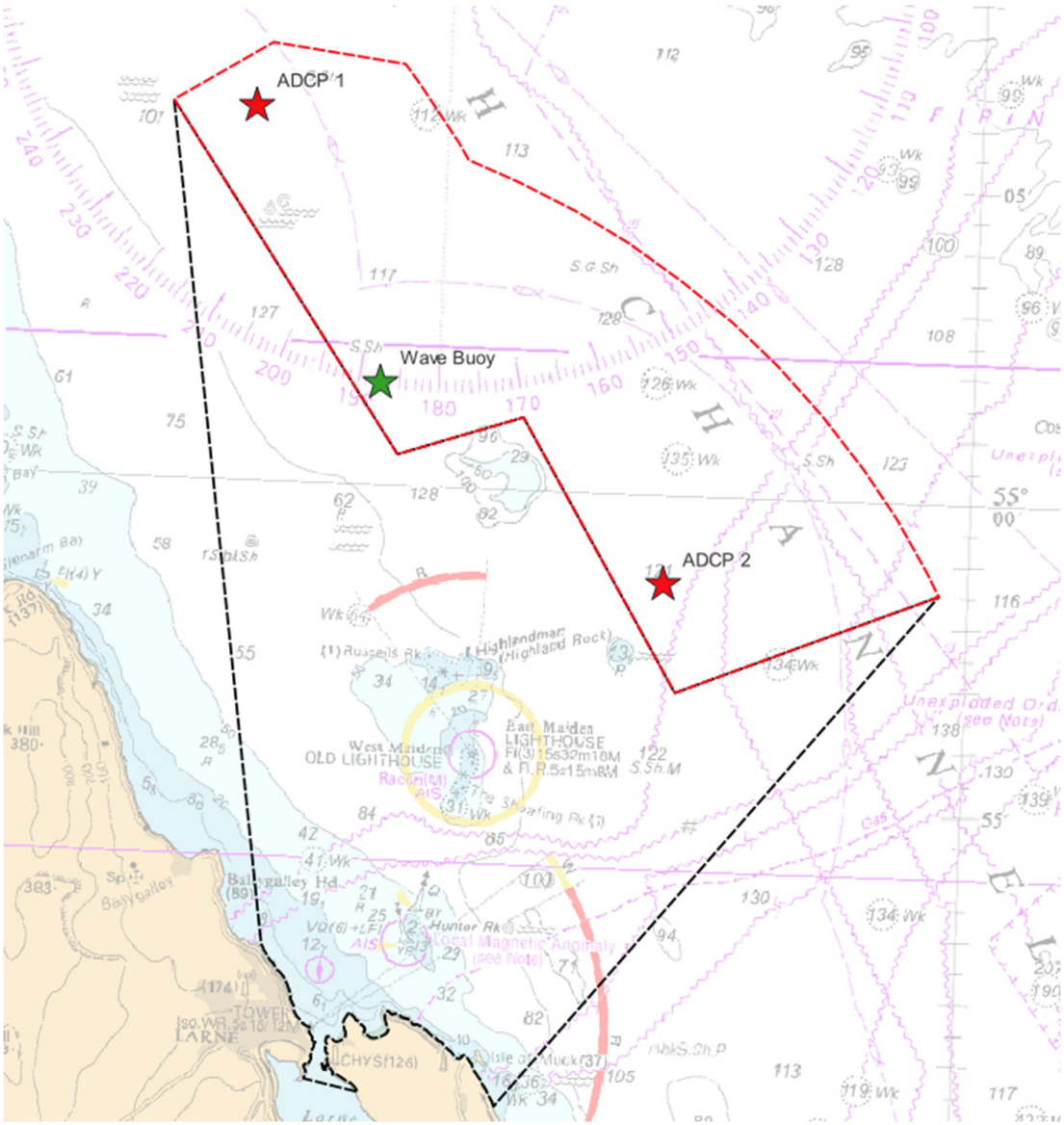

Figure 5.1 Indicative ADCP and Wave Buoy Locations

Instrument	Lat	Long
ADCP 1	55° 6.0'	-5° 50.4'
ADCP 2	54° 58.6'	-5° 38.6'
Wave Buoy	55° 1.6'	-5° 46.6'

Table 5.1 Proposed co-ordinates of ADCP and Wave Buoy

The ADCPs may be deployed in shrouded seabed frames, or low drag submerged buoys, designed to securely anchor the instruments to the seafloor and protect them from damage or displacement. The design will ensure proper orientation and positioning of the ADCPs to achieve accurate and reliable measurements.

The total estimated duration of the survey, including mobilization, deployment, recovery, and demobilization is 12 months. Actual timeline may be affected by weather conditions and other operational factors.

For the transect survey, the ADCP will be securely mounted on a survey vessel and calibrated as per the manufacturer's guidelines to ensure accurate measurements. The vessel will then navigate along the predetermined transects at a controlled speed, with the ADCP transmitting and receiving sound signals to measure the velocity of water currents at various depths. The transect route will be repeated several times over a 12-hour period to deliver multiple data points per position. Data collected will be logged in real-time and will include current velocity and direction through the water column.

5.4. Mobilisation

Equipment and personnel will be mobilised as per standard procedures and manufacturer's instructions. The chosen port for mobilisation, crew changes, and demobilisation will be confirmed after the survey contractor has been appointed.

Calibrations and verifications of the survey equipment will take place during mobilisation and before the commencement of operations.

Mobilisation is considered complete when all systems, tests, trials, calibrations, equipment, personnel, documentation, permits, and consents are in place and functioning correctly.

5.5. Data Acquisition Equipment

- **Surface Positioning:** Differential GPS (DGPS) systems will be used for high-accuracy positioning;
- **Subsea Positioning:** Ultra-Short Baseline (USBL) systems will be employed for subsea positioning;
- **Acoustic Doppler Current Profilers (ADCPs):** Deployed in seabed frames for measuring waves, water levels, and currents; and
- **CTD Sensors:** a device for determining Conductivity, Temperature, and Depth.

5.6. Frame design

Option 1.
The ADCP will be mounted in a trawl resistant seabed frame on a double axis gimble for self-levelling. The frame will be manufactured from marine grade stainless steel and will measure approximately 1.5 metres wide and 0.5 metres high (Figure 5.2). The frame will weigh approximately 400 kilogrammes, with final quantity of ballast to be determined prior to the survey following consideration of maximum currents and wave induced orbital velocities at the final deployment depths.

An acoustic release mechanism will be attached to each frame to provide principal recovery option. The frame will be attached to a ~500 kilogramme clump weight (1 metre wide), via ~200 metres of ground line to provide a redundant recovery option via trawl capture in the event of acoustic release failure (Figure 5.3).

Transponders will be attached to frames and clump weights to enable accurate final confirmation of frame and clump weight locations.

Figure 5.2 Example ADCP seabed frame

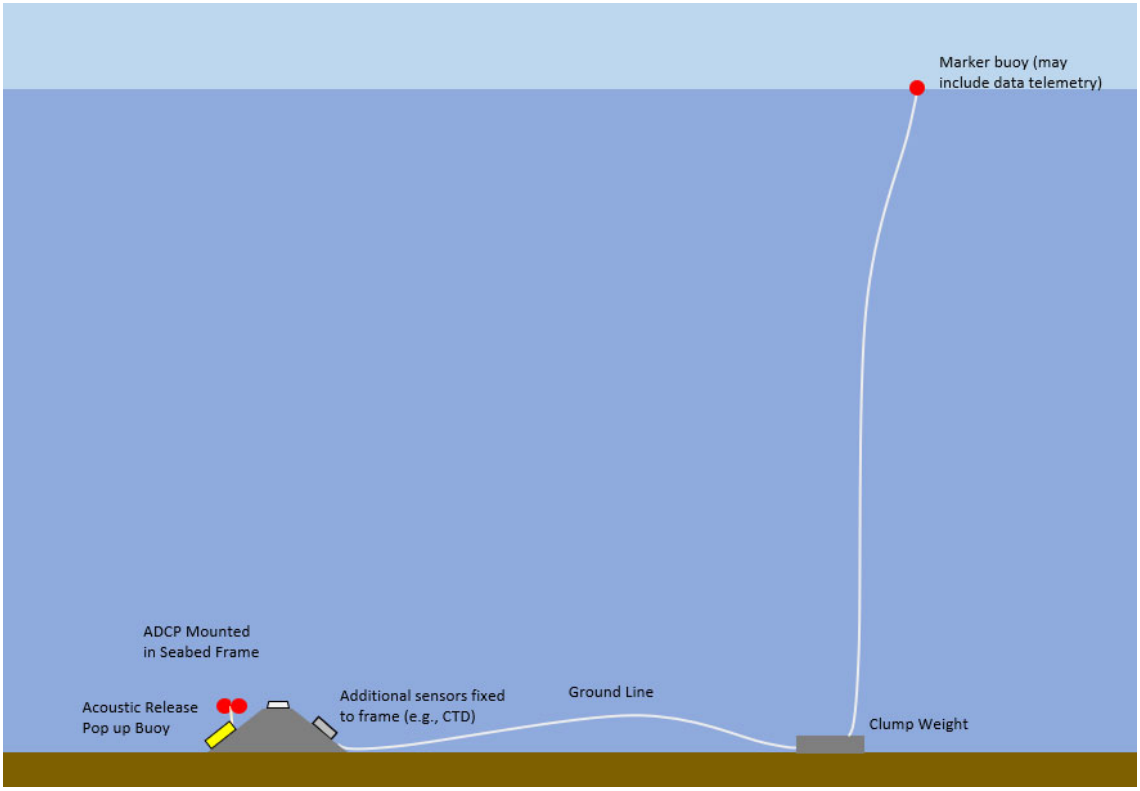

Figure 5.3 Example ADCP seabed frame arrangement

Option 2

To mitigate potential difficulties in landing a seabed frame upright in the water depths at the site, an alternative arrangement would be to house the ADCP in a low drag submerged buoy, held in position with ground weight (1 metre wide), with 200 metre ground line and clump weight (1 metre wide). A potential arrangement is shown in Figure 5.4.

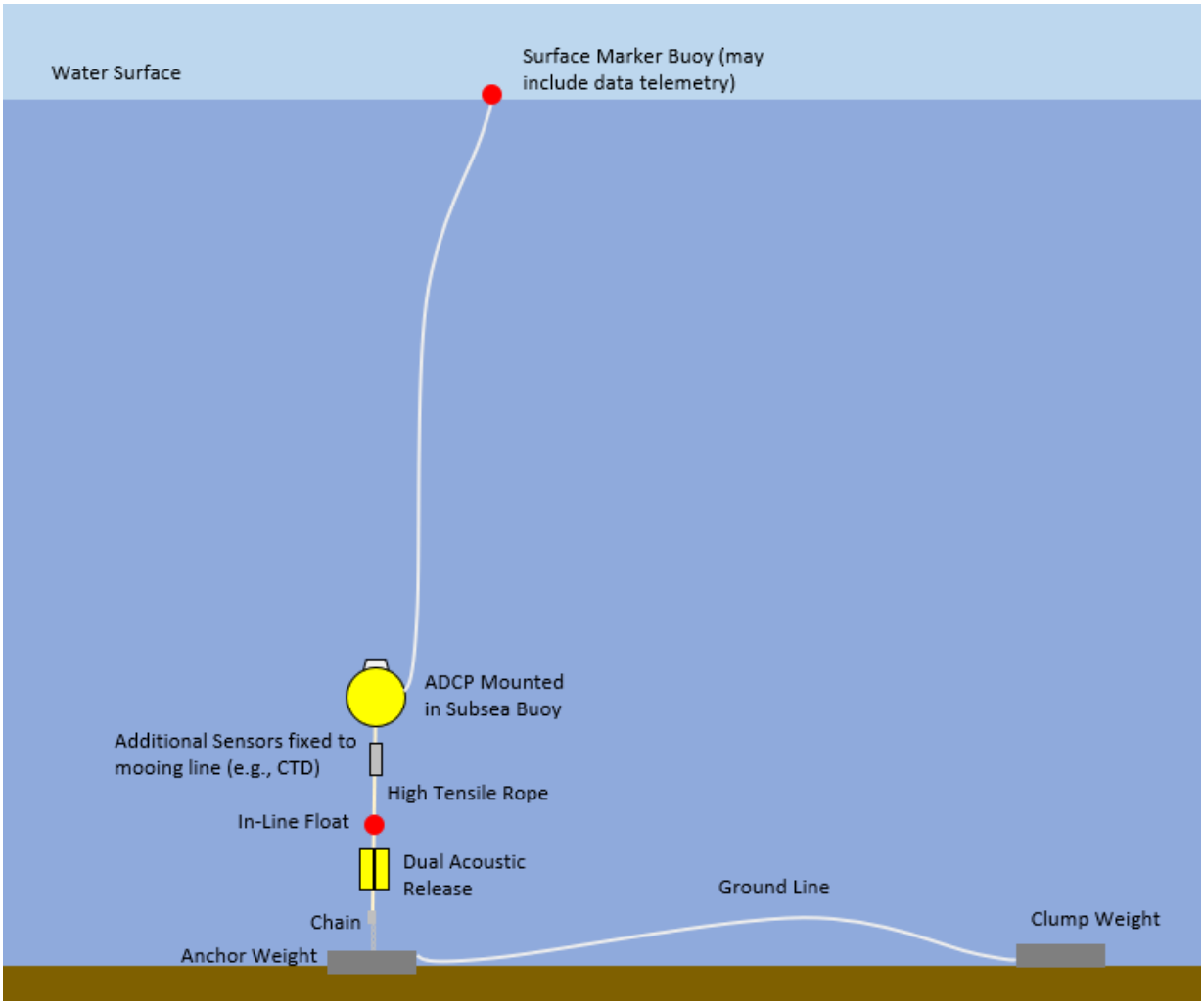

Figure 5.4 Example ADCP submerged mooring arrangement

Marker Buoys

A surface marker buoy may be used with either arrangement as principal recovery option. The buoy will be attached to the frame, clump weight or mooring. There will typically be a swivel on the underside, with a lifting eye, and/or light-emitting diode (LED) light on top. The maximum diameter is approximately 500 millimetres. Example marker buoys are illustrated in Figure 5.5.

Figure 5.5 Example marker buoys

5.7. ADCP Deployment and Recovery

The survey vessel will navigate to the predetermined ADCP deployment locations, ensuring accurate positioning using the DGPS and USBL systems. The ADCP seabed frames or moorings will be carefully lowered to the seafloor using a winch and handling equipment designed for safe and efficient operation. Personnel involved in the deployment will be trained and experienced in the proper procedures and safety measures.

After the seabed frame has been successfully lowered to the seabed, the ground line is paid out as the vessel manoeuvres to a predetermined location where the clump weight is lowered to the seabed.

An overhead vessel transect will then be completed to the confirm precise frame and clump weight locations using the USBL tracking system.

Once the ADCPs have completed their measurement period, the survey vessel will return to the deployment locations to recover the seabed frames or moorings. If a marker buoy is not utilised, the USBL system will be used to locate and track the ADCPs on the seafloor. A signal will be sent to the acoustic pop-up buoy, and once visually located the winch and handling equipment will be used to carefully lift the ADCP seabed frames or moorings from the seafloor and onto the survey vessel. A grapnel will be used to recover the frames in the event of pop-

up buoy failure. This will involve lowering the hook to the seabed and trawling between the seabed frame and clump weight.

Once the ADCPs are safely onboard, the collected data will be downloaded and transferred to the data processing team for further analysis.

5.8. Data Processing and Reporting

Following the completion of the ADCP survey and the recovery of the instruments, the collected data will be processed and analysed by a team of experienced hydrodynamic specialists using appropriate software tools. The analysis will focus on the accurate determination of wave, water level, and current characteristics within the survey area.

A comprehensive report will be prepared, detailing the results of the ADCP survey, including data plots, tables, and graphs to illustrate the findings. The report will also include a discussion of the data quality, uncertainties, and any limitations or anomalies observed during the survey.

The final report will provide essential information to support the planning, design, and construction of the offshore wind farm infrastructure.

6. Wave Buoy

6.1. Objective:

The survey aims to characterise the wave climate at the proposed North Channel Wind 1 (NCW1) floating offshore wind site. A wave buoy will be anchored to the seafloor using a mooring system designed to withstand the local wave and current conditions. The acquired data will be used to develop further understanding the site's wave regime, inform the design and positioning of the wind farm infrastructure and to investigate their potential impact on sediment transport and coastal processes.

6.2. Method Statement

This method statement outlines the general procedures and operations to be followed for the planned wave buoy deployment within the DA. This document will be reviewed and updated once the survey contractor has been appointed, and submitted to DAERA Marine Licencing Team for approval at least 8 weeks prior to the survey.

All survey activities will be carried out using specialised equipment and vessels, following industry best practices, and adhering to relevant safety and environmental guidelines. The collected data will be processed and interpreted by experienced professionals to provide a comprehensive understanding of the site's wave regime.

6.3. Survey Design

The wave buoy is planned for deployment within the offshore wind farm DA for a duration of 12 months. Actual timeline may be affected by weather conditions and other operational

factors. The proposed location for this deployment is shown in Figure 5.1 and has been selected to capture representative data for the area. Though the final location will be submitted to DAERA for approval prior to the surveys taking place.

The wave buoy will be equipped with an array of sensors configured to capture specific types of data including wave heights, periods, and direction. A downward-looking ADCP, may also be integrated for the purpose of measuring subsurface ocean currents.

The buoy will operate continuously throughout the period of deployment, gathering data in real-time. This data will be transmitted via satellite or Global System for Mobile Communications (GSM), to enable remote observation and data acquisition. Scheduled maintenance activities will be conducted in accordance with the O&M plan (see section 6.7) to ensure the integrity of the moorings and reliability and accuracy of the data collected.

6.4. Mobilisation

Equipment and personnel will be mobilised as per standard procedures and manufacturer's instructions. The chosen port for mobilisation, crew changes, and demobilisation will be confirmed after the survey contractor has been appointed.

Calibrations and verification of the survey equipment will take place during mobilisation and before the commencement of operations.

Mobilisation is considered complete when all systems, tests, trials, calibrations, equipment, personnel, documentation, permits, and consents are in place and functioning correctly.

6.5. Data Acquisition Equipment

It is intended that the following equipment is used for surveys:

- **Surface Positioning**: Differential GPS (DGPS) systems will be used for high-accuracy positioning;
- **Subsea Positioning**: Ultra-Short Baseline (USBL) systems will be employed for subsea positioning if required;
- **Wave Buoy**: Directional buoy weighing from 70 – 100kg, with diameter of up to 1.2m, with flashing obstruction light; and
- **Downward looking ADCP**: Mounted on buoy below water line to measure ocean currents
- **CTD Sensors:** a device for determining Conductivity, Temperature, and Depth.

6.6. Mooring design

The mooring system is engineered with a focus on durability and stability. It features a length of rubber (bungee) cord, terminated with stainless steel fittings, to allow the buoy to absorb shocks and adapt to the dynamic marine environment. This bungee section is directly connected to a swivel affixed to the underside of the buoy. At the opposite end, the bungee is coupled with a high tensile mooring line or chain, supplemented with inline floats and weights. These components are ultimately connected to a sinker weight, which has a

minimum mass of approximately 650 kilogrammes, and approximate seabed dimensions of 1 metre x 1 metre (subject to supplier design).

The surface buoy will have a diameter of up to 1.2 m and will feature a flashing obstruction light, with lighting and marking to be agreed with Commissioner of Irish Lights. It is likely that the buoy will be marked as follows at all times:

- Coloured yellow from at least the water-line to the top of the buoy.
- Have a yellow, flashing light character that is visible through 360 degrees with a 5 nm range
- Surmounted by a yellow 'x' shape topmark

An indicative mooring arrangement is illustrated in Figure 6.1

The buoy may also be required to meet the following International Association of Marine Aids to Navigation and Lighthouse Authorities availability standards:

- Position – category 2 (not less than 99%).
- Light – Category 2 (not less than 99%)
- Daymark – Category 2 (not less than 99%)
- Topmark – Category 2 (not less than 99%).

Requirements to notify the Commissioner of Irish Lights on the availability of aids to navigation may also be required prior to works commencing.

Final mooring arrangement will be determined based on supplier recommendations and will be tailored to the specific water depths at the selected deployment location. Additional factors, such as tidal range and anticipated wave and meteorological conditions are also incorporated into the final design of the mooring system.

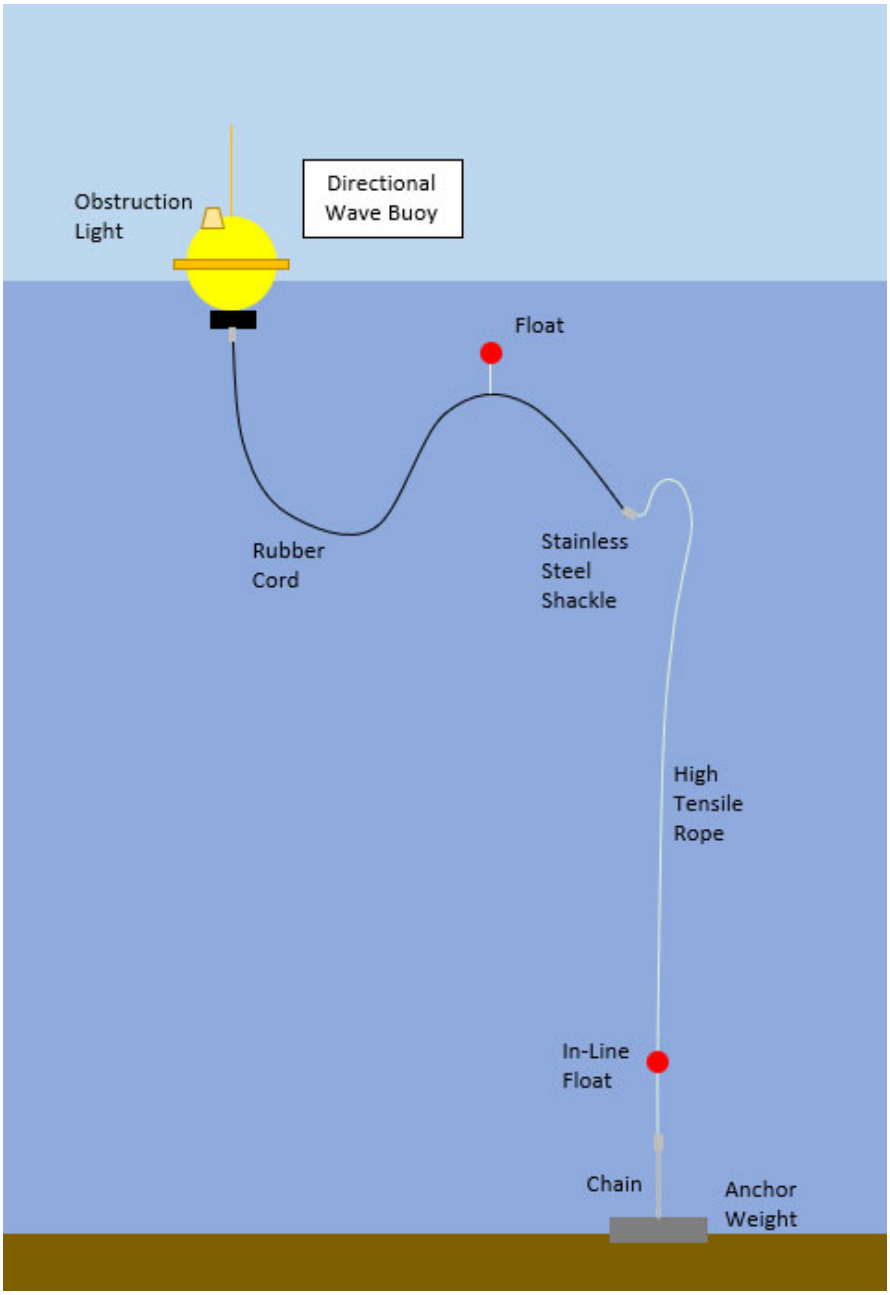

Figure 6.1 Example Mooring arrangement.

6.7. Operations and Maintenance

Regular maintenance and inspections will be undertaken to ensure data integrity and the ongoing functionality of the wave buoy and mooring system. During maintenance operations, the buoy will be attached to a winch and lifted onboard by either a crane or an A-frame. These activities will be conducted on a suitably equipped working vessel.

Buoys will be cleaned, and integrity of the mooring system assessed. A change out of the mooring systems may be required, depending on condition and any observed evidence of damage or wear and tear. Some elements will only require replacement if inspection reveals

structural damage, such as propeller damage or other forms of excessive wear. During each service visit, a complete set of spare mooring components will be available on the survey vessel.

Specific activities during each service visit will encompass:

- Thorough inspection of the mooring systems and replacement of components such as bungee cord, shackles etc as needed;
- Examination and replacement of anodes as needed;
- Provision of a spare ground weight to account for the possibility of total loss during recovery;
- Inspection of the outer housing for any form of damage;
- Testing of the LED light's functionality;
- Review and replacement of O-rings as required;
- Confirmation of the battery status;
- Downloading of data and examination of the memory card's storage capacity; and
- Verification of the satellite and data transmission systems.

Upon completion of these maintenance activities, the wave buoy will be redeployed at the original location to continue data acquisition as planned.

6.8. Deployment and Recovery

The survey vessel will navigate to the predetermined buoy deployment location, ensuring accurate positioning using the DGPS and USBL systems.

After inspection and safety checks are complete, the anchor and mooring system will be prepared ensuring all components, including the buoy are properly aligned and secured. After the anchor is positioned for deployment, the wave buoy slowly lowered into the water using the A-frame or crane. The Anchor can then be lowered to the seabed.

Once the buoy is in position and the anchor is secured, onboard technicians will remotely verify the operational status of the buoys systems.

Once the wave buoy has completed its measurement period, the survey vessel will return to the deployment location to recover buoy, mooring and anchor system. Initially the buoy will be lifted out of the water, detached from the mooring system and secured on the deck. Following on the winch will be used to recover the anchor and mooring system.

Once the wave buoy is safely onboard, the collected data will be downloaded and transferred to the data processing team for further analysis.

6.9. Data Processing and Reporting

Following the completion of the wave survey and the recovery of the instruments, the collected data will be processed and analysed by a team of experienced metocean specialists using appropriate software tools. The analysis will focus on the accurate determination of wave height, direction and period characteristics within the survey area.

A comprehensive report will be prepared, detailing the results of the survey, including data plots, tables, and graphs to illustrate the findings. The report will also include a discussion of the data quality, uncertainties, and any limitations or anomalies observed during the survey.

The final report will be submitted to the client and relevant stakeholders, providing essential information to support the planning, design, and construction of the offshore wind farm infrastructure.

7. Offshore Benthic Survey

7.1. Objective:

The aim of the survey is to gather a comprehensive dataset which describes the benthic ecology (habitats and infaunal/epifaunal communities) within the survey area to characterise the habitats present and their associated biological communities and form the first point in a monitoring timeseries. The survey will identify and determine the extent and distribution of Annex I habitats present in the survey area. Water samples will also be taken to form a marine water quality baseline for the area.

The desired outcomes of this investigation are:

- To characterise habitats and biological communities and their variability, for instance with depth and lateral distribution, across the site;
- To gather quantitative and semi-quantitative benthic and epibenthic biological community data which can be used to monitoring change in the communities over time;
- To identify and determine the extent and distribution of Annex I habitats present across the site;
- To produce a European nature information system (EUNIS) level 5 and Annex I habitat maps for the survey area; and
- To quantify water quality parameters and their variability, for instance with depth and lateral distribution across the site.

This survey will provide baseline data for the Environmental Statement (ES) for the development consent application.

7.2. Method Statement

All survey activities will be carried out using specialised equipment and vessels, following industry best practices, and adhering to relevant safety and environmental guidelines. The collected data will be processed and interpreted by experienced professionals to provide a comprehensive understanding of the site's characteristics.

7.3. Survey Design

Seabed imagery (High Definition (HD)video and stills) will be collected from up to 80 stations within the survey areas (40 within the DA and 40 within the ECC AoS) and, where suitable, samples by grab sampler. Water samples and Conductivity, Temperature and Depth (CTD) profiles will be collected with a CTD Profiler and Rosette Sampler from every third station visited. Figure 7.1 represents an indicative survey plan of the 80 stations all outside a maximum depth of 0.5 metres to allow for the vessel draught (under keel clearance).

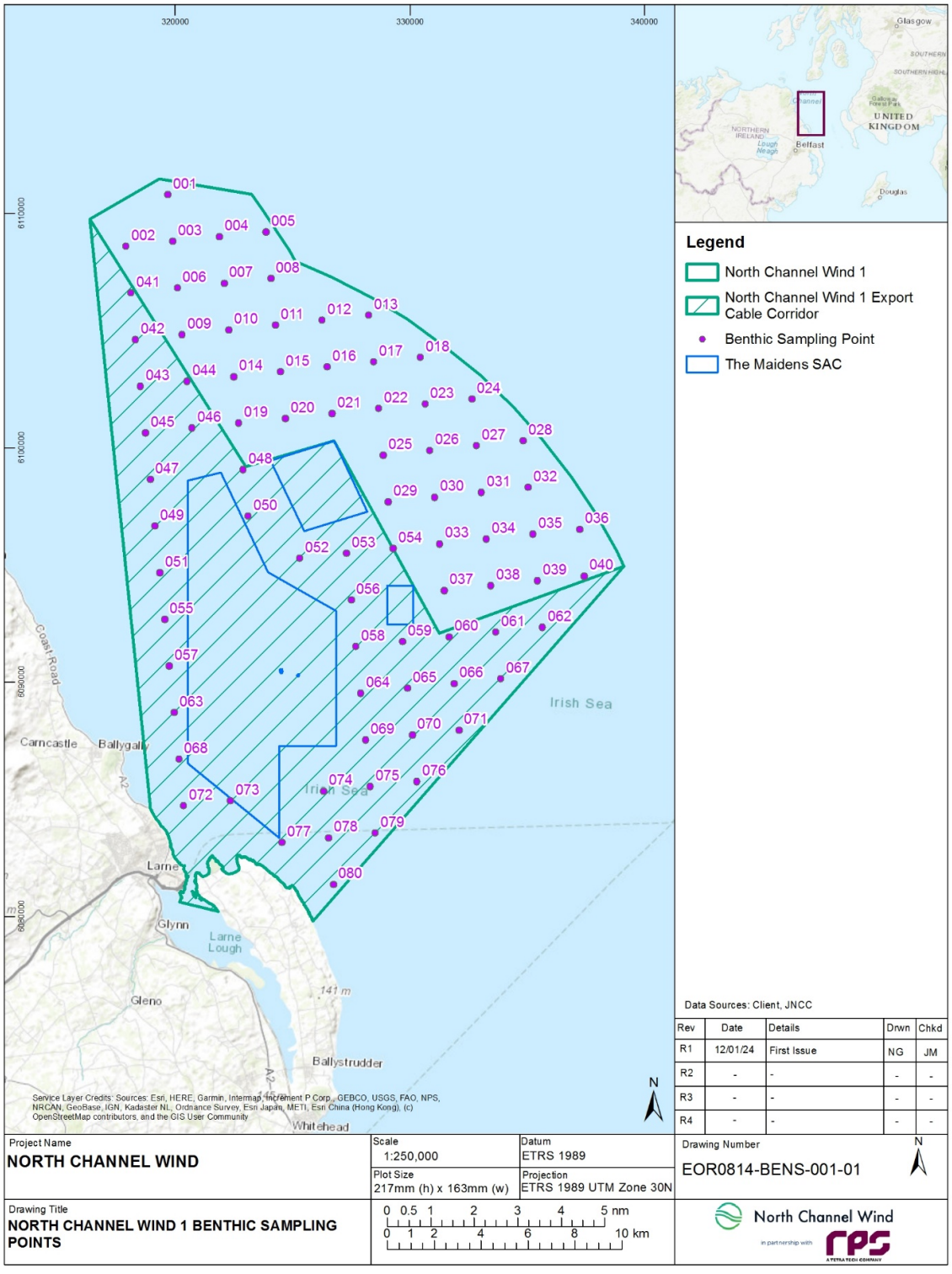

Figure 7.1 North Channel Wind 1 Benthic Sampling Points

7.4. Data Acquisition Equipment

7.4.1. Grab sampling

A grab sampler will be used to retrieve a soil sample of the seabed by the lowering of a mechanical grab. The grab will be launched from a vessel crane or A-frame.

Four grab samples will be collected at each station suitable for grab sampling using a 0.1 m^2 Day (for mud/fine sand habitats) or 0.1 m^2 'mini' Hamon (for coarse sediments) grab as appropriate. Grab sampling will be undertaken as described below.

Three samples collected from each grab sampling station will be sieved for macrofauna using 1 millimetre mesh diameter sieves. Macrofauna samples will be stored in clearly labelled (internally and externally) plastic containers and preserved in 10 percent formaldehyde buffered with borax.

One sample from each grab sampling station will be subsampled for Particle Size (350 millilitres) and Organic Carbon (100 millilitres). Particle Size and Organic Carbon subsamples will be stored in clearly labelled (internally and externally) plastic containers and frozen as soon as is practicable after collection and sent for laboratory analysis.

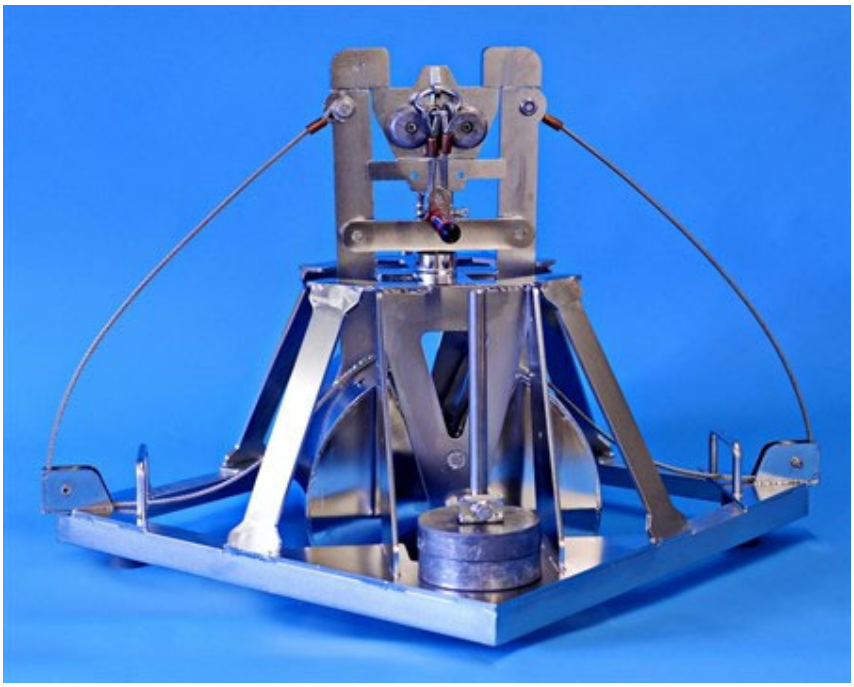

Figure 7.1 Example of Day Grab

7.4.2. Water Sampling Requirements

Water sampling will be conducted at every third station sampled following the methodology described below and in O'Brien et al. (2018)[1].

The Contractor shall be responsible for the handling, storage and transport of the samples to the onshore laboratory (and subsequent transport between laboratories), their storage and

[1] https://oar.marine.ie/handle/10793/1695

eventual disposal. Samples shall be handled and stored in a manner that minimises the risk of disturbance. All samples shall be appropriately labelled, stored upright, in a dry area, away from excessive moisture adhering to the storage criteria given in ISO19901-8 and its reference to ISO 22475-1.

The Contractor shall populate a Sample List and utilise a Chain Of Custody form to document and determine accountabilities for the samples during transit.

All samples, sub-samples and sample containers shall be labelled with a unique identifying number immediately after being removed from the sample. Sample labels should, where applicable, be printed or scanned labels rather than handwritten. The label shall include as a minimum:

- The Employer and the project name
- ID of sample.
- Date of sampling.
- Initials of a sampler

All tapes, labels, adhesives and markings shall be water resistant.

Photography of all samples shall be using an appropriate and sufficient photography setup to consistent high quality sample photography. This shall include:

- High Resolution (16MP or better) Digital SLR camera, in a fixed position.
- A fixed strong and consistent light source to ensure consistent sample colour.
- A photographic board, which as a minimum, shall be labelled with:
    - ID of sample
    - Date of sampling

7.4.3. Seabed Imagery Requirements

At each sampling station/location a 50 metre DC/ remotely operated vehicle (ROV) transect will be completed at c. 0.3 – 0.4 knots and max of 0.5 knots, with video collected continuously and still images collected when the DC is at a standard altitude (e.g., 0.5 m from seabed), to ensure consisted field of view, and at as high a frequency as is possible with at least one image collected every 20 seconds).

Ideally a minimum of four still photographs will be acquired at each environmental sampling station. Additional photographs or video footage will be acquired along transects to characterise sensitive habitats or features. This technique involves no intrusive seabed sampling.

Indicative equipment to be used is a SeaSpyder using Canon EOS 100D Digital Still Camera with dedicated strobe and an integrated video system capable of performing full HD recordings.

8. Marine Mammal Acoustic Monitoring

Continuous Porpoise Detectors (C-POD(s)) and/or AMAR Autonomous Multichannel Acoustic Recorder (AMAR) devices may be deployed in the application area to monitor the presence of cetaceans. They are fully automated passive acoustic monitoring instruments that detect porpoises, dolphins and other toothed whales (except sperm whales) by recognising the trains of echo-location sounds they produce to detect their prey, orientate and interact. A C-POD is a self-contained computer and hydrophone and can log the times and duration of click trains which resemble the echo-location clicks produced by porpoises and dolphins. Click trains are stored into different frequency bins, which can be used in some cases to identify individual animals (e.g., adult and calf). F-PODs use new electronics and software to capture more information. Static acoustic monitoring is independent of weather conditions once deployed and thus ensures high quality data is collected but only at a small spatial scale (typically around 5-700 metre radius from the C-POD). Both C-PODs and F-PODs monitor the presence and activity of toothed cetaceans by the detection of the trains of echolocation clicks that they make. Whilst it is expected that C-PODs will eventually be superseded by the new F-POD, if F-PODs are unavailable at the time of monitoring, C-PODs have the ability to record echolocations in order to robustly determine required data.

Up to two CPODs/FPODs may be deployed at any one time across the site. A sound trap may be deployed alongside one of the CPODs/FPODs for various durations throughout the monitoring campaign to obtain background noise measurements. The CPODs/FPODs will be recovered every three months to download data and change batteries. Upon each three-month recovery they may be relocated so that over the 12-month monitoring period CPODs/FPODs will be deployed at locations across the site.

The exact locations of the CPODs/FPODs have not being determined yet. Either two permanent sites will be selected, or the two sites will be relocated every three months (during battery change) based on a 4 x 4 kilometre survey grid across the site. The final locations will be submitted to DAERA for approval prior to the surveys taking place.

A schematic of the mooring design is presented in Figure 8.1. Heavy weight moorings using dyneema rope and clumped chain as mooring blocks are used. A single line runs from the mooring blocks to two surface marker buoys (example marker buoys are illustrated in Figure 5.5.), with a single loop made on the main line towards bottom where all monitoring units are shackled into a loop which is lined with a metal thimble to protect the rope from fraying with a swivel located above weights and below buoys to account for tides. A second safety line is threaded through the lid of the C-POD and also shackled onto the main line. This heavy weight mooring design is used, as it has proved successful at a number of other sites around the country, even during adverse weather conditions (O'Brien *et al.,* 2013). Recovery is through lifting the entire mooring and exchanging the C-PODs before redeployment, habitat loss is therefore temporary.

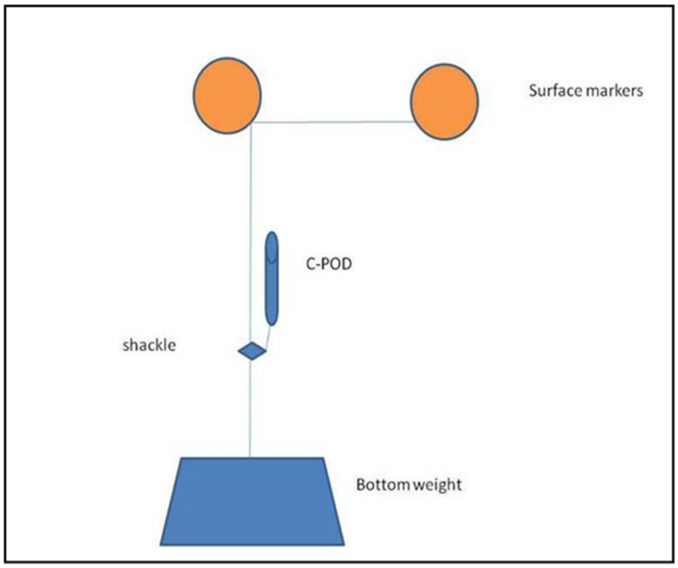

Figure 8.1: C-POD anchoring solution example (Source: IWDG)

9. Interaction with Other Users of the Sea

Prior to commencing the surveys, contact will be established with other users of the sea in the survey area, including commercial fishing vessels, recreational boaters, and offshore installations. Relevant authorities and maritime agencies will also be informed of the survey operations and a Notice to Mariners will be issued.

Survey plans, schedules, and contact details will be shared in advance to ensure awareness and to minimise potential conflicts. Regular updates on the progress of the survey will be provided to relevant stakeholders, as required.

The survey vessels will be equipped with an Automatic Identification System (AIS) to monitor and track nearby vessel traffic in real-time. The AIS will be used to identify potential conflicts and facilitate communication with other vessels to ensure safe and efficient operations.

A guard vessel may be used as an additional safety and communication measure during geophysical survey operations. Its primary function would be to assist the survey vessel and its equipment, ensure safe operations, oversee agreed temporary exclusion zones and minimise potential conflicts with other maritime activities.

NCW will work to minimise potential impacts on the fishing industry. We will be identifying and engaging with potentially affected fishermen through our Fisheries Liaison Officer in the months in advance of the surveys taking place.

Our Fisheries Liaison Officer Brian Chambers (+44 (0)7355744942) or the NCW Stakeholder Manager Fiona Stevens (+44 (0)7380 426114) will be contactable to answer any questions or concerns about the surveys.

10. General Requirements

The survey contractor and vessels will comply with international and national statute as appropriate. In addition, the following standard environmental procedures/protocols will be followed during the survey campaign:

- All vessels will comply with the latest International Maritime Organization (IMO) and Safety of Life at Sea (SOLAS) and environmental requirements for their classification and with any national requirement of the territorial or offshore waters to be operated in;
- The contractor will take particular care when handling or storing hazardous materials, radiation sources and chemicals;
- Liquid or non-liquid pollutants or waste material will not be dumped, thrown or otherwise disposed of into the sea;
- All refuse and materials shall be kept onboard the vessel and safely disposed of onshore according to the MARPOL convention;
- Where fuels, oils and lubricants are required to be stowed on boats, suitable containers will be used and stowed to allow ventilation and safe dissipation of any accidental leaked gas and retention of any leaked liquid; and
- No liquid will be discharged into the water at any stage of the work on site. No smoking will be permitted in the vicinity of fuel in storage or when in use.

11. References

- O'Beirn, F.X, O'Donnel, G, and Healy, L. (2018). Environmental Survey of Coastal and Shelf Waters – Southabout: Winter nutrients, benthos and contaminants monitoring 2018 (CV18-001). Marine Institute, Ireland
- O'Brien, J., Beck, S., Wall, D., Pierini, A., and Hansen, S. (2013). Marine Mammals and Megafauna in Irish Waters, behaviour, distribution and habitat use. Work Package 2: Developing Acoustic Monitoring Techniques.PReCAST Final Report –Marine Research Sub-programme 2007-2013 (NDP2007'13); PBA/ME/07/005(02), pp1-205.