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ENERGY PARK

volume 2
environmental statement

4 of 4



WEST ISLAY TIDAL ENERGY PARK

VOLUME 2 ENVIRONMENTAL STATEMENT

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Preface

This Environmental Statement (ES) is prepared, by DP Marine Energy Ltd (DPME), in support of an application for statutory consents for West Islay Tidal Energy Park (the Project).

The Project is being developed jointly by DPME and DEME Blue Energy (DBE) on the behalf of West Islay Tidal Energy Park Limited a special purpose Scottish Company which has been incorporated to build and operate the Project.

The Project consists of the installation of 30MW of Tidal Energy Converters and associated infrastructure including the export cables to landfall on Islay

The proposed array of tidal energy devices will be located approximately 6km (at its closest point) from the south west tip of the island of Islay in Argyll and Bute, Scotland. The proposed landfall for the associated electricity export cable will be located adjacent to Kintra Farm on the west coast of Islay.

The Regulatory Authority responsible for assessing the application for consent is Marine Scotland. They will be supported in the assessment process by a number of environmental bodies including Scottish Natural Heritage (SNH).

The Environmental Statement can be viewed during the statutory consultation period at the following locations:

Islay Energy Trust, Custom House, Bowmore, Isle of Islay, PA43 7JJ Tel: 01496 810873	Portnahaven Post Office Portnahaven Isle of Islay PA47 7SH Tel: 01496 860264	Bowmore Post Office, Main Street, Bowmore, Isle of Islay, PA43 7JH Tel: 01496 810366
Port Ellen Post Office, 66 Fredrick Crescent Port Ellen, Isle of Islay, PA42 7BD Tel: 01496 30238	DP Marine Energy Ltd Mill House Buttevant County Cork Tel: +353 22 23955	Scottish Government Library, Victoria Quay, Edinburgh, EH6 6QQ

During the consultation period copies of the Environmental Statement can be purchased from DPME either on CD for a charge of £15 or in hard copy form for £400. Copies of the Non-Technical Summary are available free of charge and a downloadable version is also be available on the West Islay Tidal website: www.westislaytidal.com. Requests for CD and or hard copies of the ES can be made to the DPME address above or by email islay@dpenergy.com

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It should be noted that the NTS and ES has been prepared by DPME supported by DBE with significant input from external sub-consultants on specialist chapters. A review process for Quality Assurance was conducted on all chapters, whether produced by external consultants or internally by DPME.

The ES has been prepared by DPME with all reasonable skill and care and whilst every effort has been made to ensure the accuracy of the material published in this and associated documents, West Islay Tidal Energy Park Ltd, DPME or DBE will not be liable for any inaccuracies.

These documents remain the sole property of DPME. They are submitted to the Regulators and Local Authorities solely for their use in evaluating the Environmental Impact Assessment for the West Islay Tidal Energy Project. No part of this publication (hardcopy or CD-ROM) or any attachments, addenda and/or technical reports may be reproduced or copied in any form or by any means or otherwise disclosed to third parties without the express written permission of DPME, except that permission is hereby granted to the Regulators to evaluate this Environmental Statement in accordance with their normal procedures, which may necessitate the reproduction of this response to provide additional copies strictly for internal use.

DPME would like to acknowledge the technical support provided by Siemens/MCT, Alstom/TGL and Bluewater/BlueTEC for their considerable assistance in enabling the design envelope to be defined.

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Glossary of Terms:

Agreement for Lease	Agreement entered into between West Islay Tidal Ltd and The Crown Estate for the rights to development on the seabed, named as West Islay Tidal, shown in Figure 5.1.
Dynamic positioning vessel	A Dynamic Positioning Vessel (DP) can safely maintain its position and heading in a tidal flow using a system of thrusters. DP vessels are able to work safely and efficiently in waters deeper than vessels using anchors.
Export cables	Cables used to export power generated by the tidal turbines to the onshore infrastructure.
Gravity based structure (GBS)	A structure which uses ballast to sit securely on the seabed without needing to be stabilized by piles or anchors. The GBS is used to support a tidal turbine.
Monopile	A single large diameter steel tube that is grouted into a hole bored into the seabed. The monopile is used to support a tidal turbine.
Nacelle	The enclosure of the tidal turbine's mechanical and electrical equipment.
Pin pile	The use of multiple small diameter steel tubes that are grouted into a hole bored into the seabed. The pin piles are used to support a tidal turbine.
Project	For the purpose of this ES, the Project refers to the West Islay Tidal Energy Project.
Remotely operated vehicle (ROV)	A Remotely Operated Vehicle (ROV) is an underwater vehicle able to undertake multiple subsea operations. ROVs are highly manoeuvrable and are controlled by operators on-board the DP vessel.
Tidal turbine	A device that converts hydrodynamic energy in the tidal flow into electrical energy.
Tidal turbine array	Term used to describe a group of tidal turbines.
Turbine support structure (TSS)	A turbine support structure is the structure placed on the seabed onto which a tidal turbine is installed.
Wet mate connector	A device used to connect electrical and data cables underwater.

List of Acronyms

AA Appropriate Assessment
AADT Annual Average Daily Traffic
ABRA Argyll & Bute Renewables Alliance
AC Alternating Current
AD Anno Domini
ADCP Acoustic Doppler Current Profiler
AfL Agreement for Lease
AFT Argyll Fisheries Trust
AGLV Areas of Great Landscape Value
AHC Active Heave Compensation
AIS Automatic Identification System
AL-ARP As Low as Reasonably Practicable
AMAA Ancient Monuments & Archaeological Areas Act
AOD Above Ordnance Datum
AR4 Forth Assessment Report
ASCOBANS Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish & North Seas
ASFB Association of Salmon Fisheries Board
AST Atlantic Salmon Trust
AWAC Acoustic Wave and Current
BADC British Atmospheric Data Centre
BAP Biodiversity Action Plan
BAT Best Available Technique
BERR Department of Business, Enterprise & Regulatory Reform
BGS British Geological Survey
BOCC Birds of Conservation Concern
BODC British Oceanographic Data Centre
BS British Standard
BSI British Standards Institution
CAA Civil Aviation Authority
CEFAS Centre for Environment, Fisheries & Aquaculture Science
CFA Clyde Fishermen's Association
CD Chart Datum
CIA Cumulative Impact Assessment
CIRIA Construction Industry Research & Information Association
CMACS Centre for Marine and Coastal Studies
CMS Construction Method Statement
COWRIE Collaborative Offshore Wind Research into the Environment.
CPA Coast Protection Act
CPT Core Penetration Tests.
CRM Collision Risk Modelling
dB Decibel
DBE DEME Blue Energy
DDV Drop Down Video
DECC Department of Energy & Climate Change
DEFRA Department for Environment, Food & Rural Affairs
DEME Dredging, Environmental & Marine Engineering
DFO District Fisheries Office
dGPS Differentially corrected GPS
DOE MD Department of Environment, Marine Division
DP Dynamic Positioning
DP Decommissioning Programme
DPME DP Marine Energy
DSFB District Salmon Fisheries Boards
EC European Commission
EcIA Ecological Impact Assessment
EEC European Economic Community
EIA Environmental Impact Assessment
EMEC European Marine Energy Centre
EMF Electro Magnetic Field
EMaP Environmental Management Plan
EMP Environmental Monitoring Programme
ENVID Environmental Issue Identification

EPS European Protected Species
ERCoP Emergency Response Cooperation Plan
ES Environmental Statement
ESAS European Seabirds at Sea
ETA Estimated Time of Arrival
EU European Union
EUNIS European Nature Information System
FAO Food and Agriculture Organisation
FGS Favourable Conservation Status
FEPA Food and Environment Protection Act
FLO Fisheries Liaison Officer
FREDS Forum for Renewable Energy Development in Scotland
FRS Fisheries Research Services
FSA Formal Safety Assessment
FTE Full Time Equivalents
GDP Gross Domestic Product
GHG Greenhouse Gas Emissions
GIS Geographical Information Systems
GPS Global Positioning System
HATT Horizontal Axis Turbine
HLV Heavy Lift Shearleg Vessels
HIAL Highlands & Islands Airports Ltd
HIRA Hazard Identification & Risk Assessment
HRA Habitat Regulations Appraisal
HS Historic Scotland
HSE Health and Safety Executive
ICES International Council for the Exploration of the Sea
ICOMOS International Council on Monuments and Sites.
IFA Institute for Archaeologists
IEMA Institute of Environmental Management
IMO International Maritime Organisation
IPCC Intergovernmental Panel on Climate Change
ISA Immediate Study Area
IUCN International Union for Conservation of Nature
JCP Joint Cetacean Protocol
JNAPC Joint Nautical Archaeology Policy Committee.
JNCC Joint Nature Conservation Committee
kg Kilogram
km Kilometre
km² Square kilometre
Km/h Kilometre per hour
kV Kilovolts
LAT Lowest Astronomical Tide
LBAP Local Biodiversity Action Plan
LGA Landscape Character Assessment
LDP Local Development Plan
LLA Local Lighthouse Authority
LSCA Landscape Seascape Character Assessment
LSE Likely Significant Effect
m Metre
MarLIN Marine Life Information Network
MAIB Marine Accident Investigation Branch
MARPOL International Convention for the Prevention of Pollution from Ships
MS Marine Scotland
MBES Multibeam Echo Sounder
MCA Maritime and Coastguard Agency
MCS Marine Conservation Society
MCT Marine Current Turbines Limited
MESH Marine European Seabed Habitats
MFA Marine and Fisheries Agency
MGN Marine Guidance Note
MHWS Mean High Water Springs
MLWS Mean Low Water Springs
MLURI Macaulay Land Use Research Institute
mm Millimetre

MMO Marine Management Organisation
MNCR Marine Nature Conservation Review
MNNS Marine Non Native Species
MoD Ministry of Defence
MP Member of Parliament
MPA Marine Protected Area
MPS Marine Policy Statement
MS Marine Scotland
MSFD Marine Strategy Framework Directive
MSFD Marine Strategy Framework Directive
MSL Mean Sea Level
MSP Mean Spring Peak
MSS Marine Scotland Science
ms Metres per second
MSW Multi Sea Winter (adult salmon)
MW Megawatts
NATS National Air Traffic Service
NMRS National Monuments Records of Scotland
NBN National Biodiversity Network
NCI Nature Conservation Importance
NGR National Grid Reference
NIEA Northern Ireland Environment Agency
NLB Northern Lighthouse Board
Nm Nautical miles
NPF National Planning Framework
NSA National Scenic Area
NSRA Navigational Safety Risk Assessment
OCFA Offshore Cable Feasibility Assessment
OSPAR Oslo & Paris Conventions for the protection of the marine environment
OREI Offshore Renewable Energy Installation
OS Ordnance Survey
PAD Protocol for Archaeological Discoveries
PAM Passive Acoustic Monitoring
PAN Planning Advice Note
PBR Potential Biological Removal
PEXA Practice and Exercise Area
PPG Pollution Prevention Guidelines
PHA Preliminary Hazard Analysis
PMF Priority Marine Feature
PSD Power Spectral Density
RCAHMS Royal Commission for Ancient and Historical Monuments for Scotland
ReDAPT Reliable Data Acquisition Platform Tidal
RES Renewable Energy Strategy
REZ Renewable Energy Zone
RNLI Royal National Lifeboat Institution
ROCs Renewables Obligation Certificates
ROV Remotely Operated Vehicle
ROW Receiver of Wreck, wreck administration department within the UK Maritime Coastguard Agency.
RPM Revolutions per Minute
RSPB Royal Society for the Protection of Birds
RTP Roger Tym and Partners
RYA Royal Yachting Association
SAAR Standard Annual Average Rainfall
SAC Special Area of Conservation
SAM Scheduled Ancient Monument
SAMS Scottish Association for Marine Science
SAR Search and Rescue
SBL Scottish Biodiversity List
SCANS Small Cetacean Abundance in the North Sea
SCADA Supervisory Control and Data Acquisition
SCOS Special Committee on Seals
SEPA Scottish Environment Protection Agency
SEA Strategic Environmental Assessment

SFF Scottish Fishermen's Federation
SHEP (Historic Scotland's) Scottish Historic Environment Policy
SHETL Scottish Hydro Electric Transmission Ltd
SHEPD Scottish Hydro Electric Power Distribution Ltd
SIFAG Scottish Inshore Fisheries and Advisory Group
SLA Scenic Landscape Area
SLVIA Seascape & Landscape Visual Impact Assessment
SMA Seal Management Area
SMRU Seal and Mammal Research Unit
SMP Survey Monitoring Plan
SNH Scottish Natural Heritage
SNMP Scotland's National Marine Plan
SOLAS International Convention for the Safety of Life at Sea
SOS Secretary of State
SPA Special Protection Area
SPG Supplementary Planning Guidance
SPL Sound Pressure Level
SPP Scottish Planning Policy
SRSI SAMS Research Services Limited
SSA Setting Study Area
SSE Scottish and Southern Energy
SSER Scottish and Southern Energy Renewables
SSSI Special Site of Scientific Interest
TCE The Crown Estate
TAC Total Allowable Catch
TEC Tidal Energy Converter
TGL Tidal Generation Limited
THLS Trinity House Lighthouse Service
TOC Total Organic Carbon
TSS Turbine Support Structure
TSS Traffic Separation Scheme
TTS Temporary Threshold Shift
UK United Kingdom
UKBAP UK Biodiversity Action Plan
UKC Under Keel Clearance
UKHO UK Hydrographic Office
UKRES UK Renewable Energy Strategy
UNCLOS United Nations Convention of the Law of the Sea
UNESCO United Nations Educational, Scientific & Cultural Organisation.
VATT Vertical Axis Turbine
V Volts
VERs Valued Ecological Receptors
VHF Very High Frequency
VP Vantage Point
VMS Vessel Monitoring System
VTS Vessel Traffic Services
WANE The Wildlife & Natural Environment (Scotland) Act (2011)
WEWS Water Environment & Water Services Act
WITEP West Islay Tidal Energy Park
WGNAS Working Group on North Atlantic Salmon
WHO World Health Organisation
WFD Water Framework Directive
WSA Wider study area
ZAV Zone of Actual Visibility
ZTV Zone of Theoretical Visibility

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ENERGY PARK

volume 2 // chapter 21 // summary, mitigation & monitor



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21.0 Summary, Mitigation, Monitoring & Conclusions

21.1 Introduction

DPME are submitting an application for consent to build and operate a 30MW tidal energy project, the West Islay Tidal Energy Park, off the south-west corner of Islay in Argyll and Bute in Scotland. The scope of application includes:

- Tidal turbines;
- Marshalling hub;
- Inter-array Cabling; and
- Export Cables to high water mark.

Excluded from the application are the following:

- Onshore cabling (overhead or underground);
- Sub-station and cable connection infrastructure;
- Sub-sea cable from Islay to Kintyre; and
- Service/monitoring Facilities.

The project, which is technology neutral, features a design envelope for the technology and turbine locations.

The likely impacts of the Project have been identified in each chapter of the ES in relation to those key issues identified during the EIA process. As discussed in Chapter 2 – Legislative and Policy Context, the impact of the Project on the environment has been assessed against a set of baseline criteria. The significance criteria of the impacts are specific to each chapter and so defined individually therein. Impacts of a “Major” or “Major/Moderate” significance are considered to be “significant” in EIA terms.

21.2 Habitat Regulations Appraisal (HRA)

In line with the requirements of the Conservation of Habitats and Species Regulations 2010, and the Conservation (Natural Habitats, &c.) Regulations 1994 (the Habitats Regulations) (‘the Habitat Regulations’), HRA was undertaken to evaluate the likely significant effects arising from the Project. This is provided in a separate report addressing Special Areas of Conservation for marine mammals, along with Special Protection Areas for birds (Technical Appendix 7.9).

Based on the results presented in the report, for marine mammals it is concluded that there are no likely significant effects arising from the development, either alone, or in-combination with other plans or projects, and therefore appropriate assessment is not required.

The HRA screening report (Appendix 10.2) concluded that there is no potential for the development to have a likely significant effect (LSE) on any qualifying ornithological feature at a Natura site. SNH advised that, through applying their screening criteria, there is potential for LSEs on breeding auk qualifying features (guillemot, razorbill and puffin) at six Natura sites. These potential LSEs will require to be examined in more detail through the process of Appropriate Assessment by the regulator. In the case of guillemot SNH advised that potential for LSE should be concluded for Ailsa Craig SPA, Canna and Sanday SPA, Mingulay and Berneray SPA, Rum SPA (all rated as low theoretical connectivity), North Colonsay and Western Cliffs SPA and Rathlin Island SPA (both rated as moderate theoretical connectivity). In the case of razorbill SNH advised that potential for LSE should be concluded for Rathlin Island SPA (rated as low/moderate theoretical connectivity). In the case of puffin SNH advised that potential for LSE should be concluded for Canna and Sanday SPA, Mingulay and Berneray SPA (both rated as low theoretical connectivity) and Rathlin Island SPA (rated as moderate theoretical connectivity).

21.3 Summary of Key High Level Mitigation and Best Practice Measures

A number of key mitigation and best practice measures have been proposed throughout the ES spanning a number of receptors and/ or a number of different impacts. These are as follows:

- Development of an Environmental Management Plan (EMaP) to be agreed with SNH and Marine Scotland, following submission of this ES. The EMaP will be a working document detailing the environmental actions highlighted in the ES, all activities to be carried out on site, responsibilities for those activities, environmental risks and the management protocols to be put in place to control these, as well as identification of personnel responsible for each element of the EMaP;
- An Environmental Monitoring Programme (EMP), to be agreed with Marine Scotland (MS) and Scottish Natural Heritage (SNH);
- A detailed Construction Method Statement (CMS) and a Pollution Control and Spillage Response Plan to be prepared and agreed with SEPA, SNH and MS-LOT prior to commencement of construction;
- All work will be undertaken to an overarching Health, Safety and Environmental Management System (HSEMS), which will include the CMS, the PIRP and the EMaP. The project will be supervised in accordance with the Construction Design and Management Regulations (2007); and
- Pollution Control and Spillage Response Plans to be developed and included in the EMaP;

21.4 Environmental Impact Assessment - Summary of Impacts

The following information in Table 21.1 summarises the impact assessments carried out under each topic, mitigation measures proposed (where considered necessary) and the residual impact. The commitment to implement the proposed mitigation measures in association with recognised knowledge gaps will assist in informing the proposal to undertake environmental monitoring during construction and operation.

Table 21.1: Summary of Potential Impacts Before and After Adoption of Proposed Mitigation

Chapter	Potential Impacts	Significance	Mitigation Measure	Residual Impacts
Biological Environment				
7 - Mammals				
	Injury and disturbance due to noise and presence of construction vessels and activities	n/a	No mitigation deemed necessary, although a Marine Mammal Observer (MMO) may be used during construction activities to halt operations if marine mammals (or basking sharks) are observed within close range of the construction activities.	Minor insignificant
	Displacement leading to habitat exclusion and barrier effects		No mitigation deemed necessary.	Negligible
	Collision with operating turbines		No mitigation is deemed necessary. To the extent feasible at this site, DPME commit to undertaking monitoring studies to assess the actual level of impact arising from the West Islay Tidal Energy Park.	Moderate
	Collision with maintenance vessels		Appropriate mitigation measures will reduce the risk to marine mammals from interaction with vessels or propellers (including the 'corkscrew' seal issue) to an acceptable level	Minor
	Electromagnetic Fields (EMF)		No mitigation deemed necessary.	Negligible
	Accidental release of contaminants		No mitigation deemed necessary.	Minor
	Indirect impacts of changes to prey resource		No mitigation deemed necessary.	Negligible
8 – Benthic Ecology				
Tidal Construction (and decommissioning)	Direct physical disturbance and temporary substratum loss	Not significant	No mitigation deemed necessary	Not significant
	Smothering (release of drill cuttings)	Not significant	No mitigation deemed necessary	Not significant
Tidal Site – Operational	Introduction of Marine Non Native Species	Not significant	No mitigation deemed necessary	Not significant
	Long term substratum loss and colonisation of introduced substratum	Not significant	No mitigation deemed necessary	Not significant
	Decrease in water flow	Not significant	No mitigation deemed necessary	Not significant
	Contamination	Not significant	No mitigation deemed necessary	Not significant
Western Cable route	Potential facilitation of the spread of MNNS	Not significant	No mitigation deemed necessary	Not significant
	Direct physical disturbance and temporary substratum loss on all	Not significant	No mitigation deemed necessary	Not significant

Chapter	Potential Impacts	Significance	Mitigation Measure	Residual Impacts
Construction	receptors			
	Increased suspended sediment and deposition on all receptors	Not significant	No mitigation deemed necessary	Not significant
	Introduction of Marine Non-Native Species (MNNS) on all receptor	Not significant	No mitigation deemed necessary	Not significant
Western Cable route – Operational	Long term substratum loss and colonisation of introduced substratum	Not significant	No mitigation deemed necessary	Not significant
	Electromagnetic fields on all receptors	Not significant	No mitigation deemed necessary	Not significant
	Facilitation of the spread of Marine Non Native Species	Not significant	No mitigation deemed necessary	Not significant
9. Otters				
Construction (and decommissioning)	Displacement and loss of individuals through construction noise, vibration, increased traffic or becoming trapped in excavations.	Not significant	Best practice will be followed.	Not significant
Operational	Displacement through disturbance caused by increased human activity during maintenance activities.	Not significant	Best practice will be followed.	Not significant
10. Birds				
Construction	Vessel disturbance of seabirds	Negligible significance	Not required, but good practice will be for project vessels to stick to the defined routes and adopt a voluntary speed limit of 15km/hr.	Negligible significance
	Direct habitat loss	Negligible significance	None.	Negligible significance
Operational	Vessel disturbance of seabirds	Negligible significance	Not required, but good practice will be for project vessels to stick to the defined routes and adopt a voluntary speed limit of 15km/hr.	Negligible significance
	Seabird displacement from, and attraction to, marine habitats	Negligible significance	Ensure that all potential perching locations are safe for birds.	Negligible significance
	Collision risk to diving seabirds.	Negligible significance	Should there be evidence of collision mortality, measures will be considered that aim to prevent it occurring.	Negligible significance
Decommissioning	Marine pollution and contamination	Negligible significance	Ensure that all potential perching locations are safe for birds.	Negligible significance
	Vessel disturbance of seabirds	Negligible significance	Not required, but good practice will be for project vessels to stick to the defined routes and adopt a voluntary speed limit of 15km/hr.	Negligible significance
	Habitat reinstatement	Negligible significance	Good practice guidance on habitat reinstatement prevailing at the time will be followed.	Negligible significance
11 – Natural Fish				

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Chapter	Potential Impacts	Significance	Mitigation Measure	Residual Impacts
Construction (and decommissioning)	Fluid/contamination release from construction and decommissioning activities.	Negligible	No mitigation deemed necessary. However, a Project Environmental Management Plan (PEMP) will put in place to provide controls for avoidance or clean-up of such spills, along with the provision of spill kits. Only certified construction techniques will be used and regular maintenance checks will be carried out to prevent spills. In addition, low toxicity hydraulic oils and lubricants will be used, compliant with national and international standards, which are also biodegradable in most cases.	Not Significant
	Light Pollution during construction and decommissioning activities	Negligible	Where practical it may be possible to limit lighting to the levels required (i.e., not over light) although noting the need to maintain lighting levels for the safety of the operations being conducted at the time.	Not Significant
	Noise and vibration during construction and decommissioning activities	Negligible	No mitigation deemed necessary.	Not Significant
	Increase in suspended sediments during construction and decommissioning activities	Negligible	No mitigation deemed necessary.	Not Significant
Installed Life (from Construction through Decommissioning)	Fluid/contamination released from devices during installation, operation and/or decommissioning	Negligible	No mitigation deemed necessary. Although it is noted that the designers are selecting low toxicity oils and lubricants to national and international standards, which are also biodegradable in most cases.	Not Significant
	Loss of spawning grounds	Negligible	No mitigation deemed necessary	Not Significant
	Loss of nursery grounds	Negligible	No mitigation deemed necessary	Not Significant
	Removal/alteration of habitats due to presence of new devices/cables	Negligible	No mitigation deemed necessary	Not Significant
	Anti-fouling compounds	Negligible	Anti-fouling paints meeting recognised international and national standards that do not require additional treatment during operation are being selected at the design stage.	MINOR - Not Significant
	Barriers to fish species movement	Negligible	No mitigation deemed necessary	Not Significant

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Chapter	Potential Impacts	Significance	Mitigation Measure	Residual Impacts
Operational	Collision Risk	Negligible	No mitigation deemed necessary	Not Significant
	Operational noise and vibration	Negligible	No mitigation deemed necessary	Not Significant
	New electromagnetic fields introduced to the Tidal Site	Negligible	For the devices, transformer and power conditioning equipment have been designed internally, hence reducing field effects external to the device. Extra heavy armoured cable is being selected for the export cables, which has higher levels of insulation (compared to less armoured cable).	Minor - Not Significant
	Changes in tidal flows	Negligible	Considering the small total amount of energy taken out of the existing extremely energetic conditions, the overall consequence of impact is considered negligible. No further management actions are proposed, noting that the devices are being deliberately spaced (see Chapter 5 Project Description section 5.6) which takes account of flows and predicted wake effects.	Negligible - Not Significant
Human Environment	Operational light pollution	Negligible	The lighting by nature is designed for horizontal illumination, with the light bases also providing some shielding against downward illumination	Minor - Not Significant
	12 – Commercial Fishing			
Construction	Temporary Loss of Fishing Grounds, Creel Fishery: Western Cable Route	Moderate	Construction management plan cable burial/rock placement, safety zones, Kingfisher Information System	Minor
	Temporary Loss of Fishing Grounds, Local Scallop Fleet: Western Cable Route	Moderate	Construction management plan cable burial/rock placement, safety zones, Kingfisher Information System	Minor
	Temporary Loss of Fishing Grounds, Visiting and Nomadic Scallop Fleet: Western Cable Route	Minor	Not Required	Minor
	Safety Issues For Fishing Vessels: Tidal Site	Broadly Acceptable	Not Required	Broadly Acceptable
	Safety Issues For Fishing Vessels: Inter array cables	Tolerable with Additional Controls	See Chapter 14: Shipping and Navigation. Cable burial/rock placement, safety zones, Kingfisher Information System	Tolerable with Monitoring
	Safety Issues For Fishing Vessels:	Tolerable with	See Chapter 14: Shipping and Navigation. Cable burial/rock	Tolerable with

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Chapter	Potential Impacts	Significance	Mitigation Measure	Residual Impacts
	Western Cable Route	Additional Controls	placement, safety zones, Kingfisher Information System	Monitoring
	Increased Steaming Times: Tidal Site	Broadly Acceptable	Not Required	Broadly Acceptable
	Increased Steaming Times: Western Cable Route	Tolerable with Additional Controls	See Chapter 14: Shipping and Navigation. Cable burial/rock placement, safety zones, Kingfisher Information System	Tolerable with Monitoring
	Interference to Fishing Activity: Towed Gear	Broadly Acceptable	Not Required	Broadly Acceptable
	Interference to Fishing Activity: Static Gear	Tolerable with Additional Controls	See Chapter 14: Shipping and Navigation. Construction Management Plan	Tolerable with Monitoring
	Displacement of Fishing Vessels , Creel Fishery: Western Cable Route	Moderate	Construction management plan cable burial/rock placement, safety zones, Kingfisher Information System	Minor
	Displacement of Fishing Vessels , Local Scallop Fleet: Western Cable Route	Moderate	Construction management plan cable burial/rock placement, safety zones, Kingfisher Information System	Minor
	Displacement of Fishing Vessels, Visiting and Nomadic Scallop Fleet Western Cable Route	Minor	Not Required	Minor
	Permanent Loss of Fishing Grounds, Creel Fishery: Western Cable Route	Moderate	Cable burial/rock placement, Kingfisher Information System	Minor
	Permanent Loss of Fishing Grounds, Local Scallop Fleet: Western Cable Route	Moderate	Cable burial/rock placement, Kingfisher Information System	Minor
	Permanent Loss of Fishing Grounds, Visiting and Nomadic Scallop Fleet: Western Cable Route	Minor	Not Required	Minor
	Safety Issues For Fishing Vessels: Tidal Site	Broadly Acceptable	Not Required	Broadly Acceptable

Operational

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Chapter	Potential Impacts	Significance	Mitigation Measure	Residual Impacts
13 - Archaeology	Safety Issues For Fishing Vessels: Inter array cables	Tolerable with Additional Controls	Cable burial/rock placement, Kingfisher Information System	Tolerable with Monitoring
	Safety Issues For Fishing Vessels: Western Cable Route	Tolerable with Additional Controls	Cable burial/rock placement, , Kingfisher Information System	Tolerable with Monitoring
	Increased Steaming Times: Tidal Site	Broadly Acceptable	Not Required	Broadly Acceptable
	Increased Steaming Times: Western Cable Route	Tolerable with Additional Controls	Cable burial/rock placement, Kingfisher Information System	Tolerable with Monitoring
	Interference to Fishing Activity: Towed Gear	Broadly Acceptable	Not Required	Broadly Acceptable
	Interference to Fishing Activity: Static Gear	Tolerable with Additional Controls	Operational Management Plan	Tolerable with Monitoring
	Displacement of Fishing Vessels , Creel Fishery: Western Cable Route	Moderate	Cable burial/rock placement, Kingfisher Information System	Minor
	Displacement of Fishing Vessels , Local Scallop Fleet: Western Cable Route	Moderate	Cable burial/rock placement, Kingfisher Information System	Minor
	Displacement of Fishing Vessels, Visiting and Nomadic Scallop Fleet: Western Cable Route	Minor	Not Required	Minor
	Construction	Direct impact on archaeology and cultural heritage due to installation of infrastructure and cabling	Major- moderate significance	Temporary exclusion zones will be implemented and infrastructure will be micro-sited to prevent invasive activities. Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) will be prepared for the approval of Historic Scotland and Argyll and Bute Council to mitigate construction effects in the event of any unexpected archaeological discoveries during installation.

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Chapter	Potential Impacts	Significance	Mitigation Measure	Residual Impacts
	Indirect impact on archaeology and cultural heritage due to physical processes	Negligible significance	These measures will form part of the CEMP Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) will be prepared for the approval of Historic Scotland and Argyll and Bute Council to mitigate construction effects in the event of any unexpected archaeological discoveries during installation.	Negligible significance
	Indirect impact on setting of archaeology and cultural heritage sites due to siting of infrastructure	Minor to Negligible significance	None.	Minor to Negligible significance
Operational	Indirect impact on archaeology and cultural heritage due to physical processes	Negligible significance	Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) will be prepared for the approval of Historic Scotland and Argyll and Bute Council to mitigate construction effects in the event of any unexpected archaeological discoveries during installation	Negligible significance
	Direct impact on archaeology and cultural heritage due to removal of infrastructure	Negligible significance	Same as construction	Negligible significance
Decommissioning	Indirect impact on archaeology and cultural heritage due to physical processes	Negligible significance	Same as construction	Negligible significance
14 – Shipping & Navigation				
	Risks to navigation from the cable laying and device installation operations	Tolerable with Additional Controls	Application of risk controls as are identified in the NSRA (Technical Appendix 14.1) with regard to preventing vessels from entering the project area are implemented in order to ensure that the risk is reduced	Tolerable with monitoring
	The risk to navigation arising from the proposed clearance depths over the rotors of the MCT SeaGen and Alstom-TGL devices	Tolerable with Additional Controls	Application of risk controls as are identified in the NSRA (Technical Appendix 14.1) with regard to preventing vessels from entering the project area are implemented in order to ensure that the risk is reduced	Tolerable with monitoring
	The risk from vessels drifting into the site is considered as sufficiently low as to be considered	Tolerable with Additional Controls	Risk is sufficiently low given the vessel traffic levels and the numbers of recorded incidents from RNLi and MAIB data.	Broadly Acceptable
	The development area should be charted appropriately as a "Marine Limit in General, implying physical obstructions	Tolerable with Additional Controls	This does not exclude navigation but, along with appropriate annotation showing that limiting depths apply (either against the individual devices or as a chart note), provides the mariner with adequate information on the hazards presented by the project.	Broadly Acceptable
	Risk to such small vessels due to the	Tolerable with	Whilst pelagic and demersal fishing activities do not take place in the	Tolerable with

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Chapter	Potential Impacts	Significance	Mitigation Measure	Residual Impacts
	potential for gear entanglement when recovering or laying static gear	Additional Controls	area or its immediate vicinity, creeling vessels do operate off the Rinns in the local area. This would require the imposition of a "No Fishing" area coincident with the charting of the area as a "Marine Limit in General containing hazards" is imposed following consultation with local fishing interests and Marine Scotland	monitoring
	The export cable presents a hazard to scallop dredging activities between the site and Kintra	Tolerable with Additional Controls	The cable route is charted and information on its position provided to Kingfisher	Broadly Acceptable
	The individual devices/sub arrays require to be charted appropriately subject to the limitations of the scale of the chart and the need to avoid congestion of information	Tolerable with Additional Controls	The individual devices/sub arrays are charted appropriately subject to the limitations of the scale of the chart and the need to avoid congestion of information	Broadly Acceptable
	The sub-sea devices may not be adequately indicated by the lighting	Tolerable with Additional Controls	Where the extent of the sub-sea devices is not adequately indicated by the lighting and marking applied to any surface devices in the array, the area shall be marked with buoys meeting the requirements of the IALA MBS	Broadly Acceptable
15 – Landscape & Seascape Visual				
Receptor			Cumulative SLVIA	
Rubha na Faing to Rinns Point	Effects on Seascape Character Sub Types	Not significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence / incremental effect.	Not Significant
Receptor			Cumulative SLVIA	
Rubha na Faing to Machir Bay	Effects on Seascape Character Sub Types	Not significant	The proposed West Islay Tidal Energy Project would have negligible incremental effect.	Not significant
Lossit Bay	Effects on Seascape Character Sub Types	Not significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence / incremental effect.	Not significant
Kilchiaran Bay	Effects on Seascape Character Sub Types	Not significant	The proposed West Islay Tidal Energy Project would have no incremental effect.	Not significant
Rinns Point to Port Charlotte	Effects on Seascape Character Sub Types	Not significant	The proposed West Islay Tidal Energy Project would have negligible incremental effect.	Not significant
Rocky Moorland	Indirect Effects on Landscape	Not significant	The proposed West Islay Tidal Energy Project would have negligible incremental effect.	Not significant

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Chapter	Potential Impacts	Significance	Mitigation Measure	Residual Impacts
LCT	Character Types		incremental effect.	
Area of Panoramic Quality	Indirect Effects on Landscape Designations	Not Significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence / incremental effect.	Not significant
Portnahaven	Visual Effects Experienced by Residents within Settlements	Not Significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence / incremental effect.	Not significant
Port Wemyss	Visual Effects Experienced by Residents within Settlements	Not Significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence / incremental effect.	Not significant
Residents within 10km including: Windyedge, Port-a-Reidhleinn, Poll a Chappuil, Claddach, Brookfield, An Sabial, the Old School House, Ballymeanach, and farmsteads at Cladville and Lossit	Visual Effects Experienced by Residents within Dispersed Properties	Not Significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence / incremental effect.	Not Significant
A847	Visual Effects Experienced by Motorists and Other Road Users	Not Significant	Significant cumulative effects from localised sections of the route would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence / incremental effect.	Not Significant
Portnahaven to Port Charlotte via Kilchiaran	Visual Effects Experienced by Motorists and Other Road Users	Not Significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence / incremental effect.	Not Significant
Minor road to Claddach	Visual Effects Experienced by Motorists and Other Road Users	Not Significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence /	Not Significant

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Chapter	Potential Impacts	Significance	Mitigation Measure	Residual Impacts
Receptor			incremental effect. Cumulative SLVIA	
Picnic site at Port Wemyss	Visual Effects Experienced Recreational Receptors	Not Significant	The proposed West Islay Tidal Energy Project would have no incremental effect.	Not Significant
Core Path (Portnahaven to Port-a-Reidhleinn)	Visual Effects Experienced Recreational Receptors	Not Significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence / incremental effect.	Not Significant
Core Path (Claddach)	Visual Effects Experienced Recreational Receptors	Not Significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence / incremental effect.	Not Significant
Core Path (Portnahaven to Octofad)	Visual Effects Experienced Recreational Receptors	Not Significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence / incremental effect.	Not Significant
Summit of Ben Cladville	Visual Effects Experienced Recreational Receptors	Not Significant	The proposed West Islay Tidal Energy Project would have negligible cumulative effect.	Not Significant
Beach at Lossit Bay	Visual Effects Experienced Recreational Receptors	Not Significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would have very limited cumulative influence / incremental effect.	Not Significant
Summit of Beinn Tart a' Mhill	Visual Effects Experienced Recreational Receptors	Not Significant	The proposed West Islay Tidal Energy Project would have negligible cumulative effect.	Not Significant
Cultoan Stone Circle	Visual Effects Experienced Recreational Receptors	Not Significant	The proposed West Islay Tidal Energy Project would have negligible cumulative effect.	Not Significant
Receptor			Cumulative SLVIA	
The Gearach hunting estate	Visual Effects Experienced Recreational Receptors	Not Significant	The proposed West Islay Tidal Energy Project would have negligible cumulative effect.	Not Significant
Core Path (Kilchiaran to Machir Bay)	Visual Effects Experienced Recreational Receptors	Not Significant	The proposed West Islay Tidal Energy Project would have negligible cumulative effect.	Not Significant
Boat trips from Port Ellen to Loch Indaal	Visual Effects Experienced Recreational Receptors	Not Significant	Not Significant	Not Significant

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Chapter	Potential Impacts	Significance	Mitigation Measure	Residual Impacts
Sailing and fishing vessels from Portnahaven and Port Wemyss	Visual Effects Experienced by Recreational Receptors	Not Significant	Significant cumulative effects would be primarily associated with views of the proposed Islay Offshore Wind Farm. The proposed West Islay Tidal Energy Project would typically have very limited cumulative influence / incremental effect on the view experienced by passengers at distances of approximately 2km or more from the proposed TECs.	Not Significant
American Monument, Mull of Oa	Visual Effects Experienced by Recreational Receptors	Not Significant	The proposed West Islay Tidal Energy Project would have negligible cumulative effect.	Not Significant
16 – Traffic & Transport. No major onshore vehicle movement associated with the project. Offshore vessel impacts covered under chapter 12 and 14 above.				
17 – Recreation and Amenity				
	Tourism & Recreation Visual Impacts		<ul style="list-style-type: none"> ▪ Where appropriate works will be programmed to avoid peak tourist routes at peak visitor times to minimise potential congestion and/or disruption. ▪ Temporary interruption of recreation routes during cable route construction (where applicable) will be carefully managed and any diversions clearly sign-posted. ▪ During the temporary cable route works, screening measures may be implemented to reduce impacts on passing recreational users or from recreational focal points 	Minor
	Tourism Accommodation Impacts	Minor		
18 Socio-economic				
Construction & Operation maintenance	2-3 Full Time Equivalent Jobs	Minor	Socio-economic mitigation would only apply as a result of there being a number of national, regional and local initiatives involving the Scottish Government, regional and local development agencies with the aim of providing enhanced skills training, supply chain provision, and support for business improvement working in the offshore marine devices industry, in the West of Scotland. These will not act to reduce negative impacts, as no such impacts have been identified in the assessment. However, they would assist in realising and maximising the opportunities in the study area and where appropriate the applicants will support these initiatives	Minor
	2-5 Full Time Equivalent Jobs	Minor		Minor
Decommissioning	13 Full Time Equivalent Jobs	Moderate		Moderate
19 - Noise – Potential impacts addressed in chapter 7 –Marine Mammals & Chapter 11 Natural Fish				
20 – EMF – Potential impacts addressed in chapter 7 –Marine Mammals & Chapter 11 Natural Fish				

21.5 Environmental Monitoring Programme (EMP)

21.5.1 Introduction

Currently there are no arrays of tidal turbines operating anywhere in the world as tidal energy devices are an emerging technology, with limited operational developments upon which to base aspects of assessment. Where devices have been operating and potential environmental interactions have been monitored, the results to date indicate no significant adverse environmental impacts (Strangford Lough for example). However, it is appreciated that the potential interactions of an array of devices is to some extent unknown, and assessments must be necessarily based on data for single devices from expert judgement based on knowledge of potential receptors and current understanding of the potential effects of single devices extrapolated to encompass an array.

In the rapidly developing tidal energy sector, research and environmental monitoring works are either on-going, or planned, at a number of locations in the UK and internationally. In this evolving climate, there is no significant benefit to proposing detailed monitoring plans, the details and premise of which may require considerable revision in the light of new knowledge expected post consent.

The knowledge gained from environmental monitoring at tidal array sites will have some elements which are specific to individual sites, elements which are specific to individual technologies, however, much of the data collected will be widely applicable to, and of benefit to, developers in the wider tidal energy sector. It would be perverse, therefore, for the burden of such monitoring to fall solely on the handful of developers who have well developed technology and sites, while benefits from that monitoring are available to other, less pioneering developers. For this reason, national government support for aspects of environmental monitoring at early tidal sites is essential if the burden of knowledge collection is to be fairly shared.

An Environmental Monitoring Programme (EMP) will be developed through discussion with the regulatory authorities to ensure that the purpose of the monitoring is agreed; that objectives are set according to consensus on the ability to detect change attributable to the development; and that this is considered according to a reasonable cost / scale of studies, proportionate to the level of risk identified. This will be programme defined over an appropriate timescale, with defined reporting intervals.

21.5.2 Proposed EMP

Based on the findings of the EIA Chapters which are summarised in table 21.1 above, marine mammals and basking sharks and birds have been identified as possibly requiring further monitoring to better understand the potential impacts of the array of devices and to confirm the assumptions made in determining the level of potential impact to be attributed.

21.5.2.1 Marine Mammals

DPME propose to undertake detailed statistical analysis based on the occurrence of species at the site and the scale of change anticipated, to determine feasible monitoring strategies at the site. Noting that the site is an open ocean location, with low densities of marine mammal species and basking sharks, it will be relevant to consider the feasibility, and associated cost of detecting changes attributable to the development. The results of this study will then need to be discussed relative to the anticipated risks at the site to determine the precise scope of the on-going monitoring strategy.

The development of an environmental monitoring programme for the West Islay Tidal Energy Park will most likely be undertaken by SRSL who propose to use the latest information gathered from the baseline studies in high energy locations combined with lessons from other marine industries to design an environmental monitoring framework that can be applied to across the tidal-stream sector.

The approach will involve a thorough, scientific design phase, to consider the specific tools required for monitoring impacts to marine mammals (and other receptors), including existing techniques and development of new techniques. The statistical power needed to detect change at the project site will be closely investigated, to ensure that experimental design is effective and cost-efficient. This will address the development of EMPs that can assess with a known degree of certainty levels of impact to marine mammals and whether re-design, mitigation or site adjustment are required / effective.

DPME recognise that monitoring of effects from tidal arrays is challenging and complex, considering the scale of impacts ranging from impacts upon individuals at the array site, and population level effects. For the regulator to accurately determine and assign effects at a project and sector level, and considering the commitments to do so through strategic assessment, etc, DPME support discussion on where collaborative effort may be initiated, so that collective resources are used efficiently. This would ensure cost-effective gains in evidence of impacts to support development of the sector. For example, resources may be contributed to large scale population level studies such as improving the annual haul-out studies currently undertaken by SMRU.

Additionally, certain project locations will be more amenable (more likely to demonstrate effects at reasonable cost) than others where it may be impossible to do so. Experience at Strangford Lough is helpful in demonstrating the level of investment and study required to provide evidence of effects occurring, and considering this relative to an open ocean tidal system will be relevant to determining likely costs and feasibility. In this regard, it may be considered appropriate for developers to share costs of undertaking monitoring at particular sites which are comparable to the proposed project.

21.5.2.3 Birds

None of the Project's potential effects on birds are deemed to be of more than minor significance, however, current good practice suggests that an appropriately detailed monitoring programme be agreed and implemented.

The two-year bird survey programme was designed to give data that would form a suitable baseline against which to compare future monitoring data. Collection of boat-based survey data using the same method during the installation and operational phases would potentially provide a means to measure the extent of any seabird displacement response to the development. Future monitoring should focus on the species rated as having or medium EIA priority (guillemot and razorbill, no species merited a rating of high priority) and SPA qualifying species for which potential LSE has been identified (guillemot, razorbill and puffin). Nevertheless, monitoring should only be embarked upon if it can be shown (for example by a statistical power analysis) that there is a realistic possibility of showing a significant displacement effect, something that may be unlikely given the generally low encounter rates of auk species during the baseline surveys. The surveys noted above should be conducted during installation and in years 1 to 3, 5 and 10 of the Project's 25 year operation period. However, flexibility will be retained to cancel this monitoring programme if it is clear that useful information is not being collected.

Monitoring the response of diving auks to turbine rotors and provide data on collision risk would also be desirable. However, at this stage it is not clear how this may be practically achieved. The exposed offshore location of the Project means that compared to some other tidal energy developments (e.g., Sound of Islay Demonstration project and MCT Strangford Lough project) this development is a naturally poor candidate for research aimed at better understanding the collision risks posed to diving birds by TECs.

21.6 Conclusion

The Environmental Impact Assessment (EIA) has been carried out by DPME in accordance with relevant EU, UK and Scottish regulations and has robustly assessed the potential environmental impacts of the proposed Project.

The EIA has assessed the worst-case scenario that would have the greatest effect on the environment. This approach results in a maximum impact assessment, giving security and confidence to the consenting authorities that the environmental impact will be no greater than that which is set out within the Environmental Statement and in fact may be considerably less.

The initial array will provide information on the interactions between the array and the environment, increasing the knowledge for the remaining phases of the Project and the tidal stream industry as a whole.

The West Islay Tidal Energy Park represents an important development step for tidal stream technology in terms of the scale of development and in the transition from prototype technology to full development. The development of marine renewables is a key objective for Scotland and the Project represents a key part of the Scottish and UK renewable energy strategies.