Shetland Marine Spatial Plan: Developing spatial guidance for renewables

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Summary
The Shetland Islands are highly dependent upon the marine environment, with marine industries currently contributing over 40% of Shetland’s economic output. The Shetland Marine Spatial Plan (SMSP) was initiated in 2006 to guide development around the Shetland coast. The SMSP contains spatial data on the marine and coastal environment and its uses and establishes an overarching policy framework. It has been successfully used to guide developers in proposing changes to existing uses and introduction of new uses. Currently there are no marine renewable developments in Shetland; however it has been identified as an area of significant resource potential. A spatial model has been developed for the SMSP to guide the placement of this emerging industry, by combining locally collated and validated information on environmental, economic and social uses. The model shows levels of constraint in the planning regime, reflecting an iterative process of consultation with local advisors, planners, regulators, communities and developers. The model is designed as a decision support tool to assist in making more informed decisions about where developments are likely to be successful and where they are not. The outputs of the spatial model have been linked to policy within the SMSP.

Introduction
Over the last decade the marine renewables industry has been subject to significant research and development investment, driven by increasing concerns over climate change and energy security. The Scottish Government has set a target of 100% of Scotland’s electricity demand being met by renewable sources by 2020 (Scottish Government, 2011). It is anticipated that marine renewable energy sources (tidal and wave power) will play an important role in reaching these objectives. Whilst the development of a marine renewables industry is generally looked upon favourably, consideration must be given to potential environmental and social impacts, as well as conflicts with other users. In Shetland the development of a marine renewable industry is still in its infancy and is limited by the absence of an interconnector to the UK national grid. However, it is anticipated that an interconnector will be in place by 2018 and the Shetland Islands have been identified as having potential for both tidal and wave powered developments (Scottish Government, 2007; Natural Power, 2011). Within Shetland developers must gain both a Works Licence, issued by the Shetland Islands Council, and a Marine Licence, issued by Marine Scotland. One exploratory Works Licence has been granted by the Shetland Islands Council for a wave energy device, and a Works Licence and Marine Licence have been granted for a small scale, community owned tidal energy device.

To help guide the placement of renewable energy developments and associated cable landings, ArcGIS® has been used to map spatial data on development constraints. This guidance forms part of the ‘The Shetland Islands’ Marine Spatial Plan’ (SMPS) which was first developed as a pilot in 2006 and was subsequently voluntarily adopted by the local advisory group, including the Shetland Islands Council in 2008 and is used to guide and to assess the siting of marine developments (NAFC, 2012).

Methodology
The SMSP has previously identified and mapped marine features and maritime activities in Shetland’s waters through a process of consultation with local advisors, planners, regulators, communities and developers (NAFC Marine Centre, 2012). The spatial extents of these features and activities have been subject to local consultation, producing both local datasets and locally amended national datasets.
Initial consultation with local stakeholders and marine renewables companies provided details of features which would potentially be adversely affected by marine renewable development. Each of these features became a ‘constraint layer’ within the spatial model. Thus the model considers only features that may be negatively impacted by marine renewables developments, and so are in potential conflict with new development. Individual features underwent further consultation with local stakeholders, in order to establish both the level and spatial extent (which may extend beyond the features boundaries) of the constraint they represent. This data was used to create a spatial model using ArcMap 10.0 showing areas of potential development constraint for wave and tidal energy devices based on economic, cultural and environmental activities and features in the marine and coastal environment. The spatial guidance was separated into two distinct sub-models, one focusing on constraints to developments at sea, and the other focusing on constraints to cable landing sites at the coast. Engagement with stakeholders was used to ensure that relative constraint levels attributed to the data reflected both local and national values and was consistent with policies with SMSP.

Results and Discussion
The model output was mapped, showing total constraint both at sea and at the coast which were then colour coded into four relative constraint levels, ‘low’, ‘medium’, ‘high’, ‘very high’, Figure 1. The model is designed as a decision support tool to assist in making more informed decisions about where developments are likely to be successful and where they are not. The maps do not conclusively depict sites for marine renewable developments, but instead are designed to give developers an insight into areas of the marine environment which are already valued, and the ability and/or willingness for local stakeholders or communities to absorb any development impacts. This can enable developers to understand potential conflicts that might be negated if addressed at an early stage of any development proposal.

The outputs from the model have been integrated into the SMSP through an additional marine renewables policy (NAFC, 2012; Tweddle et al., 2012). The policy is intended to guide developments towards areas of low constraint, and encourage the development of mitigation measures in areas of medium to very high constraint. The findings of this assessment are part of an ongoing process, integral to which is the regular review and updating as new information is captured and reflects any changing use and values are placed on the marine environment and features within it.

References
NAFC Marine Centre (2012). A Marine Spatial Plan for the Shetland Islands (3rd Ed.) Published by NAFC Marine Centre. (http://www.nafc.ac.uk/SMSP.aspx)