Llywodraeth Cynulliad Cymru
Welsh Assembly Government

www.cymru.gov.uk

Marine Renewable Energy Strategic Framework

Stage 3 - Stakeholder Participation Feedback

Report by RPS to the Welsh Assembly Government

December 2010

Executive Summary

S.1 This document reports on the results of the Stage 3 Stakeholder Participation Process for the 'Marine Renewable Energy Strategic Framework' (MRESF) for Wales; a three stage project currently being undertaken by RPS within Welsh territorial waters on behalf of the Welsh Assembly Government.

S.2 The MRESF is aimed at exploring and enabling the potential for renewable energy extraction from Welsh waters, with the intention being to minimise impacts on environmental resources and socio-economic activities, while maximising the potential for sustainable energy production.

S.3 The MRESF project is divided into three stages. Stages 1 and 2 have been undertaken over the past two years. Stage 3 is progressing through 2010 to develop and deliver the overarching Framework. Stakeholder participation forms a key part of Stage 3, providing stakeholders with an opportunity to comment on and provide input to the proposed methodology for the development of the MRESF Framework.

S.4 The Stakeholder Participation Process (SPP) commenced on 10th June 2010 and ran for 8 weeks, ending on 4th August 2010. A total of 113 organisations were contacted, with stakeholder participation invited through two main routes: via the stakeholder questionnaire; and two workshops.

S.5 The workshops provided an opportunity for RPS to provide more detail on the proposed methodology for Stage 3, and enabled specific topics to be discussed at several break-out sessions. The questionnaire provided an opportunity for stakeholders to both comment on and contribute to the MRESF methodology.

S.6 A total of 21 stakeholders attended the workshops, representing 19 different companies or organisations. Questionnaires were received from 14 stakeholders, representing 13 different companies or organisations, with a further 28 individuals indicating that they would either be unable to respond or did not view it as appropriate to respond. The responses, comments and questions arising from the workshops and through the questionnaires are summarised and discussed in this report.

S.7 Feedback from the SPP will be incorporated appropriately into the development of the MRESF. Several of the comments made by stakeholders have been addressed where possible within this report.

Contents

Tables

Appendices

1 Introduction

1.1 Project Overview

1.1.1 This document reports on the results of the Stage 3 Stakeholder Participation Process for the 'Marine Renewable Energy Strategic Framework' (MRESF) for Wales; a three stage project currently being undertaken by RPS within Welsh territorial waters on behalf of the Welsh Assembly Government. The MRESF is aimed at exploring and enabling the potential for renewable energy extraction from Welsh waters, with the intention being to minimise impacts on environmental resources and socio-economic activities, while maximising the potential for sustainable energy production to be gained from Welsh waters.

1.1.2 The MRESF project was commissioned to investigate offshore wind, wave and tidal stream[1] energy, together with the potential for carbon capture and storage (CCS), within Welsh territorial waters[2]. Stage 3 of the MRESF project only considers wave and tidal stream development, with the reasons for excluding CCS and offshore wind given in the MRESF Technical Addendum (WAG, 2011a).

1.1.3 The overall aim of the project is to develop a framework for enabling the achievement of carbon dioxide emission (and other Green House Gases (GHGs)) reduction targets through sustainable development of wave and tidal stream projects within Welsh waters.

1.1.4 The MRESF project is divided into three stages. Stages 1 and 2 have been undertaken over the past two years, with the outputs from these precursor steps laying the foundation for Stage 3. Stakeholder participation also took place during Stage 1 and the results were reported in the Stage 1 report, to be published as part of the overall project outputs (RPS, 2008). Stage 3 is progressing through 2010 to develop and deliver the overarching Framework early in 2011. Stakeholder participation forms a key part of Stage 3, providing stakeholders with an opportunity to comment on and provide input to the proposed methodology for the development of the MRESF Framework.

[1] It should be noted that tidal range technologies, i.e. lagoons and barrages, are outside the remit of the MRESF project and are thus not considered in any of the data collection or assessment work comprising this initiative. The tidal range resource with the Severn Estuary is subject to a Strategic Environmental Assessment being led by DECC and the Assembly continue to support the undertaking of this study.

[2] Territorial waters, as defined by the 1982 United Nations Convention on the Law of the Sea (UNCLOS), extend 12 nautical miles (22km) from baseline (usually the mean low-water mark) of a coastal state unless this area overlaps with another state's territorial sea, in which case the border is taken as the median point between the states' baselines.

1.1.5 **Appendix A** contains the full background to the Stage 3 Stakeholder Participation Process, in the form of the report sent to Stakeholders at the beginning of this consultation. The Stage 3 Stakeholder Participation Process was extended to those individuals and organisations who were contacted during Stage 1 of the project, together with others identified during the Stakeholder Participation Process for which the project is of relevance. The list includes individuals and organisations from a range of backgrounds, in the UK and beyond:

- Developers;
- Academics;
- Research Groups;
- NGO's
- Unitary Authorities; and
- Government Departments and Agencies.

1.1.6 Stakeholder participation took place through two main routes: via the stakeholder questionnaire; and two workshops.

1.1.7 The current report provides a summary of the feedback received and the discussions held at the workshops. Included in the text is brief information on where and how the comments have been incorporated into the MRESF as a whole. In particular, many of the comments have been useful in the final formulation of the MRESF, with this work currently in draft form (WAG, 2011b). Once the work is finalised, the short cut to the website will be provided to stakeholders for information.

2 Methods

2.1 Stakeholder Participation Process

2.1.1 The Stakeholder Participation Process (SPP) commenced on 10th June 2010 and ran for 8 weeks, ending on 4th August 2010. The full list of stakeholders contacted is provided in Table 2.1 below and includes a total of 140 contacts from 113 organisations.

Table 2.1: List of Stakeholders

Contact	Company
Genevra Harker	AMEC
Sir or Madam	Aquamarine Power
Sir or Madam	Associated British Ports
Ed Rollings	Atlantis Resources Corporation
Ben Yeats	AWS Ocean Energy
Claire Savage	BHP Billiton
Brian Clark	British Marine Federation
Dr David Cotton	British Oceanographic Data Centre
David Whitehead	British Ports Association
Charlotte Mansell	Campaign for the Protection of Rural Wales
Stephen Wyatt	Carbon Trust
Sir or Madam	Cardiff University
Sarah Perry	Cardigan Bay Marine Wildlife Centre
Adrian Judd	CEFAS
Captain Saurabh Sachdeva	Chamber of Shipping
Mark Smailes	Civil Aviation Authority
Glen Darou	Clean Current
John Hamer	Countryside Council for Wales
Andy Hill	Countryside Council for Wales
Dr Sue Hearn	Countryside Council for Wales
Dr Kate Smith	Countryside Council for Wales
Dr Andrew Gill	Cranfield University
Giles Edward	Cwavepower
Tom Powell	Cygnus Energy
Phillip Bloor	DECC
Robert Lilly	DECC
Kate Payne	DECC
Trevor Raggatt	DECC
Jim Spooner	Department for Transport
Jesper Krarup Holst	Dong Energy
Russell Hall	Dresser-Rand
Amaan Lafayette	E.ON
Sir or Madam	Elsam
Matt Strickland	Environment Agency Wales
Susan Freeman	Environment Agency Wales
Jim Poole	Environment Agency Wales
Roger Wade	Environment Agency Wales
Peter Wilinson	Environment Agency Wales
Michael Evans	Environment Agency Wales
Jenny Norris	European Marine Energy Centre
Tom Hooper	Finding Sanctuary
Neil Crumpton	Friends of the Earth
Sir or Madam	GeoData Institute
Mike Johnson	Gloucester Harbour Trustees
Louise Hutchins	Greenpeace
John Hartley	Hartley Anderson
Judith Tetlow	HSE
Sir or Madam	International Council for the Exploration of the Sea
Rowan Byrne	Irish Sea Conservation Zones
Lucy Greenhill	JNCC
Christopher Smith	Knight Frank
Sir or Madam	Lancaster University

Contact	Company
Andrea Tyrrell	Lunar Energy
Melissa Moore	Marine Conservation Society
Sylvie Head	Marine Current Turbines
Joseph Kidd	Marine Current Turbines
Henrik Wareborn	Marine Energy
Sir or Madam	Marine Institute
Shaun Nicholson	Marine Management Organisation
Paul Townsend	Maritime and Coastguard Agency
Emma Lewis	Milford Haven Port Authority
Tonia Forsyth	Pembrokeshire Coastal Forum
Mark Russell	Mineral Products Association
Anders Jansson,	Minesto
Jonathan Wilson	Ministry of Defence
Hannah Pitt	National Trust
Adrian Woodhall	National Trust
Chris Lambart	National Trust
Victoria Copley	Natural England
Jack Hardisty	Neptune Renewable Energy
Martyn Boyce	North Western & North Wales Sea Fisheries Committee
Miles Hearn	Ocean Power Technologies
Mick Borwell	Oil & Gas UK
Sue Barr	OpenHydro
Max Carcus	Pelamis Wave Power Ltd
Howard Nimmo	Pulse Tidal
Stephanie Merry	Renewable Energy Association
Llewelyn Rhys	RenewableUK
Oliver Wragg	RenewableUK
Paul Reynolds	RenewableUK
Ed Frost	RES
Alan Owen	Robert Gordon University
Annie Smith	RSPB
John Clark	RSPB
Bill Langley	RWE npower
Caroline Price	RYA
Sir or Madam	Scira Offshore Energy Limited
Mark Hamilton	Scotrenewables Ltd
Ben Wilson	Scottish Association for Marine Science
Terry Vickers	Scottish Power
Sir or Madam	Sea Mammal Research Unit
Ali Hood	Shark Trust
Martin Hooker	South Wales Aggregates Working Party
Tom Hooper	South West Food and Drink
Nick Harrington	South West RDA
Michael Burrett	SPERBOY
Emmanuel Idowu	Sports Council for Wales
Robert Burnett	SSE
Andy Cummins	Surfers Against Sewage
Stephen Brooks	Sustainable Development Commission UK
Gavin Bunting	Sustainable Development Commission UK
Miles Willis	Swansea University
James Orme	Swanturbines
Tom Powell	Swanturbines/Cygnus Energy
Debra Frankiegicz	The Crown Estate
Martin Simpson	The Crown Estate
John Callaghan	The Crown Estate
David Thompson	The Crown Estate
Jamie Moore	The Crown Estate
Chris Williams	Tidal Energy Ltd
Sara Thomas	Tidal Energy Ltd
Alan Smith	Tidal Generation Limited
Captain Duncan Glass	Trinity House
Mike Weston	UHI
Richard Hill	United Kingdom Cable Protection Committee
Beth Scott	University of Aberdeen
Dr Henry Jeffrey	University of Edinburgh
Sir or Madam	University of Exeter
Professor Mike Cowling	University of Glasgow
Professor AbuBakr Bahaj	University of Southampton
Dr Jonathan Gordon	University of St Andrews
Dr David Thompson	University of St Andrews
Sir or Madam	Vattenfall
Sir or Madam	Warwick Energy

Contact	Company
Iain Russell	Wave Dragon
Paul Wegener	Waveberg
Sir or Madam	Waveenergy.dk
David Gibb	Wavegen
Louise George	Welsh Assembly Government (MCZ Team)
Dean Chapman	Welsh Assembly Government
Julia Williams	Welsh Assembly Government (MCZ Team)
Phil Coates	Welsh Assembly Government (Fisheries)
Jill Brown	Welsh Assembly Government
Jerry Percy	Welsh Assembly Government
Craig Mitchell	Welsh Local Government Association
Sir or Madam	Welsh Surfing Federation
Robert Lott	Whale and Dolphin Conservation Society
Rick Park	Wildlife Trust of South and West Wales
Sir or Madam	Wildlife Trusts Wales
Wendy Dodds	WWF

2.1.2 The contact names in the above Table 2.1 have been updated from the initial contact name where new contact details were provided.

2.1.3 A project mailbox was set up with the following email address: mresf@rpsgroup.com. This provided a clear and central system of logging stakeholder responses. Stakeholders were initially sent an email from the project mailbox with the following attachments:

- The SPP report (WAG (2010a); providing an overview of work completed to date, the planned methodology for Stage 3 and targeted questions);
- An invite to the stakeholder workshops in July 2010; and
- The SPP Questionnaire.

2.1.4 Log in details were also provided for the MRESF project website:

- http://mresf.rpsgroup.com
- Username: stakeholder
- Password: mresfspp

2.1.5 The website hosted four main pages, including a project introduction page, a documents page where the stakeholder participation documents could be downloaded, a page introducing the Stage 3 Stakeholder Participation Process, and a Links page with web addresses for the Welsh Assembly Government and RPS Group.

2.1.6 In the weeks following the original issue of the Stakeholder pack by email, 108 emails were sent to stakeholders to re-issue the stakeholder pack as a ‘reminder’ of the initial contact, with some 96 stakeholders subsequently contacted by telephone, to encourage

attendance at the workshops and completion of the questionnaire. Such additional contact was also very useful in determining where the contact name held by the MRESF had changed, ensuring the correct person was issued with the information. In some cases this involved re-sending the initial email, particularly where contact details had changed since Stage 1, with the original email not reaching the new contact. The contact list in **Appendix B** provides details of when follow-up calls were made and when additional information was subsequently issued.

2.1.7 Feedback from the SPP will be incorporated appropriately into the development of the MRESF, with the current report providing the format for stakeholder responses, summarising comments made and how/where these have been addressed.

Workshops

2.1.8 Stage 3 included provision for two workshops, aimed at enabling RPS to provide more detail on the proposed methodology for Stage 3 to facilitate discussion and feedback. The objectives of the workshop were to:

- Update and share experience/knowledge across a wide section of stakeholders on marine renewables, including developers, researchers, regulators/advisors and other marine industries;
- Discuss data used/available, limitations, confidence levels and assessment of cumulative data layers;
- Provide an outline of how we propose to estimate potential resource capacity (wave and tidal stream) in Welsh waters, assumptions used, and dialogue with stakeholder on appropriateness;
- Constraints mapping of environmental, social and economic datasets and how this will be used to provide potential sustainable development scenarios for Welsh waters.

2.1.9 The first workshop was held in Cardiff on 6th July 2010, and the second in London on 20th July 2010. A copy of the invitation to the workshops, and the workshop timetable/agenda, are provided in **Appendix C**. Further details are presented in Section 3.2, with **Appendix D** providing a table of all comments logged, together with how these are being taken forward. An evaluation form was sent to all participants after the workshops had taken place. The current report has enabled the key lessons from the workshops to be collated in a systematic and thematic manner, with Section 3.2 presenting a summary of the discussion feedback.

Questionnaire

2.1.10 A copy of the SPP questionnaire, as issued in the stakeholder pack and provided on the project website, is provided in **Appendix A** This provided an opportunity for stakeholders to comment on or contribute to the MRESF methodology, and included questions on data sources, potential constraints and key parameters for marine renewable technology. The completed questionnaires are confidential and as such have not been reproduced in full; however a summary of the responses received is provided in Section 3.3.

2.2 Reporting

2.2.1 This section briefly outlines the approach to presenting a summary of the feedback received from the questionnaire and the key points raised during the workshop discussions. Stakeholders are referred to by their stakeholder category, e.g. Developer, Regulator/Advisor, Stakeholder etc., rather than by name, to ensure confidentiality.

2.2.2 The workshops were structured to enable provision of information and discussion on a number of key points, as highlighted in Section 2.1. Although the various topics may not always have been discussed during the relevant workshop session, the approach does enable a structured and logical approach to recording the comments made, by grouping the responses into categories as appropriate.

2.2.3 For the questionnaires, results from closed questions are reported numerically. Results from open questions have been presented in Table format, or grouped together in paragraph format. Where additional comments were made on the questionnaires, these have also been reported.

3 Results

3.1.1 This section presents the results of stakeholder participation, including responses from the workshops and questionnaires.

3.2 Workshops

3.2.1 Table 3.1 and Table 3.2 below provide lists of attendees at the two workshops. A total of 21 stakeholders attended the workshops, representing 19 different companies or organisations[3]. A further 28 individuals responded either that they would be unable to attend the workshop or it was felt that it would not be appropriate for them to do so.

Table 3.1: Attendees at Cardiff Workshop 6th July 2010

Contact	Company/organisation
Sue Hearn	Countryside Council for Wales
Michael Evans	Environment Agency
Emma Lewis	Milford Haven Port Authority
Tonia Forsyth	Pembrokeshire Coastal Forum
Chris Lambart	National Trust
John Clark	Royal Society for the Protection of Birds
Martin Hooker	South Wales Aggregates Working Party
Miles Willis	Swansea University
Sara Thomas	Tidal Energy Ltd
Iain Russell	Wave Dragon
Phil Coates	Welsh Assembly Government

Table 3.2: Attendees at London Workshop 20th July 2010

Contact	Company/organisation
Kate Smith	Countryside Council for Wales
Andrew Gill	Cranfield University
Tom Powell	Cygnus Energy
John Hartley	Hartley Anderson
Joseph Kidd	Marine Current Turbines
Stephanie Merry	Renewable Energy Association
Paul Reynolds	RenewableUK
Caroline Price	Royal Yachting Association
Debra Frankieqicz	The Crown Estate
Wendy Dodds	Worldwide Fund for Nature

[3] Apologies from Stephen Wyatt (Carbon Trust) and Dean Chapman (Welsh Assembly Government),

3.2.2 The workshops included the following five targeted sessions:

- Datasets;
- Potential Resource;
- Constraint Rankings;
- Scenarios;
- Sustainability.

3.2.3 An initial 10 minute presentation was given by the project team on each topic to provide an overview. This was followed by the opportunity for discussion, questions and answers in small groupings. All questions and comments made during the workshops were logged, and are summarised in the following sections according to workshop session.

Session: Datasets

3.2.4 Particular stakeholder input was sought in the following areas:

- To identify particular datasets the stakeholder would like to be included;
- To discuss particular issues the stakeholder would like to be included but for which data may not be available;
- Discussion on data management approach;
- Discussion on methods for assessing confidence;
- Discussion on dealing with multiple data layers.

3.2.5 During the break out sessions, several attendees suggested other sources of data, or information on methods such as the management of multiple data layers. Overall the majority of the discussion focused on the first two points with relatively little comment forthcoming on the final three. The suggestions made are presented in Table 3.3 below. Please note that feedback is provided within the table on some comments, where appropriate, with a note made for other comments where the feedback has been incorporated into the overall MRESF process, primarily into a project report.

Table 3.3: Datasets: other sources of data / information

Topic	Data source/project	MRESF Response
Marine Aggregates	▪ Marine Aggregate Dredging Policy ▪ Mineral resources multiple data layer project	Marine Aggregates Dredging Policy is included in the MRESF Bibliography (WAG, 2011a). Mineral resources multiple data layer projects included in the assessment of methods to display cumulative data layers (WAG, 2011b).
Coastal Protection and Flooding	▪ LIDAR mapping compiled to inform Shoreline Management Plans ▪ Water Framework Directive data, including layer on coastal protection levels ▪ Irish Sea (e.g. MIDA and WWF research), shoreline management planning, flood and coastal erosion risk management data e.g. FutureCoastal (coastal evolution dataset)	Data request issued.
Landscape and Seascape	CCW landmap and seascape datasets provide examples of multiple data layer display.	Datasets held by the MRESF project, with methods for display reviewed (WAG, 2011a).
Recreation	The recreational dataset from Pembrokeshire Coastal Forum covers all Welsh waters. Also includes nature conservation, plans and projects.	Dataset held.
	British windsurfing.	Coastal leisure activities dataset, provided by the Environment Agency.
	Surf beaches, Blue flag beaches, diving sites of value. EA Recreational Audit.	Coastal leisure activities dataset, provided by the Environment Agency.
	RYA data includes marinas.	Dataset held.
Other Existing Projects / Programmes / Sources	Emergency Planning for Sea Empress reports.	Any shipping restrictions and/or management areas are held, however local plans are generally too small a scale for a strategic project such as the MRESF. Where sourced, public domain work is held within the MRESF bibliography (WAG, 2011a).
	Milford Haven environmental surveillance group Annual Report.	
	Planweb County Council planning tool.	
	MCT issue biannual reports provided to DoNI.	Public domain work is held within the MRESF bibliography (WAG, 2011a)
	COWRIE reports, including mitigation measures for reduction of underwater noise, do not seem to be included in research gaps Appendix of SPP report	Held within the MRESF bibliography (WAG, 2011a)
	Low Carbon Research Institute are undertaking data on potential areas of interest for marine renewable development.	Relevant literature held within the MRESF bibliography (WAG, 2011a).
	Marine Spatial Planning Conference on 1 July 2010 included examples of multi data layers and confidence methods used.	Methods for display reviewed (WAG, 2011b).
	Wales Coastal Monitoring Centre.	Coastal data searched for via national bodies e.g. Environment Agency and CCW.
	Natural Environmental Framework include mapping biodiversity in GIS. http://new.wales.gov.uk/topics/environmentcountryside/consmanagement/conservationbiodiversity/publications/nef2/;jsessionid=2jNjMmrpLHLTLmyMhqB01vTSJzyxPhFGycdFfGKvyZxyPhnNtp20!-1109583048?lang=en	Noted in the review of sustainable plans and policies (see WAG (2011a)).
	www.severnestuary.net, Biodiversity Conference.	Severn Estuary Partnership contacted early on in the project regarding potential data.
	IUCN Green Blue Energy report includes information on identifying and managing the biodiversity risks and opportunities of offshore renewable energy, Dan Wilhelmsson *et al* (www.iucn.org/marine).	Held within the MRESF bibliography (WAG, 2011a).
	Marine mammal/birds 'encounter risk' modelled by ABPmer.	Availability of the work noted in WAG (2011a).
	IMECA project is run by Liverpool University with WAG. Methods for dealing with multiple data layers.	Availability of the work noted in WAG (2011a).
	Severn Tidal Power Study includes a large dataset. Modeling work on effects of a tidal fence.	Held within the MRESF bibliography (WAG, 2011a).
	Other data management systems and data holders to be compatible with include MEDIN and BODC.	Contacted early on in the project regarding potential data MRESF project using standardised metadata format for compatibility.

Topic	Data source/project	MRESF Response
Geology / topography	BGS/NMW Bristol Channel Survey data.	Held within the MRESF bibliography (WAG, 2011a).
	OLEX - AGDS echosounder data is being coordinated by SWSFC. Data on positional depth/ground hardness.	Publicly available data held within the MRESF bibliography (WAG, 2011a).
	Seabed mapping in the Bristol Channel is available from DECC, BGS. BIOMOR is a subset of this.	Availability of the work noted in WAG (2011a).
	CCW hold mapping data on the seabed from Milford Haven to Ramsey Sound.	Appropriate GIS benthic ecology data layers provided by CCW.
	BMAPA hold data on seabed geology, topography, ecology.	Broad scale datasets held where available (see WAG (2011a)).
Fisheries	Sea Fisheries Atlas.	Availability of the work noted in WAG (2011a).
	Survey of Fishing Activity 2004-5.	Availability of the work noted in WAG (2011a).
	Fishing Activity Maps: www.swsfc.org.uk. Fisheries protection vessels observations, CCW Atlas 2004/05, fishing industry own maps.	Availability of the work noted in WAG (2011a).
	Fishing Industry (S Wales) Study (collation of fishermen's map).	Availability of the work noted in WAG (2011a).
	CEFAS are coordinating QA of SFC protection vessel observation data on fishing activity.	Contacted early on in the project regarding potential data.
	CCW: considering looking at fish data. Temporal data (spawning, nursery for fish species). Demersal fish species and potential for association with sediment types and bathymetry.	Availability of the work noted in WAG (2011a).
	Migration paths of fish. COWRIE projects could provide more information even though mainly focused on offshore wind e.g. COWRIE 2010 Effects of pile driving noise on fish behaviour.	COWRIE work included in the MRESF Bibliography (WAG, 2011a).
Marine Mammals	MCT/SMRU are undertaking a numerical modeling study on marine mammal collision risk and seal monitoring at Strangford Lough.	Public domain data held in the MRESF Bibliography (WAG, 2011a).
	SEA funded Seal Tagging together with a post doc study at St Andrews: to compile and analyse all seal tagging data from the past 25 years.	Availability of the work noted in WAG (2011a).
Subsea noise	MCT have data on O&M noise.	Public domain data held in the MRESF Bibliography (WAG, 2011a).
Navigation	MCA have updates to navigation datasets, provided on 3 layers, 5x5km, 1x1km and 100x100m. There have been no major changes to the routes.	Shipping density data used in constraint mapping supplied by Anatec.
Cables	UK Cable Protection Society for up-to-date locations.	Cable and pipeline data used in constraint mapping sourced from Seazone and Kisca.
Birds	WWT data includes breeding colonies, aerial surveys, refine sensitivity, birds that raft together overnight. Available early August. Aerial bird survey data: GIS layers available from WWT or JH.	Received from CCW and incorporated into GIS mapping (baseline in WAG (2011a) and constraint mapping in WAG (2011b)).
	Inventory of bird surveys 2000 published Mar/Apr 2010. Available from the DECC website.	Bird survey reports available on DECC website held in the MRESF Bibliography (WAG, 2011a).
Benthic habitats	Sensitivity to fishing gear type, physical disturbance etc. May provide surrogate assessment on sensitivity of benthic habitats to W&T deployment.	Received from CCW and incorporated into GIS mapping (WAG, 2011a).

3.2.6 Several other aspects related to data and data management were also discussed in the Dataset sessions. Comments on the data included a suggestion by one Stakeholder that the 'Registered parks and gardens' data layer should be grouped under 'designated sites' rather than 'recreation; this change has been made. Also relating to data categories, one *Stakeholder* queried whether the submerged landscape data layer included archaeology. Archaeological GIS data layers held by the MRESF include historic environment (from Cadw), protected wrecks (Maritime and Coastguard Agency

website) and non protected wrecks (SeaZone). The submerged landscape data is sourced from the JNCC (see www.jncc.gov.uk/page-2117) and is aimed at seabed habitats and not archaeology. A *Developer* sought to confirm that The Crown Estate leasing rounds for offshore wind are included, with all Round 3 zones taken forward having been included in the MRESF (as well as existing Round 1 and 2).

3.2.7 A *Researcher* pointed out that Automatic Identification System (AIS), used to track shipping does not include smaller craft although these are covered by the Royal Yachting Association (RYA) data with the exception of small fishing vessels. To ensure broad coverage of vessel types, the MRESF project includes GIS data layers for shipping, recreational boating and commercial fishing. Stakeholders also noted that fisheries activity data is variable and poorly recorded, and that fisheries socio-economic data is poor overall. Furthermore it was considered difficult to relate the socio-economic value of fishing to location / time. The inclusion of commercial fisheries can be data limited, however the data used for constraint mapping covers all Welsh waters and was sourced from the recently published data by COWRIE, which includes GIS mapping for commercial fisheries, (see WAG (2011b)). Although the amount of strategic level information available for a project such as the MRESF is increasing, there will always be a need for some issues to be dealt with on a site specific basis.

3.2.8 Stakeholders were also concerned about the potential for repetition within different GIS datasets, and also that key messages may be lost in the data layers. These concerns have been noted and incorporated as appropriate into the sustainable development scenarios (see WAG (2011b)). It was also noted that site specific assessments will still be required, a point recognised within the overall MRESF, which is inherently strategic and undertaken at a broad scale but does not remove the need for site specific work. Concerning data gaps, a *Researcher* suggested that these gaps should be captured in the table presenting data sources to ensure issues are not missed. The Technical Addendum (WAG, 2011a) provides an update on the 2008 review of data gaps (RPS, 2008) to ensure that data gaps are not missed. However, it should be noted that a large number of projects are currently in progress and it is therefore difficult to determine where the main data gaps will remain until at least some of the projects have reported.

3.2.9 A *Regulator/Advisor* suggested the need for cross-border data management, particularly in the Severn Estuary/Bristol Channel areas, and also greater accessibility to data In response to this point, additional initial contact has been made with SWRDA, who have recently commissioned a project to assess the potential for wave, tide and offshore wind in the south west. Also relating to transboundary issues, a *Stakeholder* suggested that

the Irish Sea MCZ and Finding Sanctuary MCZ teams are contacted with respect to the potential issues with MCZs adjoining potential strategic areas for marine renewable energy development. Contact was made with both the Irish Sea MCZ and Finding Sanctuary MCZ, which together with ongoing contact with the Welsh MCZ teams is providing information on developments adjacent to Welsh waters.

3.2.10 Attendees also identified opportunities and constraints to marine renewable energy development in Wales generally. One *Developer* suggested that the planned interconnector between Ireland and Wales improves accessibility to grid, with the planned route included in the appropriate GIS maps for information. Another *Developer* suggested that legislation is seen as a constraint to development, whereby the presence of a European Protected Species (EPS) e.g. cetaceans indicates that consent is likely to be difficult. Such constraints are acknowledged in the sustainable development steps, with the recently compiled datasets on marine mammals provided by CCW strengthening the constraint mapping further (see WAG (2011b)).

3.2.11 In terms of the MRESF process, one *Regulator/Advisor* was uncertain on how Stage 2 feeds into Stage 3. The reports are incorporated into the MRESF bibliography as they become available. The additional information gained has also added to the certainty behind the assessment of potential constraint that each issue may represent on wave and tidal stream energy developments (see WAG (2011b)). The *Regulator/Advisor* also queried whether the MRESF could be used to identify strategic demonstrator sites (i.e. lower energy sites), and was keen to ensure that a demonstrator stage is not missed. The level of energy used by the MRESF project when determining potential viable areas of resource has been informed by feedback from developers and is applicable to both demonstrator and commercial scale deployments. However, in response to queries about lower energy sites for tidal stream, the potential to investigate such sites by the MRESF is being considered between the RPS team, the WAG and the project Steering Group. Regarding a query about potential inclusion of mitigation, this has been noted in the Approach to Sustainable Development Report (WAG, 2011b) including a review of potential approaches to mitigation, however it should be noted that mitigation measures would need to be assessed and applied on a site by site basis.

Session: Potential Resource

3.2.12 Particular stakeholder input was sought on a number of points during the session on potential resource, with the key points being as follows:

- Resource Areas – minimum energy availability;

- Device density – fundamental in determining energy production potential;
- Device shadow;
- Minimum 'commercial scale' array size;
- Use of energy production per unit area; and
- Benefits of resource calculations based on minimum energy requirements vs areas with greater levels of energy.

3.2.13 Detailed comments were logged regarding specific parameters for marine renewable energy technology. These comments have been grouped according to the specific parameter considered.

3.2.14 For **minimum array size**, a variety of feedback was received. For example, a *Stakeholder, Researcher* and *Developer* considered that 30MW may be too large for the first projects, suggesting that commercial projects may be up to 5-15MW. A *Regulator/Advisor* and *Researcher* considered that in the next 5 years, developers are likely to test at demonstrator sites before developing 30MW sites, and expressed concern that the demonstrator stage may be missed. A *Developer* explained that 10MW is the maximum size for a demonstrator project (as defined by The Crown Estate). In contrast, another *Developer* considered that the parameters should include a minimum of 10-11 units, with approximately 100MW being commercial scale. The view was echoed by a *Stakeholder*, who noted that the Pentland Firth bidding round was based on 50-100MW arrays, and that 30MW is small to be commercially viable. The potential array size is considered in detail in the Approach to Sustainable Development Report (WAG, 2011b), drawing on the feedback received from Stakeholders, with the need to select a size driven by several factors including the method applied to assessing potential resource but also to reflect past renewable energy development phases (such as the Round 1 offshore wind leasing round) and potential future developments. The 30MW size chosen does not exclude smaller or larger developments, but does sit between the different levels recommended and enables an assessment of potential resource to be made.

3.2.15 Regarding the **spacing** of marine renewable energy devices, considerable variation in replies was noted. One wave device *Developer* expected arrays to be deployed in lines up to 5.5km long, with devices approximately 300m across and approximately 200m apart. A *Stakeholder* suggested spacing for tidal stream devices of 10 x rotor diameter in the direction of flow, and 3 x rotor diameter perpendicular to flow direction. A

Researcher suggested that the distance between turbines proposed in the SPP questionnaire pack (Appendix A) is too small and would lead to a loss of energy between turbines. Reference was made to work being undertaken at EMEC into rotation speed and distance parameters for resource assessment, although it was noted that this work would not be available within the MRESF timescale. A *Stakeholder* noted that the spacing of wave energy generators is complex and device specific, which is reflected in the research undertaken by the MRESF, with the values taken forward included in the Approach to Sustainable Development Report (WAG, 2011b).

3.2.16 Only one comment was logged on **load factor** and **wave energy value**. A *Developer* noted that a demonstrator device converted 21% of wave energy from water to wire. In terms of wave energy value, the *Developer* indicated that wave conditions much less than 12kW/m would not be suitable. Such information has been taken forward in the Approach to Sustainable Development Report (WAG, 2011b).

3.2.17 Several comments related to **tidal stream value**. A *Developer* stated that there needs to be justification for the figures for minimum energy requirements used and suggested that variability in the baseline data used for scenario development should be considered.

3.2.18 Several stakeholders make comments on the minimum energy resource required, particularly as regards the minimum level for tidal stream applied. A *Developer* considered that the criteria approach setting minimum levels is appropriate as this would reflect the approach taken by developers for an initial assessment of potential sites. A *Researcher* noted that 2m/s mean spring is at surface rather than hub height and if the hub height was lower in the water, the device would generate less power, with a *Professional Body* noting the large error margins. The *Researcher* requested evidence for the 2m/s threshold and that the assumptions for this are published with the study, with a *Stakeholder* expressing concern over the 2m/s value with reference to conflict with important ecological areas. The *Stakeholder* suggested that the SEA for Northern Ireland is reviewed, which uses a value of 1.5m/s, with a *Regulator/Advisor* also suggesting a different scenario for 1.5m/s. In contrast, a *Developer* suggested that larger devices are more cost efficient, and that it is currently not economically viable to consider a resource of less then 2m/s. The *Developer* also considered that in some cases high energy areas would not be suitable, due to the need for larger generators and expensive construction and maintenance costs. The *Developer* considered that the tidal stream value is likely to increase as the industry develops. The *Developer* suggested that there is potential to consider increased parameters for tides and waves for more detailed assessment, providing smaller areas which would achieve the same

output as larger low energy areas, although the need for this in the MRESF will depend on resource outputs calculated at a conservative, low level and whether they are sufficient given the levels of existing constraint. Overall, such information has been very useful when assessing the potential resource and incorporated into the Approach to Sustainable Development Report (WAG, 2011b).

3.2.19 Several participants commented on **data issues**. In one break-out group, several attendees stated that inshore areas had been excluded from the drawings shown during the workshop presentations, particularly around Pembrokeshire, and considered that these areas are likely to be of interest to developers during the early stages due to land access. The issue is acknowledged and discussed in the Approach to Sustainable Development Report (WAG, 2011b) and is a reflection of the resource data held within the Renewables Atlas (see www.renewables-atlas.info), the main source of resource data for the MRESF project. However, it should be noted that additional tidal stream data has been added by the RPS team, including data in inshore areas and channels between islands and the mainland, with the issue of data gaps therefore being of most relevance to inshore wave devices. A *Stakeholder* suggested that estuaries have good potential as a tidal stream resource, although again limited data on the resource in these areas is available.

3.2.20 The potential uncertainty and limitations in the available datasets were raised by a number of stakeholders. A *Researcher* raised the importance of numerical modelling to predict impacts, although considered that the rudimentary nature of biotope data would make this unreliable. A *Developer* pointed out that measured wave data differs from the predictions in the Atlas, with another *Developer* suggesting that there has been limited research into cavitation effects and the impact of salinity.

3.2.21 Several participants provided sources of **additional information**. This is presented in Table 3.4 below.

Table 3.4: Potential Resource: sources of additional information

Source	Topic/Notes	MRESF Response
Aquascientific	Field-testing a device that may be able to operate at lower tidal stream velocities.	The company are based at the University of Exeter, who have been consulted by the MRESF project.
Cardiff University (Roger Falconer)	Research on turbulence effects, wake effects etc.	Research noted in the 2008 review of research (RPS, 2008).
British Gas	Small scale modelling of wave device arrays in wave tanks (from 1970s).	No records traced due to staff changes, business sales and change of premises
University of Aalborg	Small array testing.	Public domain data held in the MRESF Bibliography (see WAG (2011a)).
ABPmer (Juice nPower study)	Tidal stream value.	Held in the MRESF Bibliography (see WAG (2011a)).
Peter Frankael, MCT	Paper on what is theoretically possible for tidal stream value.	Public domain data held in the MRESF Bibliography (see WAG (2011a)).
MCT	Wake modelling data for non-operational device. Techno-environmental report on array size.	Public domain data held in the MRESF Bibliography (see WAG (2011a)).

3.2.22 **Other comments** raised included grid connection constraints and the need for test sites (see WAG (2011b)). In one group, all participants considered there would be interest in combining wave and tidal devices with wind, although not necessarily wave and tidal devices together. A *Developer* noted that the collection of environmental data from operational projects is helping with the consenting of new projects.

Session: Constraint Rankings

3.2.23 Particular Stakeholder input was sought in the following areas:

- How much and what type of data was considered sufficient to assess the level of constraint;
- Stakeholder views on ensuring the assessment is device blind;

3.2.24 Stakeholder views on ensuring geographic variability is taken into consideration, including pros, cons and potential pitfalls. Table 3.5 below presents information on the different types of constraints raised or discussed during this session by various participants.

Table 3.5: Constraint Rankings: constraints raised

Constraint	Notes	MRESF Response
Shipping lanes / navigation channels	Shipping routes high constraint although can be moved.	Shipping density data from Anatec has been used in the constraint mapping.
Recreation	Importance of considering recreational boating separately from commercial shipping.	Use of the RYA Atlas in the constraint mapping.
	Recreational fishing.	Coastal recreation data layer provided by the Environment Agency.
Resource	Benchmarks for output per unit area could prevent consent for applications that do not meet benchmarks.	Not intended to be benchmarks but to enable an assessment to be made of the energy potential.
	Energy production per unit area is an important approach.	Noted.
	Energy production per unit area can be used to inform consenting decisions/ adaptive/ precautionary approach to environmental constraints.	Application will still need to be on a site by site basis.
	Avoid spatial zoning using 2 m/s resource value, as precludes sensitive and sustainable development outside any potential zones.	Point discussed further in WAG (2011b).
	Division of tidal devices into surface piercing and non surface piercing is artificial. Developer will select which type of device will extract the maximum energy. Division of wave devices into floating and bottom mounted is however relevant. There is little to no wave energy resource at depth in deep water; and floating machines cannot be deployed in shallow water.	Division of tidal devices was for constraint mapping purposes only, and was intended to reflect differences in visual impact and not methods of energy generation. Wave device data has been sourced directly from developers.
Ecology	Constraints of concern include diving birds (e.g. guillemots) in the context of tidal turbines, depth of dive, proximity of seabird colonies even where seabed area is not designated.	Additional data provided by CCW for use in constraint mapping.
	Presence of EPS.	Marine mammals included in the constraint mapping data layers.
Landscape/ seascape	Landscape, seascape, heritage and people's enjoyment of the coast.	CCW seascape and landscape GIS data included in the constraint mapping data layers.
Socio-economic	Data difficult to value owing to source and variability.	Noted. The potential for geographic variability in data layers is discussed in WAG (2011b), however site specific assessment will always be required.
Fishing Industry	Concern that fishing industry being 'squeezed' through competing uses of the marine environment.	Highlights the importance of including commercial fishing in the constraint mapping, however does not replace site specific assessment requirement.
	Not all areas commercially fished are equal: Sterilising key areas for trawling will have disproportionate effect.	Highlights the importance of including commercial fishing in the constraint mapping, however does not replace site specific assessment requirement.
Commercial	Consenting, commercial appetite.	Noted.
	Proximity to grid.	Existing and planned grid included in constraint mapping (as informative layer).
Public Perception	Public perception/support as potential constraint.	Included in WAG (2011b) within a section on 'non GIS constraints', however site specific assessment will always be required.

3.2.25 Some participants raised the potential for benefits or opportunities from the development of marine renewable energy projects, for example *Stakeholders* highlighted the benefits of no fishing areas and the potential for mutual benefits, with such issues considered in the Stage 2 project looking at the positive effects of marine renewables. A *Stakeholder* suggested the possibility of synergies between energy areas and MCZs, highlighting the

importance of the ongoing discussions between the RPS team and the Welsh MCZ team (and other teams neighbouring MCZ teams).

3.2.26 A *Stakeholder* suggested that in some cases archaeology should be considered as an environmental rather than social constraint. A *Regulator/Advisor* suggested that nature conservation features should not necessarily be a grade 5 constraint, but considered that mitigation is important.

3.2.27 In terms of opportunities, a *Researcher* considered opportunities mapping, whereby there could be economic benefits of developing in proximity to existing wind farms through sharing infrastructure, or developing in proximity to ports in terms of access for construction/maintenance. Although such work would be outside the scope of the MRESF, the data collated by the project could be used as a first step in the process.

3.2.28 Several comments were also made on methodological, process and presentation issues for the constraints and these are summarised in Table 3.6 below.

Table 3.6: Constraints Rankings: methodological, process and presentation comments

Topic	Notes	MRESF Response
Project dissemination	Access to website; do not over complicate.	Noted.
Data	Uncertainty about need to present cumulative data layers in more detail on a 2D image.	Noted, with the first drafts to be subject to discussion between RPS, the WAG and the Steering Group.
	Potential for developers to investigate the effects where there are data gaps.	Increasing the knowledge base is valuable in that it reduces uncertainty but it does not automatically follow that the level of constraint would be reduced.
	CCW will provide raw marine mammal data from Atlas.	Noted.
Geographical variability within designations	Whether such variability can be accounted for given differences in data quality.	The process is only applicable to a few datasets.
Caveats	Ensure constraints are used properly and include caveats.	Noted.
	Need for greater transparency in how constraints are graded.	Constraints ranked by RPS in discussion with the WAG and the Steering Group, with the methodology and all constraint ranks provided in WAG (2011b).
Presentation	Several participants considered that rather than a traffic light colour scheme for the constraints, shades of one colour or textured would be more appropriate i.e. indicating level of strategic constraint, site-specific assessment still required.	Noted, with the colours changed to shades of blue.
	Suggestion that main project outputs should be high, medium and low constraint areas.	Noted, with this being the preferred outcome but will ultimately be informed by the data.
	Straight lines on maps showing distinct areas can be misleading. Could use grading across layers.	Noted, however the outputs are in a grid format due to the need for data processing.
	Where existing / potential marine uses overlap, how to prioritise?	The purpose of the constraint ranking is to indicate the potential difficulties in achieving consent and not to prioritise one interest over another.

3.2.29 A *Developer* considered that hard constraints are of most concern, with these tending to be ranked more highly in the MRESF. Regarding views on particular constraints where development would be considered unsustainable, several participants in one break-out group suggested that this would involve the presence of hard constraints, such as dredged shipping channels, with such constraints generally ranked highly. A *Researcher* considered that increased fuel use and increased collision risk may result from constraining major navigation routes, which is acknowledged in the MRESF by the high constraint ranking of the busiest shipping lanes.

3.2.30 It was suggested by a *Regulator/Advisor* and a *Stakeholder* that constraint level is related to legislation, which is one aspect considered when constraint ranks are assigned. A *Researcher* considered that European legislation takes priority, although the WAG policies determine the weight afforded to renewable energy projects.

3.2.31 Several participants commented on grid issues. A *Researcher* considered that grid will become available as developments progress, and suggested ranking areas according to ability to connect. A *Developer* considered grid and distance to market to be significant issues and that this should be highlighted at the strategic level. A *Professional Body* explained that the grid is being improved in North Wales, and a *Stakeholder* raised the potential for conflicts from grid connections on sensitive Welsh coastlines. The Approach to Sustainable Development report (WAG, 2011b) does acknowledge the significance of the issue for developers, including grid as a constraint, however no definitive distance from grid can be highlighted, as the economic viability of distance from grid will be project specific.

3.2.32 In one break-out group, several participants considered that constraints mapping should be device blind, although there was interest in carrying out assessments on specific devices. It is the intention of the MRESF to remain device blind, however the structure of the GIS database would enable the constraint mapping process to be undertaken for specific devices.

Session: Scenarios

3.2.33 Particular Stakeholder input was sought in the following areas:

- Terminology issues around the word ‘scenario’;
- Views on the scenarios to be tested – positives and concerns;
- Views on maximum achievability;

- Particular constraints where development of marine renewables would be viewed as unsustainable.

3.2.34 Regarding **terminology**, several participants considered the word "scenario" to be confusing. Participants considered that this implied a choice of options rather than a series of steps along a process to achieve sustainable development. Suggestions on alternative terminology included "stage", "pathway", "process", "steps" or "phases". A *Stakeholder* also considered that the methodology is not clear and requires greater transparency. In response, the terminology has been changed for the Approach to Sustainable Development report (WAG, 2011b), from 'scenario' to 'step', including greater detail on the methodology. The result is a series of steps, each included to ensure different aspects of sustainable development are considered in full before bringing together the results from each step to produce a series of sustainable options for development.

3.2.35 Regarding **views on the scenarios (now steps)**, a *Stakeholder* considered that sustainable development is only considered in Step 5 and therefore questioned the inclusion of Steps 1-4. However, the purpose of the different steps has been designed with sustainability in mind, to ensure that each issue is considered equally but also to be clear as regards to which aspects cause the most amount of constraint on development. A *Regulator/Advisor* and *Stakeholder* considered it is important to be clear that Steps 3a and 3b are part of the overall process and should not be interpreted in isolation, a concern that is anticipated to be addressed through the change in terminology from 'Scenario' to 'Step'. A *Stakeholder* who expressed general approval of the steps to sustainable development suggested that the process is relatively easy to understand and follow, although considered that it appears difficult to undertake. A *Researcher* pointed out the use of "Reasonable Alternatives" in other strategic assessments, however as the MRESF is not based on a plan or project (as in SEA or EIA terms), consideration of alternatives is not required.

3.2.36 Several other matters were raised and these are presented in Table 3.7 below.

Table 3.7: Scenarios: other matters

Topic	Comments	MRESF Response
Timescales	There is an apparent disconnection between the 5 year MRESF timeframe and 2025 target.	The MRESF timeframe enables updates to be included at an appropriate stage, while still aiming towards a more medium term goal.
	Timescales over which devices operate.	Site specific.
Data	Ensure that sufficient justification is provided when scoping data layers out of the data set. Acknowledge the 'non issues'.	Noted.
MRESF process	Provides a good evidence base for consenting.	Noted.
	Approach focuses on the device types rather than company requirements. Company may review resource area and select a device to fit.	One of the aims of the MRESF is to provide information on which to make an informed decision on risk and the likely degree of constraint a particular site could be subject to.
Spatial scales / resource areas	Crown Estate leasing based on MW per km^2. Need to ensure commercial focus to leasing.	Noted.
	Wave resource is less geographically restricted. More difficult for wave devices in high tidal areas. Tidal devices targeted at sites with less waves. Therefore likely to be less overlap than perceived.	Data processing reveals very little overlap between tidal stream and wave energy resource.
	Industry should target the easiest/cheapest areas of producing energy first.	Noted.

Session: Sustainability

3.2.37 Particular Stakeholder input was sought in the following areas:

- Are there particular policies that should be included in the sustainability review;
- Input on the 'give and take' approach to developing a sustainable framework;
- Views on including the environmental benefits of marine renewables when developing the scenarios.

3.2.38 A *Researcher* considered that the carbon footprint of developments should be considered as part of the sustainability review of the framework, although acknowledged that this may only be possible at the site-specific level (and/or with a better understanding of devices to be deployed). A researcher suggested that doubling up of areas could provide a more sustainable solution, with the use of the same infrastructure in a small area for development.

Additional Questions and Comments

3.2.39 Additional questions asked during the workshops, and the response from the MRESF project team, are provided in Table 3.8 below.

Table 3.8: Workshops: additional questions and comments

Participant	Question asked	MRESF Response
Stakeholder	Where did the figure of 30MW come from?	This is comparable with the size of arrays used in Round 1 offshore wind farms. This array size was found to be appropriate for this initial leasing round and to kick start the offshore wind industry so it is demonstrated that this size of development can be attractive to developers and that wave and tidal arrays of a similar size could do the same for marine renewables.
	What is the possibility of using current offshore wind farms (which are already grid connected etc.) for dual energy generation?	Would need to be considered on a case by case basis.
Stakeholder	The Sustainable Development duty will be to only consider Scenario/Step 5 (all the data combined) so what is the point of Scenarios/Step 1-4?	Scenarios/Steps 1 and 2 are presented to examine whether there is enough resource in Welsh waters to make it possible for targets to be met. Scenarios/Steps 3a and 3b are presented to ensure clear decision making, transparency and that the process takes account of sustainable development.
Stakeholder	Will marine renewable development take precedent over all other uses?	The constraint mapping process is not intended to green light areas for development, but to indicate areas of lesser or greater constraint. All proposals will still require a site specific assessment.
Researcher	Are there any datasets the project is aware of but cannot get hold of? Can there be a dynamic aspect to the database?	The MRESF does identify data gaps together with projects where no outputs were available. The database is set up to enable updates to be added as required, however, the outputs of the MRESF will be used to support the WAG in their governance over the next 5 years and therefore needs to provide an strategic view over this time period i.e. new data can be held and provided for site-specific studies, but MRESF as an output will be updated at fixed timescale.
Researcher	When looking at potential resource, can we include potential changes in factors e.g. increasing device efficiency from 20-40% to see the effect on potential energy generation?	Could be applied at a later stage should device efficiency improve.
Developer	When will the marine mammal report be published or data made available? Is it possible to get the data prior to report being published?	All project reports will be made publicly available on the project website, with overall project deadline being January 2011. Data can be made available upon request to the WAG.
Developer	Did the project team speak to developers about their data availability? Potential implications of cost.	Developers provided data where it was possible to do so. For any dataset where a cost was identified by the holder, agreement with the WAG is required prior to purchase.
Developer	Is it correct that the data will not be published?	All project reports will be made publicly available on the project website, with overall project deadline being January 2011.
Developer	Some confusion about data layers.	The data layers inform on the number of datasets available for a grid area but also provide information on the constraints and the constraint levels assigned to these data layers.
Developer	When will the Stage 2 reports be published?	All project reports will be made publicly available on the project website, with overall project deadline being January 2011.
Developer	How are current uses prioritised? If a development is in the planning process already, how is this accounted for?	All current uses have a constraint rank, with the methodology described in the project reports. Projects in planning are included in the same data layer as consented projects of the same type (e.g. Round 3 wind farm sites are included in the overall renewable energy data layer).
Developer	Is the purpose of the MRESF to identify Round 2 OWF-type development areas or Round 3 OWF-type zones?	The intention is to highlight the marine renewable energy potential of Welsh waters, together with the level of existing constraint d within these zones.
Developer	How were the WAG targets for renewable energy set?	The Renewable Energy Potential is outlined in the WAG's Energy Policy statement (see http://wales.gov.uk/docs/desh/policy/100331energystatementen.pdf).
Stakeholder	Who would hold data?	The data will be available on a project website hosted by the WAG (or on their behalf).
Developer	How high up the WAG agenda is marine renewables?	See the WAG's Energy Policy statement (http://wales.gov.uk/docs/desh/policy/100331energystatementen.pdf).
Regulator/ Advisor and Stakeholder	Is there a balance between risk and precaution? Legislative framework is the biggest constraint. Even the UK government is bound by European Law. Therefore the constraint level is related to the legislation.	The constraint ranking does inherently have a degree of precaution in it, but the rankings are not purely a reflection of significance but relate instead to the potential to delay development. The information can be used by developers to assess potential risk of developing in certain places.

Participant	Question asked	MRESF Response
Developer	The planned interconnector between Ireland and Wales opens up more seaspace.	The planned route has been included in the GIS data layer for grid as an informative layer.

3.3 Questionnaires

3.3.1 Questionnaires were received from 14 stakeholders, representing 13 different companies or organisations. A further 31 individuals indicated that they would not be returning the questionnaire for various reasons, including attendance at workshops, lack of time or because it was considered inappropriate to do so. Respondents included 3 *Developers*, 5 *Stakeholders*, 5 *Regulator/Advisors* and 1 *Researcher*[4]. Not all questionnaires were fully completed, however the questionnaire included the following sentence on the first page: '*Please note that due to the different interests of Stakeholders, it is possible that some of the questions may not be applicable to all. Please mark such questions as 'not applicable*''. In some cases clarifications to closed questions were made by respondents, and in some cases further details/comments were provided.

3.3.2 Table 3.9 provides a list of stakeholders who responded to the questionnaire, and the following sections summarise the responses to each question. Where the person providing the response also attended the workshops, the name and organisation are highlighted in **bold**. Where the questionnaire was returned by a different individual to that attending the workshop, just the organisation is highlighted in **bold**.

Table 3.9: Questionnaire respondents

Contact	Company
Ben Yeats	AWS Ocean Energy
Paul Askew	Civil Aviation Authority (CAA)
Adrian Judd	CEFAS
Captain Saurabh Sachdeva	Chamber of Shipping
Dr Kate Smith	**Countryside Council for Wales (CCW)**
Stephen Oates	Environment Agency (EA)
Michael Evans	**Environment Agency Wales (EA Wales)**
Dr Ruth Williams	**National Trust**
John Clark	**Royal Society for the Protection of Birds (RSPB)**
Miles Willis	**Swansea University**
Sara Thomas	**Tidal Energy Ltd**
Iain Russell	**Wave Dragon**

[4] One respondent ticked both the *Regulator/Advisor* and *Research* category, however this respondent has been reported as *Regulator/Advisor* in this report. One respondent did not tick any categories, and indicated that they were not a *Stakeholder*, however this respondent has been grouped into the *Stakeholder* category for the purposes of this report.

Contact	Company
Robert Lott	Whale and Dolphin Conservation Society
Wendy Dodds	**World Wildlife Fund Cymru (WWF)**

Question 1: In addition to the data listed in the Metadata sheets in Appendix A; which are grouped by topic, do you hold data of relevance to the MRESF project?

3.3.3 In response to Question 1, 9 respondents provided details of additional data believed to be of relevance to the MRESF project. These are presented in Table 3.10 below:

Table 3.10: Question 1: additional data

Source	Data Description	MRESF response
CEFAS	Wave; temperature and salinity; aquatic animal health; fish stocks; fishing gear; national and international studies / programmes on marine physico-chemical and environmental variables.	Some Cefas data held as GIS data layers, with wider Cefas data referenced in the MRESF Bibliography (see WAG (2011a)).
Swansea University	Welsh Energy Research Centre (WERC) data; tidal stream research in the Bristol Channel and off NW Angelsey; detailed bathymetry of 1km^2 seabed, boat-mounted ADCP transects, benthos maps, fish populations.	Data referenced (see WAG (2011a)) but not used in constraint mapping, as this has a requirement for national scale datasets.
Environment Agency Wales	LIDAR survey data and details of flood defence assets; flood defence data; LIDAR topographic data for the coast.	Some Environment Agency data held as GIS data layers, with wider Environment Agency data referenced in the MRESF Bibliography (see WAG (2011a)).
WWF Cymru (various sources)	Potential sources of baseline data: 1 Welsh FCERM activities, such as Catchment Flood Management Plans (CFMPs) 2 Shoreline Management Plans (SMPs) 3 Severn Estuary CHaMP 4 Futurecoast 5 Data held by the University College Cork's Centre for Marine Resources 6 CCW's Sea Fishing Atlas of Wales 7 Data held by the Royal Commission on the Ancient and Historical Monuments of Wales.	1 Inland flooding, not directly connected to the sea 2 Look to acquire WFD data layers as additional datasets 3 Relevant data layers held 4 Look to acquire WFD data layers 5 MRESF limited to Welsh territorial waters 6 Held 7 Held
RSPB	Spatial datasets for bird reserves and Important Bird Areas in Wales; GIS layers of foraging radii for all Welsh seabird colonies.	GIS data held for bird reserves and Important Bird Areas.
CCW	Broadscale datasets for marine mammals and birds within Welsh waters.	Held by the MRESF (WAG, 2011a) and used in constraint mapping as appropriate.
CAA	Listing in Appendix A should include CAP 764 – CAA Policy and Guidance on Wind Turbines; CAP 168 – Aerodrome Licensing; CAP 33 UK Aeronautical Information Publication; the DECC sponsored "Wind Energy and Aviation Interests".	Included in the MRESF bibliography (WAG, 2011a).
National Trust	Europarc Publication: making the connection between land and sea.	Included in the MRESF bibliography (WAG, 2011a).
Chamber of Shipping	What information has been used for shipping data / AIS information.	Shipping density data from Anatec used in the constraint mapping.

Question 2: Using a scale of low, medium and high, how would you rank the following limitations on marine renewable energy development in Welsh waters?

- ***Practical limitations***
- ***Site Specific Issues***
- ***Support***
- ***Legislative considerations***
- ***Existing use***
- ***Data requirements***

3.3.4 For **Practical limitations**, the most common response (n = 6) was that these were a High limitation on marine renewable energy development in Welsh waters. This included responses from two *Developers*, two *Stakeholders*, one *Regulator/Advisor*, and one *Researcher*. One *Developer* ranked this limitation as both High and Medium. Five respondents selected Medium, and one respondent (a *Stakeholder*) selected Low for this category. Two respondents did not indicate their choice.

3.3.5 The majority of respondents (n = 10) considered **Site Specific** *Issues* to be a High limitation on marine renewable energy development in Welsh waters. One of these respondents, a *Regulator/Advisor*, clarified their response suggesting the encouragement of the development of technologies which are less restricted in terms of tidal / wave energy requirements. Two respondents selected Medium, one considered this to be a Low consideration, and one respondent did not indicate their choice.

3.3.6 Only three respondents considered **Support** to be a High limitation on marine renewable energy development. The majority of respondents who provided an answer to this question (n = 7) considered this to be a Medium limitation. One respondent selected Low and three did not indicate their choice.

3.3.7 The majority of respondents (n = 8) considered **Legislative** *considerations* to be a High limitation on marine renewable energy development. One of these respondents, a Regulator/Advisor, clarified their response, stating that this was potentially High in terms of European environmental legislation, but that micro-siting and mitigation could reduce the limitation level. Three respondents selected Medium, one considered this to be a Low limitation and two did not indicate their choice.

3.3.8 Only two respondents considered **Existing Use** to be a High limitation on marine renewable energy development. The majority of respondents who provided an answer to this question (n = 7) selected Medium. Two respondents selected Low and three did not indicate their choice.

3.3.9 For **Data requirements**, the most common response (n = 6) was that these were a High limitation on marine renewable energy development. One such response, from a *Regulator/Advisor,* was clarified, suggesting that this was potentially high as describing the constraints in insufficient detail will provide too little resolution of the risks, leading to consenting difficulties. Four respondents selected Medium, two selected Low, and two did not indicate their choice.

3.3.10 At the end of Question 2, respondents were asked if they felt anything else should be included. Six respondents provided further information here, and this is summarised in Table 3.11below.

Table 3.11: Question 2: comments

Respondent	Comment	MRESF Response
Researcher	Concerned that proposals on tidal range projects / coastally-attached impoundments and lagoons along the North Wales coast are not considered.	For Severn tidal range projects to be excluded it was necessary to exclude all tidal range, although the potential site off Rhyl is included in the constraint mapping (no resource for tidal stream or wave is located here). A further project of interest may be 'Tapping the Tidal Power Potential of the Eastern Irish Sea (www.liv.ac.uk/engineering/tidalpower).
Developer	Economic viability of wave resource.	Minimum energy requirements used when mapping potential areas of resource have been provided by developers and sourced from developer information. Site specific economic viability will need to be determined by the applicant.
Stakeholder	Public perception and opposition. Footprint of potential development, including construction and associated infrastructure.	Stage 1 identified a number of 'non-GIS' potential constraints on developments (RPS, 2008) which included these issues.
Stakeholder	Legislative considerations should not be referred to as a limitation to the deployment of marine renewables. Processes such as habitat regulations assessments are a necessary step.	The legislative framework, including nature conservation issues, is a necessary step in the consenting process but still represents a potential limitation on development as it can cause delays, potential extra cost, require modifications to plans and potentially halt development.
Regulator/Advisor	Dealing with uncertainty. Lack of understanding about the likely impacts of marine renewable devices, reconciling the need for a precautionary approach with a need to deploy devices in order to determine the impacts.	Uncertainty and the precautionary approach have been a frequent issue during the MRESF, and although understanding of potential impacts has increased since Stage 1 (see WAG (2011a)), significant data gaps that can only be filled from device monitoring remain. However, the information in the MRESF provides a tool for understanding and managing the process.
Regulator/Advisor	Lack of information from existing demonstration deployments, lack of coordination of monitoring and data collection, lack of joint working to identify appropriate demonstration sites and environmentally benign technologies.	Agree that publicly available data on commercial scale devices *in-situ* is patchy, however this is a function of the early status of the industry.

Respondent	Comment	MRESF Response
Regulator/Advisor	MRESF unlikely to address sustainable deployment of demonstration scale / pre-commercial projects, which will be necessary in order to learn about technological and environmental constraints. Without addressing this crucial step, the issues and problems associated with these early deployments will hold up the development of the sector in Wales.	The areas of potential resource identified are equally relevant for demonstrator sites as for commercial scale. It is not the intention of the MRESF to exclude demonstrator sites, however a nominal array size was necessary in understanding the amount of energy that could potentially be extracted from Welsh waters.
Regulator/Advisor	Over the proposed 5 year initial timescale of the MRESF, it seems likely that the many deployments will be on a non-commercial (<10MW) scale.	The 5 year initial timescale of the MRESF is a reflection of the potential need to update the project, to assess the rate of success and ongoing constraints on development heading towards the 2025 energy potential level of 4GW (WAG, 2010b).
Regulator/Advisor	Finance, Governance and incentives.	Stage 1 identified a number of 'non-GIS' potential constraints on developments (RPS, 2008) which included these issues.

Question 3: Do you consider the approach to constraint grades appropriate?

3.3.11 During the preliminary constraint mapping undertaken as part of Stage 1, each potential constraint was graded by the RPS project team in consultation with the Steering Group on a 1-5 scale. Although a full revision of the constraint rankings applied was not undertaken during Stage 3, where new data were available the information has been considered to determine whether the level of constraint should be changed (again, in consultation with the Steering Group). For Stage 3 the constraint grades for each data layer have been looked at more closely and, where appropriate, sub-layers created, primarily where the degree of constraint is geographically variable.

3.3.12 Five respondents considered the **approach to constraint grades** to be appropriate. This included two *Developers*, one *Researcher*, one *Stakeholder*, and one *Regulator/Advisor*. Three respondents did not consider the approach to be appropriate and six respondents did not indicate their choice. Respondents providing a negative answer were asked to explain why they did not consider the approach to be appropriate, and the responses are summarised in Table 3.12 below. This includes comments from respondents who did not indicate whether they consider the approach to be appropriate or not.

Table 3.12: Question 3: comments

Respondent	Comment	MRESF Response
Regulator/Advisor	Not a straight yes or no. Constraints need to be assessed with the underlying data, to determine importance and how to address. They are only one component of the tools and this should be made clear in any interpretation of the outputs.	Noted.
Developer	Useful as an initial site selection tool, however the spatial planning grading approach can be misleading. Potential for small areas to be overlooked if the resolution of the mapping is too low. No precedent has been established in order to determine what constraints may or may not be acceptable and thus grading of these can only be assumed. The grading approach will be particularly unreliable for mobile species.	The MRESF is a large scale planning tool and it is accepted that it may be too broad for some fine scale areas. It does, however, provide additional information where available and places the site specific into context. Please note that the constraints have been ranked between RPS, the WAG and the Steering Group, made up of organisations representing a wide variety of interests.
Stakeholder	Need for greater transparency on the constraint grade determined by the Steering Group. The approach to areas where there may be multiple / cumulative constraints or localised variability is unclear. Is there a Grade 6 i.e. something that would absolutely preclude development?	All constraint ranks applied are presented in WAG (2011a) together with a summary of the methodology used to assign constraints and manage cumulative data layers. The highest rank is 5, 'likely to preclude development'.
Stakeholder	Concern that the MRESF process will not consider Natura 2000 feature specific constraints on deployment to a sufficient level of detail. If features of Natura 2000 sites are included within the resource mapping process, but lack device specific sensitivity scoring, then there is an argument for removal of Natura 2000 sites from the process. There may be exceptions for a particular technology, providing that the precautionary principle ensures confidence that deployment will not cause problems. If MRESF is device blind, then this stage will not be possible. If MRESF is unable to consider potential impacts to European site features, then there is an argument that the process should not be used to advocate development of renewables within these areas.	It is very important that Natura 2000 features remain in the MRESF. The data is included both in the site boundary but also in distribution of features. The MRESF is aiming to identify areas where potential constraint may be lower, with the degree of constraint being a function of the potential constraint on development and not purely potential significance. It is not advocating development in certain areas, but highlighting areas of potential resource and the degree of constraint on development that may be anticipated in those areas. Further, it should be noted that all proposed developments will require site specific assessment, with potential for mitigation etc at that stage.
Regulator/Advisor	Difficult to respond yes or no. Likely that many or all of the constraints will be graded at the same level (probably high or medium). It could be useful to further break down the constraints to help identify main issues, to more effectively incorporate the information into the scenarios and the Stage 3 output. Would be useful to categorise constraints to distinguish between real and perceived constraints. Also would be useful to identify the major issues to take into account for MRESF outputs, or on which to focus future work. However, by defining constraints at such a high, generic level, grading is unlikely to provide anything more than an overview of the issues. Failure to describe the constraints in sufficient detail will provide too little resolution of the risks. Underweighting the constraints associated with key environmental receptors in Stage 3 will cause the spatial extent of important constraints to be underestimated.	The potential constraints on development are graded in a range from 1-5, with 1 being no likely constraint and 5 likely to preclude development and hence include real and perceived, as both have the potential to constrain development. The assessment also identifies which constraints fall within which area of resource. A broad scale study such as the MRESF has, by necessity, to present an overview of the issues to enable a strategic assessment to be made. The approach not only provides data for subsequent proposals but also enables site specifics to be placed in context.
Stakeholder	Would like more information.	Project reports will be available on the website as they become available.

Question 4: Have you addressed the issues of data gaps and uncertainty in large scale data sets previously and do you view the type of approach proposed for dealing with data gaps and uncertainty as appropriate?

3.3.13 Only four respondents had experience with addressing the issues of **data gaps and uncertainty** in large scale datasets. A *Regulator/Advisor* provided the following information:

"We have assessed our datasets and eliminated datasets for which we feel that the confidence is too low to be included in the MRESF. Following this, we have contracted specific projects to fill in data gaps e.g. seabird distribution and worked to improve confidence in others e.g. SAC habitat features. Following this, there are still gaps and uncertainty which varies by dataset and we are in discussions with RPS's GIS team about this as we provide the data We are also producing a data sheet for each dataset which outlines the format of the data, along with an indication of data quality/confidence and also refers to reports to go to for more information".

3.3.14 Six respondents did not have experience in this area and four respondents did not indicate an answer. A *Regulator/Advisor*, who did not indicate a Yes or No response, recommended that reference is made to the *Severn Tidal Power Feasibility Study Phase 2* results, when published later this year. The Severn tidal reports in the public domain are noted in the MRESF bibliography (WAG, 2011a).

3.3.15 Five respondents considered the type of approach to dealing with **data gaps and uncertainty** as appropriate for this project. One of these respondents, a *Regulator/Advisor,* considered the approach to be appropriate given the time available. They also provided the information below, following on from the quote above:

"It is very hard to assess data gaps and uncertainty in a consistent manner but by following the process outlined above, we feel that we are providing data which is fit for purpose. We are also providing assessment of confidence where possible e.g. by providing survey effort for the Marine Mammal data We are also trying to be as transparent as possible by reducing the level of interpretation to the minimum and specifying where there are data gaps and where we have an indication of confidence. In the time available, we feel that this is the best approach but are keen to improve the quality of datasets over the long term".

3.3.16 Three respondents indicated that they did not consider this approach to be appropriate, including one *Developer* and two *Stakeholders*. One of these *Stakeholders* was

concerned that, due to the timescales of the project, Highly Protected Marine Conservation Zones (HPMCZs) will not be considered as part of the MRESF mapping exercise. The *Stakeholder* recommended that the MRESF is updated to take account of these proposed locations as soon as these are available. The RPS project team are aware of the HPMCZ work being undertaken and are in consultation with the relevant team, providing data where appropriate and helping to ensure that the marine renewable industry is included in the consideration of socio-economic factors during the selection of HPMCZs. The *Stakeholder* was also concerned that the CCW marine sensitivity maps may not be integrated into the MRESF constraints mapping exercise due to the various project timescales, however the RPS team is in contact with the WAG team investigating MCZs, ensuring crossover between the projects.

3.3.17 Six respondents did not indicate an answer, with one respondent suggesting that insufficient information was provided to determine whether the approach was appropriate.

Question 5: When considering data gaps and uncertainty, please highlight the relative importance of the following:

- ***Method of data collection/generation***
- ***Consideration of raw data extent***
- ***Level of data processing undertaken***
- ***Age of data***
- ***Detail of data (e.g. fine/broad)***

3.3.18 The **Method by which data gaps and confidence** are addressed in the Framework, and the level of acceptance of the approach employed amongst statutory bodies, stakeholders and developers, is a critical component of the MRESF. Stakeholders were asked to highlight the relative importance of the above listed aspects by assigning them Low, Medium or High importance.

3.3.19 Four respondents did not indicate a response to this question, including two *Stakeholders*, a *Developer*, and a *Regulator/Advisor*.

3.3.20 The majority of respondents who provided an answer (n = 7) assigned High importance to **Method of data collection/generation**. Only two respondents considered this to be of Medium importance and one respondent indicated Low importance.

3.3.21 Five respondents assigned High importance to **Consideration of raw data extent**, and four respondents considered this to be of Medium importance. Only one respondent indicated Low importance.

3.3.22 Five respondents (n = 5) assigned High importance to **Level of data processing undertaken**, and four respondents considered this to be of Medium importance. Only one respondent indicated Low importance.

3.3.23 For **Age of data**, five respondents assigned Medium importance, with four respondents indicating High importance. Only one respondent indicated Low importance.

3.3.24 For **Detail of data (e.g. fine/broad),** five respondents assigned High importance, with four respondents indicating Medium importance. Only one respondent indicated Low importance.

3.3.25 Respondents were asked whether they felt anything else should be included. Responses are provided in Table 3.13 below.

Table 3.13: Question 5: comments

Respondent	Comment	MRESF Response
Regulator/Advisor	All of these points are of high importance but it depends on the individual data set, e.g. age of data is less important for morphological data in rocky environments but is of high importance for mobile sediment environments. Important that data confidence and extent are assessed appropriately to the parameter measured.	The responses were taken into consideration when assessing confidence and assigning any new constraint ranks, see WAG (2011a) and WAG (2011b).
Stakeholder	Dependent on the variable / phenomenon being observed. Furthermore, they are all serious issues and as such, of high importance so unsure why there is a need to prioritise.	
Stakeholder	The treatment of uncertainty is particularly relevant to the marine environment, where the level of available data is often lower in comparison with terrestrial habitats and species. The precautionary principle should be upheld when dealing with potential impacts to Natura 2000 features, and an assessment made with the best available data.	
Regulator/Advisor	Confidence in the methodology for data manipulation and analysis; final presentation of the data/outputs.	

Question 6: Can you add to or update the list presented in Appendix B?

3.3.26 Nine respondents provided information/comments relating to **Appendix B** of the Stakeholder Participation Report: **Key data gaps and Relevant Work Planned, Proposed and in Progress.** Table 3.14 below summarises the suggestions for additions or updates to the list in **Appendix B.**

Table 3.14: Question 6: additions / updates to Appendix B

Data Category	Notes	MRESF Response
Baseline data	Wave; temperature and salinity, aquatic animal health, fish stocks, fishing gear, national and international studies/programmes on marine physico-chemical and environmental variables.	Availability of the work noted in RPS (2008) and WAG (2011a).
Baseline data and potential impacts	Additional research projects in progress.	Availability of the work noted in WAG (2011a).
Baseline data	The work on landscape and visual listed in **Appendix A** represents an early but limited attempt to deal with seascape. CCW should liaise with Natural England over their approach to developing a contemporary approach to seascape character assessment and definition of seascape.	Noted.
Baseline data	Severn Estuary Partnership's State of the Severn Estuary Report; CCW commissioned research.	Understood to be in draft.
Baseline data	Spatial datasets for bird reserves and Important Bird Areas in Wales; GIS layers of foraging radii for all Welsh seabird colonies. The precautionary principle should be upheld when dealing with potential impacts to Natura 2000 sites, and an assessment made with the best available data.	Data layers held and/or requested.
Baseline data	Strategic baseline data layers for marine mammals and birds in Welsh waters.	Availability of the work noted in WAG (2011a) and used in the constraint mapping.
CAA	In terms of aviation, the listings at **Appendix B** appear very lightweight. Depending upon the nature and location of any development the impacts upon aviation can be very considerable. The issues associated with wind turbines are particularly well known. Generic data gaps inevitable until specific locations are looked at on a case-by-case basis. Clearly wave and tidal issues and related impact upon radar and other aviation aspects are 'unknown'.	Noted – however, Stage 3 is primarily aimed at wave and tidal stream.
Environment Agency Wales	The impact of devices on currents, tides, wave heights, erosion and subsequent impact on flood risks.	Availability of relevant work is highlighted in WAG (2011a).

Question 7: Is the proposed approach for assessing potential generation capacity appropriate to the project?

3.3.27 In order to assess the sustainability of energy extraction and to provide a Framework that aims towards achieving the marine renewable energy potential in Wales, it was necessary to understand at a broad level what proportion of the available energy in Welsh waters has the potential to be converted to electricity. If respondents did not agree with the approach or with the particular parameters suggested for marine renewable energy devices, they were asked to indicate which aspects they disagreed

with and to suggest alternatives. These are presented in Table 3.15. The main points raised can be summarised as follows:

- Potential generation capacity;
- Minimum energy value for wave and tidal stream;
- Minimum MW size of arrays;
- Minimum km^2 area of arrays;
- Application of a correction factor;
- Application of a load factor; and
- Application of a reduction in power generation potential.

3.3.28 Four respondents considered the proposed approach for assessing **potential generation capacity** to be appropriate to the project, whilst two respondents did not consider the approach to be appropriate. Eight respondents did not respond to this part of the question, including four *Stakeholders*, three *Regulator/Advisors*, and one *Developer.*

3.3.29 Respondents were then asked to indicate whether particular parameters for marine renewable technology considered in the MRESF project were appropriate. Fewer responses were received for this sub-question.

3.3.30 Three respondents considered the **2m/s minimum tidal stream** *value* to be appropriate, including two *Developers* and one *Regulator/Advisor*. Two respondents did not consider this value to be appropriate, including one *Researcher* and one *Regulator/Advisor.*

3.3.31 Two respondents considered the *10kW/m minimum wave energy value* to be appropriate, including one *Developer* and one *Regulator/Advisor*, although the *Developer* did suggest a value of 24 TW/m for a specific device. Two respondents did not consider the value to be appropriate, including one *Developer* and one *Regulator/Advisor.*

3.3.32 Five respondents did not consider the **minimum farm size of 30 MW appropriate given the 5 year lifespan of the MRESF**. Although one *Developer* broadly considered the figure to be appropriate, they did clarify their response for a specific device, suggesting a figure of 100 MW.

3.3.33 Five respondents did not consider **the minimum array area of 2km^2 appropriate given the 5 year lifespan of the MRESF.** One Developer broadly considered the array area as appropriate, clarifying the response for a specific device, suggesting an array length of 5.5km^2.

3.3.34 Only two respondents, a *Developer* and a *Regulator/advisor*, indicated whether **the 30% correction factor** was appropriate. The *Regulator/Advisor* suggested this value was appropriate whereas the *Developer* did not consider it appropriate, with the alternative suggested being connected to a different approach to assessing potential energy and not to the correction factor.

3.3.35 Three respondents did not consider that the **25% load factor** was appropriate, whereas one respondent considered that it was appropriate.

3.3.36 Only two respondents indicated whether the **2% reduction in power generation potential** was appropriate, with one respondent indicating that it was appropriate, and one respondent (a developer) indicating it was not appropriate. The developer considered that although site specifics would inherently be a factor, the % reduction due to conversion, transformation and transmission losses is likely to be greater than 2%.

3.3.37 The information gained from stakeholders was used in WAG (2011b), both in refining the approach taken and the figures used.

3.3.38 Where respondents disagreed with these values, they were asked to indicate which aspects they did not find appropriate, along with potential alternatives. These comments are presented in Table 3.15 below. This includes comments from respondents who did not respond to the specific questions in Question 7.

Table 3.15: Question 7: comments

Respondent	Comment	MRESF Response
Regulator/ Advisor	Not confident to answer. Are these thresholds to be used indicatively in the MRESF or are they the parameters that define the potential capacity?	They are parameters used to generate indicative resource.
Researcher	Difficulties inherent in assessing potential resource, as by adding devices, the overall resource is decreased. The minimum level for tidal stream needs to be defined in terms of where the figure comes from and what it means (e.g. peak/mean, spring/neap etc).	Noted with additional detail in WAG (2011b), with the method applied viewed as a broad overview.
	Concerns regarding the planned 30MW for a 5 year plan.	The MRESF is for 5 years but aiming at the 2025 scale, hence the 30MW (see WAG (2011b)).
	10 diameter spacing between tidal stream devices is too close. Provided further detail on power ratings. Suggested that the 2km^2 minimum area gives a different MW capacity than 30MW. Views the 30% correction factor as a little presumptive and very	Noted comments and included in WAG (2011b).

Respondent	Comment	MRESF Response
	dependent on the specific site, but may well be appropriate at this stage. 25% load factor – noted that some developers are claiming 40% load factors.	
Regulator/ Advisor	The minimum sizes for generation capacity and array area seem too large given the 5 year lifespan of the MRESF. Current projects suggested for Welsh waters are unlikely to grow to this size for many years. Minimum 10MW and 1 km^2 may be more appropriate.	The MRESF is for 5 years but aiming at the 2025 scale (see WAG (2011b)).
Developer	More detailed method for assessing potential resource.	Noted comments during preparation of the Approach to Sustainable Development (WAG, 2011b).
Developer	Minimum tidal energy and size of a commercial array are project specific. Factors potentially include the location and physical characteristics of a site, cost of the cabling, ability to form foundations and wave climate. The load factor will mostly be governed by the available resource, which for tidal stream generation is dependent on the technology and water depth. The load factor could be < 20% where the spring flow is 2m/s and > 50% in very high energy environments. Transformation and transmission losses are likely to be greater than 2%.	Noted comments during preparation of the Approach to Sustainable Development (WAG, 2011b). Please note that the resource assessment undertaken is at a very high level.
Developer	Suggested referring to M/WHhrs generated annually rather than MWage.	Noted – however these units are required to compare to the renewable energy potential identified by the WAG.
Regulator/Advisor	A target / aspirational generation capacity has already been chosen before completing the work on constraints. This may create an expectation (or even commitment) that 4GW can be delivered by the marine renewable energy sector in Wales, despite the lack of understanding of the spatial limits imposed by the constraints.	It is the intention to assess the sustainability of achieving that level of energy generation and what the implications may be.
Regulator/Advisor	Confining the area of search for tidal power to areas of 2 m/s and above focuses development into geographically restricted areas that may also overlap with key sensitivities. There is a need for wider discussion with industry about the likely current velocity thresholds for commercial energy generation, potentially reducing the tidal power threshold to at least 1.5 m/s, to enable the MRESF to identify areas which minimise conflict with other interests (including nature conservation). The minimum wave energy value of 10kW/m is probably more appropriate and places less geographical constraint on resources.	The 2m/s has been provided by developers as the minimum needed for commercial scale development. However, the potential to explore areas of 1.5m/s is being raised with the Steering Group (although this may not be commercially exploitable within the timeframe).
Regulator/Advisor	Over the proposed 5 year initial timescale of the MRESF, it seems likely that the many deployments will be on a non-commercial scale, so it seems inappropriate to impose minimum farm and array size constraints on the outputs. The sustainable deployment of pre-commercial devices and arrays is an essential step in the development of the sector in Wales in order to plan to deliver an anticipated 4GW from wave and tidal in Wales by 2025 and so must be considered in the outputs from Stage 3.	The MRESF is for 5 years but aiming at the 2025 scale, hence the 30MW (see WAG (2011b)). This does not exclude pre-commercial developments within these areas.
Regulator/Advisor	There may be devices on the brink of deployment that can work at less than 2m/s.	No specific details on tidal devices that can operate at less than 2m/s have been highlighted during the stakeholder engagement process.

Question 8: Do you consider the chosen scenarios [now steps] appropriate for testing the sustainability of the Framework?

3.3.39 The development of the Framework will involve the assessment of various potential scenarios, now renamed steps, for marine renewable energy development in Welsh waters. The outputs from the steps will be used to assess areas for development potential, based on both the degree of constraint presented by existing interests but also on the available wave and tidal stream resource in the context of the renewable energy

potential in Wales. Five steps will be investigated and developed and at each stage, enabling the potential generation capacity and resource area to be assessed. The steps are:

- Step 1 'Maximum Energy Generation'
- Step 2 'Maximum Achievability'
- Step 3a 'Least Impacting Ecologically'
- Step 3b 'Least Impacting for Existing Use'
- Step 4 'Most Sustainable for individual device types'
- Step 5 'Most Sustainable for marine renewables'

3.3.40 Respondents were presented with these five steps to sustainable marine renewable energy development in Wales. Seven respondents did not indicate their choice for any of the closed questions. Where respondents did not consider the steps to be appropriate they were asked to indicate why, and these responses are summarised in Table 3.16.

3.3.41 Of the responses received, the majority (n = 6) considered **Step 1 'Maximum Energy Generation'** to be appropriate for testing the sustainability of the Framework. One respondent did not consider this step to be appropriate.

3.3.42 Of the responses received, the majority (n = 6) considered **Step 2 'Maximum Achievability'** to be appropriate, while one respondent did not consider this step to be appropriate.

3.3.43 For **Step 3a 'Least Impacting Ecologically',** four respondents considered this to be appropriate, including two *Developers* and two *Regulator/Advisors.* Three respondents did not consider this step to be appropriate, including two *Stakeholders*, and one *Regulator/Advisor.*

3.3.44 For **Step 3b 'Least Impacting for Existing Use'**, five respondents considered this to be appropriate whereas two respondents did not consider this to be appropriate.

3.3.45 Only six responses were received for **Step 4 'Most Sustainable for individual device types'.** The majority of these respondents (n = 5) considered this step to be appropriate, and one respondent did not consider this to be appropriate.

3.3.46 For **Step 5 'Most Sustainable for marine renewables',** five respondents considered this to be appropriate, and two respondents did not consider this to be appropriate.

3.3.47 Where respondents indicated that they did not find a step appropriate, they were asked to indicate why. These responses are presented in Table 3.16 below. This includes comments from respondents who did not respond to the specific questions in Question 8.

Table 3.16: Question 8: comments

Respondent	Comment	MRESF Response
Regulator/Advisor	Very difficult question to answer. A balanced approach to assess all parameters would need all scenarios to be tested plus an approach to combine and equilibrate the outputs from the various scenarios.	The change in terminology from 'Scenario' to 'Step' is intended to clarify the pathway approach needed (i.e. all scenarios/steps needed) resulting in Step 5, which will assess the sustainability of different levels of development.
Research	Concerned that if proposals lie outside the areas highlighted by the GIS system then will be seen as "no-go" areas and result in development in these areas being more challenging to obtain consent.	The MRESF is not intended to red flag or green light areas and should a developer identify a resource not assessed in the MRESF then the same application route would apply. Similarly, the constraint mapping is not intended to create no-go areas, purely to indicate the likely degree of constraint and hence potential level of difficulty in achieving consent.
Stakeholder	Step 3b 'Least impacting for existing use' is very broad compared to the other rather specific steps and will need to reflect a range of different existing uses. For example in relation to protected landscapes the coast of Wales generates £850 million p.a for the economy of Wales so is tourism an existing use that might be displaced by people choosing not to make future visits to parts of the coast where some types of marine renewable technology are deployed.	The constraint mapping is aimed at understanding the potential degree of constraint on development.
Stakeholder	Step 3a is too narrowly defined and should include other impacts on the natural and historic environment as well as ecological constraints.	Step 3a includes environmental constraints where appropriate and where the data are available in GIS.
Stakeholder	It is not clear whether the model is to be run several times with different constraints weightings applied. If so, need clear reporting of the difference that this makes to projected generation.	It is not intended to alter constraint rankings across individual data layers. However, it is possible that geographic variability within data layers could be explored further. Model can be run with different queries.
Developer	Marine renewables include an array of wave, tidal stream, tidal range and offshore wind projects. A mix of technologies will be required. By looking at the "most sustainable marine renewable" this may obscure the larger picture by limiting the type of technology used.	Noted. However, the project has investigated offshore wind, with the reasons for not taking wind forwards in Stage 3 given in WAG (2011b). Tidal range is addressed elsewhere, primarily in the Severn Estuary projects.
Stakeholder	Whilst there is logic in having a number of steps, sustainable development considerations should be embedded into all steps and not a discrete step.	The final step, where all the constraints are brought together, is where the potential for sustainable development is assessed.
Stakeholder	Advises against use of the term 'scenario' in reference to the five different layers of constraint application. Suggests re-designing the scenario concept, and applying different terminology. The term	The change in terminology from 'Scenario' to 'Step' is intended to clarify the pathway approach

Respondent	Comment	MRESF Response
	'scenario' suggests that there are choices from a list of potential outcomes for renewable energy deployment, without the need to consider the full range of constraints. Consideration of environmental constraints should be taken into account at the start when calculating potential generation figures.	needed (i.e. all scenarios/steps needed) resulting in Step 5, which will assess the sustainability of different levels of development.
Stakeholder	The inclusion of step 1 appears overly hypothetical. Step 2 (or a variant of it) would appear to be a more sensible starting point, providing a more appropriate baseline for the development of steps 3a and 3b A more effective alternative approach to that presented by the step process, may be to identify what practical constraints there are (e.g. technological and environmental limitations), apply these and then derive the mapping results from this.	Step 1 is included to indicate the maximum energy potential, should depth and distance from shore become less constraining. Each step is then applied to test which aspects affect that area of potential resource.
Regulator/advisor	The steps are currently presented as mutually exclusive development options, with differing degrees of impact and sustainability. Provided that Step 5 is a stepwise progression through Steps 1 to 4, taking into account additional data and considerations at each stage, it should identify areas in which the sustainable development of the marine renewables sector could take place.	The change in terminology from 'Scenario' to 'Step' is intended to clarify the pathway approach needed (i.e. all scenarios/steps needed) resulting in Step 5, which will assess the sustainability of different levels of development.
Regulator/advisor	Aspirations for energy generation have been outlined in the Welsh Low Carbon Energy Statement, with thresholds for energy levels described. Confining the area of search to those areas squeeze the output from the development scenarios into areas that are geographically restricted and may overlap with key sensitivities. This is particularly the case for tidal steam energy.	The MRESF has defined areas of potential resource based on device requirement identified during the MRESF project, as a focus on commercial levels of energy is seen as essential.
Regulator/advisor	The constraint ranking method and how uncertainty in the data has been addressed is unclear.	Addressed at a broad, strategic level in WAG (2011a) (Approach to Sustainable Development).
Regulator/advisor	All of the scenarios help understand impacts, but all scenarios should be considered – not any of these options in isolation.	The change in terminology from 'Scenario' to 'Step' is intended to clarify the pathway approach needed (i.e. all scenarios/steps needed) resulting in Step 5, which will assess the sustainability of different levels of development.

Question 9: Given the definition of sustainability given in the Welsh Assembly Government Energy Policy Statement, being 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs' (http://wales.gov.uk/docs/desh/policy/100331energystatementen.pdf), do you view the sustainable approach adopted by the MRESF project to be appropriate?

3.3.48 The majority of respondents who provided an answer (n = 6) considered the sustainable approach adopted by the MRESF project to be appropriate. Three respondents did not consider the approach to be appropriate, including two *Stakeholders* and one *Regulator/Advisor*. Five respondents did not indicate whether they considered the approach appropriate or not.

3.3.49 Respondents who did not consider the sustainable approach adopted by the MRESF to be appropriate were asked to indicate why. The responses are presented in Table 3.17

below. This includes comments from respondents who did not respond to the specific question in Question 9.

Table 3.17: Question 9: comments

Respondent	Comment	MRESF Response
Stakeholder	Would expect to see reference to One Wales: One Planet, The Sustainable Development Scheme of the Welsh Assembly Government and the UK's Shared Sustainable Development Framework. The ability to balance economics, environmental and social issues is challenging and the ability of MRESF to do this, relates to the constraints and their respective rankings. Therefore there is a clear need to ensure that ecological considerations are considered earlier on than Scenario 3a and that potential constraints are equally weighted.	The sustainable framework within in which the MRESF sits is discussed in WAG (2011a). The order in which the scenarios are addressed does not weight one higher than the other (renewables plus existing socio-economic and environmental are weighted equally, although individual constraints are ranked separately) – however, it is necessary to first understand where the resource is to see where conflict with existing constraints may arise.
Stakeholder	There is a need for MRESF to appropriately identify the benthic resource in Wales available to reach the 4 GW tidal stream/wave potential by 2025. Areas of suitable seabed located within zones of key tidal resource are finite. Need to ensure that the spatial resource in Wales required for meeting the 2025 targets is assessed in a manner that appropriately considers ecological and physical constraints in the long term. Where spatial restrictions on deployment exist, developers may have to co-operate in deployment of devices that best utilise the available resource.	The outputs from the MRESF will look at different levels of potential energy generation, and the potential level of constraint that may affect development in these areas.
Regulator/Advisor	Choosing the targets before completing the constraints work may create an expectation that 4GW can be delivered in Wales by 2025, despite currently understanding the spatial limits imposed by the constraints.	The aim is to assess the sustainability of reaching the 4GW level in the context of existing constraints.
Regulator/Advisor	Confining the area of search to 2m/s for tidal stream energy will potentially encourage deployment in areas that are geographically restricted and that may overlap with highly sensitive areas where potential impacts are poorly understood. It may also discourage development of lower energy technologies.	The minimum energy level comes from developers, however RPS are having discussions with the Steering Group about the potential to look at lower, non-commercial (based on current technology/ economic viability) levels of energy.
Regulator/Advisor	Need for mitigation.	Mitigation would need to be considered on a project basis but the potential benefits are included in the WAG (2011a) report Approach to Sustainable Development. The potential for 'generic mitigation' at a broad level is also considered.
Regulator/Advisor	Insufficient description of the sensitivity of environmental constraints or technology types will result in insufficient resolution of the MRESF.	The MRESF project is by necessity broad scale and strategic, however the constraint ranking has been undertaken carefully in consultation with the Steering Group to ensure a sustainable approach.
Regulator/Advisor	The absence of impact assessment in the MRESF makes the assessment of constraints generic and reduces confidence in the outputs. The risk to certain environmental receptors (e.g. marine mammals) needs to be evaluated. Underweighting the constraint associated with mammals (and possibly birds and seascape) in particular will cause the spatial extent of important constraints to be underestimated.	The degree of potential impact is a factor when the level of constraint an issue may represent is determined, with issues such as marine mammals, birds and seascape included in the constraint ranking.

Respondent	Comment	MRESF Response
Regulator/Advisor	Big question and depends on what the electricity will be used for. If the electricity is simply used to power cars sitting in a queue on the M4, then no.	The MRESF does not include an assessment of how the electricity would be used, but is aimed as assessing how sustainable the extraction of that energy is.

Question 10: Is a 5-year timescale for the MRESF Framework realistic, taking into consideration the need for the Framework to provide certainty to the industry while being adaptive to the status of the industry and to be current in terms of understanding of the environment (human, social and natural) and the level of constraint that the various factors present to development?

3.3.50 Six respondents did not respond Yes or No to this question. Of those who did respond, the majority (n = 5) considered the **5-year timescale for the MRESF Framework** to be realistic. Several additional comments were provided from those who agreed with the timescale. A *Researcher* commented that the 5 year deliverable project is a good approach. A *Developer*, who also considered the timescale to be realistic, suggested that the Framework needs to be reactive to changes in industry development, for example to attract pre-commercial as well as commercial projects. A *Stakeholder* suggested that there should be opportunities to refresh the Framework in light of monitoring.

3.3.51 One respondent, who did not indicate a Yes or No response to this question, considered that the 5 year timescale was appropriate, but suggested the need to look further ahead and for review. Three respondents did not consider the timescale realistic, and these respondents indicated that the timescale should be longer. This included two *Stakeholders* and a *Regulator/Advisor*. One of these *Stakeholders* emphasised that the MRESF must take into account developments in technology, ecological understanding, and new designations, with concerns that the five year period may not be adequate to take such changes into account. No respondents indicated that the timescale for the Framework should be shorter. Although the MRESF timescale is 5 years, the WAG are looking to 2025 as the timeframe for development of wave and tidal stream energy. As such, although the MRESF does have a shorter timeframe (in response to a potential need for updates, given likely improvements in technology and scientific understanding), the project is looking towards the longer term timeframe to 2025.

3.3.52 One respondent, a *Regulator/Advisor* who did not respond Yes or No to either question, commented that this was a difficult question to answer and suggested that "*we have to proceed on the basis that we learn as we go and need to take a flexible approach*". The

Regulator/Advisor suggested categorising deployment as a "test", with conditions built into permits to prevent damage to European sites.

Question 11: Do you view the approach to grading areas for potential development as appropriate?

3.3.53 Following the scenario development, potential areas for development will be assessed both according to the level of constraint evident but also on the potential importance of the area for renewable energy generation. It is not intended to green light or red flag areas, but instead to use the information collected and tested in the scenarios to provide a framework for sustainable development. Stakeholders were asked to consider whether the approach to **grading areas for potential development** is appropriate. Six respondents did not indicate a Yes/No response. Of those who did respond in this way, the majority (n = 7) considered the approach to grading areas for potential development to be appropriate. One respondent did not consider the approach to be appropriate.

3.3.54 The questionnaire did not seek clarification for responses to this question, nevertheless, several respondents provided additional / alternative responses and these are provided In Table 3.18 below.

Table 3.18: Question 11: additional / alternative responses

Respondent	Comment	MRESF Response
Research	This respondent indicated 'Yes' but are concerned that if proposals lie outside the areas highlighted by the GIS system then will be seen as "no-go" areas and result in development in these areas being more challenging to obtain consent.	It is not intended to exclude other areas from development, but to identify, based on current knowledge, areas of commercial resource and to understand the potential level of constraint that developments in these areas may be subject to.
Stakeholder	Unsure.	Noted.
Stakeholder	At this stage there is an opportunity to identify all Natura 2000 sites that could be impacted by the development of marine renewables, and to ensure potentially significant effects to site features are avoided. Currently, MRESF considers Natura 2000 features within the constraint mapping exercise. Given the requirements of the Habitats Directive, it would be counter productive to include Natura 2000 sites within the energy assessment unless there is a high confidence level that there will not be significant effects on designated features. To reach this stage, MRESF would need to be subject to a habitat regulations assessment (HRA). If an HRA is not proposed, then Natura 2000 sites should be excluded from the constraint mapping process.	Natura 2000 sites are included in the constraint mapping, as appropriate for a broad scale project such as the MRESF. A site specific impact assessment and potentially HRA will be required on a site by site basis when applications for consent are made. As the MRESF project is at a broad scale and not related to plans or projects, an HRA is not required.
Regulator/advisor	Taking a strategic approach to identifying the most suitable areas for potential development will ensure that the marine renewable energy sector develops in a sustainable manner.	Noted.

Question 12: In addition to the list of stakeholders provided in Appendix C, are there any other individuals and/or organisations that you feel should be included in the stakeholder participation process?

3.3.55 Seven respondents suggested other individuals/organisations to be included in the stakeholder participation process, and these are listed in Table 3.19 below.

Table 3.19: Question 12: additional suggested stakeholders

Name of individual/organisation	Notes	Contact details
Europarc Atlantic Isles, Coast and Marine Working Group	Project noted in WAG (2011a).	c/o Phil Dyke Home farm Trelissick Feock Truro Cornwall TR3 6QL
Wales Environment Link	Relevant member groups contacted directly.	Karen Higgins Baltic House Mount Stuart Square, Cardiff CF10 5FH
Welsh Association of National Park Authorities	Although National Parks are included in the constraint mapping, the Authorities have not been contacted directly as the project is marine (seascape/landscape issued addressed using CCW mapping data).	Greg Pycrofft 126 Bute Street Cardiff CF11 7AG
National Association of Areas of outstanding Natural Beauty (AONBs)	Although AONBs are included in the constraint mapping, the Association has not been contacted directly as the project is marine (seascape/landscape issued addressed using CCW mapping data).	Howard Davies Chief Executive c/o Cotswolds Conservation Board Fosse Way Northleach Gloucestershire GL54 3JH
Welsh Federation of Sea Anglers	Sea angling is included in the constraint mapping via data provided by the Environment Agency.	Not provided
Cardiff University	Included in Stakeholder list.	Not provided
British Trust of Ornithology (BTO)	Bird data being provided as a consolidated dataset by CCW.	Andy Musgrove
Surfers Against Sewage	On the original contact list.	Richard Hardy Campaign Director Surfers Against Sewage Wheal Kitty Workshops St Agnes Cornwall TR5 ORD
C Power	Thank you for identifying a further tidal developer.	Colin Pearce
Department of Environment Northern Ireland Marine Scotland Scottish Natural Heritage Natural England	The Irish Marine Institute was contacted together with Natural England. References have been sourced from all four.	Not provided
All coastal aerodrome operators / licensees	CAA are included on the stakeholder list.	Not provided
Aquascientific	Thank you for identifying a further tidal developer.	Based at Exeter University

4 Discussion

4.1.1 This section provides a summary discussion of the responses and comments from the workshops and questionnaires. The discussion draws on the main themes that were highlighted through the stakeholder participation process, beyond the specific comments which have been addressed in the preceding sections.

4.1.2 A number of themes emerged from the workshops. Several participants highlighted the need for a demonstration stage, expressing concern that this stage may have been overlooked. It is not the intention to overlook demonstrator sites, as these are necessary for the progression of the industry, however in order to calculate the potential extractable energy it is necessary to use a standardised development, the scale chosen being mid way between demonstrator scale and the larger sizes being discussed in Pentland Firth (leasing round for 50-200MW). The use of a development size in the calculations does not preclude smaller or larger projects being developed, with these concerns having been noted and the importance of enabling demonstrator sites, if applied for by developers, also noted in WAG (2011b).

4.1.3 Some participants expressed concern over the availability and quality of certain data, a concern common to the majority of marine developments and an issue discussed in detail in several MRESF project reports (e.g. RPS, 2008). Particular datasets raised related to fisheries, which is included in the constraint mapping using the COWRIE datalayers (www.offshorewindfarms.co.uk/Assets/9COWRIE%20FISH%20VALUE%20Report%20march%2009%20Final.pdf), and also that key messages may be lost in the GIS data layers. In one workshop session the potential resource in inshore and estuarine areas was also discussed as an area which may have been overlooked. There are acknowledged limitations in the base resource dataset used, the Renewables Atlas (www.renewables-atlas.info), which does have gaps in the inshore area. Additional inshore tidal stream data has been added by RPS, although this was limited to where this data were available, however a similar dataset for wave was not available. The potential implications of the inshore data gaps are discussed in WAG (2011b).

4.1.4 It was apparent that a variety of opinions exist on appropriate marine renewable energy device parameters, for example with some attendees suggesting that the 30MW value was too high, and others considering the value too low. Device spacing was considered complex and device specific. Several participants considered that constraints mapping

should be device blind, although there was interest in carrying out assessments on specific devices. These comments were relatively complex, with the information taken forward where feasible in the assessment of extractable resource in the MRESF report on the 'Approach to Sustainable Development' (WAG, 2011b).

4.1.5 Another theme that emerged across the break-out groups was the need for transparency and justification on the approaches and methodology within the MRESF, including choice of device parameters and grading of constraints. The need for a transparent and auditable approach has been integral to the MRESF since the beginning, for example the inclusion of tables giving all the data layers used and the constraint ranking applied in the 'Approach to Sustainable Development' (WAG, 2011b). In addition, comments regarding the availability of grid infrastructure have been logged on several occasions. Access to grid is a key issue for commercial scale developments, with Stage 1 looking at the electricity network in more detail. The extent of the existing grid and the planned connection to Ireland are included in the constraint maps in Stage 3 for informative purposes (WAG, 2011b). Further consideration within the constraints/opportunities mapping is complex and outside the scope of the MRESF, although the importance of this to progressing marine renewable development is recognised.

4.1.6 Presentation was considered important, with some participants noting the potential influential aspect of colour in constraints mapping, and noting that straight lines on maps can be misleading. A great deal of care has been taken with the presentation, including changing the original 'traffic light' colouring of the constraint mapping to different shades of blue, however the GIS outputs are in a grid system, as necessitated by data processing, which would make fuzzy boundaries misleading. It was also noted that constraints need to be caveated, something reflected in the cautious approach to constraint ranking (see WAG, 2011b). Furthermore, the term "scenario" was considered to be confusing, whereby it was thought that the term implied a choice of options rather than a series of steps, each of which are required to achieve a sustainable solution. The final stage of the MRESF has included a change in terminology from 'Scenario' to 'Step' to sustainable marine renewable development in response to this point. Potential development 'Steps' and assessment of these for sustainability is the final outputs of this process.

4.1.7 The workshops were therefore a valuable part of the stakeholder participation process. Feedback received during the workshops will be incorporated into the development of the MRESF as appropriate.

4.1.8 Several of the themes from the workshops were reflected in the questionnaire responses. These included the need for the MRESF to take into account demonstration scale projects (see 4.1.2 above), and the need for greater transparency, for example on constraint grades and terminology (see 4.1.4 above).

4.1.9 The more specific questions, however, enabled a greater level of insight to be provided by stakeholders on the approaches of the MRESF. Regarding the various limitations on marine renewable energy development, practical limitations, site specific issues, legislative considerations and data requirements were more often considered to be high limitations, with support and existing use more often considered to be medium scale limitations. Additional limitations suggested by respondents included the lack of knowledge of the impacts of marine renewable energy devices. Stage 1 of the MRESF identified a number of such limitations that could not be mapped in GIS. To ensure these are not omitted from the final stages of the development of the Framework, the 'Approach to Sustainable Development' report includes a summary of these (WAG, 2011b).

4.1.10 The approach to grading constraints was most commonly considered to be appropriate by those respondents providing an answer. However, it was considered that grading approaches can be misleading, and concern was expressed that certain constraints may not be considered to a sufficient level of detail. Other suggestions included sub-dividing the constraints further, and also the need for device specific sensitivity scoring for features of Natura 2000 sites. Where feasible these have been taken forward within the development of the Framework.

4.1.11 The approach to dealing with data gaps and uncertainty was most commonly considered to be appropriate. However, concern was expressed that certain datasets will not be included in the MRESF due to the project timescales, and therefore highlighting the need for the MRESF to be updated when such information is available. It is acknowledged that certain datasets are in preparation and, should they be made available by mid-September, will be included in the MRESF to replace existing, earlier versions of these particular datasets. However, there does need to be a cut off for data inclusion, to enable the Framework to move forward. Where datasets are known to be in preparation after this time, they have been highlighted for future reference in the Technical Addendum (WAG, 2011a). As regards the responses on timeframes, although the most common response (from those who responded) was that the timescale for the MRESF project was realistic, there was recognition of the need for updates and review in light of new information. Those respondents who considered the

timeframe not to be realistic recommended a longer timescale and it was again highlighted that the project needs to take account of new information and understanding, and therefore updated on a scheduled (e.g. 5 year) basis. This is an important point, however it should be noted that the structure of the data storage and processing is such that updates and additions can be incorporated relatively easily in the future, as the knowledge base expands and devices progress towards commercial scale deployments.

4.1.12 Regarding data gaps and uncertainty, the method of data collection/generation, consideration of raw data, level of data processing undertaken, age of data and detail of data were most commonly considered to be of high importance, particularly the method of data collection/generation. However, the importance of assessing this according to the specific parameter measured was noted. These issues were taken into consideration when the project specific method for assessing data confidence was determined (see WAG (2011b)). The need to use the Precautionary Principle was highlighted in relation to potential impacts to Natura 2000 features, and presentation of data was also considered to be important. The sustainable remit within which the MRESF operates requires all potential constraints to be considered, with the manner in which constraints are ranked being a function of their potential to cause delay in consent being achieved, or indeed to make it unlikely that consent could be achieved at all. The application of that constraint equally across Welsh waters does have an inherent degree of precaution within it, but does not negate the need for site/project specific assessment.

4.1.13 As with the comments made during the workshops, the questionnaire responses indicated that the approach to assessing potential generation capacity is quite a specific area of knowledge and can produce different opinions according to the interests or experiences of the stakeholder. The most common response from those who responded was that the approach was appropriate, however few responses were received and the specific device parameters were often considered not to be appropriate. One stakeholder considered that the potential resource requires a computational fluid dynamics approach rather than a GIS approach, and another considered that a bottom-up approach is required for wave power, rather than top-down, both of which would be beyond the level of detail being produced as part of the broad scale MRESF project. Again the likelihood of pre-commercial projects coming forward within the MRESF timeframe was highlighted. The comments received were, however, very useful in refining the approach used, with the values taken forward in the calculations presented in the 'Approach to Sustainable Development' report (WAG, 2011b).

4.1.14 All steps were considered to be appropriate by the majority of stakeholders responding to this question, although fewer considered Step 3a to be appropriate and not all stakeholders considered all steps to be appropriate. The concerns have been noted, however the change in terminology from scenario to step should make it clear that each step is required before bringing all the steps together at the end, to ensure each issue is given equal weight as part of a sustainable assessment. Concerns included the potential for the creation of "no-go" areas and that sensitivities or technology type may not be described in sufficient detail. It was considered that one scenario was too broad, whilst another was too narrow. The need to clarify the process was also highlighted, including how the terminology "scenario" currently suggests a choice of outcomes, as also raised during the workshops. These comments have been taken forward in the 'Approach to Sustainable Development' report.

4.1.15 The sustainable approach adopted by the MRESF was considered to be appropriate by the majority of stakeholders who responded to this question. However concern was expressed that deployment may occur in sensitive areas, and therefore the need to include mitigation was suggested in order to meet sustainability objectives. The MRESF is aimed at understanding the sustainability of development within different areas, however there remains a need to understand site specific impacts on a project basis, with mitigation more appropriate at this stage. However, there are a number of potential routes through which mitigation could be considered at a generic level, e.g. as outlined in the draft National Policy Statement on Renewable Energy Infrastructure (http://dataenergynpsconsultation.decc.gov.uk/documents/npss/EN-3.pdf), with consideration of such broad types of mitigation made in WAG (2011b). Again, the need to describe the constraints or technology types in sufficient detail in order to clarify the risks was emphasised, and the need for an impact assessment to evaluate the risk was suggested. For a broad scale and strategic assessment, there is always a degree of difficulty in balancing the need to provide the 'bigger picture' while still ensuring sufficient detail. The project team have considered this carefully, however it should be noted that a strategic study such as the MRESF, which is being developed to assess the sustainability of extracting varying levels of energy from wave and tidal stream, does not remove the need for site/project specific assessments.

4.1.16 The majority of stakeholders who indicated an answer considered that the approach to grading areas for development was appropriate. However, concern was again expressed regarding the potential creation of "no-go" areas, and the need to consider Habitat Regulations Assessment (HRA) was highlighted by one respondent. It is important to note here that the project is not aimed at green lighting or red flagging areas

for development and as such is not intended to create no-go areas. The areas of potential resource identified are based on broad scale datasets of wave and tidal stream energy and current knowledge of commercial requirements, aiming to identify areas likely to be subject to fewer constraints on development. However, should developers identify a viable resource not highlighted by the MRESF, or seek to develop in areas identified as highly constrained, such applications would need to consider the potential degree of constraint, which may bring increased difficulties in consenting when compared to a less constrained site, and the potential for future leasing rounds by The Crown Estate.

4.1.17 The questionnaires were therefore a valuable tool in providing a more in-depth insight on the specific approaches within the MRESF.

References

RPS 2008. Marine Renewable Energy Strategic Framework for Wales. Stage 1 Report FINAL. On Behalf of the Welsh Assembly Government. Doc. Ref. JER3688R081124 Version 4.

Welsh Assembly Government, 2010a. Marine Renewable Energy Strategic Framework for Wales – Stage 3. Stakeholder Participation Process. Produced by RPS On Behalf of the Welsh Assembly Government. Doc. Ref. JER3688100428SK Version 6.

Welsh Assembly Government, 2010b. A Low Carbon Revolution –The Welsh Assembly Government Energy Policy Statement.
http://wales.gov.uk/docs/desh/policy/100331energystatementen.pdf

Welsh Assembly Government, 2011a. Marine Renewable Energy Strategic Framework for Wales – Stage 3. Technical Addendum. Produced by RPS On Behalf of the Welsh Assembly Government. Doc. Ref. JER3688R101118SK Version 7.

Welsh Assembly Government, 2011b. Marine Renewable Energy Strategic Framework for Wales – Stage 3. Approach to Sustainable Development. Produced by RPS On Behalf of the Welsh Assembly Government. Doc. Ref. JER3688R100813SK Version 7.

Appendices

Appendix A

Stage 3: Stakeholder Participation Questionnaire

Appendix B

Stakeholder Contact List

Contact	Company/organisation	Timing of follow up call	Notes	Attending Y / N / Possible	Email Reminder Sent 30/06/10	Questionnaire Returned
Beth Scott	University of Aberdeen	30/07/10 / 02/08/10	Initial email resent.		Yes	
Sir or Madam	Associated British Ports	30/07/10 / 02/08/10	Email sent asking for contact name.		Yes	
Genevra Harker	AMEC	30/07/10 / 02/08/10			Yes	
Sir or Madam	Aquamarine Power	30/07/10 / 02/08/10	Email sent asking for contact name. Resent information 03/08/10.		Yes	
Ed Rollings	Atlantis Resources Corporation	14/07/10	Initial email resent. Briefly outlined project.		Yes	
Ben Yeats	AWS Ocean Energy	30/07/10 / 02/08/10	Initial email resent.		Yes	**Yes**
Sir or Madam	BHP Billiton	30/07/10 / 02/08/10	No reply.	-	Yes	
Claire Savage	BHP Billiton	30/07/10 / 02/08/10	Contact name changed to Cerys Percival.	-		
Dr David Cotton	British Oceanographic Data Centre		Reply already received.	N	Yes	
Martin Hooker	South Wales Aggregates working Party		Reply already received.	Y (Cardiff)		
Brian Clark	British Marine Federation		Initial email resent.		Yes	
David Whitehead	British Ports Association	30/07/10 / 02/08/10	Spoke with Richard Ballantyne. Received email stating that they will not be completing the questionnaire but would like to keep the info address on the circulation list.		Yes	
Captain Saurabh Sachdeva	Chamber of Shipping	30/07/10 / 02/08/10	Would only get involved at the project level, and if there was likely to be significant impact on shipping interests. Would not get involved at this stage. Re-sent email for his reference.	N		**Yes**
Richard Hill	UK Cable Protection Committee	30/07/10 / 02/08/10	Spoke with Richard Hill. He explained that UKCPC is a voluntary trade organisation. He would like to be consulted on the Round 3 wind farm developments. Called and left message on 03/08/10.			
Llewelyn Rhys	RenewableUK	30/07/10 / 02/08/10	Resent email to Llywelyn Rhys.		Yes	
Mark Smailes	Civil Aviation Authority	14/07/10	Would like to attend workshop but resource limitations for July. Has completed questionnaire.		Yes	**Yes**
Stephen Wyatt	Carbon Trust	13/07/10	Left a message on voicemail.	Y (Cardiff)		
Sarah Perry	Cardigan Bay Marine Wildlife Centre	14/07/10	Colleague at WWF is going. Re-sent email of 10th June.	N	Yes	

Contact	Company/organisation	Timing of follow up call	Notes	Attending Y / N / Possible	Email Reminder Sent 30/06/10	Questionnaire Returned
John Hamer	Countryside Council for Wales		Kate Smith attending for CCW.	N	Yes	**Yes**
Andy Hill	Countryside Council for Wales		Kate Smith attending for CCW.	N	Yes	
Adrian Judd	CEFAS	14/07/10	Unable to attend.		Yes	**Yes**
Sir or Madam	Cardiff University	14/07/10	Answer phone.		Yes	
Glen Darou	Clean Current				Yes	
Charlotte Mansell	Campaign for the Protection of Rural Wales	14/07/10	Charlotte will not be able to attend workshop on the 20th July. Forwarded initial email to Charlotte's address asking her to complete the questionnaire.	N	Yes	
Dr Andrew Gill	Cranfield University		Reply already received.	Y (London)	Yes	
Giles Edward	cwavepower	14/07/10	Unable to make contact.		Yes	
Jonathan Wilson	Ministry of Defence		In Steering Group.	N	Yes	
Kate Payne	DECC	14/07/10	Unable to make contact.		Yes	
Trevor Raggatt	DECC	14/07/10	Answer phone.		Yes	
Phillip Bloor	DECC	14/07/10	Phil Bloor cannot attend - last day at DECC today. Has passed the information onto his colleagues.	N	Yes	
Robert Lilly	DECC	14/07/10	Interested in wind - recommended talking to Kate Payne and Trevor Raggatt.	N	Yes	
Jim Spooner	Department for Transport	14/07/10	Cannot make workshop but colleague possibly can. Forwarded email requesting confirmation of attendance.	Phil Smith Possible (London)	Yes	
Jesper Krarup Holst	DONG Energy	14/07/10	Cannot make the workshop, but would like to receive any presentations / outputs from the workshop. Resent email and asked if he may be able to complete questionnaire.	N	Yes	
Sir or Madam	Vattenfall	30/07/10 / 02/08/10	No reply.			
Chris Williams	Tidal Energy Limited		Sara Thomas attending.	N	Yes	
Dr Henry Jeffrey	University of Edinburgh	14/07/10	Left a message on voicemail.		Yes	
Sir or Madam	Elsam				Yes	
Jenny Norris	European Marine Energy Centre	14/07/10	Left a message on voicemail.		Yes	
Professor Mike Cowling	University of Glasgow	30/07/10 / 02/08/10	No reply.		Yes	
Matt Strickland	Environment Agency Wales		Michael Evans attended Cardiff workshop.		Yes	
Susan Freeman	Environment Agency Wales	14/07/10	Provided water quality data during Stage 1.		Yes	

Contact	Company/organisation	Timing of follow up call	Notes	Attending Y / N / Possible	Email Reminder Sent 30/06/10	Questionnaire Returned
Jim Poole	Environment Agency Wales	14/07/10	Unable to make contact.		Yes	
Roger Wade	Environment Agency Wales	14/07/10	Michael Evans attended Cardiff workshop.	N	Yes	
Peter Wilinson	Environment Agency Wales	14/07/10	Peter has retired. Michael Evans attended Cardiff.	N	Yes	
Michael Evans	Environment Agency Wales		Reply already received.	Y (Cardiff)		**Yes**
Amaan Lafayette	E.ON	14/07/10	Left a message.		Yes	
Sir or Madam	University of Exeter	30/07/10 / 02/08/10	Will try to complete questionnaire by Wednesday.		Yes	
Neil Crumpton	Friends of the Earth		Reply already received.	Possible (London)	Yes	
Sir or Madam	GeoData Institute	14/07/10	Left a message.		Yes	
Mike Johnson	Gloucester Harbour Trustees				Yes	
John Hartley	Hartley Anderson	14/07/10	Will be attending London.	Y (London)	Yes	
Judith Tetlow	HSE	14/07/10	Suggested that this is not something that they would get involved in.	N	Yes	
Sir or Madam	International Council for the Exploration of the Sea	14/07/10	Forwarded email to Reception who will forward to most appropriate person. reception@ices.dk.		Yes	
Lucy Greenhill	JNCC		Reply already received.	N	Yes	
Christopher Smith	Knight Frank		Land agents for Beaufort Estates in the Severn Estuary provided detailed information on the estate extent and views on development in Stage 1.		Yes	
Sir or Madam	Lancaster University	14/07/10	Will have a look at the email.		Yes	
Martyn Boyce	North Western & North Wales Sea Fisheries Committee	14/07/10	Phil Coates attended Cardiff on behalf of WAG fisheries.	N		
Dean Chapman	Welsh Assembly Government		Reply already received.	Y (Cardiff)?		
Andrea Tyrrell	Lunar Energy	14/07/10	Cannot come to workshop. Aim to complete questionnaire within the next 2 weeks.	N	Yes	
Sir or Madam	Marine Institute	30/07/10 / 02/08/10	Emailed for contact person.		Yes	
Shaun Nicholson	Marine Management Organisation	14/07/10	Re-sent email.		Yes	
Sylvie Head	Marine Current Turbines	14/07/10	Re-sent email to David Ainsworth.	N	Yes	
Paul Townsend	Maritime and Coastguard Agency		Paul unable to make workshop.	Possible (London)	Yes	
Melissa Moore	Marine Conservation Society	14/07/10	Cannot attend workshop but interested in having		Yes	

Contact	Company/organisation	Timing of follow up call	Notes	Attending Y / N / Possible	Email Reminder Sent 30/06/10	Questionnaire Returned
			involvement. Re-sent email.			
Emma Lewis	Milford Haven Port Authority		Reply already received.	Y (Cardiff)		
Tonia Forsyth	Pembrokeshire Coastal Forum		Reply already received.	Y (Cardiff)		
Mark Russell	Mineral Products Association	14/07/10	Left a message on voicemail.		Yes	
Anders Jansson	Minesto	30/07/10 / 02/08/10	Sent email to get contact details. Received reply from Anders Jansson. Forwarded initial email of 10 June.		Yes	
Hannah Pitt	National Trust		Reply already received.	N	Yes	**Yes**
Adrian Woodhall	National Trust		Reply already received.	N	Yes	
Victoria Copley	Natural England		Reply already received.	N	Yes	
Jack Hardisty	Neptune Renewable Energy	14/07/10	Spoke to Glenn Aitken. Keen for involvement. Forwarded email.		Yes	
Sir or Madam	Welsh Surfing Federation	14/07/10	Left a message on voicemail.		Yes	
Miles Hearn	Ocean Power Technologies	14/07/10	Paul no longer works for OPT. Position being looked after by Miles Hearn. Forwarded email.		Yes	
Mick Borwell	Oil & Gas UK		Left a message.		Yes	
Sue Barr	OpenHydro	14/07/10	No reply.		Yes	
Max Carcus	Pelamis Wave Power Ltd	14/07/10 30/07/10 / 02/08/10	Unable to make contact.		Yes	
Howard Nimmo	Pulse Tidal	14/07/10	Left a message on voicemail.			
Stephanie Merry	Renewable Energy Association		Attended London workshop.	Possible (London)	Yes	
Oliver Wragg	RenewableUK	14/07/10	Did not attend.	Y (London)		
Ed Frost	RES	14/07/10	Re-sent email.		Yes	
Alan Owen	Robert Gordon University	14/07/10	Spoke to Sharon who said to forward email to her (04/07/10).		Yes	
Annie Smith	RSPB		Reply already received.	N	Yes	
Bill Langley	RWE npower	30/07/10 / 02/08/10	Left a message.			
Caroline Price	RYA		Reply already received.	Y (London)	Yes	
Ben Wilson	Scottish Association for Marine Science	30/07/10 / 02/08/10	Answer phone.		Yes	
Andy Cummins	Surfers Against Sewage	14/07/10	Left a message on voicemail.		Yes	

Contact	Company/organisation	Timing of follow up call	Notes	Attending Y / N / Possible	Email Reminder Sent 30/06/10	Questionnaire Returned
Sir or Madam	Scira Offshore Energy Limited	14/07/10			Yes	
Mark Hamilton	Scotrenewables Ltd	14/07/10	Spoke to Mark Hamilton - forwarded email.		Yes	
Terry Vickers	Scottish Power	14/07/10	Left a message.		Yes	
Robert Burnett	SSE	13/07/10 and 30/07/10 / 02/08/10	Cannot come to the workshops. Send reminder for questionnaire.		Yes	
Emmanuel Idowu	Sports Council for Wales	30/07/10 / 02/08/10	Forwarded email. Email from Emmanuel Idowl on 04/08/10 stating that Sport Wales do not plan to participate in this consultation exercise on this occasion.		Yes	
Stephen Brooks	Sustainable Development Commission UK				Yes	
Gavin Bunting	Sustainable Development Commission UK	13/07/10	Left a message on voicemail.		Yes	
Ali Hood	Shark Trust	13/07/10 and 30/07/10 / 02/08/10	Sent email of 10 June to John (Conservation Officer).		Yes	
Sir or Madam	Sea Mammal Research Unit	30/07/10 / 02/08/10	Rachel Bowes no longer works for SMRU. Forwarded email again to Office Manager who will re-direct to someone who can help.		Yes	
Professor AbuBakr Bahaj	University of Southampton	13/07/10 30/07/10 / 02/08/10	Has no time to look at the questionnaire by the 4th.		Yes	
Nick Harrington	South West RDA	13/07/10	Left a message on voicemail.	N	Yes	
Nick Thornley	SPERBOY	30/07/10 / 02/08/10	Sent email to get contact details. Had reply from Michael Burrett, re-sent email.		Yes	
Miles Willis	Swansea University		Reply already received.	Y (Cardiff)	Yes	**Yes**
James Orme	Swanturbines		Tim Powell his colleague will be attending on behalf of Swan Turbines.	Possible (London)		
Martin Simpson	The Crown Estate	14/07/10	Debbie Frankiewicz is attending on behalf of The Crown Estate.		Yes	
John Callaghan	The Crown Estate	30/07/10 / 02/08/10	Debbie Frankiewicz is attending on behalf of The Crown Estate.	Possible (London)	Yes	
Russell Hall	Dresser-Rand	13 30/07/10 / 02/08/10	Sent initial email of 10th June to George Laird.			
Captain Duncan Glass	Trinity House	14/07/10	Re-sent email.		Yes	

Contact	Company/organisation	Timing of follow up call	Notes	Attending Y / N / Possible	Email Reminder Sent 30/06/10	Questionnaire Returned
Mike Weston	UHI	13/07/10	Will look at information.			
Alan Smith	Tidal Generation Limited	13/07/10	Spoke with Mike Whitehead. Asked for the invite to be forwarded.		Yes	
Louise Hutchins	Greenpeace	13/07/10	Left a message on voicemail.		Yes	
Sir or Madam	Greenpeace				Yes	
Phil Coates	Welsh Assembly Government		Phil attended on behalf of the WAG (includes SWSFC & NWSFC).	Y (Cardiff)		
Jill Brown	Welsh Assembly Government	13/07/10 30/07/10 / 02/08/10	Previous contact has been replaced by Jill Brown. Re-sent email on 03/08/10.			
Jerry Percy	Welsh Assembly Government	13/07/10	Left a message on voicemail.		Yes	
Sir or Madam	Warwick Energy	13/07/10	Spoke to Clive Hanley. He has the email and will forward on to the project team. They currently do not have any interests in Welsh waters or Irish Sea and therefore if we do not hear back we can assume that has been read and they do not wish to participate.		Yes	
Paul Wegener	Waveberg	30/07/10 / 02/08/10	Unable to make contact.		Yes	
Sir or Madam	Wave Dragon		See Iain Russell.		Yes	
Sir or Madam	Waveenergy.dk	30/07/10 / 02/08/10			Yes	
David Gibb	Wavegen	13/07/10	Interested in being involved although unlikely to be the workshop in London. Resent email.	N	Yes	
Robert Lott	Whale and Dolphin Conservation Society	30/07/10 / 02/08/10	Unable to make contact.	N	Yes	**Yes**
Rick Park	Wildlife Trust of South and West Wales	13/07/10	Sarah Kessell is new Chief Exec. Spoke to her PA (Diana Clark) who recommended speaking to Rick Park at Gwent. Forwarded email.		Yes	
Sir or Madam	Wildlife Trusts Wales	30/07/10 / 02/08/10	Nia is on holiday and is the only person dealing with marine.		Yes	
Craig Mitchell	Welsh Local Government Association	13/07/10	Cannot attend workshops. Re-sent email.		Yes	
Wendy Dodds	WWF	13/07/10	Sent reminder email.	Y (London)	Yes	**Yes**
Oliver Knight	Sustainable Development Commission UK	13/07/10	Oliver has left the commission, Gavin Buntin is new contact.	Y (London)		

Contact	Company/organisation	Timing of follow up call	Notes	Attending Y / N / Possible	Email Reminder Sent 30/06/10	Questionnaire Returned
Dr Sue Hearn	Countryside Council for Wales		Reply already received.	Y (Cardiff)		
John Clark	RSPB		Reply already received.	Y (Cardiff)	Yes	**Yes**
Iain Russell	Wave Dragon		Reply already received.	Y (Cardiff)		**Yes**
Chris Lambart	National Trust		Reply already received.	Y (Cardiff)	Yes	
Dr Kate Smith	Countryside Council for Wales		Reply already received.	Y (London)		
Dr Jonathan Gordon	University of St Andrews		Involved in project directly.			
Dr David Thompson	University of St Andrews		Involved in project directly.			
David Thompson	The Crown Estate		Debra Frankieqicz will be attending for The Crown Estate.	Y (London)		
Jamie Moore	The Crown Estate		David Tudor from TCE went to Cardiff workshop.			
Sara Thomas	Tidal Energy Ltd		Reply already received.	Y (Cardiff)		**Yes**
Joseph Kidd	Marine Current Turbines		Reply already received.	Y (London)		
Paul Reynolds	RenewableUK		Reply already received.	Y (London)		
Tom Powell	Swanturbines/Cygnus Energy		Reply already received.	Y (London)		
Rowan Byrne	Irish Sea Conservation Zones	21/07/10	Left a message and sent an email.			
Tom Hooper	South West Food and Drink	21/07/10	Sent an email.			
Sharon, Paul, and Tim	Welsh Assembly Government	21/07/10	Sent an email.			
Julie Williams	Welsh Assembly Government	21/07/10	Sent an email.			
Henrik Wareborn	Marine Energy	30/07/10 / 02/08/10	No reply.			

Appendix C

Invitation to Stakeholder Workshops

Workshop Timetable

Appendix D

Comments Logged from Workshops

Topic	Stakeholder Type	Point Raised	MRESF Response
Datasets	Stakeholder	Has the Marine Aggregate Dredging Policy been used? This has a lot of data layers which may be of use to the MRESF project.	Included in bibliography (WAG, 2011a).
Datasets	Stakeholder	Refer to the IMECA project which is run by Liverpool Uni with the WAG to find out more on methods for dealing with multiple data layers.	Included in bibliography (WAG, 2011a).
Datasets	Regulator/advisor	LIDAR mapping compiled to inform Shoreline Management Plans may be useful to project.	Not appropriate for the MRESF but would be useful for site specific studies.
Datasets	Regulator/advisor	Wales Coastal Monitoring Centre may be a useful dataset. It is WAG sponsored but hosted by Gwynedd Co. Co.	Not appropriate for the MRESF but would be useful for site specific studies.
Datasets	Regulator/advisor	Data management needs to be cross border, particularly in areas like the Severn Estuary and Bristol Channel. There also needs to be greater accessibility to data.	Stakeholder engagement plus literature search were wide ranging to take account of issues such as this. Full bibliography and project reports to be publicly available (e.g. WAG (2011a)).
Datasets	Regulator/advisor	Severn Tidal Power Study is due to publish their results in summer 2010. This is a large dataset which should be flagged when it becomes available. Their modelling work on the effects of a tidal fence could be particularly useful.	Included in bibliography (WAG, 2011a).
Potential Resource	Regulator/advisor	In the lower Severn Estuary, if a large tidal range project goes ahead, this would presumably have exclusivity on the tidal stream resources identified.	Not part of the MRESF remit to determine this.
Potential Resource	Regulator/advisor	The STPS conducted their study following the designs of the devices that were available at the time. The approach taken in the MRESF, where by environmental, social and economic datasets are built in first and adapt plans according to what is found in these datasets is a better approach.	Noted.
Potential Resource	Regulator/advisor	Aquascientific is a company in Exeter University which may be worth investigating. Their device uses drag and lift and therefore may be able to operate at lower tidal stream velocities. They are currently undertaking field testing.	Additional developer/device added to list.
Potential Resource	Stakeholder	Cardiff University (Roger Falconer) is currently undertaking research on turbulence effects, wake effects etc.	Cardiff University included in stakeholder engagement.
Potential Resource	Stakeholder	Grid connection will be a major issue, particularly around mid Wales. There may the possibility that Hydrogen could be produced as an alternative to electricity production.	Existing grid and planned link to Ireland included in GIS mapping.
Potential Resource	Stakeholder	Where did the figure of 30MW come from?	This is comparable with the size of arrays used in Round 1 offshore wind farms. This array size was found to be enough to kick start the offshore wind industry so it is assumed that wave and tidal arrays of a similar size could do the same for marine renewables.
Potential Resource	Stakeholder	In terms of minimum array size, developers can give the best idea of how much it would cost to install a 2-3 unit development versus one of 30-40 units.	The information used primarily comes from developers.
Constraint	Stakeholder	Determining constraints rankings following consultation with the steering group and using expert judgment makes sense.	Noted.
Constraint	Stakeholder	In an area of current use (i.e. a marine aggregate license area) which has good marine renewable development potential, how do you prioritise one use over another?	An existing licence gives a legal framework.
		What is the possibility of using current offshore wind farms (which are already grid connected etc.) for dual energy generation?	Dependant on developers.
Constraint	Regulator/advisor	Data gaps are a key consideration. The reason we have data gaps is that it's expensive to collect it. Is there justification for getting developers to conduct these very expensive studies? Where there is a data gap (i.e. use of a particular area by certain species) and introduce another unknown (i.e. a tidal device), we can get developers to investigate the effects.	A number of data collection projects are funded by Government, however it is for a developer to assess potential impact based on current understanding. Uncertainty does, however, tend to lead to a precautionary approach in terms of consenting.

Topic	Stakeholder Type	Point Raised	MRESF Response
Constraint	Regulator/advisor and Stakeholder	Is there a balance between risk and precaution? Legislative framework is the biggest constraint. Even the UK government is bound by European Law. Therefore the constraint level is related to the legislation.	The determination of constraint rankings did take consideration of legislation, however this was one of several factors as the level of constraint is a reflection of the degree of difficulty in achieving consent that each constraint may represent.
Constraint	Stakeholder	Shipping routes had the highest constraint although these can be moved.	The aim of the framework is to identify areas of least constraint, with main shipping routes ranked highly.
Constraint	Stakeholder	There may be potential for mutual benefits. Perception is very important as is stakeholder engagement. Good example of how public perception can cause problems is related to the furore about the effects of aggregate extraction in the Bristol Channel on local beaches. Studies showed no likely effect but only after significant amounts of money were spent on these studies.	Noted.
Constraint	Regulator/advisor	Using the phrase "trials" may be a useful way to increase understanding and support with the public.	Noted.
Constraint	Stakeholder	If you establish benchmarks for output per unit area, you could prevent consents being issued for applications that do not meet these benchmarks.	Noted.
Scenarios	Stakeholder	The Sustainable Development duty will be to only consider Scenario 5 (all the data combined) so what is the point of Scenarios 1-4?	Scenarios 1-4 are required to ensure all issues are considered to deliver a sustainable outcome in Scenario 5.
Scenarios	Regulator/advisor and Stakeholder	It is important to make it clear that Scenarios 3a and 3b should not be interpreted in isolation but as part of an overall process.	Agreed – hence change in terminology from scenarios to steps.
Scenarios	Regulator/advisor	The industry should target the easiest/cheapest areas of producing energy first.	Where to apply for consent is a decision to be made by developers.
Scenarios	Stakeholder	Will marine renewable development trump all other uses?	The aim is for sustainable development – i.e. enabling all users to be accommodated.
Scenarios	Regulator/advisor	The prioritization of marine renewable development will depend on changing needs and situation. It is important to acknowledge the timescales over which these will operate. Will they be operational for as long as wind farms? La Rance tidal barrage had an estimated 30 year lifespan but when turbines were due to be replaced they were found to be in good working order and not in need of replacement.	Timescale of projects will be determined on a case by case basis.
Scenarios	Stakeholder	It is important to ensure the grid issue is not neglected. Wales has sensitive coastlines and there are potential conflicts associated with grid connections on these coastlines. The potential to produce Hydrogen from marine renewables should be considered. The WAG have stated that the M4 is targeted to become a Hydrogen corridor. The production of Hydrogen using marine renewables could facilitate this. Transmission loss of electrical energy could also be addressed by Hydrogen production as this may be a more mobile form of energy transfer.	Hydrogen is outside the remit of the MRESF but the information is noted.
Datasets	Developer	The planned interconnector between Ireland and Wales opens up more seaspace.	The planned route has been included in the GIS mapping.
Datasets	Stakeholder	Registered parks and gardens data layer should be under designated sites and not recreation.	Grouping changed.
Datasets	Stakeholder	Check if the submerged landscape data layer includes archaeology.	No – the data layer is provided by the JNCC (see www.jncc.gov.uk/page-2117).
Datasets	Stakeholder	Pleased to hear that commercial fisheries addressed via COWRIE 'fish values' data layer.	Noted.
Datasets	Stakeholder	Mention of a mineral resources multiple data layer project that worked by adding up layers. The report was clear on what it could not be used for but not what it could be used for - therefore value slightly limited.	Noted.
Datasets	Stakeholder	CCW landmap and seascape datasets seen as good examples of multiple data layer display.	Noted.
Datasets	Developer	Legislative pathway is seen as difficult to negotiate and a constraint on development, with presence of European designated species a 'warning flag' that consent likely to be difficult.	Noted.
Datasets	Stakeholder	Coastal protection not included in constraints mapping - can we get WFD datalayer on coastal protection	Information requested from the Environment Agency.

Topic	Stakeholder Type	Point Raised	MRESF Response
		levels to use as informative?	
Potential Resource	Developer	Work undertaken by British Gas in the 1970's - not yet located but they did small scale modelling in wave tanks of wave device arrays to test interactions.	Information no longer available.
Potential Resource	Developer	University of Aalborg have done small array testing.	See bibliography for research held from the University of Aalborg (WAG, 2011a).
Potential Resource	Developer	Expect arrays to be deployed in lines up to 5.5km long, with devices being approx 300m across and approx 200m apart. Minimum of 10-11 units, with approx 100MW being business scale deployment. Demonstrator device converted 21% of the wave energy from the water to wire (had a target of 20%). Work done by University of Aalborg. The device can be tuned to the average wave size - for European conditions likely to be a 7MW, 36kw/m device at 300m size (economies of scale by having all European devices same size). Do not want to go in wave conditions much less than 12kw/m. The device needs to be larger than the wave length of the waves, otherwise it will be moved around by the waves.	Information used when assessing potential resource.
Potential Resource	Developer	Limited research into cavitation effects and the impact of salinity on tidal flow.	Noted.
Potential Resource	Developer	View that energy/location of tidal devices affected by who is running the project - implied that engineer run projects go for smaller devices in lower energy areas, with projects run for financiers tending to go for larger devices in high energy areas.	Noted.
Potential Resource	Developer	The size of the device in the tidal flow is not a big problem but wave devices ideally want to avoid large tidal flows.	Noted.
Potential Resource	Developer	Measured wave data very different to that predicted in Atlas - Atlas fine for large scale projects.	Noted – however, Atlas is most suitable dataset for a strategic scale project.
Potential Resource	Developer	Supergrid would sort out the grid connection problems.	Noted.
Potential Resource	All	Interest in combining wave and tidal devices with wind, but not necessarily wave and tidal devices together.	Noted.
Constraint	All	Change the traffic light colouring of constraints to shades of one colour.	Colour scheme changed to shades of blue.
Constraint	Stakeholder	Constraints of concern included - diving birds and tidal turbines (e.g. guillimots), depth of dive (including benthic feeders). Proximity to seabird colonies even where surrounding sea not designated - RSPB have called for an extension to SSSI sites to include loafing areas.	Noted.
Constraint	Stakeholder	Landscape, seascape, heritage and peoples enjoyment of coast.	Noted.
Constraint	Developer	Need for >40m water depth, maximum of 1m/s tidal flow, sufficient wave resource, proximity to grid, presence of EPS (depends on what they are - not necessarily marine mammals but reefs are to be avoided), presence of shipping lanes.	Information used when assessing potential resource.
Constraint	Stakeholder	Shipping lanes and navigation channels - less travelled routes may be storm forced.	Noted.
Constraint	All	The constraint mapping needs to be device blind - there was interest in running separate assessments on specific devices by amending constraints for that device.	Constraint mapping is device blind – data is managed in such a way that it could be re-run for a specific device.
Scenarios	Stakeholder	Need to consider some archaeology as environmental and not social constraint.	Noted.
Scenarios	All	Use of the word scenario was considered confusing - it sounded to stakeholders that you could choose which one you liked and not like a series of steps to go through to achieve sustainable development.	Terminology amended from ‘scenario’ to ‘step’.
Scenarios	Stakeholder	What is the cut off point for development in terms of constraint - i.e. the cost-benefit.	Would be for a developer to decide the risk of applying for consent based on the constraints present.

Topic	Stakeholder Type	Point Raised	MRESF Response
Scenarios	Stakeholder	General approval of the scenarios - is a relatively easy process to understand and follow as an external user.	Noted.
Scenarios	All	What is seen as non sustainable? Anything that can be viewed as a 'hard constraint' - i.e. a complete no on development. Examples given included dredged shipping channels and anywhere in Wales for Wales apart from Pembrokeshire.	Sustainable development is basically aimed at looking to enable development of marine renewables while minimising the impact on existing interests. The maximum level of constraint used is 'likely to preclude development' and includes issues such as existing licenses. Although wave energy is focused around Pembrokeshire, there are tidal stream resources elsewhere.
Datasets	Stakeholder	Recreational Users Dataset available from the Pembrokeshire Coastal Forum (covers all Welsh waters). Work undertaken by Exogensis, also includes nature conservation, plans & projects for coastal practitioners. Looking at how to disseminate data - potentially through annual subscription ?	Recreational users dataset held.
Datasets	Stakeholder	Potential for repetition between those collating GIS datasets and in different formats. Should be a lead within the WAG coordinating these activities.	The MRESF project uses a single metadata format for all datasets sourced.
Datasets	Stakeholder	The Environment Agency under the Water Framework Directive are also collecting a large amount of data - likely to be limited to Bristol Channel, Milford Haven and other estuaries and inlets.	Request for information placed.
Datasets	Stakeholder	Emergency Planning for Sea Empress reports may also be useful.	Priority for MRESF is for national and/or broad scale projects, although smaller scale studies are also of interest (see bibliography in WAG (2011a)).
Datasets	Stakeholder	Milford Haven environmental surveillance group - annual report (Blaise Bullimore)	Priority for MRESF is for national and/or broad scale projects , although smaller scale studies are also of interest (see bibliography in WAG (2011a)).
Datasets	Stakeholder	Natural Environmental Framework - mapping biodiversity in GIS (Daniel Reynolds) http://new.wales.gov.uk/topics/environmentcountryside/consmanagement/conservationbiodiversity/publications/nef2/;jsessionid=2jNjMmrpLHLTLmyMhqB01vTSJzyxPhFGycdFfGKvyZxyPhnNtp20!-1109583048?lang=en.	Project noted in review of sustainable approach.
Datasets	Stakeholder	Planweb County Council planning tool may also be useful.	Noted.
Datasets	Research	Low Carbon Research Institute has capacity and funding to focus data collection on potential areas of interest for marine renewable development (topography, geophysical, ADCP etc) and/or targetted stuidies on data gap issues. Work already underway but data not processed (and therefore unlikely to be useful at this point?).	Research underway is included in the data listings (WAG, 2011a).
Datasets	Developer	MCT - biannual reports provided to DoNI.	Public domain information included in the MRESF bibliography (WAG, 2011a).
Datasets	Stakeholder	BGS/NMW Bristol Channel Survey data.	Included in MRESF bibliography (WAG, 2011a).
Datasets	Stakeholder	OLEX - AGDS echosounder data collected on fishing vessels of opportunity around Welsh coast - coordinated by the SWSFC (now part of the WAG but website still SWSFC). Builds up data on positional depth/ground hardness.	Included in MRESF bibliography (WAG, 2011a).
Datasets	Stakeholder	Sea Fisheries Atlas.	Included in MRESF bibliography (WAG, 2011a).
Datasets	Stakeholder	Survey of Fishing Activity 2004-5 CCW report on SWSFC website.	Included in MRESF bibliography (WAG, 2011a).
Datasets	Regulator/advisor	Marine Spatial Planning Conference on the 1st July. Examples of multidatalayers and confidence methods used (www.coastms.co.uk/conferences/436).	Referenced when looking at approaches to cumulative data layers.
Datasets	Stakeholder	Irish Sea MCZ and Finding Sanctuary MCZ teams should be contacted with regards to MRESF project. Potential for transboundary issues with MCZs designated on boundaries with potential strategic areas for marine renewable development.	MRESF project has links through Welsh teams.
Datasets	Regulator/advisor	Other data management systems and data holders to be compatible with include MEDIN and BODC.	Metadata format is the Gemini standard.

Topic	Stakeholder Type	Point Raised	MRESF Response
Datasets	Stakeholder	Fisheries activity - variable & poorly recorded.	Noted (see WAG (2011a) for data held).
Datasets	Stakeholder	Fishery socio-economic data overall poor. 1st sale and final sale values collated. Relating socio-economic value of fishing to location (spatial) or temporal very difficulty. But important to do so!	Noted (see WAG (2011a) for data held).
Datasets	Stakeholder	www.swsfc.org.uk. Developing Fishing Activity Maps i.e. fisheries protection vessels observations, CCW Atlas 2004/05, fishing industry own maps.	Included in MRESF bibliography (WAG, 2011a).
Datasets	Stakeholder	Fishing Industry (S Wales) have consultant's study (collation of fishermans map) see website.	Included in MRESF bibliography (WAG, 2011a).
Datasets	Stakeholder	Koen Vansteen @ Cefas coordinating QA of SFC protection vessel observation data on fishing activity. Standardise for protection vessel tracks.	Noted.
Potential Resource	Stakeholder/ Research/ Developer	Areas missing on drawings for wave inshore specifically noted around Pembrokeshire. Could be an issue as this is likely to be of interest to developers in early stages given access to land.	Noted, however the Atlas is limited in inshore areas. The issue is discussed in the 'Approach to Sustainable Development' report (WAG, 2011b).
Potential Resource	Stakeholder/ Research/ Developer	Test facility/nursery/prototype sites need to be considered. Not all developers, particularly in the next 5 years, will be in a state of readiness for full scale development.	Agreed, however a reasonable scale is required in order to assess the potential available resource.
Potential Resource	Stakeholder/ Research/ Developer	30MW likely to be too big for 1st arrays? Ambitious. Commercial projects may be up to 5-15MW? Possibly >10MW demo/1st small commercial, >10 full commercial.	Information used when assessing potential resource (WAG, 2011b).
Potential Resource	Research	2m/s mean spring is at surface not hub high, if hub high lower in water then device would only generate 300kW.	Information used when assessing potential resource (WAG, 2011b).
Potential Resource	Developer	Understand criteria approach setting at minimum level as this would be the approach taken by developers for initial overview of potential sites. Potential to consider faster tidal/large wave areas for more detailed assessment could provided smaller areas which would achieve same output as larger, low energy areas.	Information used when assessing potential resource (WAG, 2011b).
Potential Resource	Research	Rotate speed and distance parameters (distance used is too small - would have loss of energy between turbines) for resource assessment being looked at by EMEC. Pre British Standard. PEL114/11. To discuss in more detail with Miles.	Information used when assessing potential resource (WAG, 2011b).
Constraint	Stakeholder	Socio-economic difficult to value e.g. where collected from, variability of fish stock, variability of fishing effort, value of fish taken, (1st sale value, enhanced market value, 'profit' to fishermen, turnover?	Noted (see WAG (2011a) for data held).
Constraint	Stakeholder	Fishing Industry being 'squeezed'. Habitat Areas (SACs, SPAs and MCZs to come), aggregate dredging, MOD firing areas, wndfarms, tidal/wave energy. Is the fishing industry going to be squeezed into areas that remain? Is that practical?	Demonstrates importance of including commercial fisheries in the constraint mapping (see WAG (2011a) for data held).
Constraint	Stakeholder	Difficult to identify, but not all areas commercially fished are equal. E.g. key areas for trawling (tows) so sterilizing these areas will have disproportionate effect.	Demonstrates importance of including commercial fisheries in the constraint mapping.
Constraint	Stakeholder	Possibility of synergies e.g. Energy Area & MCZ?	MRESF project team in discussions with Welsh MCZ team.
Constraint	Stakeholder	Impacts on recreational fishing. Potentially high value - whole range of issues in calculating this.	Recreational fishing data included in Environment Agency GIS dataset.
Constraint	Stakeholder	Benefits of no fish areas.	Not a function of the MRESF.
Constraint	Stakeholder	Landmap data attributed to ICES are inaccurate (on several fronts).	Landmap data is the best dataset for this type of information covering Wales. All datasets have limitations, with the MRESF giving a confidence score (see WAG (2011b)).
Constraint	Research	Economic benefits of developing in proximity to existing windfarms to share infrastructure? Proximity to ports for construction/maintenance. Opportunities mapping?	For developers to consider during site selection.

Topic	Stakeholder Type	Point Raised	MRESF Response
Constraint	Regulator/advisor	How many constraint layers being considered? In the region of 65 for MRESF. CCW currently working on a number of datasets - seascape, birds, marine mammals to extract useful information/standardise for a number of factors (e.g. survey effort).	Awaiting data sets.
Constraint	Regulator/advisor	CCW looking at sub layer data for seascapes, birds, marine mammals etc. Not sure that this is appropriate for the purposes of a strategic study such as MRESF as this may be too detailed. Suggest that approach is high level for this project.	Noted.
Constraint	Regulator/advisor	CCW currently working on a number of datasets - seascape, birds, marine mammals to extract useful information/standardise for a number of factors (e.g. survey effort).	Awaiting data sets.
Constraint	Regulator/advisor	CCW to send on raw marine mammal data from Atlas as this is more useful for MRESF than interpreted dataset.	Awaiting data sets.
Sustainaibility	Research	Doubling up of areas to be used could provide more sustainable solution - using same infrastructure, small area for development, combined baseline 'characterisation' assessments etc.	For developers to consider during site selection.
Sustainaibility	Research	Carbon footprint of development should be considered as part of whether the strategic framework is sustainable? May only be possible at the site-specific level/consideration.	Not appropriate for a broad scale study such as the MRESF.
Datasets	Regulator/advisor	Bird data layers to be provided by CCW will merge existing bird data layers into 1. Currently exist at different spatial scales.	Awaiting data sets.
Datasets	Regulator/advisor	Concern that in all the important data layers, key messages may get lost. Will not remove requirement for site specific assessment.	Noted.
Datasets	Regulator/advisor	Uncertainty on how stage 2 feeds into stage 3.	Stage 2 increases the certainty upon which assessments of potential constraint can be made.
Datasets	Research	Need to be aware of all issues to make sure things don't get missed. Should capture the data gaps in the table presenting data sources.	Remaining data gaps are highlighted in the Technical Addendum.
Datasets	Regulator/advisor	Is there a place for mitigation when considering where to develop.	Mitigation needs to be considered on a site by site basis.
Datasets	Regulator/advisor	Keen to ensure that a strategic demonstrator stage is not missed out - i.e. look for lower energy sites. Can the project be used to identify such sites?	The project is looking at identifying sites with sufficient levels of energy, based on information on commercial needs of developers.
Datasets	Research	New report published - the IUCN Green Blue Energy Identifying and managing the biodiversity risks and opportunities of offshore renewable energy, ed Dan Wilhelmsson et al (www.iucn.org/marine).	Included in MRESF bibliography (WAG, 2011a).
Resource	Regulator/advisor	There may be areas of high nature conservation value, that have the highest energy resource, however there may be device designs that are suited to the location and may present a lower potential impact to the conservation designation. Care should be taken not to preclude the use of device designs in certain types of environment.	To be determined on a site by site basis. Currently insufficient information on potential impacts foe several issues to compare specific devices.
Resource	Regulator/advisor and Research	Concern that the demonstrator stage may get lost - consider it unlikely for developers to go straight for 30MW before testing at demonstrator sites, certainly in the next 5 years.	Agreed, however a reasonable scale is required in order to assess the potential available resource.
Resource	Research	Can a number of scenarios be presented according to the available resource? Potentially 2 ms-1 and 1.8 ms-1. Need to understand fully where that 2 ms-1 threshold originates and publish that subset of assumptions alongside the results of the study. Pragmatism involved here. MCT have developed in an area of high conservation value in Strangford Lough.	2m/s comes from developers as minimum energy needed for commercial development (some state higher values). Project team in discussion with Steering Group regarding the potential benefits of looking at lower energy, non commercial sites.
Resource	Regulator/advisor	Potentially run different scenario for 1.5m/s to see what this means	Project team in discussion with Steering Group regarding the potential benefits of looking at lower energy, non commercial sites.
Resource	Professional Body	The error margins are huge - do we need a subset of water to wire to take this into consideration. The Juice nPower study by ABPmer is useful.	Information used when assessing potential resource (WAG, 2011b).

Topic	Stakeholder Type	Point Raised	MRESF Response
Constraints	Regulator/advisor	Must ensure we do not get into a system of spatial zoning by the 2ms-1 resource issue, that precludes sensitive and sustainable development outside any potential zones.	The MRESF is aimed at understanding how sustainable the extraction of energy from certain areas is and is not intended to exclude development outside these areas.
Constraints	Regulator/advisor	Project dissemination, in particular access to the website, depends on what WAG wants. Don't want compromise on solid foundation and don't over complicate.	Noted.
Constraints	Professional Body	The main project outputs will need to be high, medium and low constrained areas so developers can choose.	To an extent will be driven by the data, but the intention is to have areas of greater and lesser constraint.
Constraints	All	General uncertainty about the need to present cumulative data layers in more detail on a 2 D image	Noted, however the project team feel that the approach brings benefits in understanding the data.
Constraints	Research	Geographic variability within designations will be an issue, but can this be accounted for given huge difference in data quality?	The application of geographic variability within a dataset is highly limited as the approach is only appropriate in very few datasets.
Scenarios	Professional Body	There is an apparent disconnect between the 5 year MRESF timeframe and 2025 target.	It is anticipated that the MRESF may need updating, however it is looking, at present knowledge, towards the sustainability of meeting the energy levels by 2025. The level of knowledge is anticipated to change, hence the 5 years for the MRESF.
Scenarios	Regulator/advisor	Favourable conservation status is an important factor for sustainable development but that doesn't mean that nature conservation features such as marine mammals should be ranked '5' - this sends the wrong message. But mitigations is important.	Noted.
Scenarios	Professional Body	The electricity grid is being built up in north Wales for Wylva including extra for wind, wave and tide.	Noted.
Scenarios	All	Limited knowledge of new cable routes - the north Wales/Ireland link seems fairly firm and the Ireland/Pembrokeshire link less so.	Cable routes included in GIS mapping are those already built or in planning.
Scenarios	Research	Ensure that sufficient justification is provided when scoping data layers out of the data set. Acknowledge the 'non issues'.	Noted.
Datasets	Research	Wave and Tidal SEA has been amalgamated into the offshore energy SEA.	Noted.
Datasets	Research	Additional dataset: Ariel bird survey data collected by the WWT is available. GIS layers available from WWT or JH. Also, the inventory of bird surveys 2000 (published Mar/Apr 2010) is available from the DECC website.	Awaiting CCW bird GIS data layers.
Datasets	Developer	When will the marine mammal report be published or data made available? Is it possible to get the data prior to report being published?	Report due to be published late summer. Would need to speak to WAG regarding data availability.
Datasets	Developer	Did the project team speak to developers about their data availability?	Developers provided data where it was possible to do so.
Datasets	Developer	Would WAG be willing to pay for developer datasets? This would provide an opportunity for developers to recoup costs.	Would need to be agreed on a case by case basis.
Datasets	Developer	Is it correct that the data won't be published?	All MRESF project reports will be published on the project website.
Datasets	Research	COWRIE has been replaced by zone by zone forums. RAG not going to be going forward. It's not possible to do something similar (as COWRIE) for wave and tidal as it's an embryonic industry.	Noted.
Datasets	Developer	MCT have commissioned SMRU to undertake a numerical modelling study on marine mammal collision risk. MCT have also been conducting seal monitoring at Strangford Lough and have reduced their shutdown perimeter to 50m. A lot of data has been collected and this is being fed into their model. Since SMRU also undertook the marine mammal collision risk study for MRESF, it would be useful for MCT to get some of this data.	Public domain information included in the MRESF bibliography (WAG, 2011a).
Datasets	Developer	There may be the possibility of MCT to provide data on O&M noise. The MCT data shows that there is perceivable noise coming from Seagen but it is comparable to ferry noise or pebbles washing on a beach.	Awaiting data.

Topic	Stakeholder Type	Point Raised	MRESF Response
		There is currently no available public data on this issue so any data that MCT could provide would be very useful in judging impacts.	
Datasets	Research	There are updates to navigation datasets from the MCA This has been included in the latest SEA This is provided on 3 layers, 5x5km, 1x1km and 100x100m. No major changes to the routes but the 100x100m data is very interesting in terms of how defined the routes are.	Shipping density data used in constraint mapping supplied by Anatec.
Datasets	Research	AIS misses out smaller craft although these are picked up by the RYA data (although small fishing vessels is not included).	The MRESF project includes GIS data layers for shipping, recreational boating and commercial fishing.
Datasets	Research	Data available on seabed mapping in the Bristol Channel. Available from DECC, BGS. BIOMOR is a subset of this.	Included in MRESF bibliography (WAG, 2011a).
Datasets	Research	CCW also have mapping data on the seabed from Milford Haven to Ramsey Sound.	Included in MRESF bibliography (WAG, 2011a).
Datasets	Research	In the SPP, the Originator of the Renewable Energy Resources data is cited as various sources, though the original source for all these datasets is DTI (now DECC).	The main source is the DTI, now DECC Atlas, however the information is supplemented by RPS held tidal stream data.
Datasets	Research	Seal Tagging. SEA funded tagging was conducted and the data for these are available.	Public domain information included in the MRESF bibliography (WAG, 2011a).
Datasets	Research	A post doc in St Andrews has just been started which will compile all the seal tagging data from the past 25 years (~500 tags) and analyse it all properly.	Included in MRESF bibliography (WAG, 2011a).
Datasets	Developer	MCT due to submit their ES by the end of august and have been told by CCW and WAG to include the marine mammal data collected by MRESF.	Should feed into the SEA and should be published in mid September. Possible to provide draft report/data.
Potential Resource	Developer	Seagen has been operating at 2.5m/s on spring tides for their 1.2MW device (2x16m blades, pitched rotor). Strangford is producing more than expected due to the tidal curve being a lot steeper than typical sinusoidal curve meaning more time at peak flow. There are significant differences in tidal stream in small areas.	Information used when assessing potential resource (WAG, 2011b).
Potential Resource	Research	Peter Frankael has recently written a paper on what is theoretically possible.	Public domain information included in the MRESF bibliography (WAG, 2011a).
Potential Resource	Developer	MCT still hasn't got a proper handle on spacing yet and is planning to do more work with Edinburgh University on this. They plan to increase their Seagen device to 1.4MW by increasing blade size to 20m.	Information used when assessing potential resource.
Potential Resource	Developer	MCT applying for 10MW demonstrator project in Skerries. This is because 10MW is the maximum size for a demonstrator project (as defined by the Crown Estate). Monitoring will be required due to it being a demonstrator project.	Noted.
Potential Resource	Developer	MCT were asked if consenting is easier due to monitoring data filling data gaps. CCW are probably a bit more positive (about the Skerries project) after Strangford Lough marine mammal data collection.	Noted.
Potential Resource	Research	MCT were asked if the Skerries project could be extended, what would they see as a commercial size development. Pentland Firth are looking for applications of up to 100MW but MCT thinks that 10MW is still financially viable.	Noted.
Potential Resource	Developer	MCT summary techno-economical report could be provided to MRESF.	Noted.
Potential Resource	Developer	Export cable route not addressed yet for Skerries site, just offshore consents. A substation would fall under onshore consents (T&CP Act).	Noted.
Potential Resource	Research	Numerical modelling is important. This needs to be used to predict impacts but biotope data is so rudimentary that this is unreliable.	Noted.
Potential Resource	Research	If devices are deployed in areas of low current speed then this takes away environmentally sensitive areas (high tidal stream environments).	Minimum tidal energy for commercial development comes from developers. Project team in discussion with Steering Group

Topic	Stakeholder Type	Point Raised	MRESF Response
			regarding the potential benefits of looking at lower energy, non commercial sites.
Potential Resource	Research	Wave energy is more complex as there are more factors to take into account, less data and less consensus. Also the resource is more variable (i.e. how bad the Caribbean Hurricane season is).	Noted.
Potential Resource	Developer	MCT have collected wake modelling data has been collected for the static device at Lynmouth but not while operational. There is potential for data to be provided.	Noted.
Constraint Ranking	Research	For the last SEA, only constraints 3 and 5 were used. If there was no (or very small) constraint, this was not investigated.	Noted.
Constraint Ranking	Research	Is there values in having so many categories?	This informs the sustainability assessment. If there is a minimal impact on a use then it has to be included. Acknowledgement of use even if it is easy to resolve.
Constraint Ranking	Developer	How are current uses prioritised? If a development is in the planning process already, how is this accounted for?	Issues such as Crown Estate lease (i.e. who holds the rights to use the seabed) and the order in which applications are formally submitted for planning.
Constraint Ranking	Research	Priority is also included in the constraints (i.e. European legislation takes priority) but it is up to WAG and their policies to determine whether Renewable Energy trumps all else.	The aim of the project is to test the sustainability of extracting wave and tidal energy and how this interacts with existing constraints.
Constraint Ranking	Developer	The constraint ranking has been decided by consents managers, it makes sense and will be very useful.	Noted.
Constraint Ranking	Research	When it comes to using the constraints, the MRESF needs to ensure that they are used properly and caveated. There will be a tendency for people to look at the maps/pictures without looking at the proper caveats. Difficult to properly caveat.	Noted – important not to use figures in isolation but to read in conjunction with the accompanying reports.
Constraint Ranking	Developer	Is the purpose of the MRESF to identify Round 2 OWF-type development areas or Round 3 OWF-type zones?	The intention is to identify areas of varying degrees of constraint and to understand how much energy has the potential to be extracted from these areas.
Constraint Ranking	Research	Marine Spatial Planning is very fluid. MRESF needs to be caveated properly to ensure people know what it is i.e. a guide to potential areas for developments?	Noted.
Constraint Ranking	Research	Straight lines on maps showing distinct areas are a bit misleading. Would it be possible to have grading across layers?	These are generated by the grid squares and are needed to calculate potential resource areas.
Constraint Ranking	Developer	The constraint layers are effectively being three things at once: 1) it shows the amount of data available, 2) it shows the number of constraints, 3) highlights whether a particular constraint is a significant issue. Overall, it's very useful.	Noted.
Scenarios	Developer	How were the WAG targets for renewable energy set?	The numbers represent the potential for marine renewable energy and have been calculated from earlier studies.
Scenarios	Research	In the SEA, a list of "Reasonable Alternatives" were also suggested.	If adapted as a plan, an SEA will be required (under the relevant SEA legislation). The aim is to deliver a series of options to WAG.
Scenarios	Developer	The point was made that what is most valuable to the Welsh economy/society etc isn't for the MRESF to decide but for the WAG and ministers to judge priorities. MCT agreed this was a sensible approach.	The MRESF is aimed at providing information, to be used as a tool for decision making and not to make the decision itself.
Scenarios	Research	Grid is a priority but resource is most important. Grid is a changeable situation and will be built in as developments progress. Possibility of ranking areas according to connectability.	Difficult to rank areas for connectability as the cost of connection may be more acceptable in some places for a large project and not for a small project – i.e. it would be highly variable.
Scenarios	Developer	How do developers feel about overall process? It is needed if WAG are going to push along with a licensing	Noted.

Topic	Stakeholder Type	Point Raised	MRESF Response
		round. Conflicts are already apparent. This provides a good evidence base for consenting.	
Scenarios	Developer	What is outlook for technology (5 years)? Array to be deployed in 2015 off W Scottish coast or Skerries. It will be a Seagen type device (i.e. surface piercing). Surface piercing is needed as OWFs have call out times of ~40 days (for tidal devices this is ambitious) and they need to be removed from the water for maintenance.	Noted.
Scenarios	Research	Are there any unsustainable constraints? Major navigation routes: increased fuel use etc. Also if navigation routes are constrained there is an increased collision risk. This will need attention. Standard collision risk assessments wont be adequate in the next 20-25 years.	The maximum constraint rank is defined as 'likely to preclude development'.
Datasets	Stakeholder	Have all RYA data and this represents RYA areas of sea use around Wales.	Held by the project (WAG, 2011a).
Datasets	Stakeholder	Will get back to MRESF on Irish Sea (e.g. MIDA and WWF research), shoreline management planning, flood and coastal erosion risk management data e.g. FutureCoastal (coastal evolution dataset).	Noted.
Datasets	Stakeholder	Useful data could be provided by BMAPA (seabed geology, topography, ecology. Try UK cable protection society (?) for up-to-date locations. Both are listed as stakeholders in Appendix C of SPP report.	Public domain information included in the MRESF bibliography and cable data held in GIS (WAG, 2011a).
Datasets	Developer	COWRIE reports - engineering mitigation measures for reduction of underwater noise. Other COWRIE reports do not seem to be included in research gaps appendix of SPP report. Crown Estate leasing rounds for offshore wind - sure it is included but need to make sure.	Included in MRESF bibliography (WAG, 2011a).
Datasets	Developer	Migration paths of fish etc in relation to tidal stream and wave energy areas. COWRIE projects could provide more information even though mainly focused on offshore wind e.g. COWRIE 2010 Effects of pile driving noise on fish behaviour.	Included in MRESF bibliography (WAG, 2011a).
Potential Resource	Stakeholder	Allow 10 x diameter of rotor downstream for next in line turbine. Sidewards, possibly only need 3 x diameter. The 10 x diameter requirement would reduce the number of devices within a fixed area Calculation of 2 m/s is based on top 50% of water column per m2 of water on a peak tide. Spacing of wave energy generators is complex and device specific.	Information used when assessing potential resource (WAG, 2011b).
Potential Resource	Stakeholder	Not area of expertise. No comment.	Noted.
Potential Resource	Stakeholder	Not area of expertise. No comment.	Noted.
Potential Resource	Developer	Important to be clear on criteria and justification for figures used e.g. 2m/s. There may need to be a consideration of variability in the baseline data used for the scenario developments and also useful for the future.	Noted.
Constraints	Stakeholder	Localised variability is important to recognise for constraints. Division of tidal devices into surface piercing and non surface piercing is artificial. A site developer will select which type of device will extract the maximum energy and will probably have the engineering expertise to do this more effectively than can be done in the current project. Division of wave devices into floating (surface piercing is a strange description) and bottom mounted (fully submerged is a less relevant description) is however relevant. There is little to no wave energy resource at depth in deep water; floating machines cannot be deployed in shallow water.	The MRESF is by necessity a broad scale and strategic project, providing a side benefit of placing a specific project in context. Site specific assessments will always be required to take account of local variability. The split between surface piercing/fully submerged is not aimed at energy extraction but rather differences in potential impact – primarily visual.
Constraints	Stakeholder	No discussion on 'other' constraints e.g. public perception/support as potential constraint. Need greater transparency on how constraints were graded.	The constraints that have been ranked are those for which a geographic map can be produced. Other types of constraint are discussed in detail in the Stage 1 report (RPS, 2008) and as a summary in the Approach to Sustainable Development (WAG, 2011b).
Constraints	Stakeholder	RYA would want to stress the importance of considering recreational boating separately from commercial shipping; the two need individual consideration.	The issues are ranked and mapped separately.

Topic	Stakeholder Type	Point Raised	MRESF Response
Scenarios	Stakeholder	Need to change terminology to 'stage' to avoid confusion of the process with the project outputs which are development scenarios.	Terminology amended from ‘scenario’ to ‘step’.
Scenarios	Stakeholder	Terminology tricky. Maybe pathway, steps or phases. Methodology is not clear - needs greater transparency.	Terminology amended from ‘scenario’ to ‘step’.
Scenarios	Developer	Scenarios is a strange description - stages in the process would be clearer.	Terminology amended from ‘scenario’ to ‘step’.
Datasets	Developer	Recreational datasets - to include surfing? Surf beaches, Blug flag beaches, diving sites of value via BSAC. EA Recreational Audit.	Coastal recreation information sourced from The Environment Agency and Pembrokeshire Coastal Forum (WAG, 2011a).
Datasets	Stakeholder	Marinas are on RYA website/dataset. Windsurfing not covered. Suggest contact British windsurfing.	Coastal recreation information sourced from The Environment Agency and Pembrokeshire Coastal Forum (WAG, 2011a).
Datasets	Stakeholder	Who would hold data?	The WAG or a consultant on their behalf. Data is compatible with the WAG metadata system.
Potential Resource	Developer	Energy assumptions - energy capacity is a of cubic function of flow i.e. increasing tidal stream from 2 to 3m/s etc.	Information used when assessing potential resource (WAG, 2011b).
Potential Resource	Developer	Big devices have cost efficiencies over small devices i.e. cabling, construction maintenance costs etc are the same but energy return is bigger for large devices. Current status of market would mean that it is unlikely to be economically viable to look at resource under 2 m/s (realistic). Equally, there is a top slice where high m/s would not be suitable as it would be too expensive to construct/maintain, big generator would be required, devices not yet designed to tolerate conditions etc. Window of opportunity is between this. Likely to become larger as window as devices enter the water and production costs are reduced and capabilities/understanding increase.	Information used when assessing potential resource (WAG, 2011b).
Potential Resource	Stakeholder	Estuaries - tidal stream resource. Not well mapped but good potential.	The main source of wave and tidal resource data is the DTI, now DECC Atlas, however there are data gaps in inshore areas (including estuaries), with the information supplemented where available by RPS held tidal stream data.
Potential Resource	Stakeholder	Pentland Firth bidding round based on 50-100MW arrays and would the same for commercial deployment in Welsh waters. Power station is 500Mw so 30MW is considered small to be commercially viable.	Information used when assessing potential resource (WAG, 2011b).
Potential Resource	Stakeholder	Energy Storage - pump storage in north Wales. Potential opportunity for turning intermittent energy into 'base load'.	Noted.
Constraints	Developer	Energy production per unit area is an important approach.	Information used when assessing potential resource (WAG, 2011b).
Constraints	Stakeholder	Can use energy production per unit area to inform consenting decisions/adaptive/precautionary approach to environmental constraints.	Noted.
Constraints	Developer	From a developers point of view resource is top on the agenda From a planning perspective this pushes into areas of environmental/socio-economic interest. Hard constraints of most concern.	Noted.
Constraints	Developer	Key constraint to development in Welsh waters is consenting and commercial appetite (based on available resource, consenting/regulatory regime, investment return, potential incentives, distance to shore/port etc).	Noted.
Scenarios	Stakeholder	Approach focuses on the device types rather than PM/utility company requirements who may just look at resource area and then select a device to fit.	Noted.
Scenarios	Stakeholder	Crown Estate leasing based on MW per km2 so commercial focus to leasing i.e. unlikely to obtain lease for large area but low output vs small area with high output. Need to ensure this to obtain licence from TCE.	Information used when assessing potential resource.
Scenarios	Developer	Wave spread out over a wider area, less geographically restricted. More difficult for wave in more tidal areas and therefore likely to be less overlap than potential perceived. Tidal devices also targeted at less wavey sites but not as significant an issue. Need to view wave and tidal as constraints to each other.	When resource areas are mapped, there is very little overlap between wave and tidal stream energy areas.

Topic	Stakeholder Type	Point Raised	MRESF Response
Constraints	Stakeholder	Opportunities - proximity to port, commerciality factor?	Ports are included in the constraint mapping.
Constraints	Stakeholder	RYA data ranked H, M, L for sublayers.	Noted.
Constraints	Stakeholder	Red/green - visually stop & go. Graduated colour scheme, textured or continuum of colours.	Colour changed to shades of blue.
Scenarios	Stakeholder	Agree that pathway/process and stages/steps would be less confusing than scenarios.	Terminology amended from 'scenario' to 'step'.
Scenarios	Developer	Grid. Is a significant issue as is distance to market. Flag up at a strategic level although appreciate difficult to drill down into detail at this level. High level asset plans?	Existing and planned grid shown on constraint mapping for informative purposes.
Potential Resource	Regulator/advisor	Concerns over use of 2m/s and overlap with important areas for ecology/designations and conflict. Suggest review NI SEA which uses 1.5m/s.	Minimum tidal energy for commercial development comes from developers. Project team in discussion with Steering Group regarding the potential benefits of looking at lower energy, non commercial sites.
Datasets	Regulator/advisor	Bird data - WWT working on this. Will include breeding colonies, aerial surveys, refine sensitivity, birds that raft together overnight (?) Should be available early August.	Awaiting data.
Datasets	Regulator/advisor	Marine mammal/birds 'encounter risk' being modelled by ABPmer. General device types based on a grid on encounter risk. Should be available mid August.	Awaiting data.
Datasets	Regulator/advisor	Also considering looking at fish data Temporal data (spawning, nursery for fish species). Demersal fish species and potential for association with sediment types and bathymetry. Unlikely to be available for MRESF timescale.	Noted.
Datasets	Regulator/advisor	Seascape & landscape (Exogensis). What RPS have from CCW is appropriate for strategic/regional review. CCW looking at more detailed local view but this would only be required at the site-specific stage.	Noted.
Datasets	Regulator/advisor	Marine mammal. 500 seal tag dataset potentially being reviewed for PhD with SMRU.	Noted.
Datasets	Regulator/advisor	HabMap. Clare Eno sensitivity to fishing gear type, physical disturbance etc. May provide surrogate assessment on sensitivity of benthic habitats to deployment W&T deployment?	Included in MRESF bibliography (WAG, 2011a).