

Application for Consent to conduct  
Marine Scientific Research

Date: 01/02/2019

1. General Information

1.1 Cruise name and/or number:
CE19007

1.2 Sponsoring Institution(s):	
Name:	Marine Institute
Address:	Rinville, Oranmore, Co. Galway
Name of Director:	Dr Peter Heffernan

1.3 Scientist in charge of the Project:	
Name:	Chris McGonigle
Country:	Ireland
Affiliation:	Ulster University
Address:	2a Cromore Road, Coleraine, Co. Derry, Northern Ireland. BT52 1SA
Telephone:	+44(0)2870124076
Fax:	
Email:	<a href="mailto:cd.mcgonigle@ulster.ac.uk">cd.mcgonigle@ulster.ac.uk</a>
Website (for CV and photo):	<a href="https://pure.ulster.ac.uk/en/persons/chris-mc-gonigle">https://pure.ulster.ac.uk/en/persons/chris-mc-gonigle</a>

1.4 Entity(ies)/Participant(s) from coastal State involved in the planning of the project:	
Name:	Dr. John Howe
Affiliation:	Senior Lecturer in Marine Science, Scottish Association of Marine Sciences, UK
Address:	Scottish Marine Institute, Oban PA37 1QA
Telephone:	+44 (0)1631 559 257
Fax:	
Email:	John.Howe@sams.ac.uk
Website (for CV and photo):	
Name:	Dr. Jenny Collier, Professor of Marine Geophysics
Affiliation:	Imperial College, London
Address:	Imperial College London, South Kensington Campus, London SW7 2AZ
Telephone:	+44 (0)20 7594 6443
Fax:	
Email:	<a href="mailto:jenny.collier@imperial.ac.uk">jenny.collier@imperial.ac.uk</a>
Website (for CV and photo):	
Name:	Dr. Annika Clements
Affiliation:	Senior Scientific Officer - Seabed Habitat Mapping, Agri-Food Biosciences Institute, NI
Address:	Agri-Food and Biosciences Institute 18a Newforge Lane, Belfast, Co Antrim Northern Ireland UK BT9 5PX
Telephone:	+44 (0)28 9025 5636

Fax:	
Email:	Clements, Annika <a href="mailto:Annika.Clements@afbini.gov.uk">Annika.Clements@afbini.gov.uk</a>
Website (for CV and photo):	
Name:	Dr. James Dooley
Affiliation:	Professor of Microbiology, Ulster University
Address:	2a Cromore Road, Coleraine, Co. Derry, Northern Ireland, BT52 1SA
Telephone:	+44 28 7012 4427
Fax:	
Email:	<a href="mailto:jsg.dooley@ulster.ac.uk">jsg.dooley@ulster.ac.uk</a>
Website (for CV and photo):	
Name:	Dr. Fabio Sacchetti
Affiliation:	Hydrographer and multibeam expert, Marine Institute, Ireland
Address:	Rinville, Oranmore, Co. Galway. H91 R673
Telephone:	+353 (0)9 138 7200
Fax:	+353 (0)9 138 7201
Email:	<a href="mailto:fabio.sacchetti@Marine.ie">fabio.sacchetti@Marine.ie</a>
Website (for CV and photo):	

## 2. Description of Project

### 2.1 Nature and objectives of the project:

The overall aim of this proposal is to explore the feasibility of collecting multi-frequency acoustic backscatter data and temporally coincident ground-truth data at a range of scales, optimised for the characterisation of benthic habitats and other associated features of interest in an understudied area of high conservation and natural resource value. This proposal will also explore emerging and novel technologies to enhance the quantification of biodiversity and community composition.

This will be achieved by the following objectives:

1. Acquire multi-spectral backscatter imagery from the range of available MBES operating frequencies optimised for backscatter analysis.
2. Acquire backscatter imagery over contrasting features including biogenic and non-biogenic reef, and associated features of geomorphological interest.
3. Collect new data to allow us to characterise the biophysical environment in the water column.
4. Acquire spatially and temporally relevant optical ground-truth data to examine fine-scale morphological complexity and epifaunal community structure using the best available technologies.
5. Examine sedimentary composition and infaunal community structure using grab samples.
6. Collect, process and analyse environmental DNA samples to explore use as a proxy for benthic biodiversity.
7. Collect a reference set of biogenic material from candidate sessile marine invertebrates with contrasting life histories.

8. Develop open-access reference collection of acoustic, optical, sedimentological, molecular and genetic data for researchers in marine and benthic mapping communities to utilise for future analytical approaches.

#### Outcomes and Benefits

This survey will help us to understand more about environmental controls on benthic communities that will help inform the conservation of priority Annex I habitat in Ireland, the UK and Europe. This benefits society as it will help to inform natural resource management by refining our understanding of process affecting ecological communities. Interdisciplinary collaboration allow participants to benefit from exposure to different legislative frameworks which will facilitate knowledge transfer between the partner institutions.

#### 2.2 If designated as part of a larger scale project, then provide the name of the project and the Organisation responsible for coordinating the project:

This work will contribute to some of the scope for Management and Monitoring of Marine Protected Areas (MarPAMM), administered by the SEUPB through Interreg VA. Further information is available here: <http://www.mpa-management.eu/>. This work will make a contribution to the T2 Benthic Habitats package which is coordinated by Dr. Annika Clements at the Agri-Food Biosciences Institute, Belfast.

#### 2.3 Relevant previous or future research projects:

This proposal represents a continuation or development from the foundations of several European projects (legacy and ongoing), most notably:

- 1) Mapping European Seabed Habitats (MESH) Project JNCC was leading an international marine habitat mapping programme entitled 'Development of a framework for Mapping European Seabed Habitats, or MESH for short, which started in spring 2004 and finished in January 2008. The MESH partnership covered all five countries in the INTERREG (IIIb) north-west Europe area, drawing together scientific and technical habitat mapping skills, national data collation and management expertise, and experience in the use of habitat mapping in management and regulatory frameworks.
- 2) The Joint Irish Bathymetric Survey (JIBS). The Maritime and Coastguard Agency led the Joint Irish Bathymetric Survey (JIBS) Project, approved under the INTERREG IIIA Programme, with the Marine Institute as project partner. Objectives included joint seabed survey to satisfy the needs of many organisations. The JIBS project commenced on 10 April 2007 and was completed in June 2008.
- 3) INFOMAR is a DCCAE funded joint programme between the Geological Survey Ireland and the Marine Institute, surveying our unmapped marine territory and creating a range of integrated mapping products of the physical, chemical and biological features of the seabed.
- 4) INIS Hydro is part of the EU funded INTERREG IVA Programme, Priority 2, Theme 2: Environment. Between 2011 and 2013 the INIS Hydro partnership conducted multibeam echo sounder bathymetric surveys of over 1,400 km<sup>2</sup> of strategically important seabed off the west coast of Scotland and the east coast of Ireland and Northern Ireland generating data of IHO Order 1A quality.

#### 2.4 Previous publications relating to the project:

Collier, J. S., & Brown, C. J. (2005). Correlation of sidescan backscatter with grain size distribution of surficial seabed sediments. *Marine Geology*, 214(4), 431-449.

McGonigle, C., & Collier, J. S. (2014). Interlinking backscatter, grain size and benthic community structure. *Estuarine, Coastal and Shelf Science*, 147, 123-136.

McGonigle, C., Brown, C., Quinn, R. and Grabowski, J., 2009, Evaluation of image-based multibeam sonar backscatter classification for benthic habitat discrimination and mapping at Stanton Banks, UK, *Estuarine, Coastal and Shelf Science*, 81(3): 423-437.

McGonigle, C., Brown, C. J., & Quinn, R. (2010). Insonification orientation and its relevance for image-based classification of multibeam backscatter. *ICES Journal of Marine Science: Journal du Conseil*, fsq015.

Hughes Clarke, J. 2015. Multispectral acoustic backscatter from multibeam, Improved classification potential. United States Hydrographic Conference 2015. March 16th -19th National Harbour, Maryland, USA.

Hughes Clarke, J., Iwanowska, K. K., Parrott, R., Duffy, G., Lamplugh, M., & Griffin, J. (2008). Inter-calibrating multi-source, multi-platform backscatter data sets to assist in compiling regional sediment type maps: Bay of Fundy. In Proceedings of the Canadian Hydrographic Conference and National Surveyors Conference.

### 3. Geographical Areas

3.1 Indicate geographical areas in which the project is to be conducted (with reference in Latitude and longitude in decimal degrees, including coordinates of cruise/track/way points/sampling stations). Please provide coordinates in a separate excel spreadsheet.

These sites have been selected based on current research activities at Ulster University. The areas were surveyed as part of the MESH and JIBS project, and existing MBES data is available for these sites. Repeat acoustic surveys at these sites will allow an assessment of change in the benthic environment which can be incorporated into final year dissertation projects, comparing the extant JIBS MBES data with the data acquired as part of the training exercises).

In addition to the six proposed areas, the event of prolonged exposed conditions, there are two contingency areas indicated on Figure 1: g) contained within the bounds of the Joint Irish Bathymetric Survey (JIBS); and h) contained within the bounds of the coverage collected by the Royal Navy on behalf of the United Kingdom Hydrographic Office in 2010 aboard *HMS Enterprise* (Figure 1). These areas have a limited amount of ground-truth data that is restricted to grab samples with a relatively sparse level of coverage, and a limited capacity to sample in areas of hard substrata. Several additional sites of high scientific interest are available in more sheltered conditions that still have sufficient draught for the *RV Celtic Explorer*. These sites include Rathlin Island cMCZ, Red Bay SAC, Laconia Bank, Middle Bank, the Tuns Bank and the Causeway and Skerries SAC, all of which are of significant scientific and conservation interest.

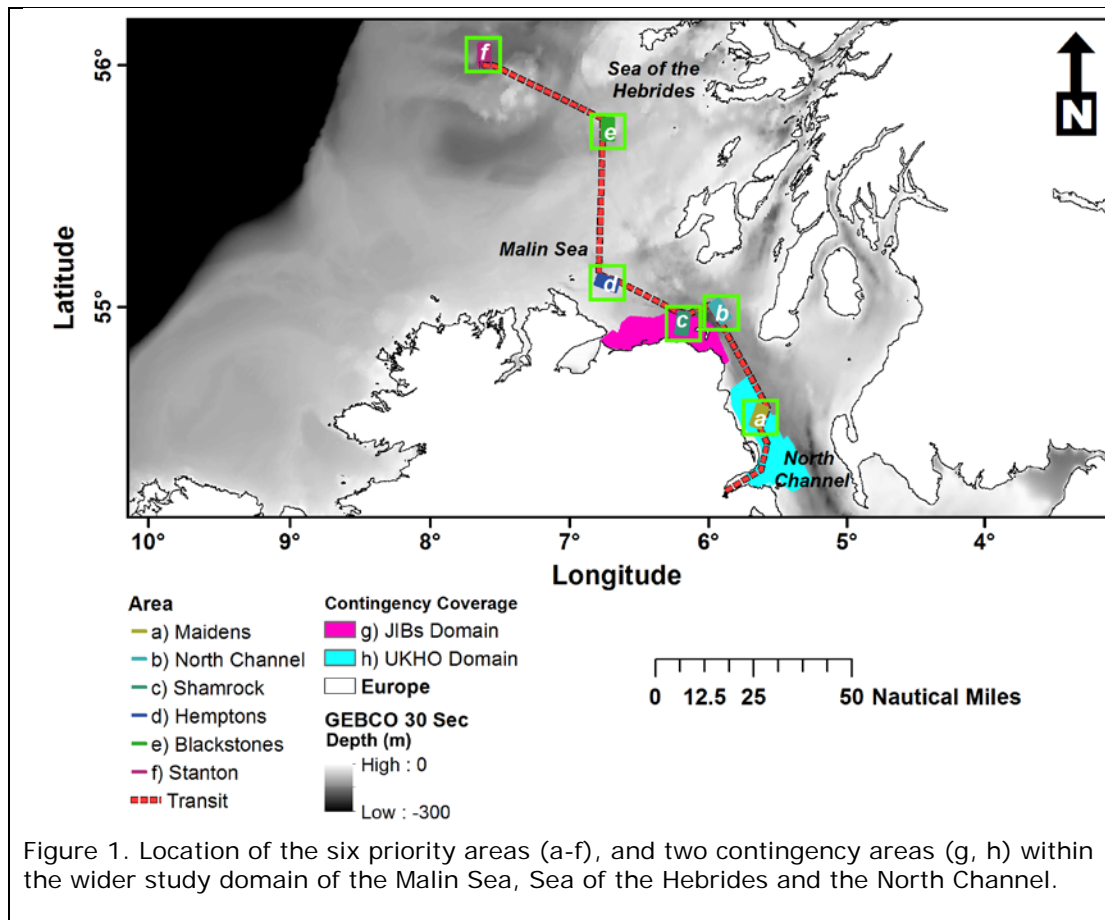


Figure 1. Location of the six priority areas (a-f), and two contingency areas (g, h) within the wider study domain of the Malin Sea, Sea of the Hebrides and the North Channel.

### 3.2 Attach chart(s) at an appropriate scale (1 page, high-resolution) showing the geographical

Areas of the intended work and, as far as practicable, the location and depth of sampling Stations, the tracks of survey lines, and the locations of installations and equipment.

At the chosen survey site acoustic survey lines will be plotted prior to survey and will depend on sea state and water depth over the area. Night-time working on the cruise will be utilized for acoustic data collection to maximise value-for-money in terms of use of ship-time. Ground-truthing stations will be selected based on the acoustic data sets. The following is a guide for the approximate number of proposed samples using each of the sampling techniques for each of the 6 regions of interest. The exact location of the samples and deployment will be based on interpretation of the acoustic data, the central positions of the acoustic lines are indicated in the attached spreadsheet.

- Grab samples - Day / Shippek grab (24 stations) – four replicates at each location
- Under water video (24 stations) – four replicates at each location
- ROV Dive (3 transects)
- Baited Remote Underwater Video (8 deployments, 6 hour soak time).

Survey lines and grab station co-ordinates will be decided at the time of survey depending on weather conditions and time restraints.

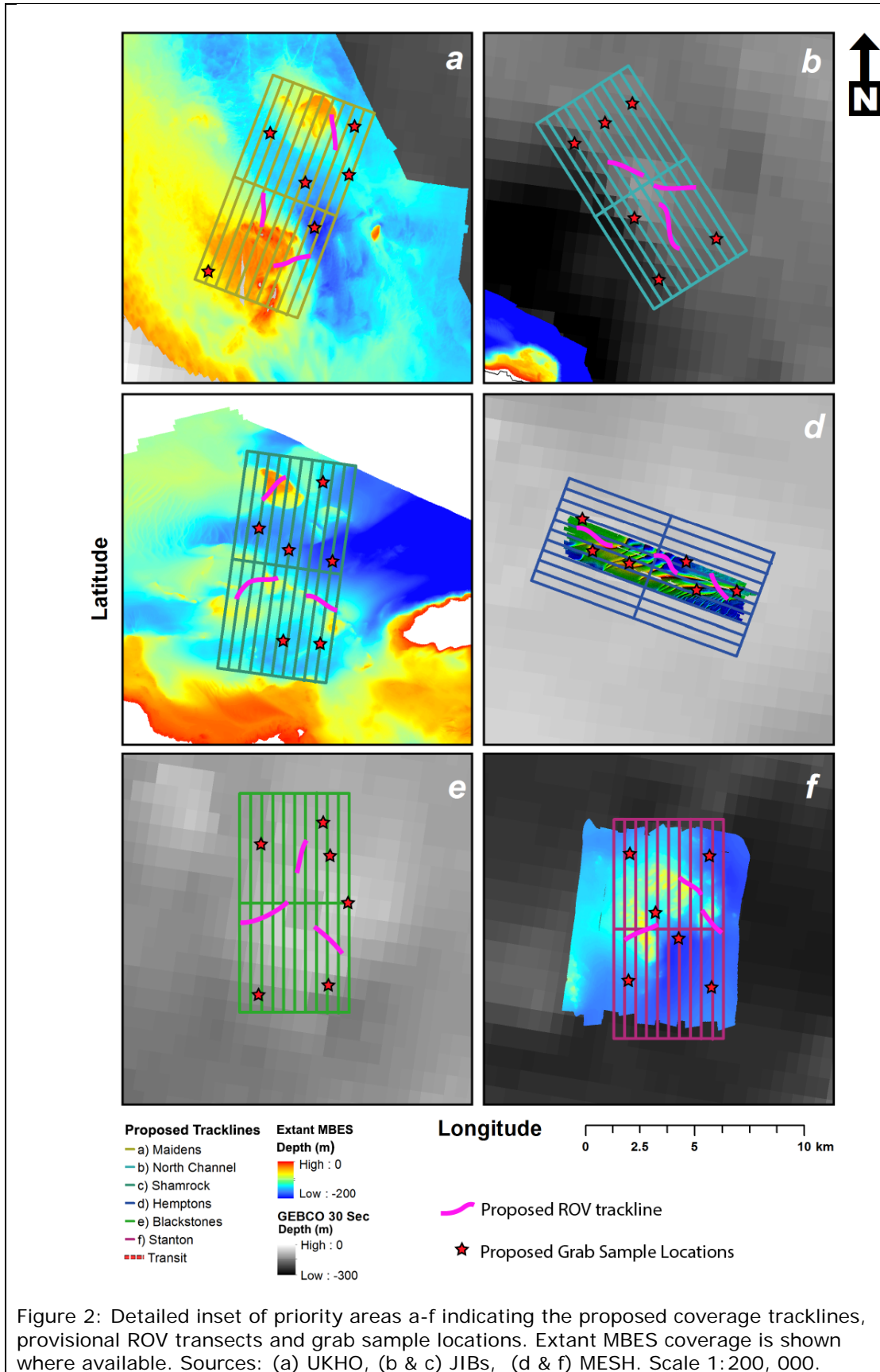


Figure 2: Detailed inset of priority areas a-f indicating the proposed coverage tracklines, provisional ROV transects and grab sample locations. Extant MBES coverage is shown where available. Sources: (a) UKHO, (b & c) JIBs, (d & f) MESH. Scale 1:200, 000.

#### 4. Methods and means to be used

##### 4.1 Particulars of vessel:

Name:	Celtic Explorer
Type/Class:	Multipurpose Research Vessel D100 A1 ICE CLASS ID + UMS +SCM DP (CM)
Nationality (Flag State):	Irish
Identification Number (IMO/Lloyds No.):	IMO Number: 9244439
Owner:	Marine Institute
Operator:	P&O Maritime Services
Overall length (meters):	65.5
Maximum draught:	5.7m
Displacement/Gross Tonnage:	2425T
Propulsion:	2 x 1530 KW, 1000Rpm, 1 x 1020 KW, 1000 Rpm
Cruising & maximum speed:	10 & 16 knots
Call sign:	EI GB
INMARSAT number and method and capability of communication (including emergency frequencies):	00353 91 423397 / 00353 91 423433 00870 763066743 00 353 87 9678520 / 00 353 86 1735500
Name of Master:	Antony Hobin/Denis Rowan
Number of Crew:	13-15
Number of Scientists on board:	18-20 max

4.2 Particulars of Aircraft:	
Name:	
Make/Model:	
Nationality (flag State):	
Website for diagram & Specifications:	
Owner:	
Operator:	
Overall Length (meters):	
Propulsion:	
Cruising & Maximum speed:	
Registration No.:	
Call Sign:	
Method and capability of communication (including emergency frequencies):	
Name of Pilot:	
Number of crew:	
Number of scientists on board:	
Details of sensor packages:	
Other relevant information:	

4.3 Particulars of Autonomous Underwater Vehicle (AUV):	
Name:	
Manufacturer and make/model:	
Nationality (Flag State):	
Website for diagram & Specifications:	
Owner:	
Operator:	
Overall length (meters):	
Displacement/Gross tonnage:	
Cruising & Maximum speed:	
Range/Endurance:	
Method and capability of communication (including emergency frequencies):	
Details of sensor packages:	
Other relevant information:	

4.4 other craft in the project, including its use:

4.5 Particulars of methods, full description of scientific instruments to be used (for fishing gear specify type and dimension) and location

Types of samples and Measurements:	Methods to be used:	Instruments to be used:	To be carried out within 12nm (yes or no):
Acoustic data	Hull-mounted acoustic survey methodology	Multibeam sonar, Single beam sonar,	Yes
Biological samples (infauna and epifauna)	Grabs, ROV Holland 1	Day grab, Shipek grab,	Yes
Sediment grain size samples	Grabs	Day grab, Shipek grab	Yes
Video data	Underwater video surveys	Drop-down video frames; ROV Holland 1	Yes
Laser Line Scanner	Subsea LiDAR	ULS-500 Laser Line Scanner	Yes

4.6 Indicate nature and quantity of substances to be released into the marine environment:  
 Biological samples will be preserved in 4% Formaldehyde solution. No other harmful substances will be used.

4.7 Indicate whether drilling will be carried out. If yes, please specify:  
 No drilling will be carried out.

4.8 Indicate whether explosives will be used. If yes, please specify type and trade name, Chemical content, depth of trade class and stowage, size, depth of detonation, frequency of Detonation, and position in latitude and longitude:  
 No explosives will be used.

5. Installations and Equipment

Details of installations and equipment (including dates of laying, servicing, method and Anticipated timeframe for recover, as far as possible exact locations and depth, and Measurements):

We will install a small number of Baited Remote Underwater Videos (x8) – based on a very simple trap camera design to look at non-invasive techniques for monitoring mobile species and scavenging etc. This could be executed in two stages within each of the day shifts, based on 2 x 6 hour deployments for our array of 8 baited underwater cameras. It is envisaged that this should have a very minimal impact in the area, and all sampling would be completed within a 48 hour period, no gear is being left on site. A similar set up to what we are proposing is described in the attached study. <https://www.int-res.com/articles/esr2018/37/n037p037.pdf>

The exact locations for the deployment will be determined from interpretation of the acoustic data coverage, but they will be based around a 10 km<sup>2</sup> box based on the centreline in the attached excel document.



6. Dates

6.1 Expected dates of first entry into and final departure from the research area by the research vessel and/or other platforms:
First entry into UK waters 18:00 30 <sup>th</sup> of April – based on transit from Galway.
Survey works will be completed by 15:00 on 11 <sup>th</sup> of May 2019 exiting UK waters shortly thereafter and beginning transit to Cork for demobilisation on 12 <sup>th</sup> of May 2019.
6.2 Indicate if multiple entries are expected:
No.

7. Port Calls

7.1 Dates and Names of intended ports of call:
There may be a need to exchange some personnel mid-cruise depending on availability of representatives of coastal states. This could happen at Greencastle in Co. Donegal or Lisahally Co. Derry– this could likely happen as a small boat transfer rather than as a dedicated port call. AFBI have indicated their capacity to arrange something in this eventuality and this is something that they routinely organise. The dates for this would be finalised closet to the time, but it is likely that this would be mid-way through cruise to allow for personnel changeover.

7.2 Any special logistical requirements at ports of call:
N/a.

7.3 Name/Address/Telephone of shipping agent (if available):

8. Participation of the representative of the coastal State

8.1 Modalities of the participation of the representative of the coastal State in the research Project:
The cruise will be run by UK scientists and the data will feed into UK Higher Education via the University of Ulster BSc Environmental Science degree programme.
Dr. Annkia Clements. Senior Scientific Officer - Seabed Habitat Mapping, Agri-Food Biosciences Institute, NI is part of the scientific personnel for this cruise. There will also be an invitation to DAERA Marine Division for further representation from Northern Ireland.

8.2 Proposed dates and ports for embarkation/disembarkation:
Mobilising in Galway (28 <sup>th</sup> of April 2019), Demobilising in Cork (12 <sup>th</sup> of May 2019). Possibility of disembarkation on small boat transfer mid-cruise, in this event it will be organised locally by AFBI.

9. Access to Data, Samples and Research Results

9.1 Expected dates of submission to coastal State of preliminary report, which should include
The expected dates of submission of the data and research results:

All UK based partners (Ulster University, Scottish Association of Marine Sciences, Imperial College London) will have immediate access to data and samples. Cruise report available end of August 2019.

9.2 Anticipated dates of submission to the coastal State of the final report:

Cruise report available end of August 2019.

9.3 Proposed means for access by coastal State to data (including format) and samples:

All UK based partners (Ulster University, Scottish Association of Marine Sciences, Imperial College London) will have immediate access to data and samples.

9.4 Proposed means to provide coastal State with assessment of data, samples and Research results:

Data and samples will be processed by Ulster University contract research staff and post-graduate students. Results will be published, if appropriate, in leading marine science journals. After a suitable embargo period, data will be freely available to UK government agencies (DEFRA, SNH, DAERA, AFBI, FRS etc.).

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples

And research results:

Data and samples will be processed by Ulster University contract research staff and post-graduate students.

9.6 Proposed means of making results internationally available:

Research results will be published in leading marine science journals.

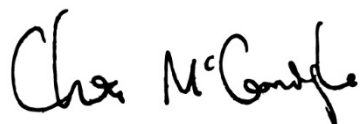
## 10. Other permits Submitted

10.1 Indicate other types of coastal state permits anticipated for this research (received or Pending):

Pending (Licensing Exemption – Marine Scotland (UK), DAERA (NI), National Parks and Wildlife (RoI).

## 11. List of Supporting Documentation

11.1 List of attachments, such as additional forms required by the coastal State, etc.:



Signature:

Contact information of the focal point:

Name: Chris McGonigle

Country: Northern Ireland

Affiliation: Ulster University

Address: 2a Cromore Road

Telephone: +44(0)2870124076

Fax:

Email: [cd.mcgonigle@ulster.ac.uk](mailto:cd.mcgonigle@ulster.ac.uk)