Application for Consent to conduct
Marine Scientific Research

Date: _08/01/2018_____

1. General Information

1.1 Cruise name and/or number: Celtic Voyager
CV18003

1.2 Sponsoring Institution(s):	
Name:	Marine Institute funded project for Institute of Technology Sligo
Address:	IT Sligo, Ash Lane, Sligo, Ireland
Name of Director:	Dr James Bonsall

1.3 Scientist in charge of the Project:	
Name:	Dr James Bonsall
Country:	Ireland (resident), British (birth)
Affiliation:	Institute of Technology Sligo
Address:	Ash Lane, Sligo, Ireland
Telephone:	+353 (0)87 24 27 846
Fax:	
Email:	Bonsall.james@itsligo.ie
Website (for CV and photo):	https://itsligo.academia.edu/JamesBonsall

1.4 Entity(ies)/Participant(s) from coastal State involved in the planning of the project:	
Name:	Martina Maloney, Office of Research and Development
Affiliation:	Marine Institute
Address:	Rinville, Oranmore, Co. Galway, Ireland
Telephone:	+353 (0)91 387473
Fax:	
Email:	martina.maloney@marine.ie
Website (for CV and photo):	https://www.marine.ie/Home/site-area/research-funding/research-funding

2. Description of Project

2.1 Nature and objectives of the project:
Europe's Lost Frontiers Project successfully identified the earliest contact between mainland Europe and Great Britain based on a large-scale programme of sub-surface mapping and coring in the region known as Doggerland, located off the east coast of Britain. Occupying much of the North Sea basin between continental Europe and Britain, Doggerland would have been a heartland of human occupation and central to the process of re-settlement and colonisation of north Western Europe during the Mesolithic and the Neolithic. Recent sub-surface mapping off the west coast of Britain now affords us the opportunity to determine the earliest contact between mainland Europe/Britain and Ireland. The evidence for early Mesolithic and Neolithic contacts between Ireland and Britain along the Atlantic province is strong. Therefore any earlier contact is also strong in these areas based on the known palaeolandscape. The evidence has been determined to be probably better in the chosen study areas of Liverpool Bay and Cardigan Bay – potentially – than the North Sea and Doggerland (in terms of earliest contact). To provide a context for the earliest contacts in Ireland there is a need to explore the

palaeo-coastlines, based on previous sub-surface mapping. The extent of the palaeo-coastlines off the present day Irish coast is limited, therefore we must look to the adjacent palaeo-coastlines that are appropriate for further study. The available land and supporting data are best off the west coast of Britain. Specifically, our sub-surface mapping and data from the palaeo-coastlines has identified a number of key locations which we intend to core. The project will reconstruct and simulate the palaeo-environments of the Irish Sea using ancient DNA extracted directly from sediment cores and explore the palaeolandscapes of Ireland and identify incipient signals indicating early contact and development within the region of the Irish Sea.

The specific objectives of the Research Survey will be:
To obtain 16 Cores from Liverpool Bay
To obtain 4 Cores from Cardigan Bay
To obtain high-precision geophysical data at each of the 21 Core locations
To preserve and ship to Cork the Cores obtained.

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:

Europe's Lost Frontiers Project, University of Bradford, directed by Prof. Vince Gaffney: https://lostfrontiers.teamapp.com/

2.3 Relevant previous or future research projects:

The Chief Scientist is Dr James Bonsall, based at the Centre for Environmental Research Innovation and Sustainability (CERIS) at the Institute of Technology Sligo, has 20 years of experience as an archaeological geophysicist with a background in coastal erosion and its impact upon archaeological features in the terrestrial and marine landscapes. Ship-based experience extends to extensive periods of in-shore survey and reconnaissance assessments around Sligo Bay.

Eithne Davis, is a PhD candidate at IT Sligo engaged in the study of Prevention, Control and Eradication of Invasive Species. Eithne has a particular interest in ecology, sustainability issues, and in the coastal environment with previous research on spatial studies of areas susceptible to coastal erosion, focussing on geophysical hazard factors and socio-economic vulnerability. Eithne is a Helm and emergency responder for the RNLI station at Rosses Point, Sligo.

Dr Benjamin Gearey, based at University College Cork, was co-ordinator for the Palaeoenvironmental Programme of the Humber Regional Environmental Characterisation Programme. He has experience of the on-board protocols and approaches for the collection of vibrocores, having overseen the collection and sampling of around 440 sediment cores from the Gardline Vessel Sea Profiler during a 2 week continuous research voyage.

Kevin Kearney is a PhD candidate at University College Cork, with a strong background in palaeoenvironmental and palaeoeconomic reconstructions and has no ship-time experience.

Dr Richard Bates, Senior Lecturer, St. Andrews. Richard employs the use of high resolution geophysical survey techniques with specific focus on near surface, high resolution terrestrial geophysics (archaeology, palaeo-environmental reconstruction, climate change impact) and marine, high resolution survey (palaeo-landscape reconstruction, ecosystem evaluation, resource mapping, sediment dynamics). Development of multi-sensor equipment for environmental investigations with an emphasis on climate impact studies such as marine benthic mapping and glacier retreat in the maritime Arctic. Commercialization of applied geophysics for marine investigation of Special Areas of Conservation and offshore marine resource development both internationally and on the UK Continental Shelf.

Dr Martin R. Bates, School of Archaeology, History and Anthropology, University of Wales Trinity St. David. A Pleistocene Geoarchaeologist actively engaged in the investigation of submerged landscapes in Orkney around the Bay of Firth and the Loch of Stenness. Additionally he is project geoarchaeologist for the Quaternary Archaeology and Environments of Jersey Project and is leading a new multi-disciplinary research fieldwork at La Cotte de St.Brelade in Jersey.

The project team are all published experts in the techniques proposed, many of whom pioneered these technologies. Their institutions fully support the project and are prepared to provide equipment and administrative support.

- Professor Vince Gaffney, Anniversary Chair, University of Bradford, director of the Lost Frontiers Project, Professor Gaffney has developed a new paradigm for the study of ancient landscapes and the human past.
- Dr Robin Allaby, Associate Professor, University of Warwick. An evolutionary geneticist who specializes in palaeogenomics and the evolution of domestication. Allaby has over 20 years experience in the field and uses computational approaches and ancient DNA to understand genome evolution and the spread of agriculture from Neolithic centres of origin. Supervisor of the DNA analysis programme.
- Dr. David Smith, Lecturer, University of Birmingham. Specialist in palaeoentymology, geoarchaeology and wetland archaeology. Expertise in the geoarchaeology of alluvial landscapes and Holocene landscape change. Supervisor of the environmental analysis programme.
- Dr. Eugene Ch'ng, Associate Professor, University of Nottingham. Specialises in interactive 3D virtual environments, simulation in games engines, Agent-Based Modelling for marine and terrestrial ecology, and his experience in respect of Big Data. Fusion of 3D visualisation and Multi-Agent Systems is a strength. Supervisor of the complex systems simulation programme. 2017 Ship-Time Programme Grant-Aid Application Form (RESEARCH) 13
- Dr. Simon Fitch, Research Fellow, University of Bradford. A marine geophysicist and Mesolithic specialist who has worked for the past 13 years on the mapping and interpretation of the palaeolandscapes of the southern North Sea, primarily using seismic reflection data. Supervisor of the seismic mapping programme and the Mesolithic specialist.
- Dr. Philip Murgatroyd, Research Fellow, University of Bradford. An agent-based modeller with 10 years experience of interdisciplinary research within archaeology, including modelling medieval military logistics and geophysics and data visualisation of the Stonehenge landscape. Project manager and complex systems simulation postdoc.

2.4 Previous publications relating to the project:

Europes' Lost Frontiers publications:

Gaffney V. et al. 2016. Sentinel-1 Bathymetry for North Sea Palaeolandscape Analysis. International Journal of Remote Sensing, 37:3, 471-491, DOI: 10.1080/01431161.2015.1129563

Ch'ng E, Gaffney VL and Hakvoort G (2016) Stigmergy in comparative settlement choice and palaeoenvironment simulation. Complexity. 21(3): 59-73.

Gaffney V et al. 2015. Thermal age, cytosine deamination and the veracity of 8,000 year old wheat DNA. bioRxiv preprint first posted online November 17, 2015. DOI:

Smith, O., Momber, G., Bates, R., Garwood, P., Fitch, S., Pallen, M., Gaffney, V. & Allaby, R.G. 2015. Response to comment on "Sedimentary DNA from a submerged site reveals wheat in the British Isles 8000 years ago". Science. Science 349, 247; DOI: 10.1126/science.aab2062

Smith, O., Momber, G., Bates, R., Garwood, P., Fitch, S., Pallen, M., Gaffney, V. & Allaby, R.G. In Review. Sedimentary DNA from a submerged site provides evidence of wheat in the British Isles 8000 years before present. Science. 27 February 2015 Vol 347 Issue 6225 DOI: 10.1126/science.1261278

Gaffney V. 2014 My Historic Environment. The Historic Environment 5(1). 89-92
van S., Heteren, Meekes JAC., Bakker MAJ., Gaffney V., Fitch S., Gearey B., Paap BF. (2014). Reconstructing North Sea Palaeolandscapes from 3D and high-density 2D seismic data: An overview. Netherlands Journal of Geosciences, 1-12

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.

Liverpool Bay (-3.753123899 53.54692468) and Cardigan Bay (-4.322224551 52.258334), see attached spreadsheet for a sampling locations.

Starting from Cobh, and proceeding towards Liverpool Bay (-3.753123899 53.54692468) and then south to Cardigan Bay (-4.322224551 52.258334), before returning back to Cobh.

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.

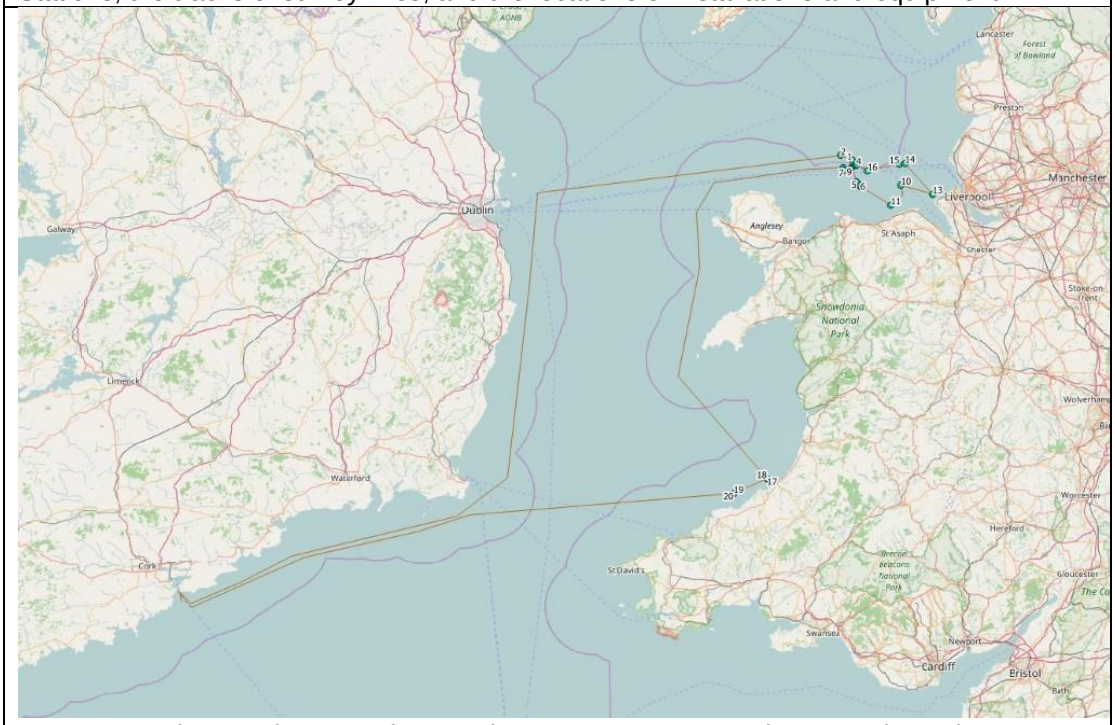

Fig. 1. Trackmap showing the two locations in Liverpool Bay and Cardigan Bay.

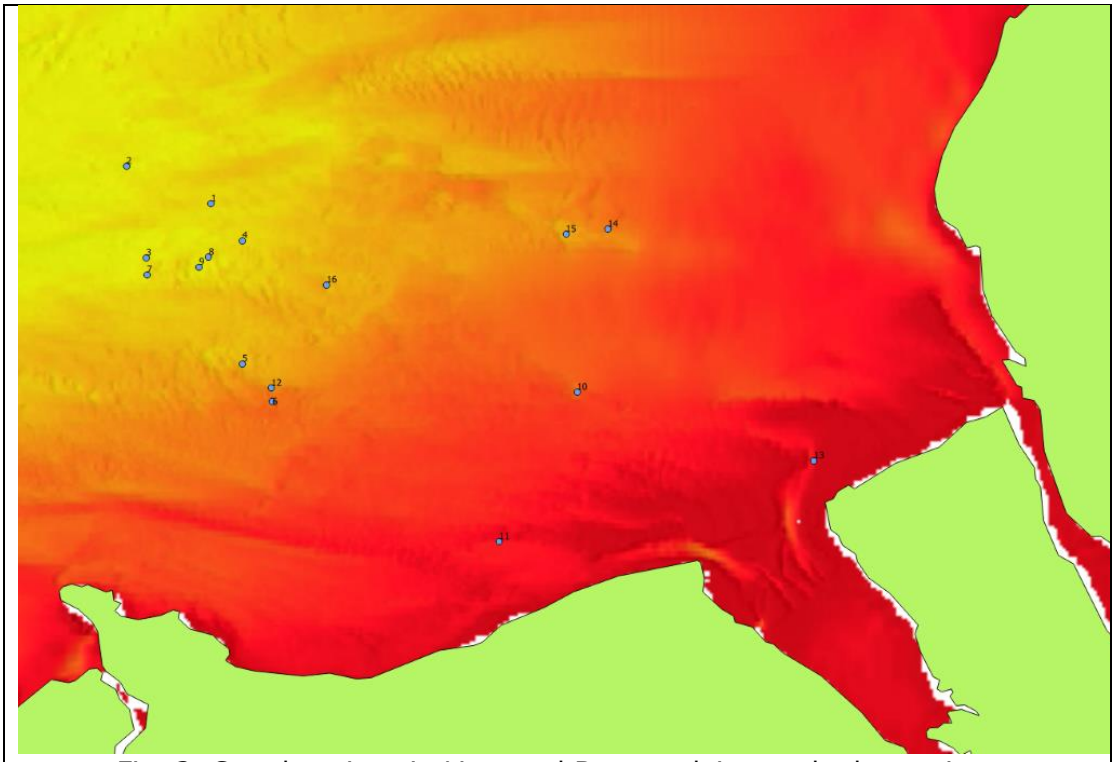

Fig. 2. Core locations in Liverpool Bay overlying seabed mapping.

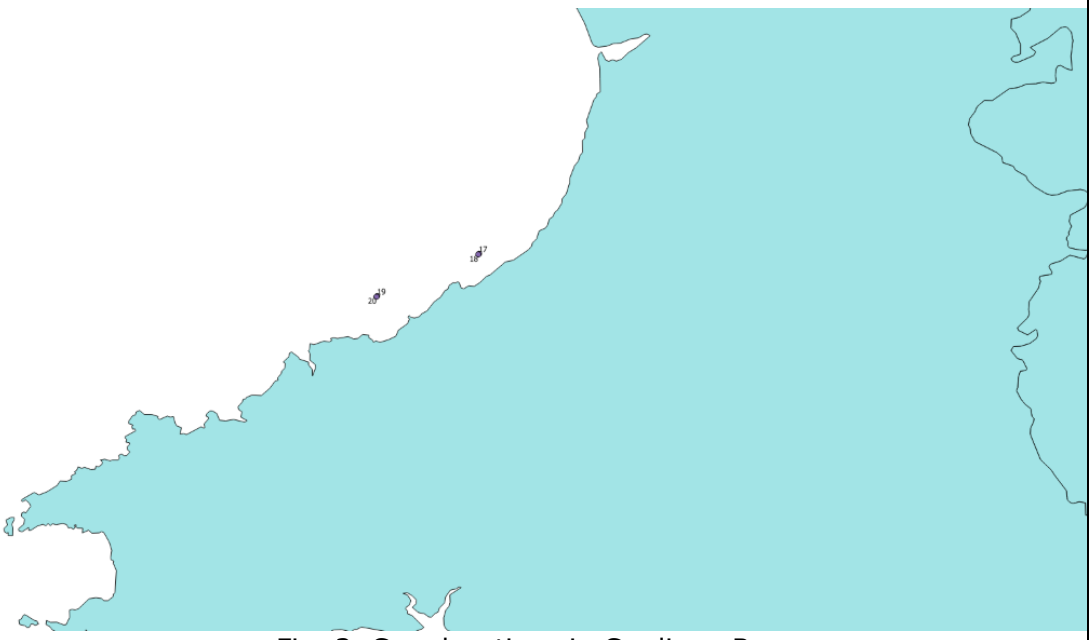

Fig. 3. Core locations in Cardigan Bay.

Depth of sampling stations to be a maximum of 6m.

4. Methods and means to be used

4.1 Particulars of vessel:	
Name:	R.V. Celtic Voyager
Type/Class:	100 A1 Research Vessel, LMC
Nationality (Flag State):	Irish
Identification Number (IMO/Lloyds No.):	
Owner:	Marine Institute
Operator:	P&O Maritime Services
Overall length (meters):	31.4
Maximum draught:	4m
Displacement/Gross Tonnage:	340
Propulsion:	Wärtsilä UD25M5 (626 kW),
Cruising & maximum speed:	<= 10 knots
Call sign:	EIQN
INMARSAT number and method and capability of communication (including emergency frequencies):	GMDSS A class, E-mail. Mini M SAT C and GSM 00 353 91 423396 / 00870 763066755 00870-764687325 / 764687326
Name of Master:	Philip Baugh/Colin McBrearty
Number of Crew:	7
Number of Scientists on board:	8 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):
Coring	Vibro-Corer	Vibro-Corer	No

4.6 Indicate nature and quantity of substances to be released into the marine environment:
None to be released

4.7 Indicate whether drilling will be carried out. If yes, please specify:
Coring will be carried out to a maximum depth of 6m in to sediment only

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

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):
No installations will be made

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:
20th February 2018 to 25th February 2018
6.2 Indicate if multiple entries are expected:
No

7. Port Calls

7.1 Dates and Names of intended ports of call:
None

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:

8.2 Proposed dates and ports for embarkation/disembarkation:

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:
July 2018

9.2 Anticipated dates of submission to the coastal State of the final report:
July 2018

9.3 Proposed means for access by coastal State to data (including format) and samples:
Open Access data and samples to be stored at the University of Warwick, in the Allaby Laboratory

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

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples And research results:
ERC grant funded Lost Frontiers Project, based at the University of Bradford

9.6 Proposed means of making results internationally available:
The project will publish its results in a variety of formats. Results will be disseminated within journals aimed at audiences across the specialities represented by the project's team. Critical data sets, including core scans will be made available digitally for re-study by the wider community. The spatial and temporal nature of the data lends itself to the production of animations of change over time - disseminated via video websites such as YouTube and Vimeo. There has been considerable media interest in previous projects focussing on the submerged North Sea. This work is not just multidisciplinary but truly interdisciplinary and will produce significant publications within the realms of archaeology, geography, ecology, biology, computer science and simulation.

10. Other permits Submitted

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

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:
Country:
Affiliation:
Address:
Telephone:
Fax:
Email: