# LLŶR FLOATING OFFSHORE WIND PROJECT

## Llŷr 1 Floating Offshore Wind Farm

## Environmental Statement

## Volume 6: Appendix 17B - MultiBeam EchoSounder (MBES) Survey Report

## August 2024

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Prepared by: Llŷr Floating Wind Ltd

FLOVENTIS ENERGY

**Document Status**

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| | |
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**Glossary of project terms**

| Term | Definition |
|---|---|
| The Applicant | The developer of the Project, Llŷr Floating Wind Limited. |
| Array | All wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure within the Array Area, as defined, when considered collectively, excluding the offshore export cable(s). |
| Array Area | The area within which the wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure will be located. |
| Floventis Energy | A joint venture company between Cierco Ltd and SBM Offshore Ltd of which Llŷr Floating Wind Limited is a wholly owned subsidiary. |
| Landfall | The location where the offshore export cable(s) from the Array Area, as defined, are brought onshore and connected to the onshore export cables (as defined) via the transition joint bays. |
| Llŷr 1 | The proposed Project, for which the Applicant is applying for Section 36 and Marine Licence consents. Including all offshore and onshore infrastructure and activities, and all project phases. |
| Marine Licence | A licence required under the Marine and Coastal Access Act 2009 for marine works which is administered by Natural Resources Wales (NRW) Marine Licensing Team on behalf of the Welsh Ministers. |
| Offshore Development Area | The footprint of the offshore infrastructure and associated temporary works, comprised of the Array Area and the Offshore Export Cable Corridor, as defined, that forms the offshore boundary for the S36 Consent and Marine Licence application. |
| Offshore Export Cable | The cable(s) that transmit electricity produced by the WTGs to landfall. |
| Offshore Export Cable Corridor (OfECC) | The area within which the offshore export cable circuit(s) will be located, from the Array Area to the Landfall. |
| Onshore Development Area | The footprint of the onshore infrastructure and associated temporary works, comprised of the Onshore Export Cable Corridor and the Onshore Substation, as defined, and including new access routes and visibility splays, that forms the onshore boundary for the planning application. |
| Onshore Export Cable(s) | The cable(s) that transmit electricity from the landfall to the onshore substation. |
| Onshore Export Cable Corridor (OnECC) | The area within which the onshore export cable circuit(s) will be located. |
| proposed Project | All aspects of the Llŷr 1 development (i.e. the onshore and offshore components). |
| Onshore Substation | Located within the Onshore Development Area, converts high voltage generated electricity into low voltage electricity that can be used for the grid and domestic consumption. |
| Section 36 consent | Consent to construct and operate an offshore generating station, under Section 36 (S.36) of the Electricity Act 1989. This includes deemed planning permission for onshore works. |

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# Llŷr Floating Offshore Wind Farm – Proposed Export Cable Route Hydrographic Survey 2024: Survey Report

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## Details

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## List of Abbreviations

| | |
|---|---|
| **DPR** | Daily Progress Report |
| **DGPS** | Differential Global Positioning System |
| **DTM** | Digital Terrain Model |
| **CD** | Chart Datum |
| **ECR** | Export Cable Route |
| **FOWF** | Floating Offshore Windfarm |
| **GMT** | Greenwich Mean Time |
| **IHO** | International Hydrographic Organisation |
| **MBES** | Multibeam Echosounder |
| **MCA** | Maritime and Coastguard Agency |
| **OEL** | Ocean Ecology Limited |
| **OSGM15** | Ordnance Survey Great Britain 2015 |
| **PPP** | Precise Point Positioning |
| **PPK** | Post Processed Kinematic |
| **QHSE** | Quality, Health & Safety and Environment |
| **SAC** | Special Area of Conservation |
| **SPA** | Special Protected Area |
| **SVP** | Sound Velocity Profiler |
| **UTC** | Coordinated Universal Time |
| **UTM** | Universal Transverse Mercator |
| **WGS84** | World Geodetic System 1984 |
| **QA** | Quality Assurance |
| **QC** | Quality Control |

# 1 Introduction

## 1.1 Project Overview

Llŷr 1 (the proposed Project) is a Floating offshore wind farm (FOWF) being developed by Floventis Energy Limited (Floventis). The proposed Project is located in the approaches to the Bristol Channel in the Celtic Sea, approximately 44 km from the Lundy Island shore, 62 km from the Devon coastline and 35 km from the Welsh coastline (Figure 1). The proposed Export Cable Route (ECR) is located in water depths ranging between 15 m to 60 m and will run north towards Pembroke.

Following on from the benthic characterisation survey undertaken by OEL between February and April 2024, OEL has undertaken hydrographic survey works required to better inform the habitat assessment reporting in addition to effectively delineating the presence of a suitable channel for the proposed ECR.

The survey scope required a refined area of the original benthic characterisation survey area to be surveyed with Multibeam Echosounder (MBES) as displayed in Figure 1.

## 1.2 Requirement

MBES bathymetry was required along the proposed ECR over one mainline spanning the length of the ECR, with a 925m spur near the southern end of the mainline and, an additional mainline ~152m south of the centre of the proposed ECR, see Figure 1.

## 1.3 Document Overview

This document details the setup, progress, and initial field observations of the MBES survey undertaken by OEL between in July 2024. Further detail is also provided on site information and sampling strategy.

## 1.4 Site Information and Location

### 1.4.1 Designated Sites

The proposed survey area intersects the Pembrokeshire Marine SAC which is a designated marine protected area covering 1,380 km$^2$ in southwest Wales. This SAC is designated for the protection of the following habitats and species:

- Annex I reef
- Fragile sponge & anthozoan communities on subtidal rocky habitats
- Maerl
- Mussel beds
- *Musculus discors* beds
- *Ostrea edulis* beds
- Seagrass beds

Further features designated within this SAC include:

- Estuaries
- Large shallow inlets and bays
- Reefs
- Sandbanks which are slightly covered by seawater all the time
- Mudflats and sandflats not covered by seawater at low tide
- Coastal lagoons
- Atlantic salt meadows
- Submerged or partially submerged sea caves
- Grey seal (*Halichoerus grypus*)
- Shore duck (*Rumex rupestris*)
- Sea lamprey (*Petromyzon marinus*)
- River lamprey (*Lampetra fluviatillis*)
- Allis shad (*Alosa alosa*)
- Twaite shad (*Alosa fallax*)

**West Wales Marine SAC**

The proposed survey area also intersects the West Wales Marine SAC which is situated off the coast of Wales extending from the Llŷn peninsula in the north, to Pembrokeshire in the southwest. The SAC has been identified as an area of importance for harbour porpoise (*Phocoena phocoena).*

**Skomer, Skokholm and the Seas off Pembrokeshire SPA**

The proposed survey area also intersects the eastern extent of the Skomer, Skokholm and the Seas off Pembrokeshire Special Protected Area (SPA) which is classified for the protection of: European storm-petrel (*Hydrobates pelagicus*), Manx shearwater (*Puffinus puffinus*), Atlantic

puffin (*Fratercula arctica*), and lesser black-backed gull (*Larus fuscus*), as well as red-billed chough (*Pyrrhocorax pyrrhocorax*), short-eared owl (*Asio flammeus*) and breeding seabird assemblage. The SPA extends beyond the 12 nautical mile boundary, lying partly in Welsh territorial waters and partly in UK offshore waters meaning Natural Resources Wales (NRW) and JNCC are responsible for providing statutory advice.

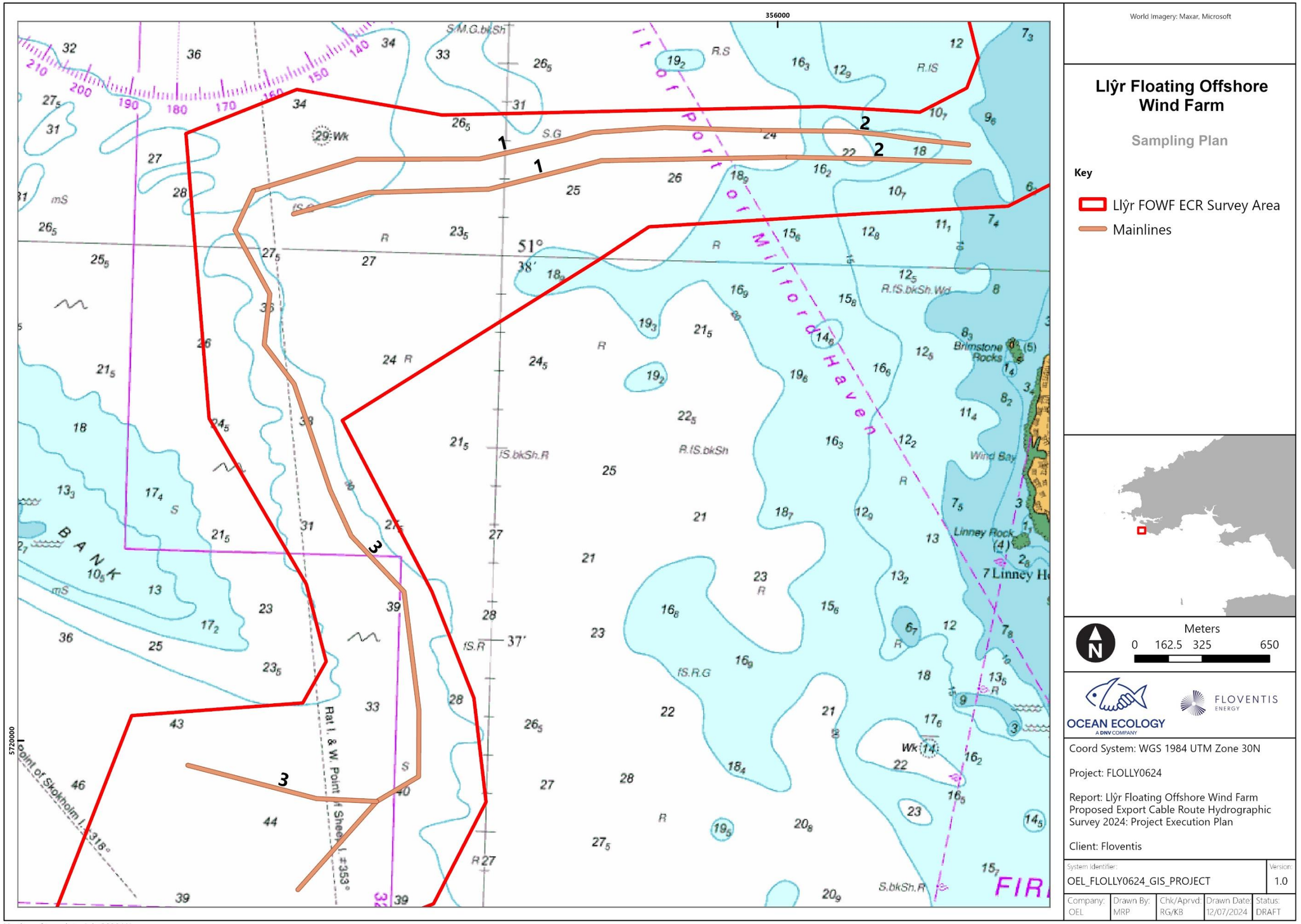


**Figure 1** Survey area overview and line plan.

# 2 Scope of Work

Survey acquisition was prioritised along transects that run through areas of interest across the SAC and SPA. Bathymetry and backscatter were collected simultaneously to ensure 100% ensonification.

Parameters for the MBES survey included 100% bathymetric coverage, 100% backscatter coverage and 0.5m bin size.

# 3 Survey Design

## 3.1 Overview

The data collection plan was based on the requirement to collect MBES along the proposed ECR. The initial line plan provided by the client spanned the length of the proposed ECR, with a short 925m spur near the southern end of the mainline and, an additional mainline ~152m south of the centre of the proposed. Once the initial survey requirements had been met, the crew expanded the line plan to concentrate data collection over the areas where camera transects had been completed as part of the benthic characterisation survey. Once this additional bathymetry had been collected, the crew expanded the data collection further within the benthic characterization survey area where Annex I Reef Features were thought to be present.

# 4 Survey Methods

## 4.1 Survey Vessel

The survey was conducted aboard OEL's 11.7 m MCA Category 2 survey vessel '*Argyll Explorer*' (Table 1 and Plate 1). The vessel mobilised and operated out of Milford Marina, on a 12-hour basis, operating in daylight hours only, and returning to port each day.

**Table 1** Vessel details

| | |
|---|---|
| **Vessel Name** | Argyll Explorer |
| **Area of operation** | Offshore |
| **Call Sign** | MWFU |
| **IMO Number** | 235057487 |
| **Mobilisation Port** | Milford Marina, Milford Haven |
| **Length** | 11.7 m |
| **Beam** | 5.5 m |
| **Draft** | 1.5 m |


**Plate 1** OEL's dedicated survey vessel Argyll Explorer.

## 4.2 Geodetic Parameters

The geodetic (Table 2) and projection parameters (Table 3) used for this survey are detailed in the tables below.

**Table 2** Geodetic parameters

| Parameter | Details |
|---|---|
| Name | World Geodetic System 1984 (WGS84) |
| Ellipsoid | WGS 84 |
| Semi-Major Axis (a) | 6378137.000 m |
| Semi-Minor Axis (b) | 6356752.314 m |
| Inverse Flattening | 298.257 223 563 |
| Geodetic parameters EPSG Code | 4326 |

**Table 3** Projection parameters.

| Projection | Transverse Mercator |
|---|---|
| Name | UTM Zone 30 N |
| Longitude of Natural Origin | 6° West |
| Latitude of Natural Origin | 0° |
| False Easting | 1 500 000.00 m |
| False Northing | 0.00 m |
| Scale Factor at Natural Origin | 1 |
| Units | metres |

## 4.3 Datum Transformation Parameters

All data is referenced to WGS84, UTM Zone 30 N, with no datum transformation need. No conversion or test coordinate was provided by the Client.

## 4.4 Vertical Datum

All altitude and depth data above seabed are referenced to LAT. The geoid model OSGM15 was coupled with a manual offset to chart datum in Qinsy.

## 4.5 Unit Format and Conversions

The formats that have been used throughout this project are detailed in Table 4 and are expressed using the following conventions.

**Table 4** Project unit format and convention details.

| Unit Formats and Conventions | |
|---|---|
| Geographical Coordinates | Latitude N DD˚MM.mmmmmm' to 6 decimal places.<br>Longitude E/W DD˚MM.mmmmmm' to 6 decimal places. |
| Grid Coordinates | Meters in the following format:<br>Easting EEE EEE.eee m to 3 decimal places.<br>Northing NNN NNN.nnn m to 3 decimal places. |
| Linear distances | Meters to 1 decimal places. |
| Offset measurement sign conventions | Meters in the following format:<br>'Y' is positive forward.<br>'X' is positive to starboard.<br>'Z' values are positives upwards from the waterline. |
| Time | UTC (GMT). |

## 4.6 Survey Equipment

The survey was undertaken using the equipment detailed in Table 5.

**Table 5** Summary of RGMP Equipment.

| System | Equipment | Accuracy |
|---|---|---|
| **Primary Navigation** | Applanix POSMV WaveMaster II GNSS (integrated into MBES) | 0.5-2.0m - DGPS<br>0.1m - PPP |
| **Primary Heading** | Applanix POSMV WaveMaster II INS (integrated into MBES) | 0.03° accuracy with 2m baseline |
| **Primary Attitude** | Applanix POSMV WaveMaster | 0.02° - PPP |
| **Datum Reduction** | INS Corrected PPK reduced to CD using OSGB15. | |
| **MBES** | Norbit iWBMS (400kHz) | IHO Special Order |
| **Sound Velocity Profiler** | Valeport SWiFT SVP | 0.02m/s |
| **Sound Velocity Sensor** | AML Oceanographic SV Xchange 1500m/s (MBES integrated) | +/- 0.025m/s |
| **Integrated Navigation** | QPS Qinsy | |

## 4.7 Data Acquisition Method and Quality Assurance

### 4.7.1 Horizontal Control

The GNSS receivers were secured to the vessel where they had a clear unobstructed view of the sky and as far away as possible from large metal objects which may cause a multi-pathing environment.

The solution status and accuracy of the primary position was observed in the Norbit and QPS Qinsy software.

## 4.8 Multibeam Bathymetry

The MBES single curved head was mounted to the same custom-built flange as the USBL, which was on a pole, fixed to the side of the vessel. The pole was lowered vertically into the water to a fixed point. A combination of pullies and ropes allowed the pole to be safely operated.

The optimum multibeam range was selected for the depth of water for the best coverage and ping rate. Data was logged as S7K files within the Norbit software and saved in Qinsy database files. 100% seafloor coverage was collected and was used to produce a DTM at 0.5m gridding. To achieve this, the system was operated at a maximum operating angle of 100°.

Multibeam data was viewable in the Norbit software and gridded in QPS Qinsy Online. Data noise, interference and sound velocity difference was also be viewed in situ to ensure the online surveyor can collect the best data possible. The use of an automated alarm on set parameters is set up to ensure good data collection.

## 4.9 Summary of Operations

Survey operations took place between Saturday 13th and Monday 15th July 2024. A summary of daily activity is provided in Table 6 below.

**Table 6** Progress log for hydrographic survey operations aboard the *Argyll Explorer* in July 2024.

| Date | Activity | Kms Completed |
|---|---|---|
| 13/07/2024 | Vessel and equipment were mobilised. Engine fault so crew unable to start data collection. | 0 |
| 14/07/2024 | Survey operations commenced. Initial line plan completed so additional 19.07km of data collected. | 30.07 |
| 15/07/2024 | An additional 71.71km of data collected. Survey operations deemed complete. | 71.71 |

### 4.9.1 Weather and Technical Downtime

During the survey, 12 hours of technical downtime were recorded while port engine faults were diagnosed and rectified. Due to the faults occurring on a weekend, the availability of marine engineers was extremely difficult. Despite this, the engine issue was resolved and alongside trials were conducted meaning that the vessel was able to commence survey operations on Sunday 14th July. No weather downtime affected the survey operations although weather conditions were marginal on Monday 15th July.

# 5 Provisional Results

A total of 83.35km of multibeam and backscatter data was collected across the survey area. The data coverage can be seen in Figure 2. The data collected meet the following parameters:

**Coverage**

- Data was collected across the whole survey area, equalling approximately 4.1km$^2$ of MBES and MBBS data.
- An additional 71.74km of MBES and MBBS data was collected, beyond the original scope.
- Due to weather, static fishing gear and a brief technical issue, there are some data gaps. Further details of the causes are explained in the following bullet points.
- Most data gaps are <5m$^2$ and were induced by unfavourable weather conditions on Monday 15th July. These are primarily around areas of high rugosity as the multibeam struggled to cope when the vessel was pitching and rolling however, they do not affect the ability to distinguish the seafloor type for habitat mapping purposes.

- Two larger data gaps occurred as result of static fishing gear deployed on the single mainline south of the proposed route. One gap is approximately 63m west from the most eastern end of the line (herein referred to as Gap 1) and another (herein referred to as Gap 2) is approximately 2km west of Gap 1.
- A third gap (Gap 3) can be attributed to a technical issue with the multibeam data which meant that a small amount of data was not able to be recovered in post processing. This also occurred on the single mainline south of the proposed route but again, does not affect the ability to distinguish the seafloor type.

**Resolution**

- Bathymetry data was collected with a bin size of 0.5m, ensuring high resolution depth information throughout the survey area.

**Data Quality**

- Both bathymetric and backscatter data were collected concurrently, ensuring consistency between the datasets.
- Poor weather on Monday 15th July made data collection difficult when the prevailing weather was either beam on to the vessel or heading towards the bow, causing the vessel to pitch and roll.

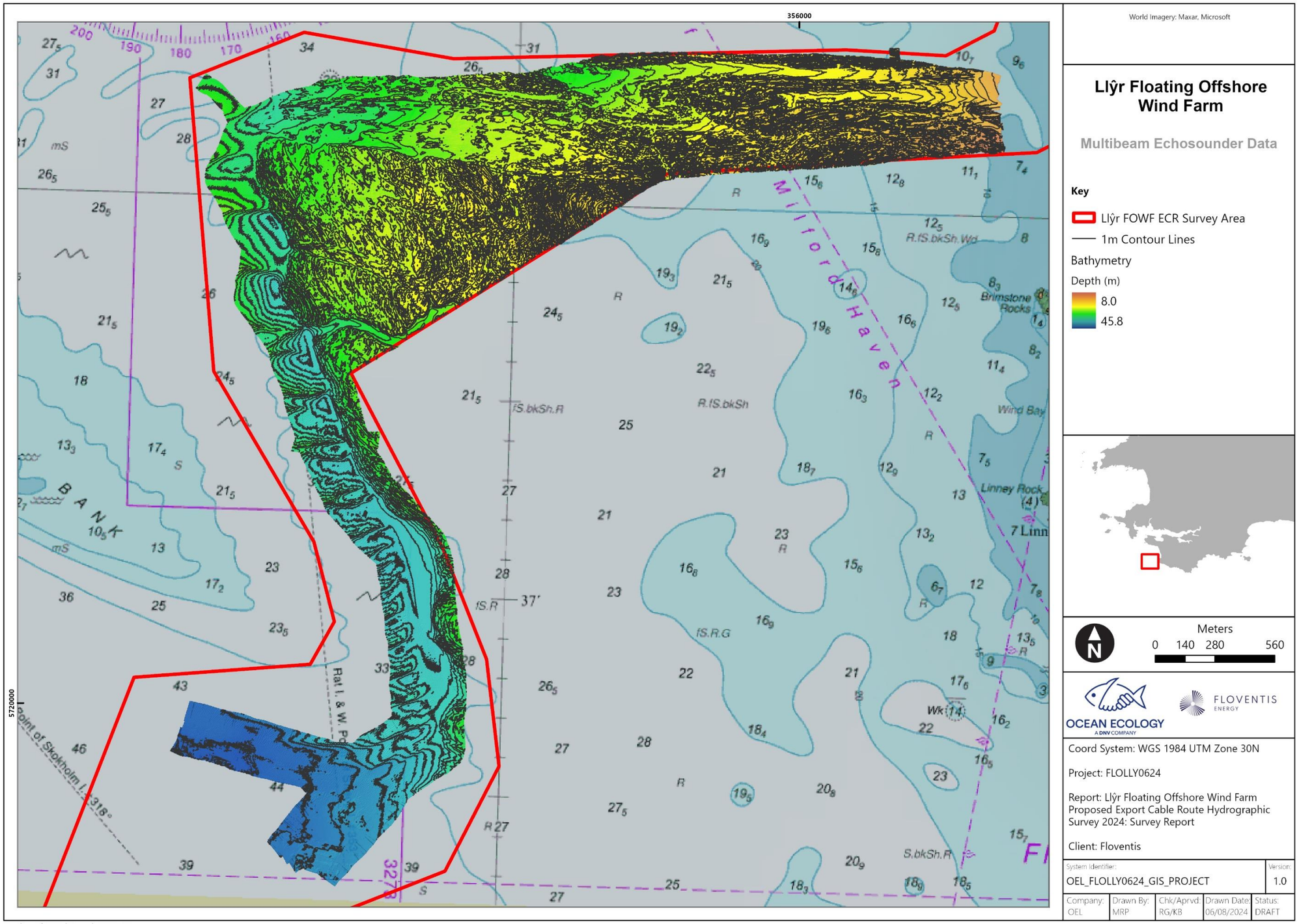


**Figure 2** Seabed relief with contours at 1m intervals

# 6 QHSE Summary

Survey operations were completed safely and efficiently in line with OEL's QHSE procedures. No safety observations were made over the four-day project. Table  summarises the technical downtime during survey operations.

**Table 8** Summary of technical downtime and instances that affected data quality.

| Date | Issue | Solution |
|---|---|---|
| 13/07/2024 | Port engine fault so crew unable to commence data collection. | Engine fault resolved and alongside engine trials were completed. |
| 14/07/2024 | Marginal weather conditions caused a reduction in data density. | Weather conditions improved slightly throughout the day, so most data gaps were able to be infilled. |
| 14/07/2024 | Fishing gear on mainlines so vessel had to manoeuvre around the surface buoys causing two data gaps. | Attempted to recollect at a different state of tide when surface buoy had moved slightly. |

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