

CHERISH Project Wales Surveying Band 1 Marine Licence Application

The CHERISH project is applying for a Band 1 Marine Licence on behalf of the Department for the Environment, Climate and Communications (Government of Ireland). Proposed activities include a *Marine Survey* where sediment (grab) sampling (density < 50 samples within any one hectare) will occur and an *Onshore Coring Survey* where one 50 mm diameter core will be retrieved (estimated volume removed 0.165 m³) from Warren Beach foreshore (between Mean High Water and Mean Low Water) at Abersoch, Wales.

CHERISH Project Overview:

The CHERISH project (2017-2023) investigates the impacts of climate change to coastal cultural heritage around the coasts of Ireland and Wales. The CHERISH project is managed by the Royal Commission on the Ancient and Historical Monuments of Wales, with the three other project partners of Aberystwyth University, Geological Survey Ireland and The Discovery Programme: Centre for Archaeology and Innovation Ireland. The project is funded through the Ireland-Wales 2014-2020 European Territorial Co-operation programme

Marine Survey Method Statement

The CHERISH project is applying to conduct a marine survey in Welsh coastal waters <12 nautical miles from shore in 2021 (KRY21_CHERISH). The KRY21_CHERISH priority areas are designated based on areas for marine bathymetry acquisition (Figure 1) from discrete CHERISH sites along with seabed sampling (Figure 2).

An application has been submitted to the Ocean Policy Unit of the Foreign Commonwealth and Development Office to conduct marine scientific research in UK waters. An application is being submitted for a Seabed Survey licence from The Crown Estate. A Notification of Exemption for a marine license is being prepared due to the scientific purpose of the proposed survey. We are contacting the local harbour authorities, Trinity House, the Maritime and Coastguard Agency, and Natural Resources Wales to ensure our activity is exempt from requiring a marine licence and will not cause obstruction or danger to navigation, or significantly effect a marine protected area.

To date, three previous marine surveys, using the RV Keary (Table 1), have occurred in shallow UK waters, with bathymetry and sub-bottom data acquired. Seabed samples are required to create seabed sediment maps of the sites of interest. If successful in our application, the 2021 survey to UK water will deploy a small Van Veen grab (or similar) for seabed sampling at proposed locations.

During operations, all relevant maritime safety legislation will be complied with. At least five days before commencement of works, a local notification will be issued to marine users, including fisherman's organisations, relevant authorities and other local stakeholders to ensure that they are made fully aware of the works. HM coastguard will also be notified in advance (zone31@hmcg.gov.uk) and we will liaise with local fishermen that may be impacted by the works. The vessel will not anchor over the seabed within one nautical mile of subsea cables.

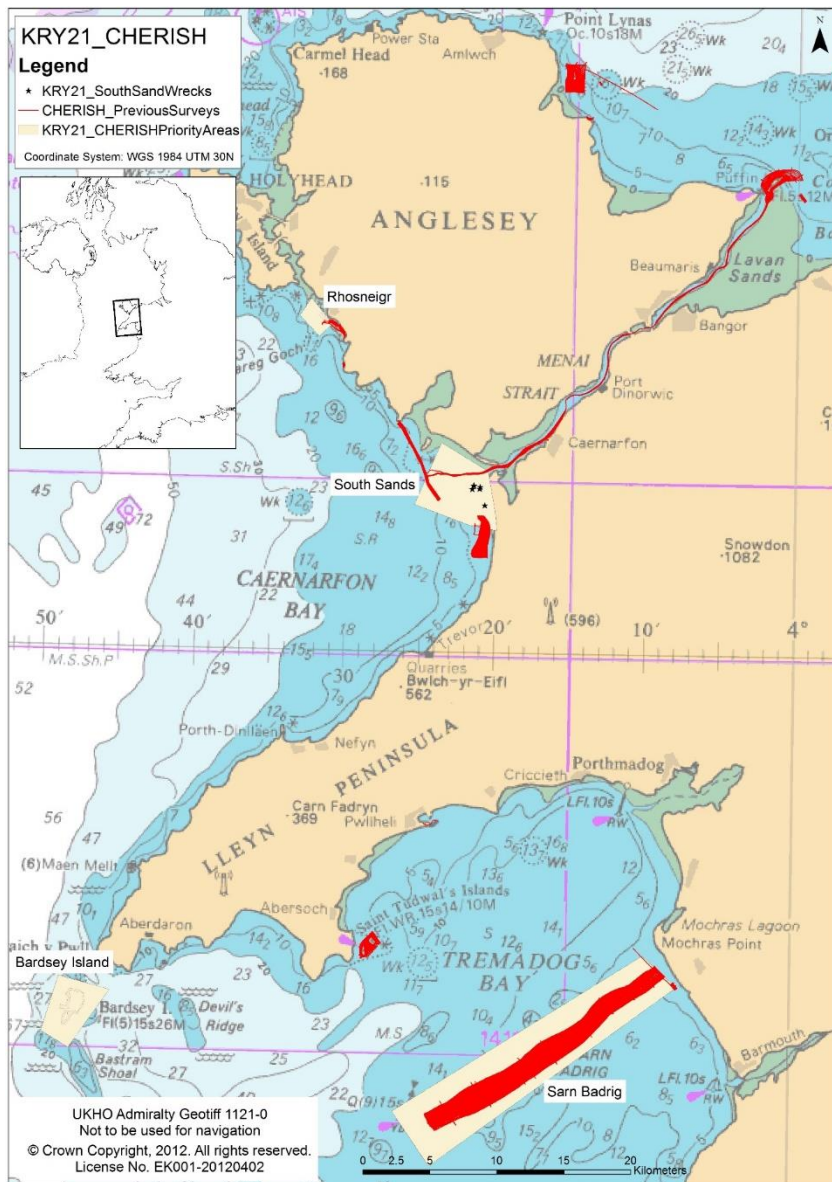


Figure 1: KRY21_CHERISH Priority areas (yellow polygons) for marine bathymetry and seabed sampling, with locations of the three previous CHERISH marine surveys (2018-2020) in red.

Proposed Survey dates

A 2 week period within 15th August to 10th October 2021. The exact dates will be determined by the relevant permissions and weather conditions. Preferred dates are 15th to 29th August, or 29th August to 12th September.

Seabed Sampling Outline

Seven sampling areas (Figure 2) comprising of up to sixty five sampling locations are proposed to sample seabed type in CHERISH study areas. Proposed locations are based on existing bathymetry and acoustic backscatter maps produced on previous CHERISH surveys in the area. Sample locations are

distributed over seven regions in Welsh coastal waters: Dulas Island, Puffin Island, South Sands, Rhosneigr, Bardsey Island, St Tudwal's Islands and Sarn Badrig. All sample locations are <30 m depth, except for Bardsey Island where two proposed locations are <50 m. A Van Veen grab (or similar) would be used to sample approximately 200 cm² of seabed. Estimated sediment recovery would be <2 kg per sample location.

Seabed samples would be recovered using a small Van Veen grab (or equivalent) operated from a winch on the RV Keary. Dimensions of the sampler would be approximately 200 cm², with estimated sediment recovery <2 kg per sample location, and generally less than 0.5 kg. Samples would be visually assessed on board for sediment type. Select samples (up to the total number of 65) would be further retained for particle size analysis following the survey. Total volume of material removed will be <0.2 m³.

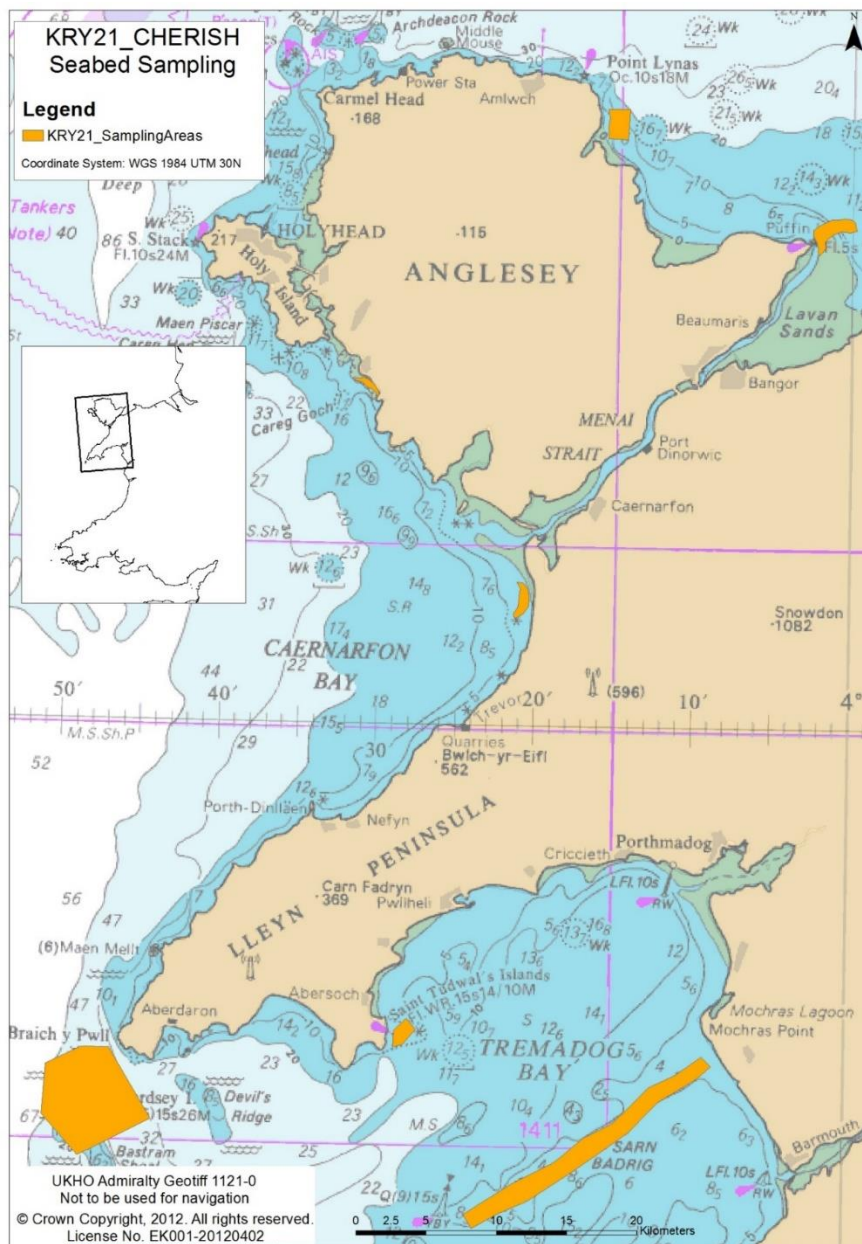


Figure 2: Seven proposed areas for seabed sampling during KRY21_CHERISH that correspond with CHERISH study areas: Dulas Island, Puffin Island, Rhosneigr, South Sands/Dinas Dinlle, Bardsey Island, St Tudwal's Islands, and Sarn Badrig.

Survey Deliverables

Anticipated data deliverables of this survey include:

- Seabed sampling datasets:
 - Seabed type at point locations
 - Particle size analysis at selected locations (based on sufficient sample recovery and available budget)
 - Seabed maps at selected coastal sites
- Other data deliverables:
 - Marine bathymetry, backscatter and sub-bottom data at selected sites (Sarn Badrig, Bardsey Island, Rhosneigr)
 - Preliminary Survey Report (3 months after survey)
 - Final Survey Report (6 months after survey)
 - Seamless onshore-offshore maps (Bardsey Island and Rhosneigr)

- *Table 1: Particulars of proposed vessel*

Name:	R.V. Keary
Type/Class:	Coastal Research Vessel
Nationality (Flag State):	Irish
Identification Number (IMO/Lloyds No.):	IMO 404520
Owner:	Geological Survey of Ireland
Operator:	Geological Survey of Ireland
Overall length (meters):	15.5
Maximum draught:	1.5 or 2.1 with survey equipment deployed
Displacement/Gross Tonnage:	10/36
Propulsion:	2*Cummans QSC 8.3-500 INT 368 kW/2600RPM
Cruising & maximum speed:	17 & 22 knots
Call sign:	EI-GO-9
INMARSAT number and method and capability of communication (including emergency frequencies):	VHF DSC
Name of Master:	Sean Cullen/Agust Magnusson
Number of Crew:	2 crew + 2 max
Number of Scientists on board:	3 max

Onshore Coring Survey Method Statement

CHERISH is applying for a Band 1 Marine Licence to retrieve a core circa 3 m long and 55 mm in diameter using a percussion corer. The core will be used to date the organic horizons and determine the source of minerogenic material, to help reconstruct the environmental history of the location. The proposed core site is at grid reference SH32032 29595 (Table 2, Figure 3), which is between mean high water and mean low water. The CHERISH coring team will comprise personnel from Aberystwyth University.

Table 2: Proposed co-ordinates of core

Co-ordinate Reference System	Co-ordinates
Ordnance Survey National Grid	SH 32032 29595
British National Grid (digits)	232032 329595
Geographic Co-ordinates	N 52.837433° W 4.495013°



Figure 3: Proposed location of core on Warren Beach between Mean High Water and Mean Low Water

Over the past four years the CHERISH team from Aberystwyth University has been conducting coastal palaeoenvironmental research at numerous coastal locations in North Wales. At Llyn Maelog on Anglesey, we have identified that around 7000 years ago the sea inundated this coastal lake turning it to a marine environment for around 500 years. This event has sparked interest within the research community investigating and modelling early Holocene sea-level rise. Sites in Wales that record this important period of environmental are scarce and our understanding is based on limited data. However, Llyn Maelog can also be used to illustrate some key implications of future sea-level rise in coastal locations.

Recently CHERISH has been investigating the intertidal sequence at the Warren Beach, Abersoch, where Project colleagues at the Royal Commission identified important intertidal peat exposures bearing the imprint of animal hoof prints and evidence of old peat cuttings. This is in addition to the significant exposures of tree remains and peat which are often visible. CHERISH believes that the deposit are the result of two distinct phases of tree/peat growth in the early Holocene that may well bracket the sea-level rise identified at Llyn Maelog.

General coring principles

Percussion coring is used to penetrate sediments where traditional, hand operated corers are precluded due to the sediment density or viscosity of the material to be sampled. Intertidal peats, as found at this location, are generally very dense and often underlain by hard layers of silts and clays or loose sand. The corer consists of a hollow, metre-long steel tube that is driven into the ground by a petrol-powered percussion hammer. The core is extracted with a manual jacking system. The retrieved material is contained within a plastic sleeve.

Proposed Survey dates

CHERISH anticipate the work will take place between on one day to be confirmed between either 03/08/21 - 04/08/21 or 01/09/21 - 29/10/21, subject to suitable tides and weather.

Methods

CHERISH proposes to retrieve one core from the foreshore of Warren Beach, Abersoch (BNG: SH 32032 29595). The site selected for sampling is around the neap high tide area and exposed for much of the time between high tides. CHERISH aims to use a single drive to obtain a core sequence approximately 3 metres in length. This would require 3 separate drives (in a single hole) to obtain a complete sequence. The barrel has an external diameter of 55mm, therefore total material removed/displaced will be approximately 0.165m³. The preparation, retrieval and cleaning of equipment between each drive takes around 20 minutes, thus it is anticipated that the complete coring operation will be completed within 2 hours. The sampling hole will be back-filled with beach sand.

The corer is an Atlas Copco Cobra TT 90cc petrol driven percussion hammer with hardened steel core barrel and rods. The external diameter of the core barrel is 55 mm with an internal sample diameter of 50 mm, and 1 metre in length. The engine produces approximately 109 dB(A) of noise (similar to a small chainsaw) and around 3.8 m/s² of vibration during its operation. Sampling on a beach foreshore typically takes between 30 seconds to 1 minute of run-time to take a single metre of core. The core extraction system is a hand-operated jacking unit that incrementally raises the core barrel from the sediment.

Environmental impacts

The coring process overall has a minimal impact on the environment. Vehicles will be parked at “Quarry Car Park” (BNG SH 32900 30400) and coring equipment carried in on foot. The principal impact is the noise and vibration from the petrol engine and percussion hammer. However, as the run-

time is often less than 1 minute per metre of core, it is estimated there would be less than 3 minutes of disturbance to retrieve the proposed 3 metres of core from the Abersoch foreshore. However, as there will be approximately 20 minutes between each drive, the vibration and noise will be in short bursts.

Emissions are minimal, with the equipment run with a synthetic fuel that produces fewer harmful emissions than convention 2-stroke fuel. Other than freshwater for washing the core barrel, no liquids or fluids are released during the operation. No refuelling or lubrication will take place on the foreshore. Sequences of cores aim to be extracted from a single hole. All equipment is cleaned and disinfected between sites in line with our biosecurity protocol to prevent cross-contamination of microbes or invasive species.



Figure 4: Operating the percussion corer

Safety

Appropriate personal protective equipment will be used by the team and the area under investigation will be appropriately marked to warn members of the public and operations will only be carried out when it is safe to do so. All equipment and materials will be removed from the site immediately on completion of works.

Experience

The CHERISH Project team members are highly experienced in all forms of coring at sensitive and or challenging sites. The team have undertaken certified percussion core training. A bespoke risk assessment is conducted prior to arrival on-site, and continue to monitor any risks or impacts as the work progresses.



Figure 5. Core retrieval using the manual jacking system in the intertidal zone



Figure 6 Impact of coring and example of extracted material in an open barrel corer

Notifications

Marine Survey

The local harbour authorities (Gwynedd Council and Caernarfon Harbour), Trinity House and the Maritime and Coastguard Agency have been notified about the proposed survey. Responses from Trinity House and the Maritime and Coastguard Agency indicate that with their proposed measures, there it is unlikely there will be a danger to navigation.

A Crown Estate Licence is being applied for the marine survey

Onshore Coring Survey

Location (grid reference) of the proposed activity has been provided to the Marine Licencing Team at Natural Resources Wales. The beach is outside a SSSI, with a SAC starts at Mean Low Water (see attached correspondence from Natural Resources Wales).

A Crown Estate Licence is being applied for the onshore coring survey.

The Royal Commission on the Ancient and Historical Monuments of Wales have been contacted, and provided confirmation that no archaeological features will be adversely affected by proposed coring activities.

Further Information

For further information, please contact Dr Kieran Craven from the Geological Survey Ireland (Dpt of the Environment, Climate and Communications – Government of Ireland) at kieran.craven@decc.gov.ie