AIS Marine Traffic Validation
Appendix 12B

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00	22 December 2018	Initial Draft
00a	02January 2018	NIRAS Review
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01	15 February 2018	Final Draft
02	08 May2018	Final Draft Review
03	29 May 2018	Final Draft Comments
04	13 June 2018	Further Review of Comments
05	20 June 2018	Final Submission

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1. Executive Summary

This Appendix of Chapter 12 (Shipping and Navigation), of the EIA Report presents an assessment of the marine traffic within the vicinity of the optimised Seagreen Project, as detailed in Chapter 5 (Project Description) of the EIA Report.

As set out in Chapter 1 (Introduction) of the EIA Report, the original Seagreen Project (herein referred to as the originally consented Project) received development consents from Scottish Ministers in 2014. This was confirmed in November 2017, following legal challenge by the Royal Society for the Protection of Birds (RSPB) to the consent award decision. Seagreen is now applying for additional consents for an optimised design (herein referred to as the optimised Seagreen Project), based on fewer, larger, higher capacity Wind Turbine Generators (WTGs) that have become available, since the 2014 consent decision, and inclusion of monopiles as a foundation option.

Seven years have elapsed since the marine traffic survey data used in the original 2012 Navigational Risk Assessment (NRA) (Appendix 12C (Project Alpha and Project Bravo 2012 NRA) of the EIA Report) for the originally consented Project was collected. A marine traffic validation exercise has been undertaken to compare the 2011 data used in the 2012 NRA against 2017 data collected to support an NRA Addendum (Appendix 12A (NRA Addendum) of the EIA Report). This validation will ensure that the baselines are comparable and can be used to make an effective assessment within the Environmental Impact Assessment (EIA) Report, submitted as part of the optimised consent for Project Alpha and Project Bravo (the optimised Seagreen Project).

From 28 days of Automatic Identification System (AIS) data (consisting of 14 days in February and March 2017 and 14 days in July and August 2017) assessed within the study area, identifiable changes associated with fishing patterns were observed when compared to the 2011 NRA survey data.

Throughout the 2017 winter survey period there was an average of 18 unique vessels per day recorded within the study area, representing a small increase when compared to the 2011 NRA survey data (16 unique vessels per day). During the 2017 summer period there was an average of 20 unique vessels per day recorded, also representing an increase when compared to the 2011 NRA survey data (14 unique vessels per day).

Vessel routeing has changed during the 2017 survey period, with three routes recorded in the 2011 survey period, no longer reflected. These routes were low use and therefore this does not constitute a major change in traffic between the two survey periods. It is also noted that vessels were observed to intersect the optimised Seagreen Project within the 2017 data on similar passages to these three routes, however not to the extent that a route could be defined.

The 2017 survey presents all main routes intersecting the optimised Seagreen Project plus a minimum 10 nautical mile (nm) buffer compared to the 2011 survey which presents only the routes intersecting the originally consented Project. Therefore, the 2017 survey allows greater consideration of routeing on approach and on departure from the study area.

Overall the routes present in the 2017 survey data, that were also present in the 2011 survey data, have not changed markedly in terms of mean positions and vessel numbers; just the extent to which they have been considered in line with current marine guidance.

In terms of the overall traffic levels within the study area, the changes observed between the 2011 NRA survey period and the 2017 survey period are not considered to change the conclusions of the assessment, or significantly increase impacts on receptors. In terms of changes in the number of vessels of each type, there are no notable changes with the exception of fishing vessels and tankers.

In summary, the baseline assessment of 2011 marine traffic within the 2012 NRA and the 2017 validation survey data are comparable in terms of traffic volumes. Therefore the 2017 validation survey data can be used as an assessment tool to inform the 2017 EIA Report (Chapter 12 (Shipping and Navigation)) submission.

2. Introduction

2.1 Overview

Seagreen Wind Energy Limited (Seagreen) is submitting an EIA Report to accompany an optimised consent application for the optimised Seagreen Project. The location of the proposed development is within the North Sea, in the outer Firth of Forth and Firth of Tay region (see Figure 3.1).

The optimised Seagreen Project referred to throughout this report describes the area which includes the proposed offshore wind farms, Seagreen Alpha Offshore Wind Farm (OWF), hereafter referred to as "Project Alpha" and Seagreen Bravo OWF, hereafter referred to as "Project Bravo". The study area referred to throughout this report is the combined sites and a minimum 10nm buffer around it.

Seagreen have commissioned Anatec Limited to undertake a marine traffic validation exercise to update the 2011 survey data used in the 2012 NRA (Appendix 12C (Project Alpha and Project Bravo 2012 NRA) of the EIA Report) for the optimised Seagreen Project with AIS traffic data from 2017. The purpose of this exercise is to determine whether or not there have been any material changes to vessel traffic in the study area and therefore whether there would be a requirement to undertake an updated NRA based on changes in traffic volumes and on routeing. This validation exercise has also ensured that the information for the new application meets the requirements outlined in the Maritime and Coastguard Agency's (MCA) Marine Guidance Note (MGN) 543. It is however noted that no radar traffic survey has been carried out as part of this work. The smaller vessels not on AIS would not be expected to add significant levels of traffic in addition to the tracks recorded on AIS at this location, given the distance from shore.

2.2 Purpose of Validation Exercise

The 2011 marine traffic survey data (AIS and radar) used for the NRA application in 2012 (Appendix 12C (Project Alpha and Project Bravo 2012 NRA) of the EIA Report) was collected across two separate periods – 14 days in March 2011 and 26 days in June and July 2011 – both from dedicated survey vessels. As seven years have now elapsed since this data was collected it is considered necessary to assess newer AIS data, to ensure the original findings remain valid, Therefore, 28 days of AIS data – 14 days in February and March 2017 and 14 days in July and August 2017 – has been assessed.

3. Validation Survey Methodology

3.1 Study Area

Figure 3.1 presents the location of the optimised Seagreen Project, relative to the United Kingdom (UK) coastline and a buffer which together constitute the study area considered throughout the following analyses. The buffer (minimum of 10nm) used in the 2017 validation survey is the same buffer extent previously used in the 2011 NRA survey to allow a valid comparison.

The Project is located within the North Sea, in the outer Firth Of Forth and Firth of Tay region, approximately 15nm (27 kilometres (km)) east of the Angus coastline. The optimised Seagreen Project is an optimised design of the 2014 originally consented Project. The Project comprises an area of approximately 114nm^2 (391km^2) located to the east of Scalp Bank. The Project optimisation does not include the Offshore Transmission Asset, as the existing 2014 licence remains valid however, risk assessment of offshore substation platforms (OSPs) is considered within Chapter 12 (Shipping and Navigation) of the EIA Report. The OSPs are included within the risk assessment as they are an integral part of the array therefore were required to be included within the collision and allision modelling (see Appendix 12A (NRA Addendum) of the EIA Report).

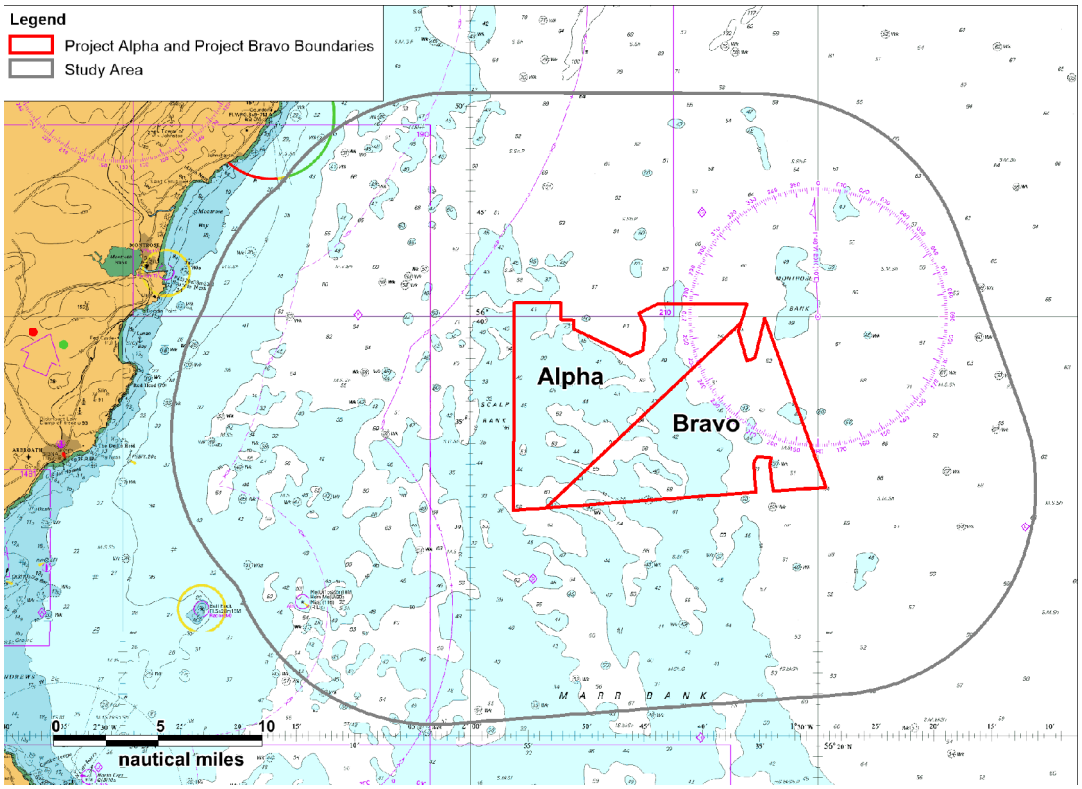

Figure 3.1 Optimised Seagreen Project and Study Area

3.2 Survey Data Summary

This report presents an analysis of 40 days of AIS and radar data collected within the study area for the 2012 NRA and 28 days of AIS for the 2017 validation study. The survey periods analysed are summarised in Table 3.1. These periods were selected to cover both tidal and seasonal variations, as required by MGN 543, as well as being within two years of submission.

Table 3.1 Summary of Survey Data

Survey	Season	Survey Period	Data Type	Data Capture
NRA Survey (2011)	Summer	20th June – 21st July 2011	AIS and Radar	26 Days
	Winter	12th March – 26th March 2011	AIS and Radar	14 Days
Validation Survey (2017)	Summer	21st July – 3rd August 2017	AIS	14 Days
	Winter	16th February – 1st March 2017	AIS	14 Days

3.3 Summary of AIS Carriage Requirements

Regulation 19 of Safety of Life at Sea (SOLAS), Chapter V – Carriage requirements for vessel borne navigational systems and equipment – sets out navigational equipment to be carried on board vessels, according to vessel type. In 2000, the International Maritime Organization (IMO) adopted a new requirement (as part of a revised chapter V) for vessels to carry AIS.

AIS is required onboard all vessels of more than 300 gross registered tonnage (GRT) engaged on international voyages, cargo vessels of more than 500 GRT not engaged on international voyages, passenger vessels irrespective of size built on or after the 1st July 2002, and fishing vessels equal to or greater than 15 metres (m) in length from the 31st May 2015 onward. A proportion of smaller vessels (fishing and recreational vessels) also carry AIS voluntarily. It is noted that at the time of the 2011 survey, fishing vessels equal to or greater than 24m but less than 45m in length were required to carry AIS.

4. 2011 NRA Survey Results

4.1 Introduction

This section presents analysis of the vessel tracks recorded within the study area throughout the 2011 survey periods for use in the 2012 NRA (Appendix 12C (Project Alpha and Project Bravo 2012 NRA) of the EIA Report).

4.2 Survey Results

Figure 4.1 (taken from the NRA undertaken in 2011 (Appendix 12C (Project Alpha and Project Bravo 2012 NRA) of the EIA Report) presents the vessel tracks, colour-coded by vessel type, recorded within the study area throughout the winter 2011 survey period. Following this, Figure 4.2 presents the vessel tracks recorded during the summer 2011 survey period.

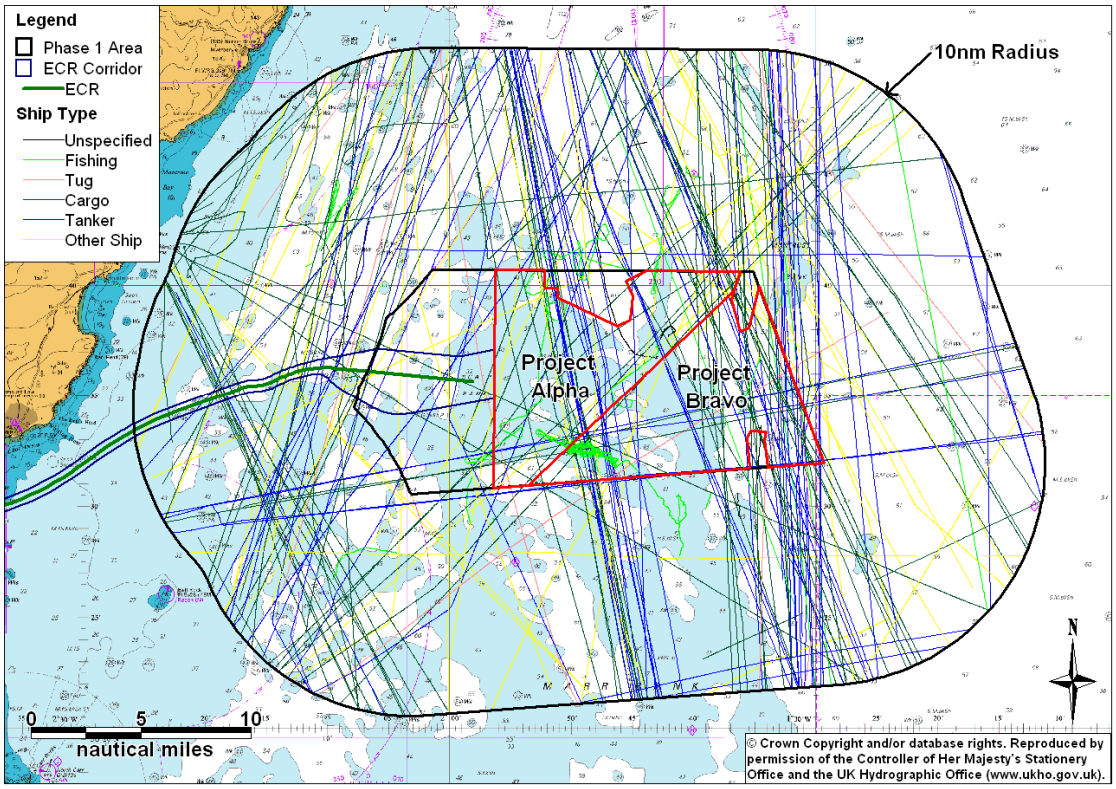

Figure 4.1 2011 Winter Survey Data Colour-Coded by Vessel Type

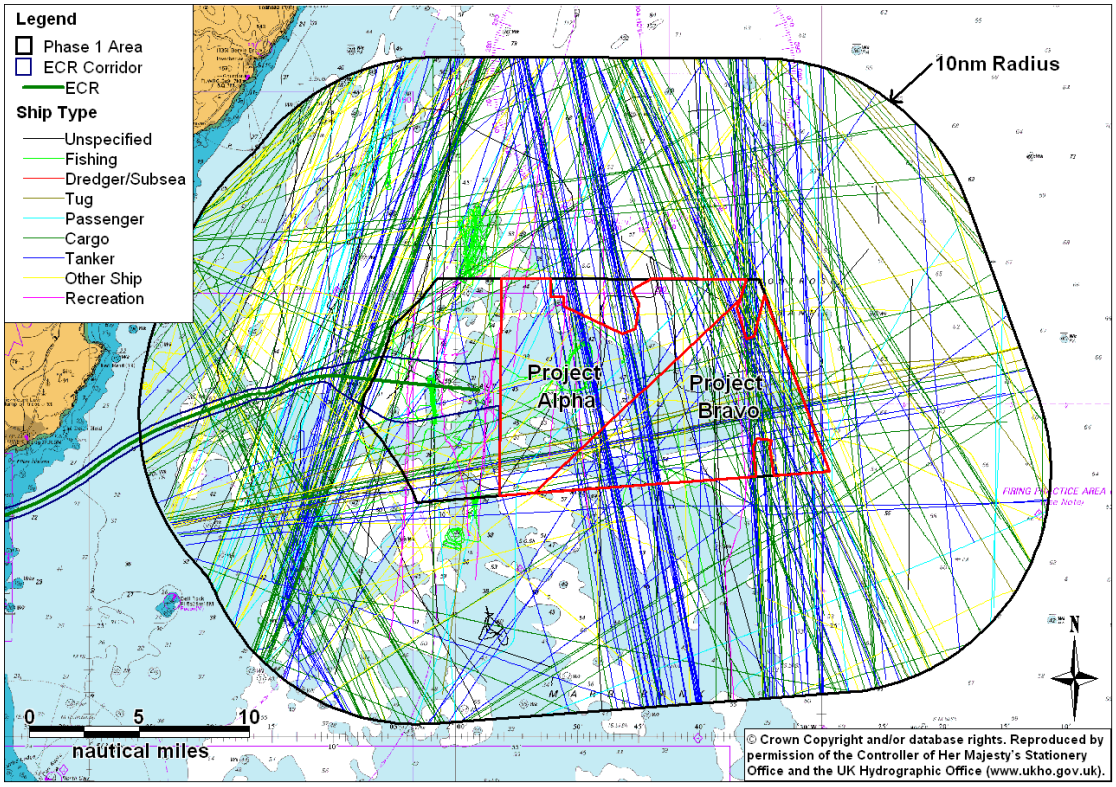

Figure 4.2 2011 Summer Survey Data Colour-Coded by Vessel Type

Figure 4.3 presents the type distribution for the combined survey periods, where vessel counts are based upon the number of unique vessels recorded per day.

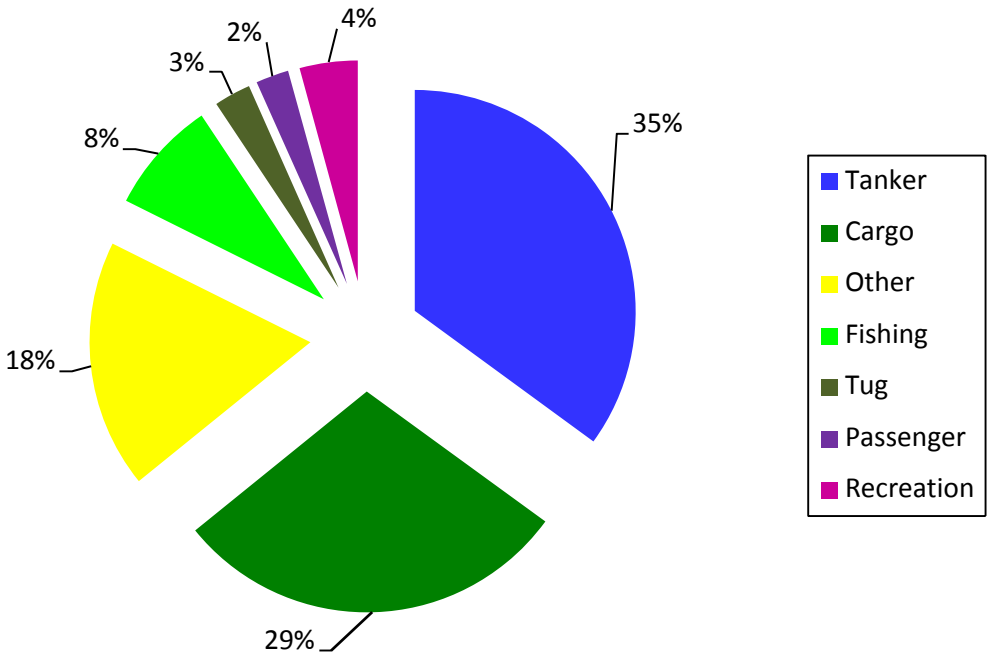

Figure 4.3 2011 Survey Data Vessel Type Distribution

4.3 Main Routes

The main routes and corresponding 90th percentiles identified from the 2011 NRA survey data are presented in Figure 4.4 and Figure 4.5, respectively.

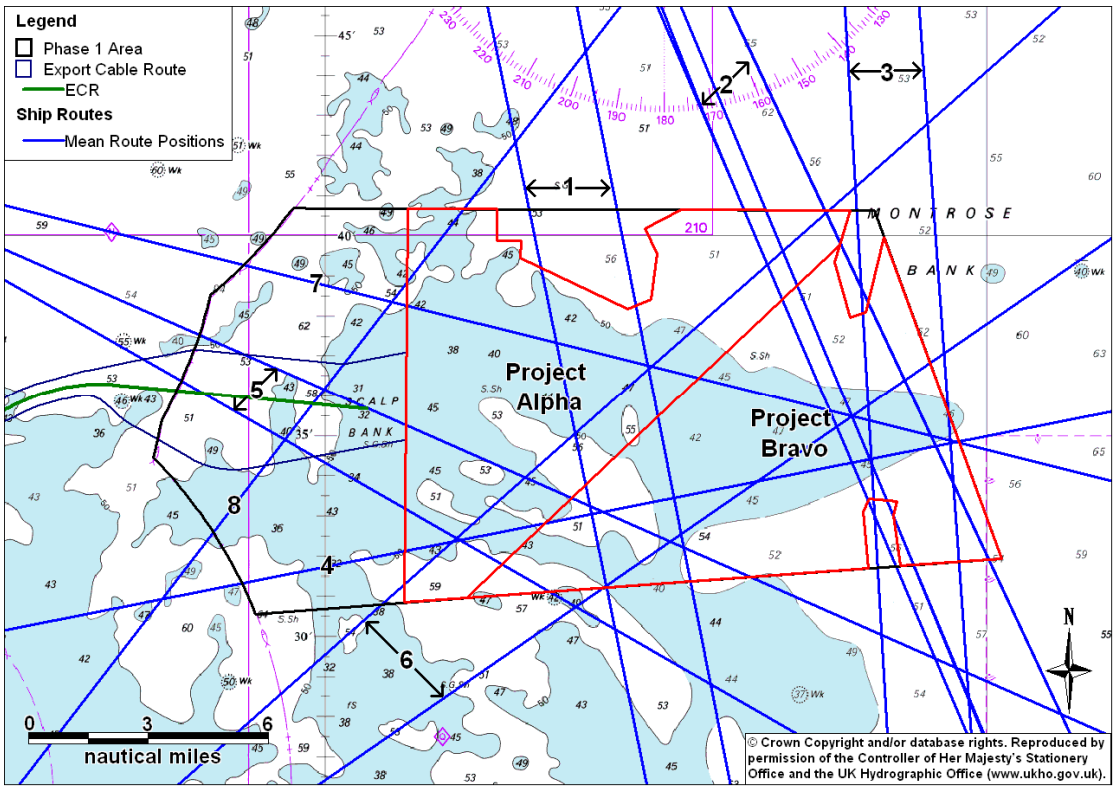

Figure 4.4 2011 Survey Main Routes

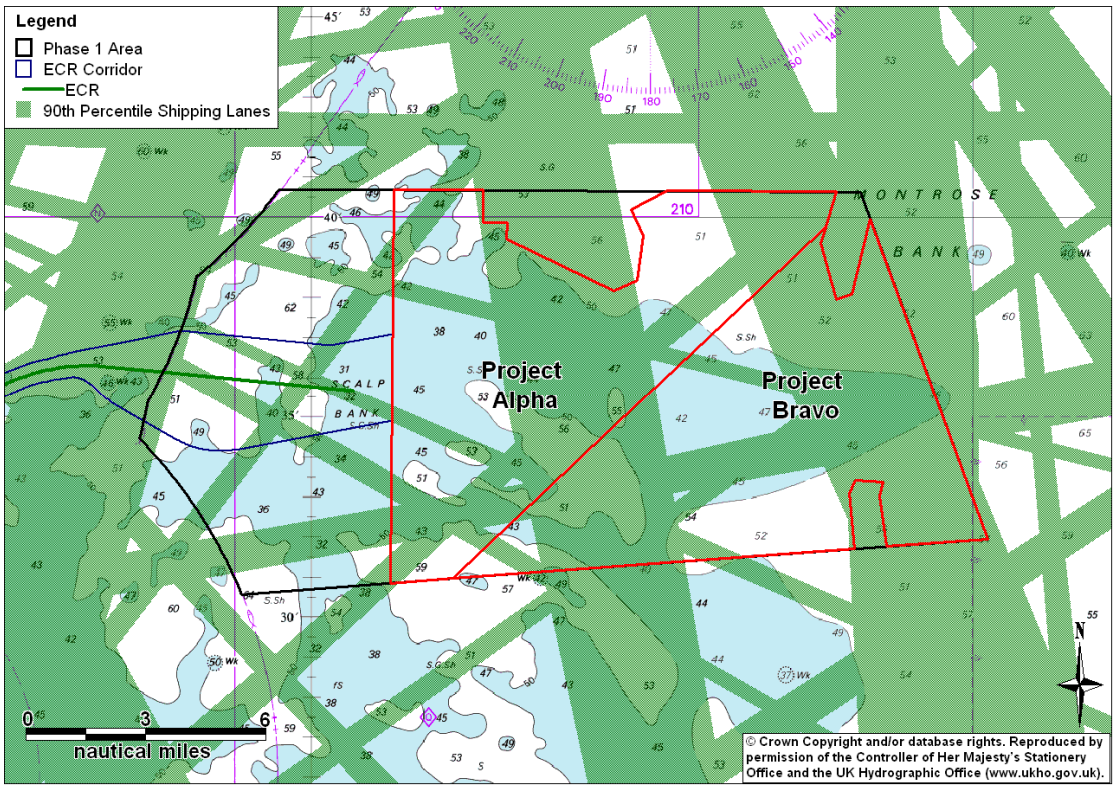

Figure 4.5 2011 Survey Main Route 90th Percentiles

A description of each of the main routes identified from the 2011 survey data is presented in Table 4.1.

Table 4.1 Description of Main Routes from 2011 Survey Data

Route Number	Average Vessels per Day	Main Vessel Types	Description
Route 1	1.6	Tanker	A wide route mainly used by tankers (70%) headed between Aberdeen and the Humber (Immingham).
Route 2	1.3	Cargo/Tanker	A wide route mainly used by larger vessels than those on Route 1 (cargo vessels (57%) and tankers (24%)), headed between Aberdeen, Belgium, The Netherlands and the Humber (Immingham).
Route 3	1.3	Cargo/Tanker	A wide route mainly used by

Route Number	Average Vessels per Day	Main Vessel Types	Description
			tankers (59%) and cargo vessels (31%) headed between Northern Scottish ports including Inverness, Lerwick, Invergordon, Buckie and Peterhead to the Humber (Immingham).
Route 4	0.5	Cargo/Tanker/Oil and Gas	Used by cargo vessels (39%), tankers (33%) and offshore vessels (28%). Vessels are headed between offshore platforms (e.g. Elgin Field), Scandinavian ports (Gdansk, Copenhagen and Gothenburg) and Dundee and Perth.
Route 5	0.1	Cargo	Low use route used by cargo vessels between Montrose and Germany/Denmark.
Route 6	0.2	Cargo/Oil and Gas	Low use route. Used by cargo vessels and offshore vessels. A small number of cruise/passenger vessels also use this route. Vessels are headed inbound to Leith and Rosyth, with a number of outbound vessels headed to the North Sea and Norwegian ports of Bergen and Stavanger.
Route 7	0.03	Cargo	Very low use route used by cargo vessels between Montrose and Denmark.
Route 8	0.08	Cargo/Tanker	Very low use route used by large tankers and cargo vessels headed to Grangemouth, Hound Point and Leith.

5. 2017 Validation Survey Results

5.1 Introduction

This section presents analysis of the vessel tracks recorded on AIS within the study area throughout the 2017 validation survey. The data analysed was recorded from a shore based receiver rather than a dedicated survey vessel as agreed with the MCA. This provided full coverage of the study area throughout both survey periods. Survey vessel tracks recorded as actively engaged in a survey were classified as temporary (non-routine) traffic, and therefore have been excluded from further analysis. Vessels are assessed by type, number and size as required by MGN 543.

5.2 Vessel Type

Figure 5.1 and Figure 5.2 present the vessel tracks, colour-coded by vessel type, recorded within the study area throughout the 2017 winter and summer survey periods. Following this, Figure 5.3 presents the vessel type distribution for the combined survey periods.

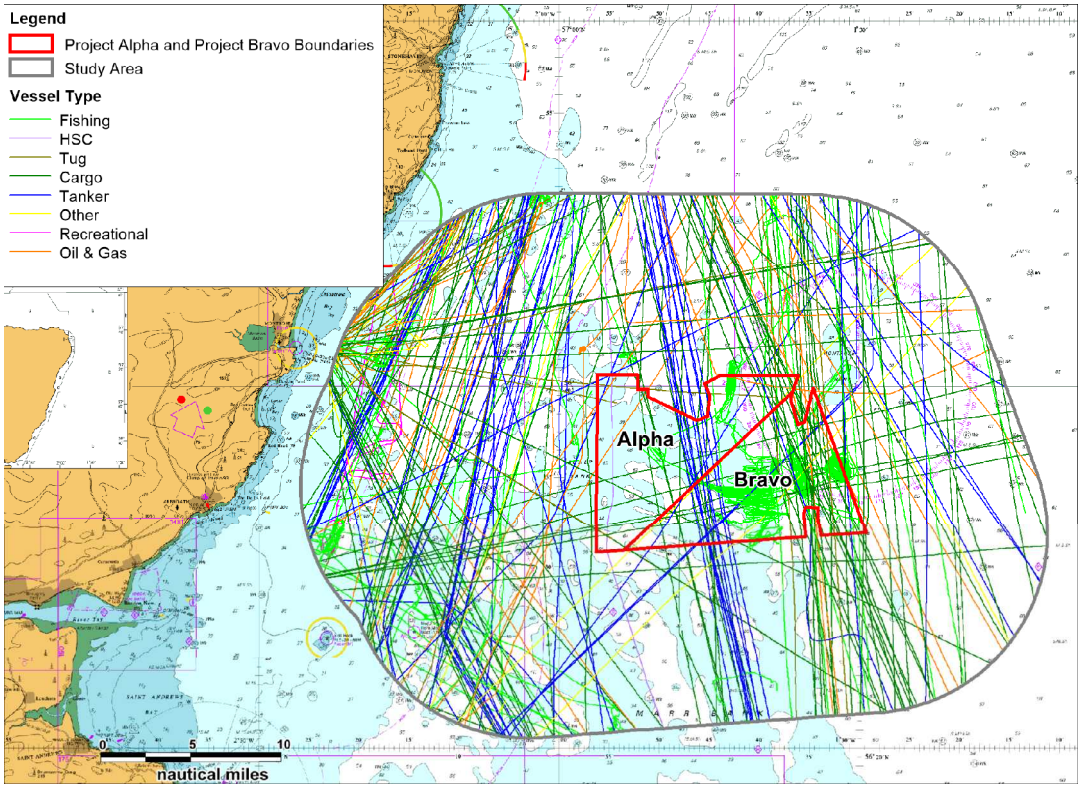

Figure 5.1 2017 Validation Winter Survey Data Colour-Coded by Vessel Type

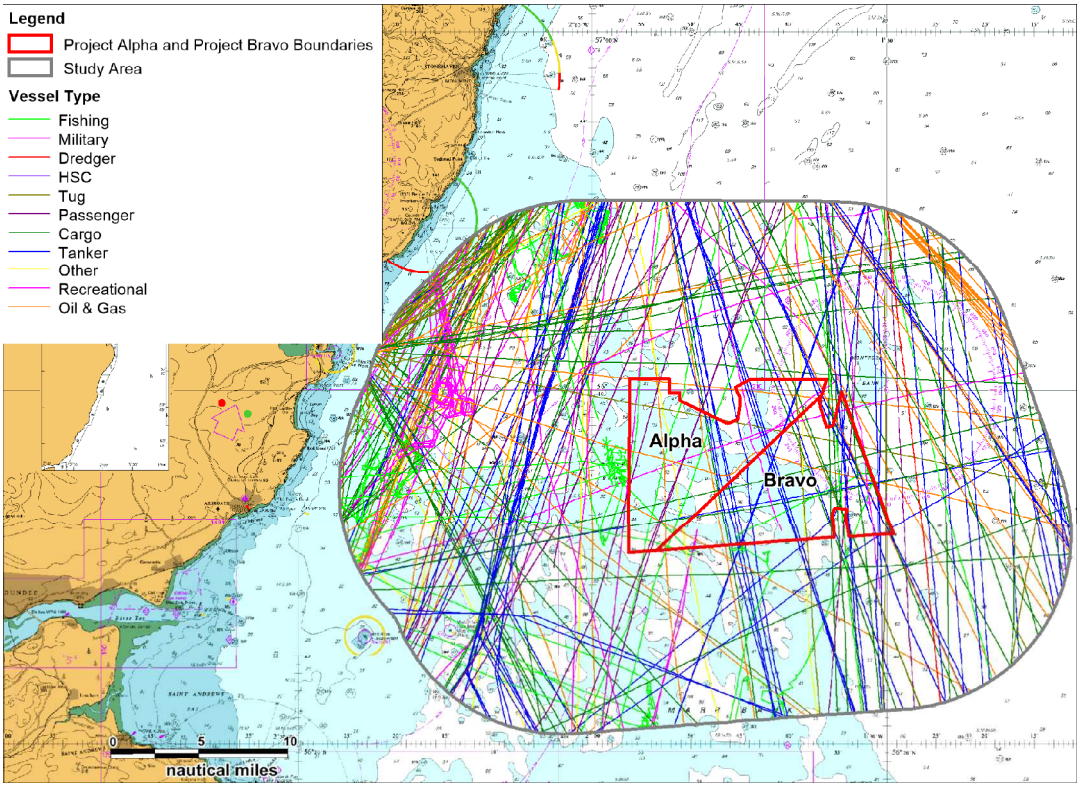

Figure 5.2 2017 Validation Summer Survey Data Colour-Coded by Vessel Type

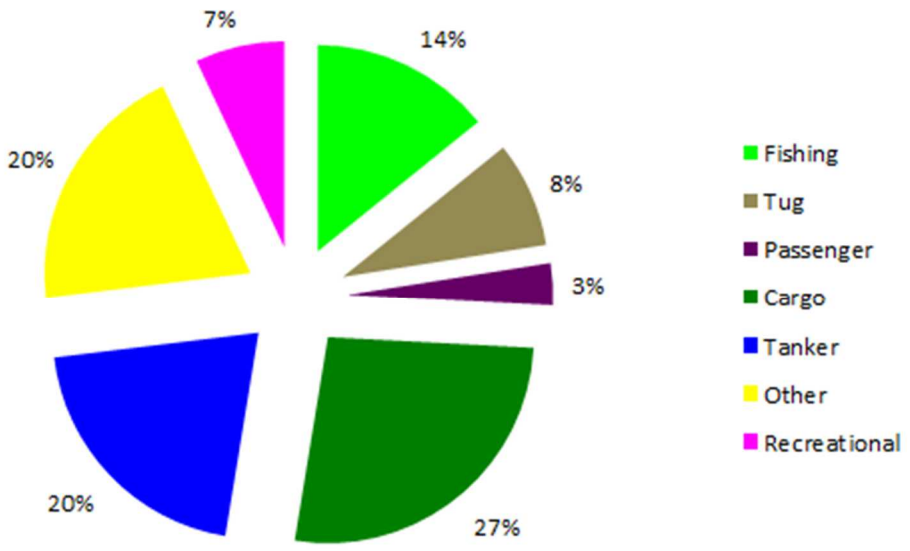

Figure 5.3 2017 Validation Combined Survey Data Vessel Type Distribution

The most frequently recorded vessel types within the study area throughout the combined survey periods were cargo vessels (27%) followed by tankers (20%) and 'other' vessels (20%). Among the vessels included in the 'other' vessel category are survey vessels, a port tender, a training ship, a buoy-laying vessel, High Speed Craft (HSC), a multiworker vessel,

lifeboats, a military vessel, a dredger and a coastguard vessel. Oil & gas vessels were also included in 'other' and contributed to the majority of the 'other' traffic.

When compared to the 2011 survey data, there was a slight change in the distribution of vessel types. In particular, there was a lower proportion of tankers recorded during the 2017 validation survey, compared to the 2011 survey, as well as a higher proportion of fishing vessels recorded.

It can be concluded that the vessel type distribution within the study area changed slightly from the 2011 survey, with cargo vessels and tankers generally remaining the two most common vessel types. The proportional increase in fishing vessels is likely due to stricter AIS carriage requirements (see Section 3.3). It is noted that 71% of fishing vessel tracks recorded during the 2011 survey were on Radar rather than AIS.

A detailed comparison between vessel numbers of each main type is presented in Section 6.

5.3 Vessel Count

Figure 5.4 presents the daily vessel count (represented as the number of unique vessels recorded per day) within the study area throughout the 2017 survey periods.

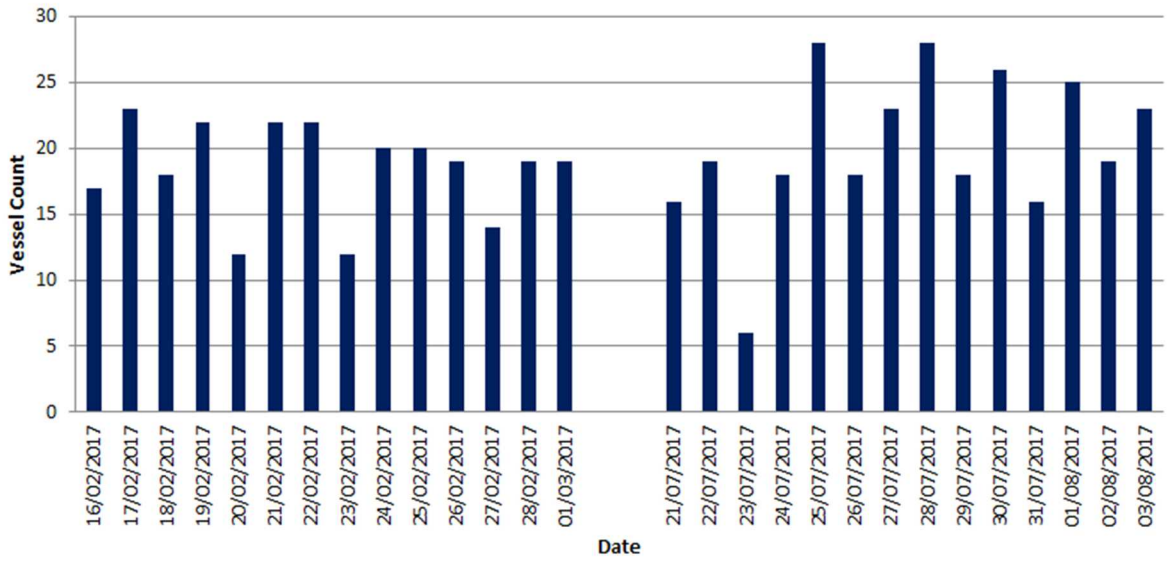

Figure 5.4 2017 Validation Survey Data Daily Vessel Count

Across the 2017 winter survey period there was an average of 19 unique vessels per day recorded within the study area and 20 unique vessels per day recorded during the 2017 summer survey period. This represents a slight increase in the number of unique vessels per day, compared to the 2011 survey periods, when an average of 16 unique vessels per day was recorded during the winter and 14 unique vessels per day during the summer.

The busiest days recorded within the study area, throughout the 2017 survey periods, were the 25th and 28th July 2017 when 28 unique vessels were recorded. This is compared to 26 unique vessels on the busiest day recorded throughout the 2011 survey periods (24th June 2011).

The quietest day recorded within the study area, throughout the 2017 survey periods, was the 23rd July 2017 when six unique vessels were recorded. This compares to three unique vessels on the quietest full survey day recorded throughout the 2011 survey periods (22nd June 2011).

It can be concluded that the number of vessel movements within the study area has changed from the 2011 survey data, but the changes identified are not of a magnitude to change the conclusions of the assessment, or significantly increase impacts on receptors.

5.4 Vessel Length

Figure 5.5 presents the vessel tracks, colour-coded by vessel length, recorded throughout the 2017 survey periods. Following this, Figure 5.6 presents the vessel length distribution for the combined survey periods. It is noted that approximately 3% of vessels recorded throughout the 2017 survey periods could not be associated with a length (in the majority fishing vessels) and have therefore been excluded from Figure 5.6.

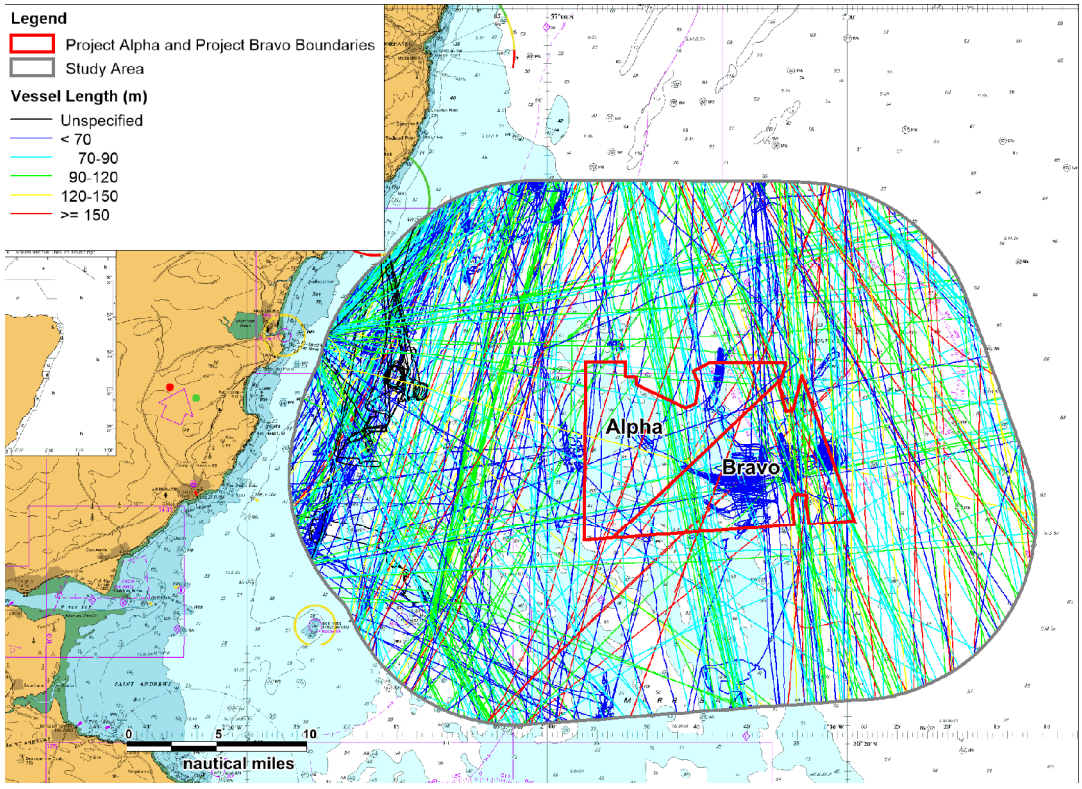

Figure 5.5 2017 Validation Survey Data Colour-Coded by Vessel Length

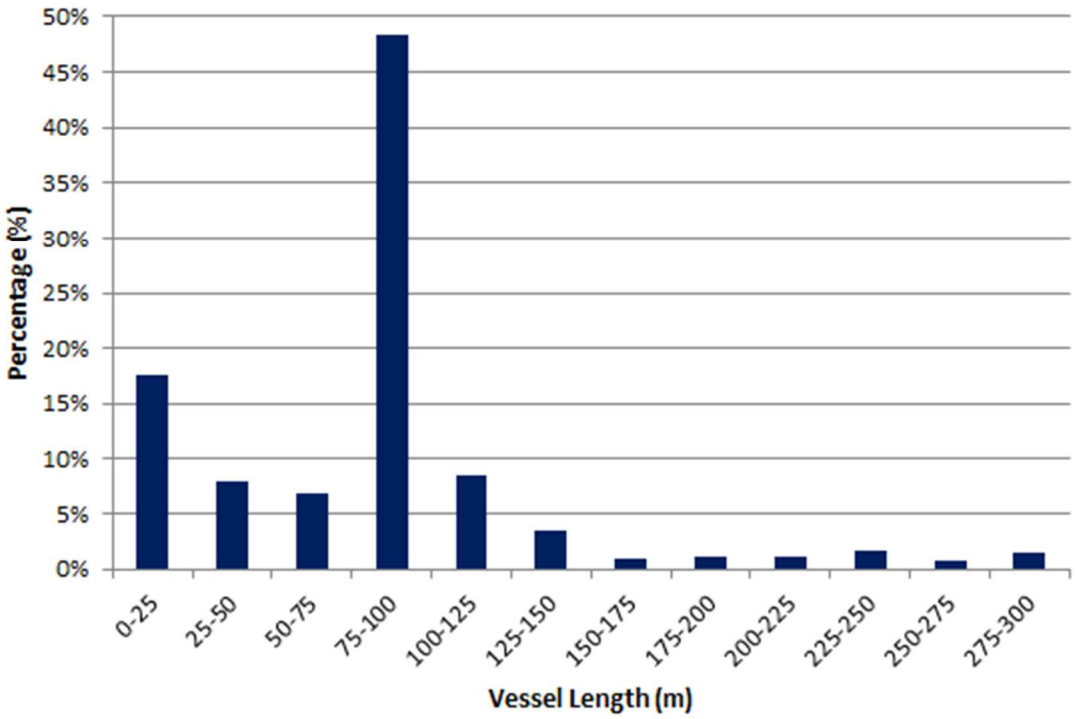

Figure 5.6 2017 Validation Survey Data Vessel Length Distribution

The average lengths of vessels recorded over the combined survey periods was 82m. It can be seen that a large proportion of vessels had lengths between 75m and 100m (48%).

The average lengths of vessels recorded throughout the 2011 survey periods was greater than the 2017 survey (91m) with a higher proportion of vessels recording lengths between 75m and 100m (57%).

It can be concluded that the distribution of vessel lengths within the study area has changed from the 2011 survey data, with a higher proportion of smaller vessels recorded. This shift may be attributed to an increase in the number of fishing and recreational vessels (see Section 6.5 and Section 6.6 respectively for details) recorded in the 2017 validation survey, but it is more likely to be due to the stricter AIS carriage requirements now in place for fishing vessels (see Section 3.3).

5.5 Vessel Draught

Figure 5.7 presents the vessel tracks, colour-coded by vessel draught, recorded throughout the 2017 survey periods. Following this, Figure 5.8 presents the vessel draught distribution for each survey period. It is noted that approximately 20% of vessels recorded throughout the 2017 survey periods did not broadcast a draught and have therefore been removed from Figure 5.8.

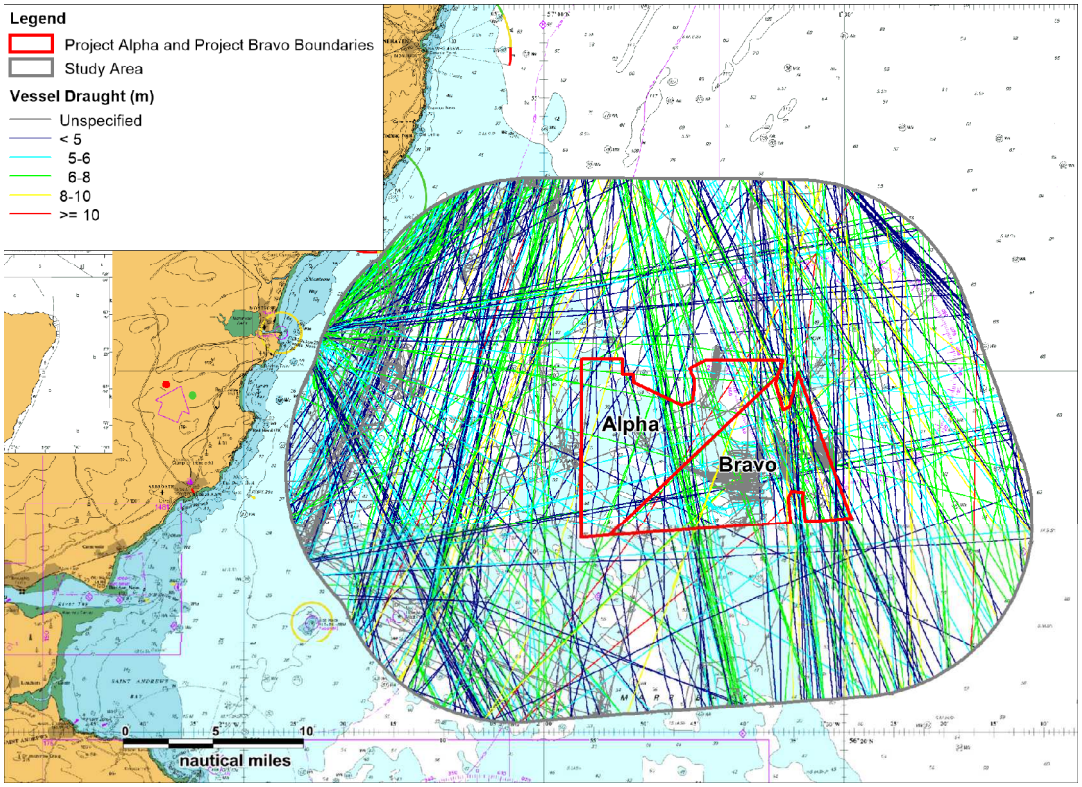

Figure 5.7 2017 Validation Survey Data Colour-Coded by Vessel Draught

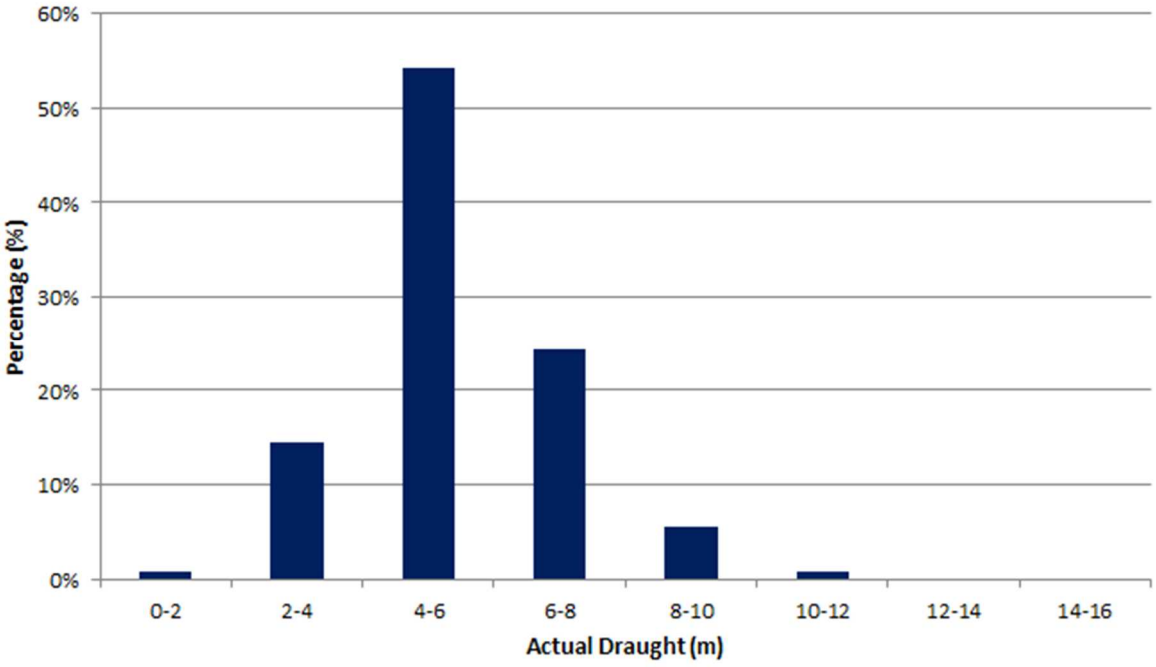

Figure 5.8 2017 Validation Survey Data Vessel Draught Distribution

The average draught recorded over the combined survey periods was 5.5m. It can be seen that the majority of vessels had draughts between 4m and 6m (54%).

The average draughts of vessels recorded throughout the 2011 survey periods was similar (5.1m) with a slightly higher proportion of vessels recording draughts between 4m and 6m (59%).

It can be concluded that the distribution of vessel draughts within the study area did not alter substantially from the 2011 survey data.

5.6 Vessel Speed

Figure 5.9 presents the vessel speed distribution for each survey period. It is noted that approximately 16% of vessel tracks could not be associated with a valid average speed[1] and have therefore been removed from the analysis.

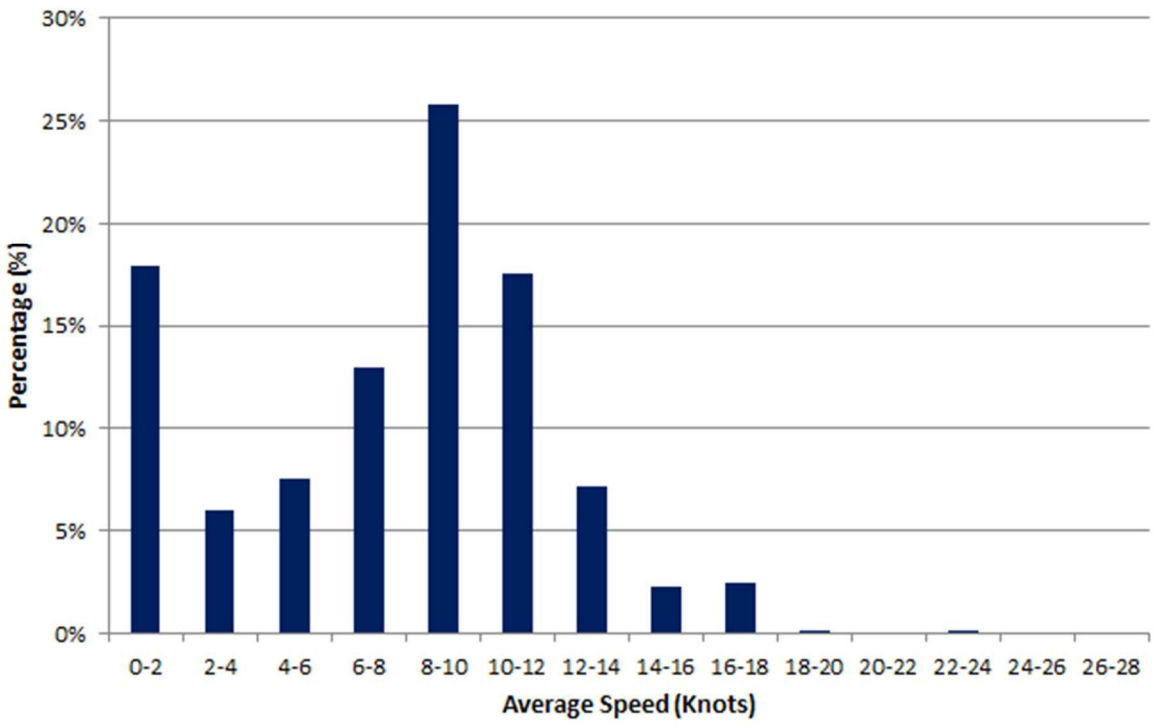

Figure 5.9 2017 Validation Survey Data Average Speed

The average speed recorded over the combined survey periods was 7.6 knots. It can be seen that significant proportions of vessels had speeds between 8 and 10 knots (26%), less than 2knots (18%) and 10 and 12 knots (18%).

The average speeds of vessels recorded throughout the 2011 survey periods was higher (9.4 knots) with a lower proportion of vessels recording speeds between 8 and 10 knots (14%).

[1] Due to issues with Class B AIS systems

There was also a higher proportion of vessels transiting between 10 and 12 knots (32%) and significantly lower proportion transiting at less than 2 knots (less than 5%).

It can be concluded that the distribution of vessel speeds has changed from the 2011 survey data, with a higher proportion of vessels transiting at less than 2 knots and a lower proportion of vessels transiting between 10 and 12 knots. This shift may be attributed to an increase in the number of fishing vessels (see Section 6.5 for details) recorded in the 2017 validation survey but it is more likely to be due to the stricter AIS carriage requirements now in place (see Section 3.3).

6. 2017 Validation Survey Vessel Type Analysis

6.1 Introduction

This section presents a more detailed analysis of the main vessel types recorded on AIS within the study area throughout the 2017 validation survey. This includes non-transit uses of the study area, as per MGN 543, which in this case consists primarily of fishing vessels and anchored vessels.

It should be noted that the previous 2011 survey analysed Project Alpha and Project Bravo individually given the methodology within the 2012 NRA (Appendix 12C (Project Alpha and Project Bravo 2012 NRA) of the EIA Report). However as the two sites (Project Alpha and Project Bravo) are immediately adjacent and given that the two Projects in combination presents a worst case scenario in 2018, the 2017 validation survey has analysed both sites combined (the optimised Seagreen Project). In line with the optimised approach to the 2018 application this will allow the in-isolation and in-combination scenarios to be effectively assessed, following on from the assessment work originally undertaken in 2012.

6.2 Cargo

Cargo vessels accounted for approximately 27% of vessel traffic throughout the 2017 survey periods. These tracks are presented in Figure 6.1.

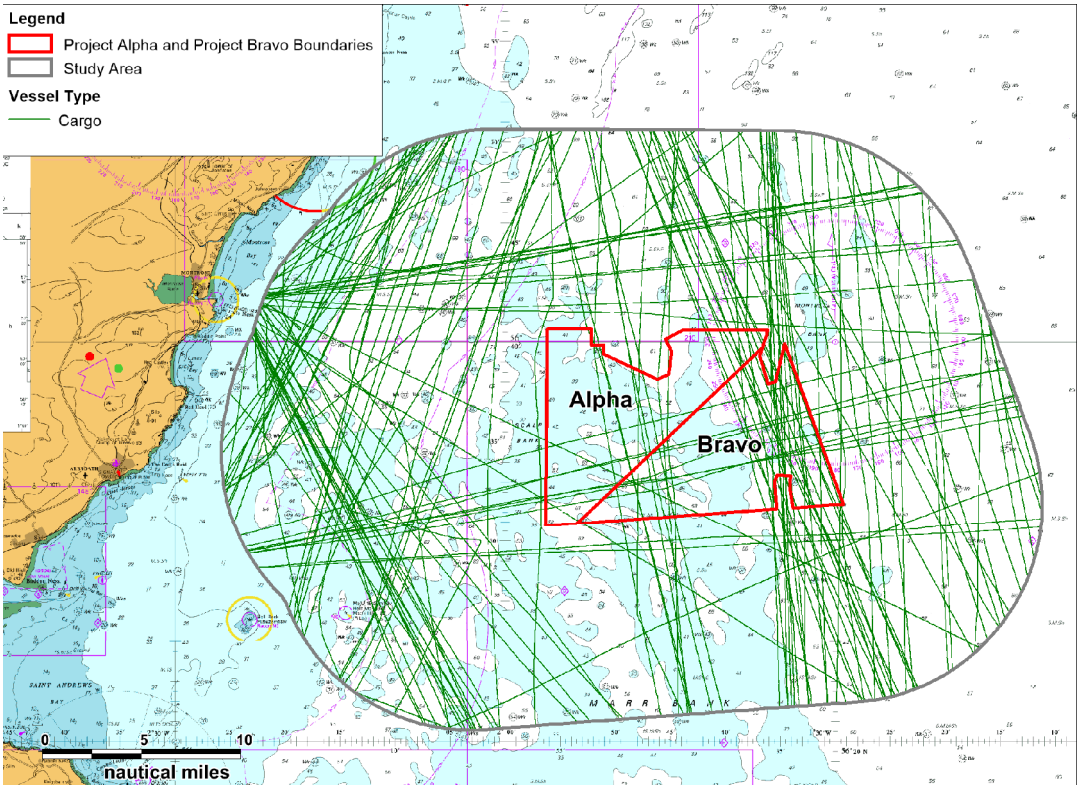

Figure 6.1 2017 Validation Survey Cargo Vessels

There was an average of two unique cargo vessels per day recorded intersecting the optimised Seagreen Project during the 2017 validation survey period.

There was an average of two unique cargo vessels per day intersecting both the Project Alpha and Project Bravo areas during the 2011 survey period.

Overall, there was no material change in the number of cargo vessels recorded intersecting the site when compared to the 2011 survey data.

6.3 Tankers

Tankers accounted for approximately 20% of vessel traffic throughout the 2017 survey periods. These tracks are presented in Figure 6.2.

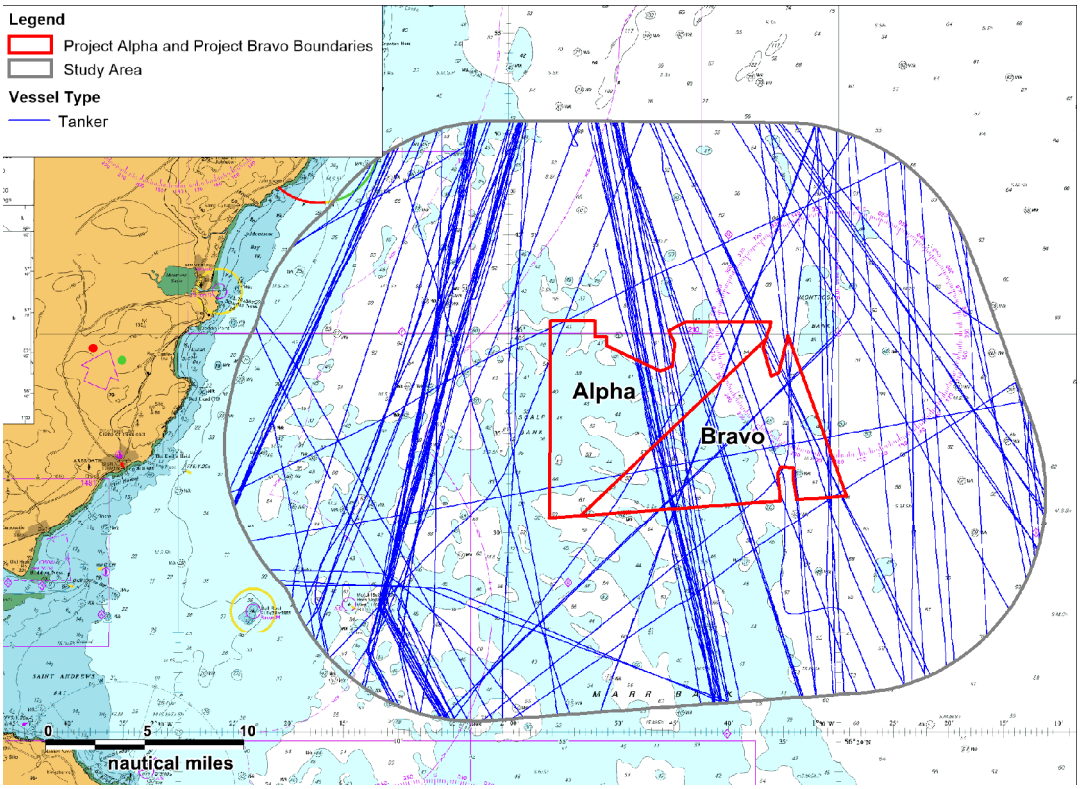

Figure 6.2 2017 Validation Survey Tankers

There was an average of one unique tanker per day intersecting the optimised Seagreen Project during the 2017 validation survey period.

There was an average of two unique tankers per day intersecting Project Alpha and an average of three unique tankers per day intersecting Project Bravo during the 2011 survey period.

Overall, there was a no material change in the number of tankers recorded intersecting the Project when compared to the 2011 survey data of Project Alpha (two vessels in 2011) or to the previous 2011 analysis of Project Bravo (three vessels in 2011). Therefore, it can be

concluded that the 2017 marine traffic does not change the conclusions of the assessment or significantly increase impacts on receptors.

6.4 Passenger Vessels

Passenger vessels accounted for approximately 3% of vessel traffic throughout the 2017 survey periods. These tracks are presented in Figure 6.3.

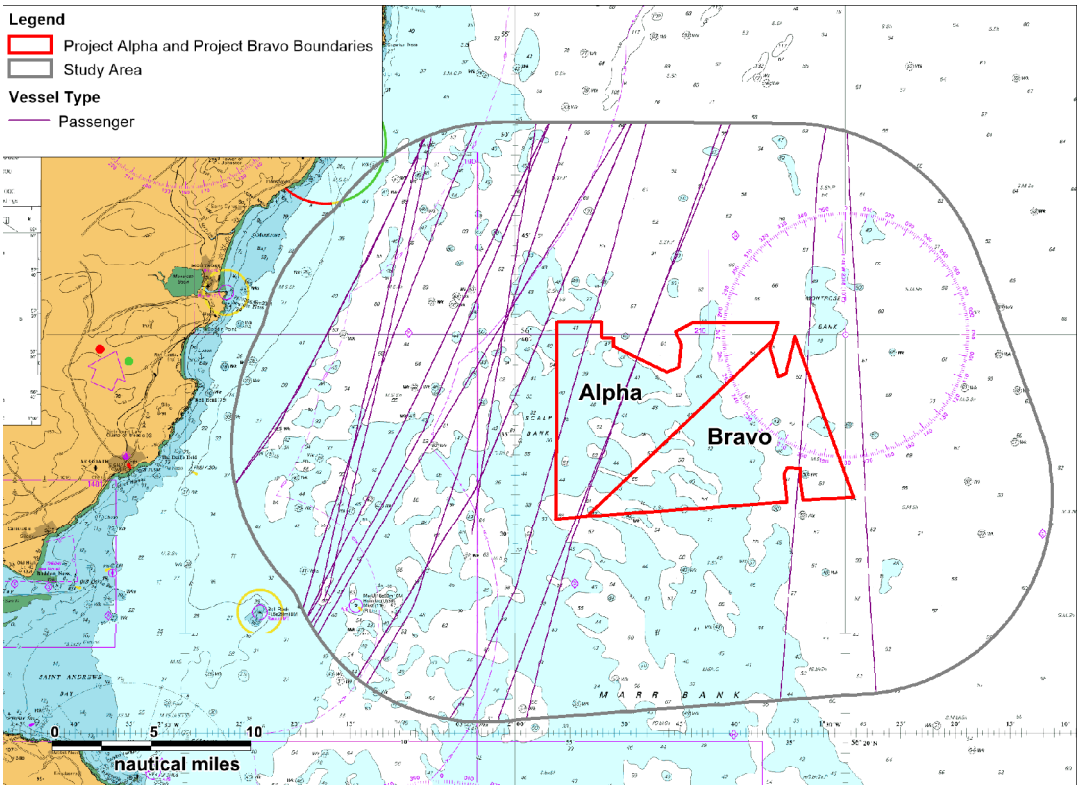

Figure 6.3 2017 Validation Survey Passenger Vessels

There was a total of four unique passenger vessels recorded intersecting the optimised Seagreen Project during the 2017 validation survey period.

There was a total of four unique passenger vessels recorded intersecting Project Alpha and a total of two unique passenger vessels intersecting Project Bravo during the 2011 survey period.

Overall, there was no material change in the number of passenger vessels recorded intersecting the optimised Seagreen Project when compared to the previous 2011 survey of Project Alpha (four vessels in 2011), or to the previous 2011 analysis of Project Bravo (two vessels in 2011). Therefore, it can be concluded that the 2017 marine traffic does not change the conclusions of the assessment or significantly increase impacts on receptors.

6.5 Fishing Vessels

Fishing vessels accounted for approximately 14% of vessel traffic throughout the 2017 survey periods. These tracks are presented in Figure 6.4.

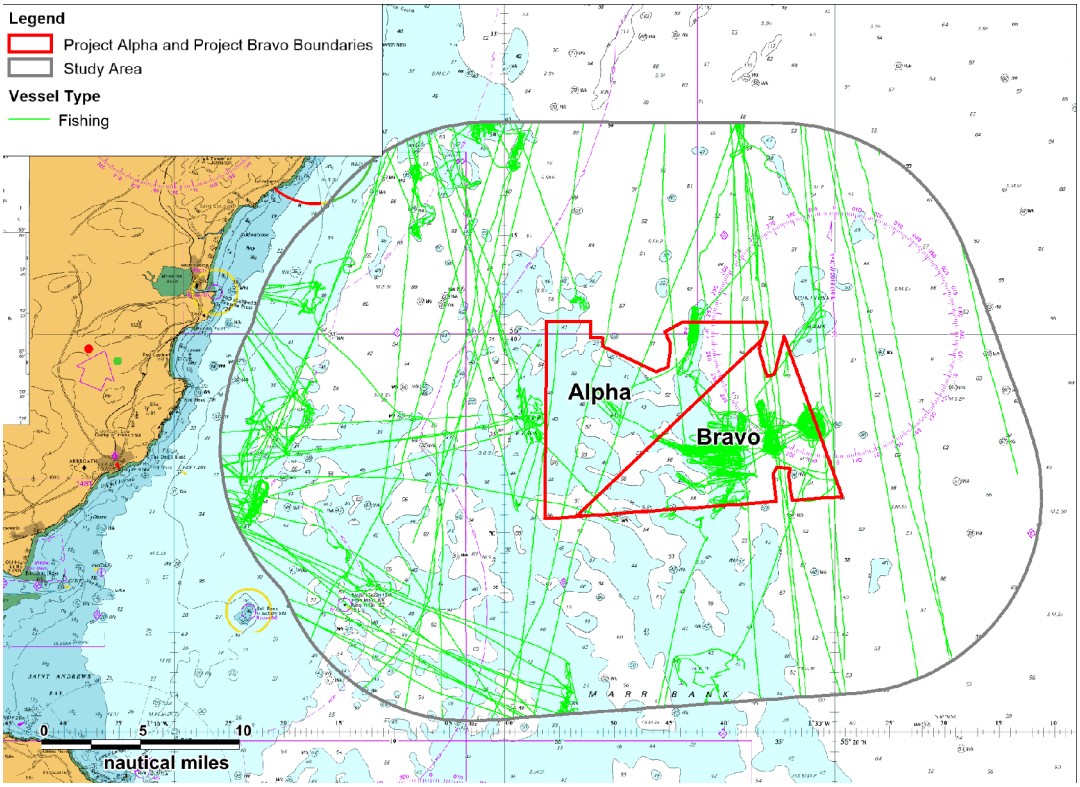

Figure 6.4 2017 Validation Survey Fishing Vessels

There were a total of 24 fishing vessels recorded intersecting the optimised Seagreen Project during the 2017 validation survey periods.

There were a total of four unique fishing vessels intersecting both Project Alpha and Project Bravo during the 2011 survey period.

Overall, there was a material increase in the number of fishing vessels recorded intersecting the site when compared to the 2011 survey data (previously a total of eight vessels in 2011, now a total of 24 vessels in 2017). This shift is likely to be attributed to updated stricter AIS carriage requirements now in place for fishing vessels (see Section 3.3) resulting in a higher number of fishing vessels being recorded on AIS although it is noted that this is also dependent on other factors such as weather, the time of the survey, quotas and seasonal factors. In Chapter 11 (Commercial Fisheries) of the EIA Report, it is noted that a seasonal peak in fishery stocks is expected in the period April to June and that there has been an increase in scallop dredging activity over the last five years.

6.6 Recreational Vessels

Recreational vessels accounted for approximately 7% of vessel traffic throughout the 2017 survey periods. These tracks are presented in Figure 6.5.

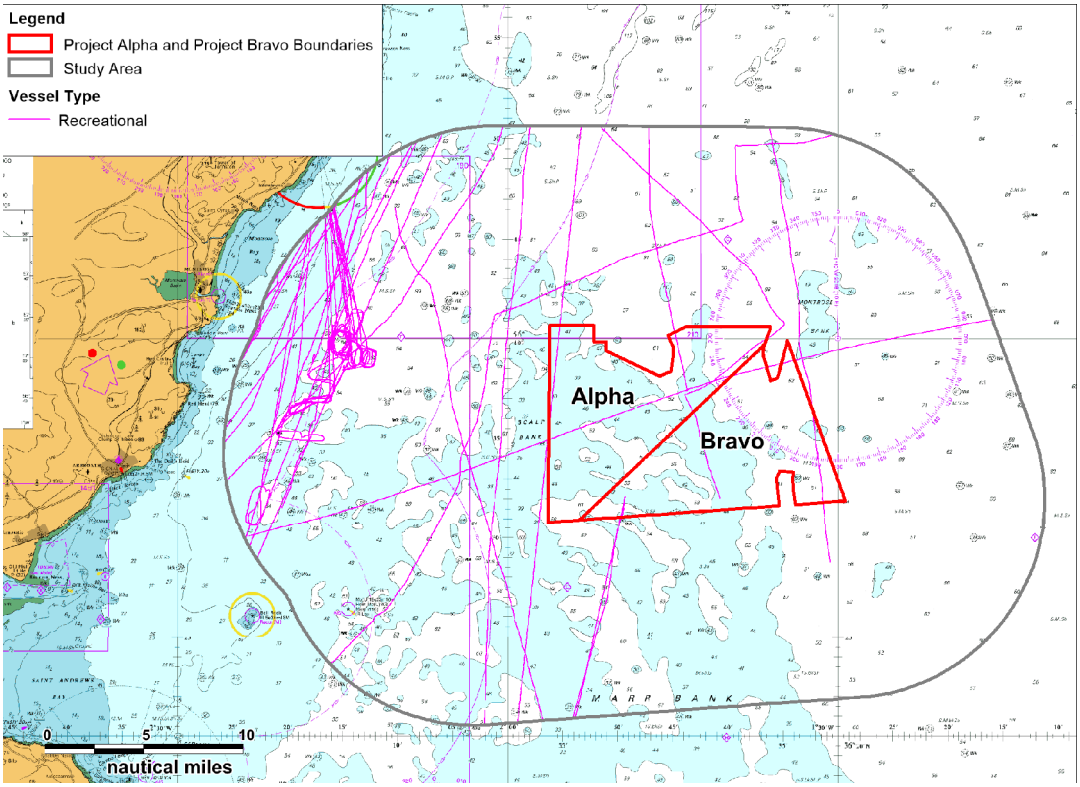

Figure 6.5 2017 Validation Survey Recreational Vessels

There were no recreational vessels recorded intersecting the optimised Seagreen Project during the winter 2017 validation survey period and a total of seven unique recreational vessels recorded intersecting the optimised Seagreen Project during the summer 2017 validation survey period.

There were no recreational vessels recorded intersecting the optimised Seagreen Project during the winter survey period and a total of six recreational vessels recorded across the summer period intersecting Project Alpha during the 2011 survey period. There were also no recreational vessels recorded intersecting the optimised Seagreen Project during winter and three recreational vessels recorded during summer intersecting Project Bravo during the 2011 survey period.

Overall, there was no material change in the number of recreational vessels recorded intersecting the optimised Seagreen Project when compared to the previous 2011 survey of Project Alpha (total of six vessels in 2011) or to the previous 2011 analysis of Project Bravo (total of three vessels in 2011). Therefore, it can be concluded that the 2017 marine traffic does not change the conclusions of the assessment or significantly increase impacts on receptors.

6.7 Other Vessels

Vessels classified as 'other' vessels accounted for approximately 20% of vessel traffic throughout the 2017 survey periods. These tracks are presented in Figure 6.6.

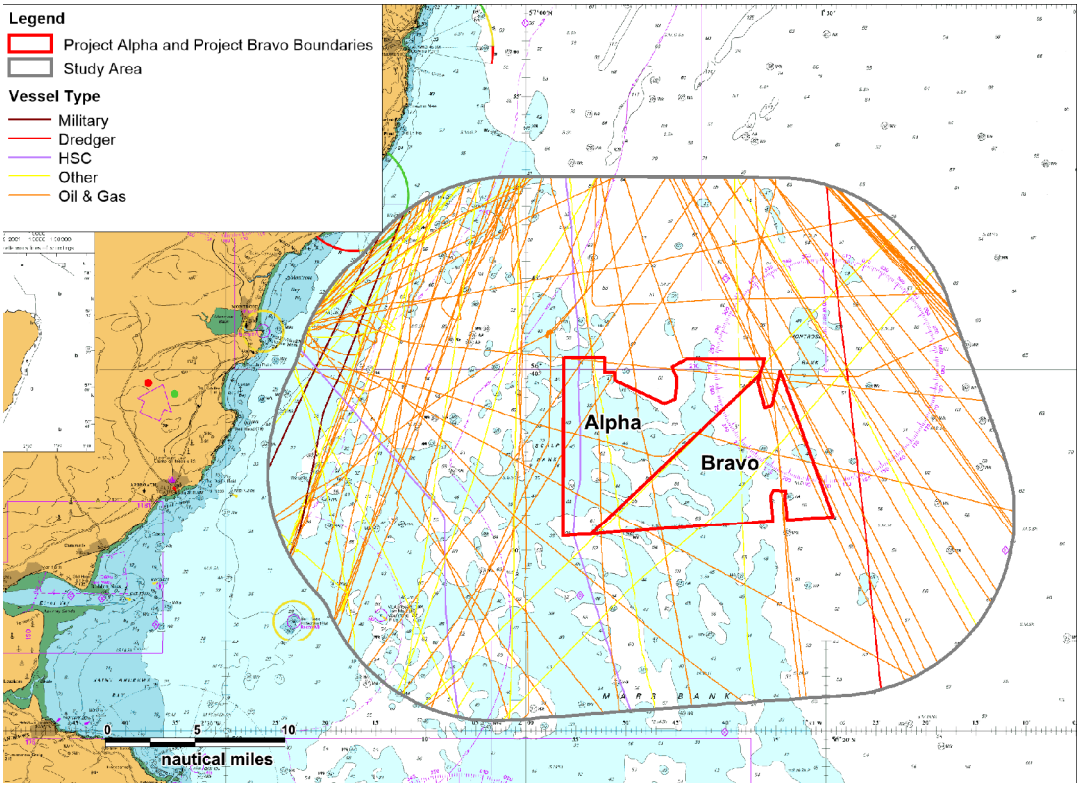

Figure 6.6 2017 Validation Survey 'Other' Vessels

There were 18 'other' vessels recorded across the optimised Seagreen Project during the combined 2017 validation survey periods.

There were 19 'other' vessels recorded intersecting Project Alpha, during the 2011 survey period and 17 'other' vessels recorded intersecting Project Bravo.

Overall, there was no material change in the number of 'other' vessels recorded intersecting the site when compared to the previous 2011 survey of Project Alpha (19 vessels in 2011) or to the previous 2011 survey of Project Bravo (17 vessels in 2011). Therefore, it can be concluded that this does not change the conclusions of the assessment or significantly increase impacts on receptors. It should be noted that in both the 2017 validation survey and the 2011 survey, the majority of 'other' vessel traffic was oil & gas support vessels.

6.8 Anchored Vessels

Anchored vessels can be identified based upon the AIS navigational status which is programmed on the AIS transmitter onboard a vessel. Information is manually entered into the AIS and therefore it is common for vessels not to update the navigational status if they are anchored for only a short period of time. For this reason, those vessels which travelled at a speed of less than one knot for more than 30 minutes were assumed to be at anchor and were included in the following analysis.

Figure 6.7 presents the tracks of vessels deemed to be at anchor, colour-coded by vessel type, recorded within the study area throughout the 2017 survey periods.

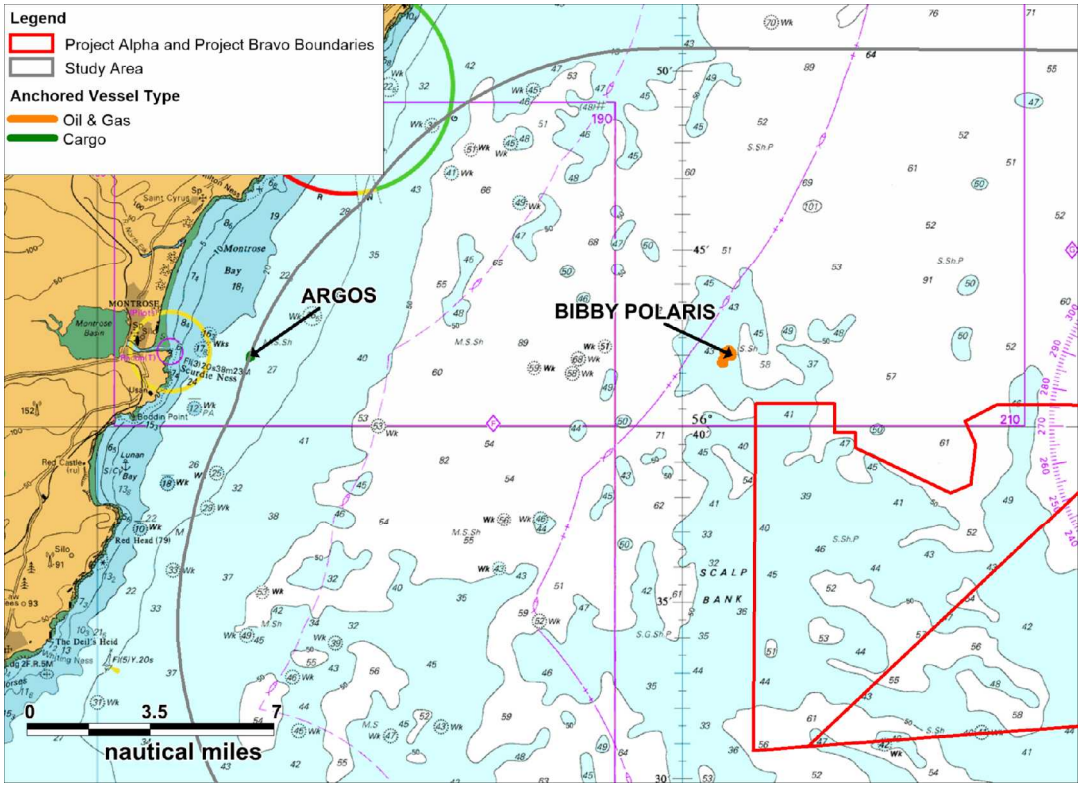

Figure 6.7 2017 Validation Survey Anchored Vessels Colour-Coded by Vessel Type

There were a total of two vessels recorded at anchor during the 2017 validation survey period. These consisted of one oil & gas vessel and one cargo vessel. The offshore supply vessel, *Bibby Polaris* was the closest anchored vessel relative to the optimised Seagreen Project, located approximately 1.4nm to the northwest of the site. This vessel was anchored from the 16th February to the 25th February 2017 and its AIS reported the vessel destination as Montrose Anchorage.

The other anchored vessel was the general cargo vessel; *Argos* located 14.3nm northwest of the optimised Seagreen Project. This vessel was anchored on the 3rd August 2017, before heading into the port of Montrose. There were no anchored vessels recorded within the optimised Seagreen Project.

During the 2011 survey, two vessels were recorded at anchor. These consisted of one oil & gas vessel and one cargo vessel. Both these vessels were located west of the optimised Seagreen Project with the closest vessel approximately 13.5nm from the site.

Overall, there was no change in the number of anchored vessels recorded within the optimised Seagreen Project when compared to the previous 2011 survey; however, the distance of anchored vessels from the Project has decreased.

7. 2017 Validation Survey Main Routes

7.1 Introduction

This section provides assessment of the main vessel routes which have been identified within the study area, based on a review of the 2017 marine traffic survey data presented in Section 5. A comparison against the routes identified in the 2011 survey (see Section 4) is then provided.

7.2 Main Routes

The main routes identified are presented in Figure 7.1. It is noted that these routes have been created independently of those listed in the 2011 survey, and therefore the route IDs presented do not correspond. Further route details are provided in Table 7.1. The origin and/or destination ports presented in the table represent the most common destinations transmitted via AIS by vessels using that route (and a vessel on a route will therefore not necessarily be associated with the ports listed).

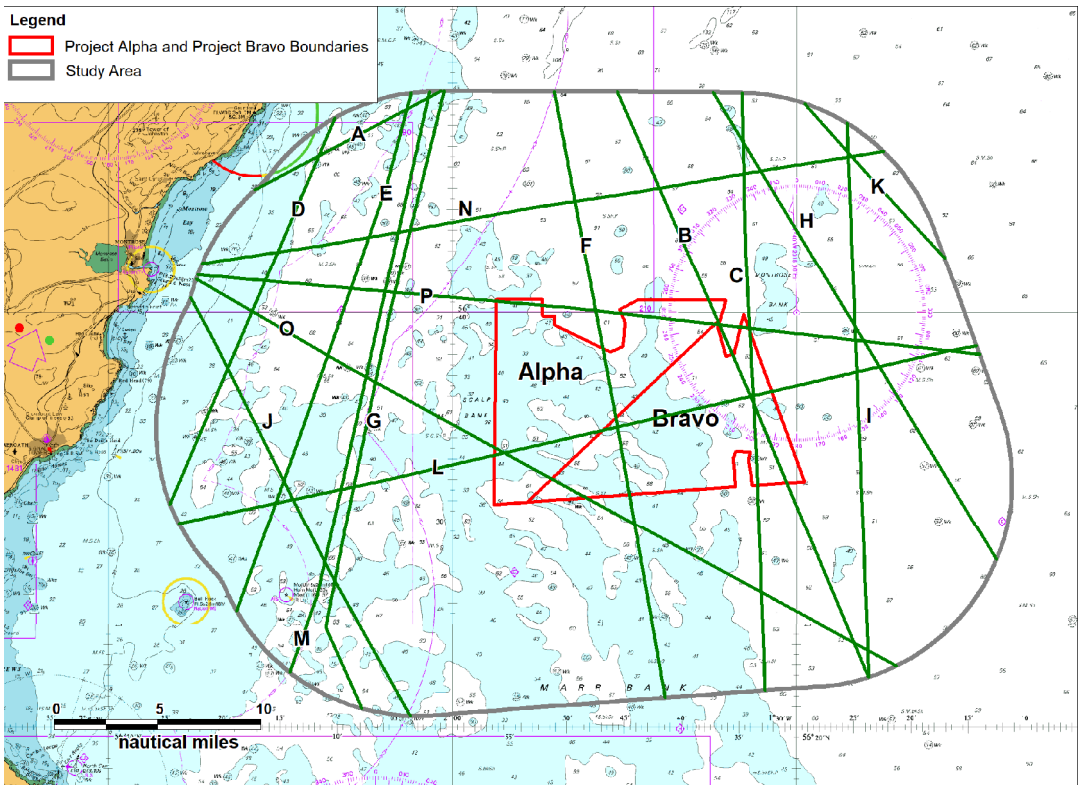

Figure 7.1 2017 Validation Survey Main Routes

Table 7.1 2017 Validation Survey Main Route Detail

Route Number	Main Destination/Origin Ports	Average Vessels per Day	Main Vessel Types	Description
A	Montrose/North Sea Fields	1	Oil and Gas	Route used mainly by oil and gas support vessels associated with various North Sea fields.
B	Aberdeen/Rotterdam	1	Cargo	Cargo vessels mainly associated with Aberdeen. Route includes some tanker activity.
C	Peterhead/Immingham	1	Cargo/Tanker	Mainly cargo vessels and tankers running between northeast Scottish ports and the Humber.
D	Aberdeen/Immingham	1	Cargo/Tanker	Mainly cargo vessels and tankers running between Aberdeen and Immingham or Dundee.
E	Aberdeen/Immingham	1	Cargo/Tanker	Mainly cargo vessels and tankers running between Scottish ports and Immingham/Grangemouth.
F	Aberdeen/Immingham	1	Tanker	Tankers mainly running between Aberdeen and Immingham.
G	Aberdeen/Immingham	1	Tanker	Tankers mainly running between Aberdeen/Peterhead and Immingham.
H	Aberdeen/Rotterdam	1	Cargo/Tanker	Cargo vessels and tankers mainly associated with Aberdeen.
I	Belfast/Tees	1	Cargo/Tanker	Mainly cargo vessels and tankers associated with

Route Number	Main Destination/Origin Ports	Average Vessels per Day	Main Vessel Types	Description
				Tees.
J	Montrose/Tees	1	Cargo	Mainly cargo vessels associated with Montrose.
K	Aberdeen/Cygnus Field	0.5	Oil and Gas	Oil and gas traffic between Aberdeen and Cygnus Field.
L	Dundee/Køge	0.5	Cargo	Mainly cargo vessels running between Dundee and continental Europe.
M	Scottish Ports/Immingham	0.5	Cargo/Tanker	Mainly cargo and tanker vessels transiting between Scottish ports and Immingham.
N	Montrose/Rostok	0.5	Cargo	Mainly cargo vessels running between Montrose and continental Europe.
O	Montrose/Eemshaven	0.5	Cargo	Mainly cargo vessels running between Montrose and continental Europe.
P	Montrose/Alma Field	0.5	Oil and Gas	Oil and gas traffic associated with Montrose.

7.3 Percentiles

The main routes identified were used in combination with the marine traffic survey data to develop 90th percentile lanes within the study area, as presented in Figure 7.2.

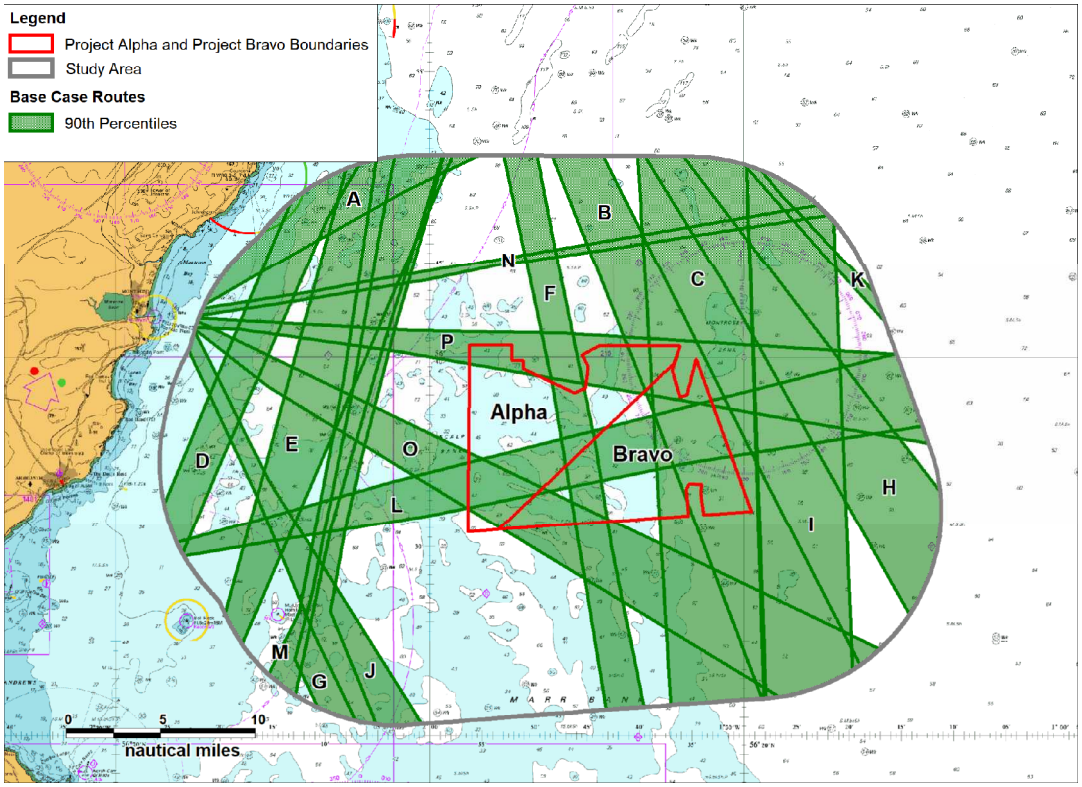

Figure 7.2 90th Percentiles

7.4 Main Route Comparison

This section provides comparison of the eight main routes identified in the original NRA (Appendix 12C (Project Alpha and Project Bravo 2012 NRA) of the EIA Report), developed from the 2011 survey data (Figure 7.3), with the routes identified from the 2017 data (Figure 7.4). It should be noted that in the 2012 NRA, only routes intersecting the originally consented Project were presented (eight in total) compared to this 2017 validation exercise which considers all routeing within the study area.

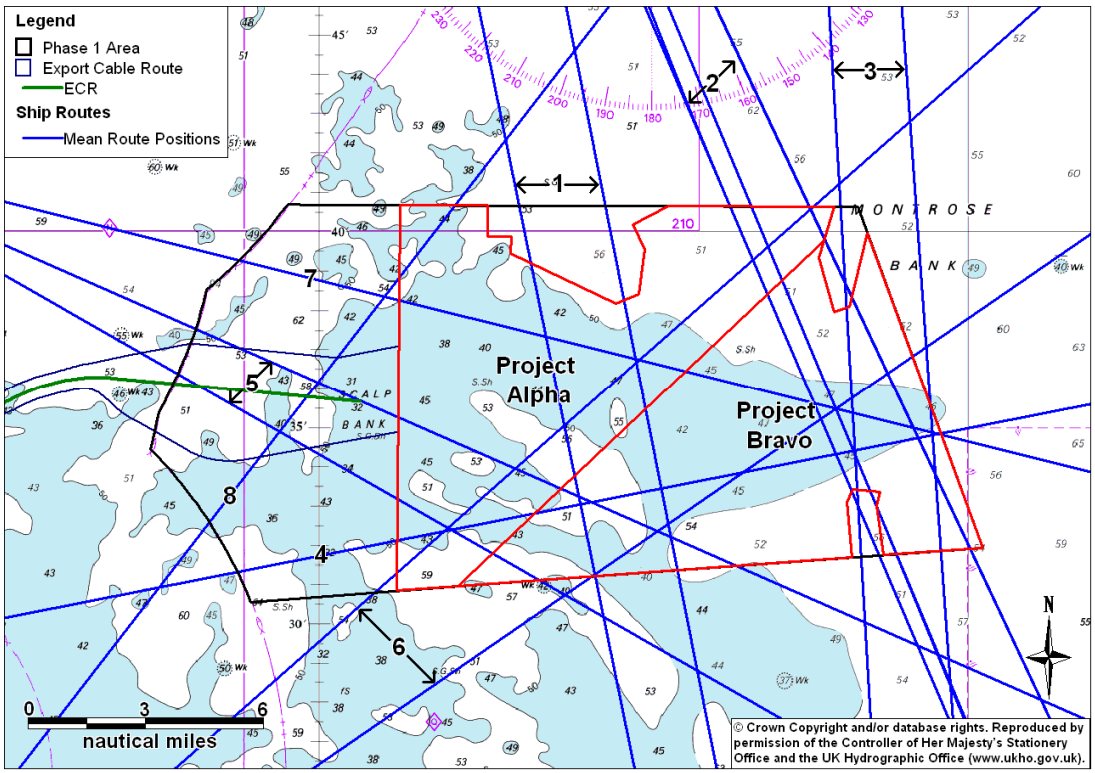

Figure 7.3 2011 Survey Main Routes

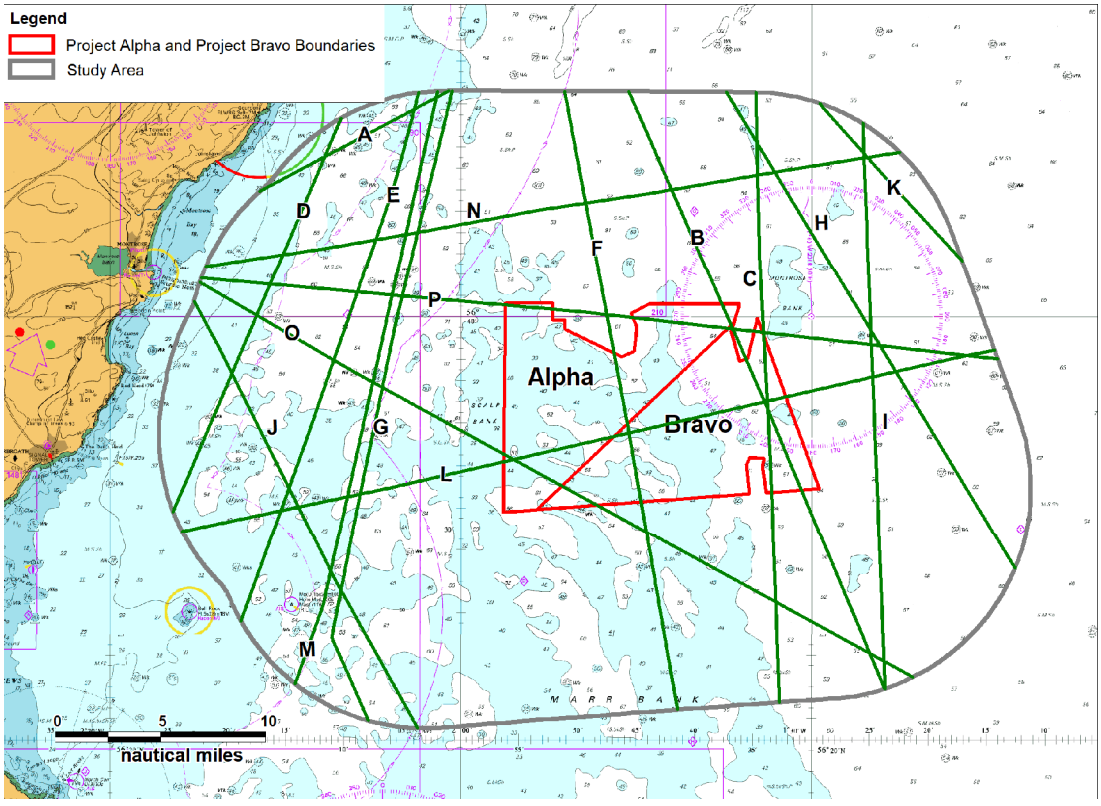

Figure 7.4 2017 Validation Survey Main Routes

When comparing the 2011 survey data routes to the 2017 survey data routes, the main difference to note is that due to the installation of the Inch Cape meteorological mast (Met Mast), there are fewer routes utilising the sea area at the southwestern boundary of the optimised Seagreen Project.

The following sections compare each of the eight original 2011 survey routes in detail against the 2017 survey routes.

7.4.1 Route 1

In the previous 2011 survey, route 1 intersected the centre of the originally consented Project and encompassed two routes. These were used mainly by tankers transiting between Aberdeen and Immingham. In the 2017 dataset, route F was identified as being the same as route 1. Route F also consists of mainly tankers transiting between Aberdeen and Immingham. This route has not been split into two separate routes, unlike route 1 in the 2011 data (Figure 7.3). In terms of vessel numbers, route 1 had an average of 1.6 vessels per day which has halved to 0.8 vessels per day in 2017 for route F.

7.4.2 Route 2

Route 2 intersected the originally consented Project and transited through the east of the site in the 2011 survey. This route consisted of multiple routes used mainly by cargo vessels and tankers transiting between Aberdeen, European ports and Immingham. In the 2017 dataset, route B was identified as being the same as route 2 in that traffic consists of mainly cargo vessels transiting between Aberdeen and Rotterdam (the Netherlands). This route has not been split into multiple separate routes, unlike route 2 in Figure 7.3. In terms of vessel numbers, route B had an average of 1.3 vessels per day which has decreased slightly to 1.1 vessels per day in 2017 for route B.

7.4.3 Route 3

Route 3 intersected the originally consented Project and transited through the east of the site in the 2011 survey. This route was split into two and consisted mainly of tankers and cargo vessels transiting between Northern Scottish ports and Immingham. In the 2017 dataset, route C was identified as being the same as route 3 in that traffic consists of tankers and cargo vessels transiting between Peterhead and Immingham. This route has not been split into two separate routes, unlike route 3 in Figure 4.4. In terms of vessel numbers, route 3 had an average of 1.3 vessels per day which has decreased slightly to 1.1 vessels per day in 2017 for route C.

7.4.4 Route 4

Route 4 intersected the originally consented Project and transited through the south of the site in the 2011 survey. This route consisted mainly of tankers, cargo vessels and oil & gas vessels transiting between offshore platforms, Scandinavian ports and Scottish ports. In the 2017 dataset, route L was identified as being the same as route 4, in that traffic consisted mainly of cargo vessels transiting between Dundee and Køge (Denmark). In terms of vessel

numbers, route 4 had an average of 0.5 vessels per day which has decreased slightly to 0.4 vessels per day in 2017 for route L.

7.4.5 Route 5

Route 5 intersected the originally consented Project and transited through the southwest of the site in the 2011 survey. This route consisted mainly of cargo vessels transiting between Montrose and Germany/Denmark. In the 2017 dataset, route O was identified as being the same as route 5. Route 5 consisted mainly of cargo vessels transiting between Montrose and Germany/the Netherlands. Route O has not been split into two separate routes unlike route 5 in the 2011 data (Figure 7.3). In terms of vessel numbers, route 5 had an average of 0.1 vessels per day which has increased slightly to 0.2 vessels per day in 2017 for route O.

7.4.6 Route 6

Route 6 intersected the originally consented Project and transited through the centre of the site from the southwest boundary to the northeast boundary in the 2011 survey. This route consisted mainly of cargo vessels and offshore vessels transiting inbound to Leith and Rosyth and outbound to the North Sea and Norwegian ports. This route was not reflected in the 2017 dataset, as can be seen in Figure 7.4.

7.4.7 Route 7

Route 7 intersected the originally consented Project and transited through the centre of the site from the northwest boundary to the southeast boundary in the 2011 survey. This route consisted mainly of cargo vessels transiting between Montrose and Denmark. This route was not reflected in the 2017 dataset, as can be seen in Figure 7.4.

7.4.8 Route 8

Route 8 intersected the northwest boundary of the originally consented Project in the 2011 survey. This route consisted mainly of tankers and cargo vessels transiting to Grangemouth, Hound Point and Leith. This route was not reflected in the 2017 dataset, as can be seen in Figure 7.4.

8. Conclusion

In conclusion, the 2017 survey data identified some changes to the nature of the vessel traffic when compared to the 2011 survey data. These changes are primarily associated with an increase in fishing vessels recorded (likely attributed to stricter AIS carriage requirements since the 2012 Offshore Environmental Statement (ES)) and a decrease in tankers transiting through the area.

8.1 Vessel Type

Throughout the 2017 survey periods the most frequently recorded vessel types within the study area were cargo vessels (27%), followed by tankers (20%) and 'other' vessels (20%). When compared to the 2011 survey data, there was a greater proportion of fishing vessels and tug vessels recorded during the combined survey periods and fewer tankers recorded. The proportions of the remaining vessel types did not have any notable changes.

8.2 Vessel Count

The vessel count was higher during the 2017 summer period (20 unique vessels) compared to the 2017 winter period when 19 unique vessels were recorded. When compared to the 2011 survey data, this is an increase in vessel counts across both seasonal periods. This increase in vessel count is likely to be due to an increase in fishing vessels recorded. The variable levels of fishing vessel activity are likely to be as a result of stricter AIS carriage requirements for fishing vessels, as well as, possibly being due to seasonal fishing patterns/quotas which can vary year to year. It is also noted that there has been an increase in scallop dredging activity over the last five years within the optimised Seagreen Project area. Therefore, given the nature of fishing operations the increase in vessel count is not deemed a material change when compared to the 2011 survey.

8.3 Main Routes

There were 16 main routes identified from the 2017 survey period, with daily average traffic levels on these routes relatively low. When compared to the main routes identified from the 2011 survey period, there are some changes. Most notably, three of the routes originally identified were not reflected within the new data. These three routes were identified as low use routes with less than one vessel per day on average, therefore, this is considered to be a minor change, and it is noted that vessels were observed to intersect the Project within the updated data on similar passages to these routes, however, not to the extent that a route could be defined.

As previously noted, the 2011 survey only presented the eight routes intersecting the originally consented Project, rather than the routes within the entire study area, therefore, it cannot be stated that the 2017 routes not intersecting the optimised Seagreen Project were not present previously in 2011. Overall, the routes present in the 2017 survey data that were also present in the 2011 survey data have not changed materially in terms of mean positions and vessel numbers.

8.4 Validity of NRA Baseline

In terms of main route analysis within the study area, a number of small changes in the mean positions of main routes were observed between the 2011 survey period and the 2017 survey period,(largely due to the installation of the Inch Cape Met Mast). It was noted early in the assessment process that this could influence the future case routeing scenarios when investigated as part of the EIA Report (Chapter 12 (Shipping and Navigation)), therefore the routeing assessment and the modelling linked to this has been undertaken as part of Appendix 12A NRA Addendum. However, the validation also showed that there were no material changes in the number or type of vessels meaning that impact rankings considering these values had not been affected and relevant outputs of the original NRA (Appendix 12C Project Alpha and Project Bravo 2012 NRA) remain valid and suitable for use as an assessment tool to inform the EIA Report (Chapter 12 (Shipping and Navigation)).