

1 INTRODUCTION

1.1 Background

Scottish Executive has commissioned a Strategic Environmental Assessment (SEA) to assess the potential environmental effects from the development of marine renewables (wave and tidal devices) off the coast of Scotland. The results from the SEA will be used by the Scottish Executive to inform the development and implementation of its strategy for marine energy.

A number of additional (support) studies are being undertaken to address the gaps in information and understanding identified in the Scoping Report. These are taking the form of reviews of existing research and information to assess the issue based on the current states of knowledge. It is acknowledged that the studies will not be able to fully address existing gaps in knowledge and therefore this support study also identifies and details specific future research needs with priorities that will help address the remaining gaps in information.

Marine and Risk Consultants Limited (MARICO Marine) was commissioned by The Scottish Executive to provide information related to maritime traffic and navigation risk in the area of northern and western Scotland. The purpose of the project was to inform decision-makers about potential risk arising from passing ships to areas considered for marine renewables development.

1.2 Shipping & Navigation Assessment

This project was not intended to, nor meets, the requirements of MGN 275(M)⁴ that apply to developers. Instead it presents an overview of traffic levels at present and historically in order to assess whether any immediate risks may be present that would preclude the development of marine renewables in the potential development locations and to provide information based recommendations to development location should it be felt that they are required.

It is proposed that the developers of any offshore project perform a full vessel traffic survey and navigation assessment for each site to the requirements of MGN275(M), should it be decided that an application for consent is to be submitted. In addition the constraints of the MCA draft shipping route template⁵ and the DTI methodology⁶ for assessing risks, although aimed primarily at wind farm developments, may be considered appropriate to wave and tidal devices.

⁴ UK MCA Proposed UK Offshore Renewable Energy Installations (OREI) – Guidance on Navigation Safety Issues – Marine Guidance Note MGN275(M)

⁵ UK MCA – Draft Windfarm “Shipping Route” Template

⁶ UK DTI – Guidance on the Assessment of the Impact of Offshore Windfarms

1.3 The Report

This report presents the findings from the assessment of vessel traffic data collected during the periods 18th – 31st January and 1st – 14th August 2006 by the use of the UK Maritime and Coastguard Automatic Agency's Identification System⁷ (AIS) network, combined with examples of data obtained during surveys of MEHRA (Marine Environmental High Risk Areas) conducted by MARICO using radar and AIS, providing a comparable data set for individual sites at different times of year to assess the traffic levels at one location to that of another and to identify any seasonal variations that may occur at or between different locations.

1.4 The Vessel Traffic Data

The data collected by the use of the AIS network provided over 10 million records during the total 28 day period, with over 100,000 records containing erroneous or no data that had to be amended manually. Only a very small number of vessels were identified as non-transit users due the requirements of AIS to be carried only on merchant vessels or vessels of 300GT or more (See footnote 7 below)

Data presented from the earlier MEHRA surveys included the radar tracking of non-transit users to help identify local trends otherwise not noticed.

1.5 Charts

Charts used in this report are not for navigational purposes. Unless otherwise stated, they are covered by SeaZone Solutions licences. Where applicable, the areas identified by the Scottish Executive as potential development sites are presented as overlays. These areas of development interest are not included on the charts in this report and are subject to change.

⁷ Automatic identification systems (AISs) are designed to be capable of providing information about the ship to other ships and to coastal authorities automatically. The requirements are regulated by the International Maritime Organisation and the regulation requires AIS to be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages and all passenger ships irrespective of size. The requirement became effective for all ships by 31 December 2004

1.6 Locations

The red areas shown in **Figure 1** represent potential areas of development for wave devices, the blue areas for tidal devices. The specified study area is from the Solway Firth to the Pentland Firth including the western side of the Northern Isles, areas not already covered by the above colours are shown in green. The east coast of Scotland is excluded from this study although some plots show recorded vessel tracks on the east coast for comparison.

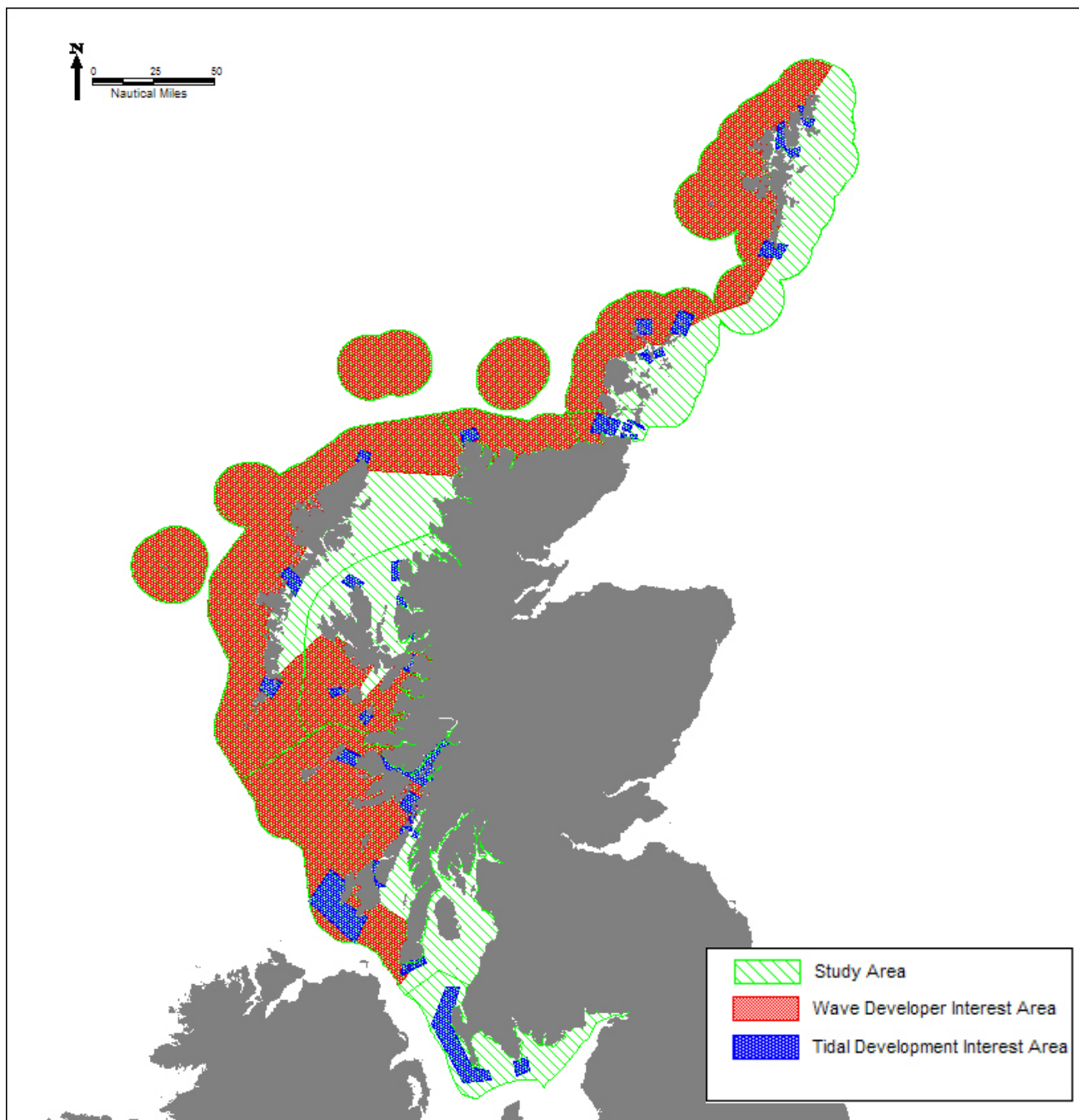


Figure 1: Plot of SEA Study Area ad Areas of Interest for Development

2 VESSEL TRAFFIC SURVEYS

2.1 Vessel Traffic Data

In response to the requirement of the project to assess vessel traffic in the study area, with particular focus on the areas of interest for development, vessel traffic data was collected from the UK Maritime and Coastguard Agency's (MCA) vessel Automatic Identification System (AIS) monitoring network. Vessels of 300GT and above are required to carry the AIS equipment, therefore the records should include well over 90% of commercial vessels; allowing for some transmission losses and other technical problems. However, naval vessels and vessels under 300GT are not required to carry the AIS equipment. Therefore small commercial ships, most naval vessels, most yachts, recreational craft and fishing vessels will not be included in the data set. The percentage of vessels thus outside the data set will vary greatly between areas but could be from 10 to 50% at some times of the year.

For these vessels to be included future detailed surveys by observation, radar and AIS would have to be carried out. This is in line with our recommendations for survey of individual sites (**See Section 8**)

Within the limitations stated above, the use of the AIS data for vessels of 300GT and above enabled coverage of the entire area for the duration of both 14 day periods (18-31 Jan and 1-14 Aug 2006), providing a comparable data set for individual sites at different times of year to assess the traffic levels at one location to that of another and to identify any seasonal variations that may occur at or between different locations.

2.2 Data Sources

Vessel traffic data for ships equipped with AIS was obtained from the UK MCA's AIS network, recording from multiple shore stations located around the UK coastline on a 24/7 basis. Vessels were recorded within the range of these stations (VHF radio range – approximately 24 Nautical miles (Nm)).

No radar based surveys were undertaken for this project to provide coverage for tracking small vessels such as pleasure craft and fishing vessels, therefore coverage of these vessel types is based on the requirements of AIS and data from the MARICO MEHRA surveys. At present very few small pleasure/fishing vessels carry AIS transponders.

2.2.1 Yachts

Information contained in the Royal Yachting Association's Coastal Atlas of Recreational Boating⁸ showing yacht routes was also considered as shown in Section 3.3.6. The atlas only shows typical routes that yachts take.

⁸ Whilst routes may vary, the RYA, has collated typical routes that yachts use into the Coastal Atlas of Recreational Boating which is available from the RYA.

2.2.2 Fishing Vessels

Few fishing vessels are fitted with AIS and therefore are generally not included in the data sets. When considering the effects of fishing vessels on navigation, it should be noted that they make passages to and from their fishing grounds but once there, their dwell time and manoeuvring increases their effect on navigation within the area. Therefore, these factors will have to be considered in the future.

2.3 Plotting Vessel Traffic Data

The vessel data has been plotted so that the individual path taken by each vessel is represented by a single track line overlaid on to charts. Therefore the areas with no vessel traffic recorded will be white while those areas with most vessel traffic recorded will have a many tracks and tend to be very dark.

2.4 Objectives

The objectives of the assessment of the above data were to identify and assess:

- Location of the potential development sites of interest to developers relative to areas used by marine craft;
- Numbers, types and identification of vessels presently using such areas, including course, speed, name, IMO classification and nationality where possible;
- Non-transit uses of the areas, e.g. fishing , leisure craft, aggregate dredgers etc;
- Whether the areas contain transit routes used by coastal or deep-draught vessels on passage; and
- Alignment and proximity of the proposed development sites relative to adjacent shipping lanes.

2.5 Recording Periods

The recorded vessel traffic data was converted to track data for the periods of 18th to 31st January 2006 and 1st to 14th August 2006.

2.6 Data Collection Methodology

The two periods of recorded data were supplied by the MCA in raw AIS format with the coverage included the entire UK coastline, resulting in the provision of two extremely large files. Marico's in-house software decoded and converted the raw data into a sequential database format, removing records outside of the study area, whilst attaching vessel details. The resulting output files contained track files for the periods of the recording having all data attached to each record per minute in MapInfo Import formats. The MapInfo files were concentrated into a continuous GIS Database, covering the periods of recording.

2.7 Data Processing

The MapInfo database files contain positions with data linked for all tracked targets over the survey periods at one minute intervals. Field names and type of data contained in the database are shown in **Table 1**.

FIELD NAME	DETAILS
DATE	Daily Date
TIME	Daily Time (UTC)
GMINS	Daily Running Minutes (0 -1440)
SOG	Speed Over Ground (Knots)
COG	Course Over Ground (Degrees)
HDG	Vessel Heading (Degrees)
LAT	Latitude Position
LON	Longitude Position
NAME	Vessel Name
CALLSIGN	Vessel Call Sign
SHIPGROUP	Abbreviated Ship group to simplify searches
SHIPTYPE	Ship Type Description
DRAUGHT	Maximum Draught during present transit
BOUND	Port of Destination
IMO	IMO Number
MMSI	MMSI of AIS equipped Vessels
DIST	Dimensions of Vessel

Table 1: Field Names in Vessel Database

The table structure used was identical for both survey periods in order that the two data sets were comparable. It should be noted that the information transmitted by AIS provides only basic data regarding the vessel type and does not make the distinction between different types of Tankers and Dry Cargo (i.e. Crude Oil tankers versus Vegetable Oil tankers); however it does provide a good overview of the vessel groups using the area.