4.13.1

Rampion 2 WIND FARM

Volume 4, Appendix 13.1

Navigational risk assessment

GoBe wood.

Rampion 2 Offshore Wind Farm

Navigational Risk Assessment

Prepared by	Anatec Limited
Presented to	Rampion Extension Development
Date	7 May 2021
Revision Number	02
Document Reference	A4460-RED-NRA-01

	Aberdeen Office	**Cambridge Office**
Address	10 Exchange Street, Aberdeen, AB11 6PH, UK	Braemoor, No. 4 The Warren, Witchford Ely, Cambs, CB6 2HN, UK
Tel	01224 253700	01353 661200
Email	aberdeen@anatec.com	cambs@anatec.com

Revision Number	Date	Summary of Change
00	12 March 2021	First Issue
01	16 April 2021	Revised following GoBe review
02	7 May 2021	Revised following Wood review

	Aberdeen Office	Cambridge Office
Address	10 Exchange Street, Aberdeen, AB11 6PH, UK	Braemoor, No. 4 The Warren, Witchford Ely, Cambs, CB6 2HN, UK
Tel	01224 253700	01353 661200
Email	aberdeen@anatec.com	cambs@anatec.com

Contents

1 Introduction

1.1 Background

1.1.1 Anatec was commissioned by Rampion Extension Development Limited (RED) to undertake a Navigational Risk Assessment (NRA) for the proposed Rampion 2 Offshore Wind Farm (hereafter Rampion 2). The Preliminary Environmental Information Report (PEIR) Assessment Boundary referred to in this NRA consists of the offshore component only and is, where relevant, split into the array area and offshore cable corridor. This NRA presents information on the Proposed Development relative to the existing and estimated future navigational activity and forms the technical Appendix to **Chapter 13: Shipping and navigation, Volume 2**.

1.2 Navigational risk assessment

1.2.1 An Environmental Impact Assessment (EIA) is a process which identifies the environmental effects of a proposed development, both negative and positive. An important requirement of the EIA for offshore projects is the NRA. Following the Maritime and Coastguard Agency (MCA) methodology (MCA, 2013) and Marine Guidance Note (MGN) 543 (MCA, 2016), this NRA includes:

- outline of methodology applied in the NRA;
- summary of consultation undertaken with shipping and navigation stakeholders to date;
- lessons learnt from previous offshore wind farm developments;
- summary of the project description relevant to shipping and navigation;
- baseline characterisation of the existing environment including:
  - key navigational features;
  - meteorological and oceanographic conditions;
  - vessel traffic movements;
  - emergency response resources; and
  - historical maritime incidents.
- discussion of potential impacts on navigation, communication and position fixing equipment;
- cumulative and transboundary overview;
- future case vessel traffic characterisation;
- collision and allision risk modelling;
- impact identification;

- outline of embedded environmental measures; and
- outline of through life safety management features.

1.2.2 It is noted that a Formal Safety Assessment (FSA) has not been undertaken within the NRA; instead the NRA aims to screen the potential impacts and determine which should be taken forward to the preliminary assessment undertaken using the FSA methodology in **Chapter 13, Volume 2**. Potential impacts are considered for each phase of development as follows:

- construction;
- operation and maintenance; and
- decommissioning.

1.2.3 The assessment of Rampion 2 is based on a parameter-based design envelope approach, which is recognised in the Overarching National Policy Statement (NPS) for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011), the NPS for Renewable Energy Infrastructure (EN-3) (DECC, 2011) and *Planning Inspectorate Advice Note Nine: Rochdale Envelope* (The Planning Inspectorate (PINS), 2018). The design envelope includes conservative assumptions to form a maximum design scenario which is considered and assessed for all impacts. Further details on the design envelope are provided in **Chapter 4: The Proposed Development, Volume 2.**

2 Guidance and legislation

2.1 Legislation

2.1.1 Planning policy on offshore renewable energy Nationally Significant Infrastructure Projects (NSIP) specifically in relation to shipping and navigation is contained in the NPS for Renewable Energy Infrastructure (EN-3) (DECC, 2011). Additionally, planning policy on NSIP for ports is contained in the NPS for Ports (Department for Transport (DfT), 2012). **Section 13.2** of **Chapter 13, Volume 3** summarises the relevant matters within NPS EN-3 and the NPS for Ports and where they are considered in the PEIR.

2.2 Primary guidance

2.2.1 The primary guidance documents used during the assessment are the following:

- MGN 543 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2016)[1];
- Methodology for Assessing the Marine Navigational Safety & Emergency Response Risks of Offshore Renewable Energy Installations (OREI) (MCA, 2013); and
- Revised Guidelines for FSA for Use in the Rule-Making Process (International Maritime Organization (IMO), 2018).

2.2.2 MGN 543 highlights issues that shall be considered when assessing the effect on navigational safety from offshore renewable energy developments, proposed in United Kingdom (UK) internal waters, UK territorial sea or the UK Exclusive Economic Zone (EEZ).

2.2.3 The MCA require that their methodology is used as a template for preparing NRAs. It is centred on risk management and requires a submission that shows that sufficient controls are, or will be, in place for the assessed risk to be judged as broadly acceptable or tolerable with mitigation (see **Section 3.2**). Across **Chapter 13, Volume 2** and the NRA both base and future case levels of risk have been identified and what measures are required to ensure the future case remains broadly acceptable or tolerable with mitigation.

2.3 Other guidance

2.3.1 Other guidance documents used during the assessment are as follows:

[1] MGN 543 has now been superseded by MGN 654 published in April 2021 – a comprehensive review of this Appendix against the updated version of the guidance document will be undertaken post-PEIR and updates made as appropriate.

- MGN 372 (Merchant and Fishing) Offshore Renewable Energy Installations (OREIs): Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2008);
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation O-139 on The Marking of Man-Made Offshore Structures (IALA, 2013);
- The Royal Yachting Association's (RYA) Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy (RYA, 2019);
- Standard Marking Schedule for Offshore Installations (DECC, 2011);
- UK Marine Policy Statement (HM Government, 2011); and
- Marine and Coastal Access Act 2009.

3 Navigational risk assessment methodology

3.1 Formal safety assessment methodology

3.1.1 A shipping and navigation receptor can only be affected by an impact if there is a pathway through which an impact can be transmitted between the source activity and the receptor. In cases where a receptor is exposed to an impact, the overall severity of consequence to the receptor is determined. This process incorporates a degree of subjectivity. The assessments presented herein for shipping and navigation receptors have considered the following criteria:

- baseline data and assessment;
- expert opinion;
- level of stakeholder concern;
- time and/or distance of any deviation;
- number of transits of specific vessels and/or vessel types; and
- lessons learnt from existing offshore developments.

3.1.2 It is noted that, with regards to commercial fishing vessels, the methodology and assessment has been applied to impacts considering commercial fishing vessels in transit. A separate methodology and assessment have been applied in **Chapter 10: Commercial fisheries, Volume 2** to consider impacts on commercial fishing vessels including safety impacts which are directly related to commercial fishing activity (rather than commercial fishing vessels in transit) and impacts of a commercial nature.

3.2 Formal safety assessment process

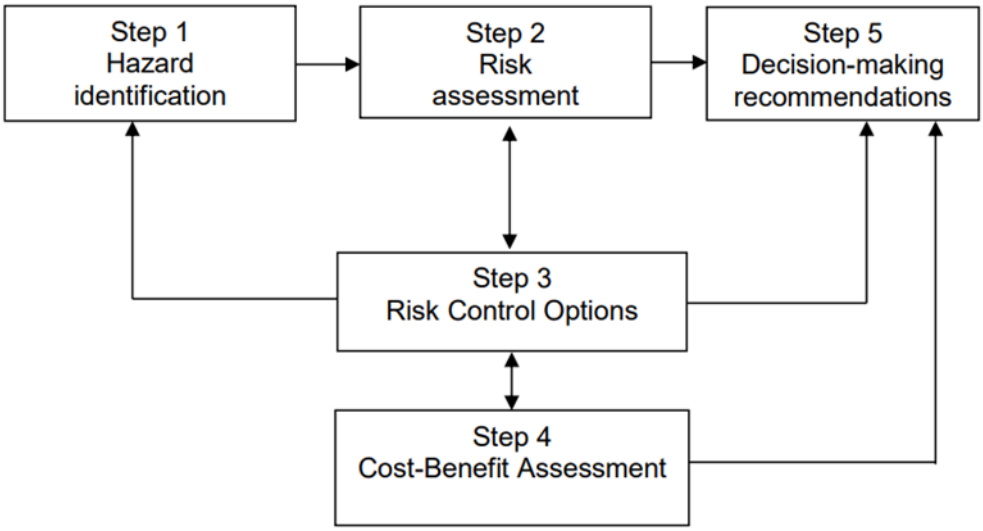
3.2.1 The IMO FSA process (IMO, 2018) as approved by the IMO in 2018 under Maritime Safety Committee – Marine Environment Protection Committee (MEPC).2/circ. 12/Rev.2 will be applied to the impact assessment within this NRA, and informs **Chapter 13, Volume 2**.

3.2.2 The FSA process is a structured and systematic methodology based upon risk analysis and Cost Benefit Analysis (CBA) (if applicable) to reduce impacts to As Low as Reasonably Practicable (ALARP). There are five basic steps within this process as illustrated by **Figure 3.1** and summarised in the following list:

- Step 1 – Identification of hazards (a list is produced of hazards prioritised by risk level specific to the problem under review);
- Step 2 – Risk analysis (investigation of the causes and initiating events and consequences of the more important hazards identified in step 1);
- Step 3 – Risk control options (identification of measures to control and reduce the identified hazards);

- Step 4 – CBA (identification and comparison of the benefits and costs associated with the risk control options identified in step 3); and
- Step 5 – Recommendations for decision-making (defining of recommendations based upon the outputs of steps 1 to 4).

Figure 3.1 Flow chart of the FSA methodology (IMO, 2018)



3.2.3 It is noted that impacts of a commercial nature are considered outside the remit of the NRA but have been assessed in the FSA where appropriate.

Hazard workshop methodology

3.2.4 A key tool used in the NRA process is the Hazard Workshop which ensures that all risks are identified and qualified in discussion with relevant consultees. **Table 3-1** and **Table 3-2** define the severity of consequence and the frequency of occurrence rankings that have been used to assess impacts within the hazard log, completed based on the outputs of the Hazard Workshop.

Table 3-1 Severity of consequence ranking definitions

Rank	Description	Definition			
		People	**Property**	**Environment**	**Business**
1	Negligible	No perceptible impact	No perceptible impact	No perceptible impact	No perceptible impact
2	Minor	Slight injury(s)	Minor damage to property for instance,	Tier 1 local assistance required	Minor reputational impacts – limited to users

Rank	Description	Definition			
		People	Property	Environment	Business
			superficial damage		
3	Moderate	Multiple minor or single serious injury	Damage not critical to operations	Tier 2 limited external assistance required	Local reputational impacts
4	Serious	Multiple serious injuries or single fatality	Damage resulting in critical impact on operations	Tier 2 regional assistance required	National reputational impacts
5	Major	More than one fatality	Total loss of property	Tier 3 national assistance required	International reputational impacts

Table 3-2 Frequency of occurrence ranking definitions

Rank	Description	Definition
1	Negligible	< 1 occurrence per 10,000 years
2	Extremely unlikely	1 per 100 to 10,000 years
3	Remote	1 per 10 to 100 years
4	Reasonably probable	1 per 1 to 10 years
5	Frequent	Yearly

3.2.5 The severity of consequence and frequency of occurrence are then used to define impact significance via a risk matrix approach as shown in **Table 3-3**. The tolerability of an impact is defined as Broadly Acceptable (low risk), Tolerable (intermediate risk) or Unacceptable (high risk).

Table 3-3 Tolerability matrix and risk rankings

Severity of Consequence						
	5					
	4					
	3					
	2					
	1					
		1	2	3	4	5
		Frequency of Occurrence				

	Unacceptable (high risk)
	Tolerable (intermediate risk)
	Broadly Acceptable (low risk)

3.2.6 Once identified, the tolerability of an impact will be assessed to ensure it is ALARP. Further risk control measures may be required to further mitigate an impact in accordance with the ALARP principles. Unacceptable risks are not considered to be ALARP.

3.3 Methodology for Cumulative Effects Assessment

3.3.1 The impacts identified in the FSA are also assessed for cumulative effects with the inclusion of other projects and proposed developments – the Cumulative Effects Assessment (CEA). Given the varying type, status and location of developments, a tiered approach to cumulative assessment has been undertaken, which splits developments into tiers depending upon project status, proximity to the PEIR Assessment Boundary and the level to which they are anticipated to cumulatively impact relevant users. It also considers data confidence, most notably in terms of the level of certainty over the location and timescales for a development.

3.3.2 The tiers are summarised in **Table 3-4**, with the level of assessment undertaken for each tier included. It is noted that an aggregate of the criterion is used to determine the tier of each development. For example, if a development is located within 30 nautical miles (nm) of the PEIR Assessment Boundary and may impact a main commercial route within 1nm of the array area but the development is only scoped, it may still be allocated to Tier 1.

Table 3-4 Cumulative development screening summary

Tier	Minimum Development Status	Criterion	Data Confidence Level	Level of CEA
1	Under construction, consented or under determination	May impact a main commercial route passing within 1nm of the array area and/or interacts with traffic which may be directly displaced by the array area. Raised as having possible cumulative effect during consultation. **Offshore wind farms:** Up to 30nm from the PEIR Assessment Boundary. **Oil and gas infrastructure:** Up to 5nm from the PEIR Assessment Boundary. **Marine aggregate dredging areas:** Up to 15nm from the PEIR Assessment Boundary.	High or medium	Quantitative cumulative re-routeing of main commercial routes
2	Under construction, consented or under determination	May impact a main commercial route passing within 1nm of the array area and/or interacts with traffic which may be directly displaced by the array area. **Offshore wind farms:** Between 30 and 60nm from the PEIR Assessment Boundary. **Oil and gas infrastructure:** Between 5 and 10nm from the PEIR Assessment Boundary. **Marine aggregate dredging areas:** Between 15 and 30nm from the PEIR Assessment Boundary.	High or medium	Qualitative cumulative re-routeing of main commercial routes

Tier	Minimum Development Status	Criterion	Data Confidence Level	Level of CEA
3	Scoped or under examination	Does not impact a main commercial route passing within 1nm of the array area and does not interact with traffic which may be directly displaced by the array area. **Offshore wind farms:** Up to 60nm from the PEIR Assessment Boundary. **Oil and gas infrastructure:** Up to 10nm from the PEIR Assessment Boundary. **Marine aggregate dredging areas:** Up to 30nm from the PEIR Assessment Boundary.	Low	Qualitative assumptions of routeing only

3.3.3 Offshore wind farm developments are screened out if over 60nm from the PEIR Assessment Boundary or within 60nm of the PEIR Assessment Boundary but have not yet been scoped.

3.3.4 Similarly, oil and gas infrastructure is screened out if over 10nm from the PEIR Assessment Boundary or within 10nm of the PEIR Assessment Boundary but have not yet had a basis of design submitted.

3.3.5 Marine aggregate dredging areas are screened out if over 30nm from the PEIR Assessment Boundary or within 30nm of the PEIR Assessment Boundary but have not had a bilateral agreement application submitted.

3.3.6 These distances represent a conservative approach, noting that beyond these distances it is not considered feasible that a cumulative effect would be present. This is a typical approach undertaken for the CEA in NRAs.

3.4 Assumptions

3.4.1 The shipping and navigation baseline and impact identification has been undertaken based upon the information available and responses received at the time of preparation. It was assessed based upon a conservative scenario, in particular noting that the locations of structures will not be finalised until post consent.

4 Consultation

4.1 Types of stakeholder

4.1.1 There are various stakeholder types; these are outlined in **Table 4-1** and are as per the descriptions defined in the Methodology for Assessing the Marine Navigational Safety & Emergency Response Risks of Offshore Renewable Energy Installations (OREI) (MCA, 2013).

Table 4-1 Description of stakeholder types

Type of Stakeholder	Description
Risk imposer	Includes those whose actions or policies result in a risk and need action.
Risk taker	Includes those whose action or inaction results in a risk.
Risk beneficiary	Includes those who benefit from imposing or taking a risk.
Risk payer	Includes those who pay for the management of a risk.
Risk sufferer	Includes those who suffer the consequence of a risk.
Risk observer	Includes those aware of a risk but not affected directly by the risk.

4.1.2 In order to ensure that all stakeholders and their interested users were included within the NRA process, a review of stakeholder types was undertaken in line with the baseline study. Stakeholders have been represented by organisations that have different roles including:

- proposers who are proposing the development;
- approvers who are responsible for giving the development consent;
- advisors who are formally consulted by the approvers;
- users who are not formally consulted by the approvers but who may wish to provide input to them; and
- observers.

4.2 Stakeholders consulted in the Navigational Risk Assessment process

4.2.1 Key shipping and navigation stakeholders have been consulted in the NRA process. The following stakeholders have been consulted via dedicated meetings:

- MCA;
- Trinity House;
- UK Chamber of Shipping;
- RYA;
- Shoreham Port;
- Newhaven Port & Properties;
- Littlehampton Harbour Board;
- Associated British Ports (ABP) Southampton;
- Britannia Aggregates;
- Cemex UK Marine;
- Hanson Aggregates Marine; and
- Tarmac Marine.

4.2.2 As well as being consulted directly, the RYA also agreed to pass on information regarding Rampion 2 to its member clubs for consideration and provided feedback.

4.2.3 As well as consulting with the organisations outlined above, 23 Regular Operators identified from the vessel traffic surveys were provided with an overview of Rampion 2 and offered the opportunity to provide comment (the full Regular Operator letter is presented in **Annex E**). The full list of Regular Operators identified is provided below

- Aggregate Industries UK;
- Amasus Shipping;
- Arklow Shipping;
- Bernhard Schulte;
- Britannia Aggregates;
- Brittany Ferries;
- Carnival;
- Cemex UK Marine;
- Cobelfret Ferries;
- DEME;
- DFDS Seaways;
- Elbdeich Bereederungs;
- Gesellschaft füer Oeltransporte (GEFO);

- Grimaldi;
- Hanson Aggregates Marine;
- HAV Shipping;
- James Fisher Shipping;
- JR Shipping;
- Jungerhans Maritime Services;
- Mediterranean Shipping Company (MSC);
- Stolt-Nielsen;
- Tarmac Marine;
- United European Car Carriers (UECC); and
- Van Dam Shipping.

4.2.4 Cobelfret Ferries, Britannia Aggregates, Cemex UK Marine, DEME, Hanson Aggregates Marine and Tarmac Marine provided feedback directly (see relevant entries in **Table 4-2**), while Volker Dredging Limited (VDL) also responded through the British Marine Aggregate Producers Association (BMAPA) which were provided the Regular Operator letter for circulation among marine aggregate dredging representatives.

4.3 Consultation responses

4.3.1 Various responses have been received from stakeholders during consultation undertaken in the NRA process, either during conference calls, via email correspondence or through the Scoping Opinion. The key points and where they have been addressed in the NRA or **Chapter 13, Volume 2** are summarised in **Table 4-2**.

Table 4-2 Summary of key points raised during consultation

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
RYA	1 July 2020 Email correspondence	The proposal to undertake visual identification of recreational craft in combination with surveys for other receptors is welcomed.	Visual observations recorded during geophysical surveys undertaken in July and August 2020 are considered in **paragraph 13.3.18.**
		Suggest that vessel traffic surveys are undertaken between mid-June and no later than the August bank holiday since bad weather at the end of August can give poor recreational vessel data. There is no preference for the timing of the winter vessel traffic survey.	The summer vessel traffic survey was undertaken between 8 and 22 August 2020 (noting that the August bank holiday was 31 August 2020) (see **Section 7**). Additional visual observations including of recreational vessels were recorded from mid-July (see **paragraph 13.3.18**).
		The plan to validate the vessel traffic survey data with clubs and training centres is welcomed provided that there is a clear method for translating the findings of the NRA into the EIA hierarchy to eliminate identified impacts. Additionally, it would be useful to speak directly with clubs around the landfall location.	The RYA agreed to pass on Information regarding Rampion 2 to its member clubs for consideration (see **Section 4.2**) and feedback has been taken into account (see 23 October 2020 entry in **Table 4-2**). The NRA methodology including the IMO FSA process (which has been applied directly in **Chapter 13, Volume 2**) is described in **Section 3**.
		In addition to AIS data, the RYA Coastal Atlas identifies boating areas around the UK following consultation with member clubs.	The RYA Coastal Atlas has been used to assist with characterising recreational vessel movements within and in proximity to the

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
			PEIR Assessment Boundary (see **paragraph 13.3.14**).
MCA	2 July 2020 Email correspondence	Content with the intended approach for the vessel traffic surveys in principle although October is quite early for a 'winter' survey.	The winter vessel traffic survey was undertaken between 1 and 15 November 2020 (see **Section 7**).
Trinity House	2 July 2020 Email correspondence	Vessel traffic data from 2020 could be affected by the restrictions imposed in response to COVID-19, especially with regards to recreational traffic, and this will need to be assessed accordingly.	The approach to data collection and results have been discussed and agreed with the MCA (see **paragraph 5.3.2**). This includes the use of 12 months of AIS data covering 2019 to validate the findings of the vessel traffic surveys and identify any tangible effects of COVID-19 (see **Annex B**).
MCA	29 July 2020 Scoping response	The Environmental Statement (ES) should supply detail on the possible impact on navigational issues for both commercial and recreational craft, specifically: Collision risk; Navigational safety; Visual intrusion and noise; Risk management and emergency response; Marking and lighting of site and information to mariners; Effect on small craft navigational and communication equipment; The risk to drifting recreational craft in adverse weather or tidal conditions; and	Displacement of existing routes and activity and subsequent increases in collision risk are scoped into the impact assessment undertaken in **Chapter 13, Volume 2** and quantitative modelling of collision risk has been undertaken in **Section 18**. Effects on navigation, communication and position fixing equipment including visual intrusion and noise are scoped into the impact assessment undertaken in **Chapter 13, Volume 2** and considered in **Section 15**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		The likely squeeze of small craft into the routes of larger commercial vessels.	Reduction of emergency response provision is scoped into the impact assessment undertaken in **Chapter 13, Volume 2** with risk management and marking, lighting and promulgation of information considered as part of the embedded environmental measures in **Section 20**. Drifting allision risk is scoped into the impact assessment undertaken in **Chapter 13, Volume 2** and quantitative modelling of drifting allision risk has been undertaken in **Section 18**.
		Attention needs to be paid to routeing, particularly in heavy weather ensuring shipping can continue to make safe passage without large-scale deviations. Cumulative and in-combination effects on shipping routes should also be considered.	Displacement of existing routes is scoped into the impact assessment undertaken in **Chapter 13, Volume 2** and anticipated post wind farm routeing has been modelled in **paragraph 17.6.5**. Adverse weather impacts on routeing is considered in **Section 14.3**. Displacement of existing routes at a cumulative level is considered in **Section 17.7**.
		There are concerns over the available sea room the project may leave for vessels	Displacement of existing routes and activity and subsequent increases in collision risk are

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		entering and exiting the Inshore Traffic Zone (ITZ). There are also concerns on the impacts this will have on the safety of both commercial vessels and pilot boats during pilotage operations.	scoped into the impact assessment undertaken in **Chapter 13, Volume 2** and quantitative modelling of collision risk has been undertaken in **Section 18**.
		An NRA will need to be submitted in accordance with MGN 543, MGN 372 and the MCA's methodology. The NRA should be accompanied by a detailed MGN 543 Checklist.	The NRA has considered MGN 543, the MCA's methodology and the IMO guidelines for FSA as primary guidance (see **Section 2.2**) but also considers MGN 372 (see **Section 2.3**). An MGN 543 Checklist has been completed (see **Annex D**).
		Attention should be paid to cabling routes and where appropriate burial depth for which a Cable Burial Index study should be completed. If cable protection measures are required, the MCA will accept a 5 percent reduction in surrounding depths referenced to Chart Datum (CD).	Cable burial and a cable burial risk assessment (CBRA) are considered as part of the embedded environmental measures in **Section 20**.
		Consideration will need to be given to the implications of the site size and location on Search and Rescue (SAR) resources and an Emergency Cooperation Plan (ERCoP) should be undertaken. Attention should be paid to the level of Radio Detection and	Reduction of emergency response provision including SAR is scoped into the impact assessment undertaken in **Chapter 13, Volume 2** with marking, lighting and promulgation of information considered as part of the embedded environmental

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		Ranging (Radar) surveillance, Automatic Identification System (AIS) and shore-based Very High Frequency (VHF) radio coverage and appropriate mitigation such as communication features.	measures in **Section 20**. An ERCoP will be undertaken post consent.
		Hydrographic surveys should fulfil the requirements of the International Hydrographic Organization (IHO) order 1a standard, with the final data supplied to the MCA.	Detailed and accurate hydrographic surveys will be undertaken periodically at intervals agreed with the MCA (see **Section 21.9**).
Littlehampton Harbour Board	30 July 2020 Scoping response	The shoreward 2nm of the cable landing envelope falls within the Competent Harbour Authority area and so there is likely to be a need for pilotage during some types of vessel operation in this area. The eastern edge of the cable envelope is also immediately adjacent to Littlehampton's pilot boarding station and should be reviewed further in the NRA.	Ports and related services relating to Littlehampton Harbour are described in **Section 9.5** and restrictions on port access including use of pilotage services is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
		Littlehampton's two commercial quaysides are used for the import of roadstone in coasters up to 80 metres (m) Length Overall (LOA). The upcoming construction of the A27 Arundel bypass may lead to a significant increase in traffic volumes associated with Littlehampton since a proportion of the necessary aggregate may come from the port.	The potential for increases in vessel traffic volumes out of Littlehampton are considered in the establishment of the future case vessel traffic (see **Section 17.1**) and consultation has been undertaken with Highways England (see PEIR **Chapter 24: Transport, Volume 2**). The specific activity associated with

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
			Littlehampton is considered in the impact assessment in **Chapter 13, Volume 2**.
		Due to the under keel clearance at Littlehampton harbour entrance, calls by coasters occur only on the spring tide windows so are often missed in AIS sampling. There are currently ten commercial fishing vessels, seven active charter angling vessels and three active resident workboats operating out of Littlehampton, very few of which broadcast on AIS, and the project is likely to impact all of these groups.	Port related traffic out of Littlehampton based on the vessel traffic surveys (which includes Radar data in addition to AIS) is described in **paragraph 13.6.15**.
		The vast majority of recreational vessels operating from Littlehampton do not use AIS and so this cannot be relied on as the only source of vessel traffic data.	Port related traffic out of Littlehampton based on the vessel traffic surveys (which includes Radar data in addition to AIS) is described in **paragraph 13.6.15**.
		The harbour entrance breakwaters at Littlehampton are due for replacement by 2025 which will be a significant infrastructure project possibly at the same time as the construction of Rampion 2.	The potential for increases in vessel traffic volumes out of Littlehampton are considered in the establishment of the future case vessel traffic (see **Section 17.1**).
Trinity House	4 August 2020 Scoping response	A comprehensive vessel traffic analysis in accordance with MGN 543 should be undertaken and possible cumulative and in-	The methodology for vessel traffic analysis is described in **Section 7** and includes compliance with MGN 543. The outputs of the

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		combination effects on shipping routes and patterns should be adequately assessed.	vessel traffic analysis are provided in **Section 13** and **Annex E**. Displacement of existing routes at a cumulative level is considered in **Section 17.7**.
		Proposed layouts should conform to MGN 543 and significant consideration should be given to the layout of the current Rampion Offshore Wind Farm (hereafter Rampion 1) including alignment with the current operational site.	An indicative worst case layout for shipping and navigation is provided in **paragraph 8.2.1** and is considered to be in compliance with the principles of MGN 543.
		The development should be marked with marine aids to navigation in accordance with the general principles outlined in IALA Recommendation O-139 and additional aids to navigation such as buoys may be necessary to mitigate risks, particularly during construction. All marine navigational marking will need to be agreed with Trinity House.	The NRA has considered IALA Recommendation O-139 (see **Section 2.3**). The use of lights, marks, sounds, signals and other aids to navigation including a buoyed construction area around the array as required by Trinity House, MCA and Civil Aviation Authority (CAA) is considered as part of the embedded environmental measures in **Section 20** and further marine aids to navigation considerations have been provided in **Section 20.2**).
		A decommissioning plan should be considered including consideration for any obstruction left in situ.	A decommissioning plan will be developed post consent (see **Section 21.10**).

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		Possible navigational marking of the export cables and the vessels laying them should be considered as should the impact on navigation and requirement for appropriate risk mitigation measures if cable protection is required.	No lighting or physical marking for the export cables is anticipated to be required during the operation and maintenance phase (see **paragraph 20.2.10**) and post construction monitoring of the cable protection, including burial depths, is described in **Section 21.8**.
Ministry of Defence (MOD)	4 August 2020 Scoping response	There are concerns that any turbines or structures erected in Danger Area D037 would impact on the Navy's freedom to exercise within the Danger Area (including exercises involving ships) and cause physical obstructions.	Military Practice and Exercise Areas (PEXAs) are described in **Section 9.9** and displacement of existing activity is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
		In the interests of air safety, it is requested that the development is fitted with MOD accredited aviation safety lighting in accordance with the CAA, Air Navigation Order 2016.	The use of lights, marks, sounds, signals and other aids to navigation as required by Trinity House, MCA and CAA is considered as part of the embedded environmental measures in **Section 20**.
Newhaven Port & Properties	4 August 2020 Consultation meeting	The south eastern corner of the Scoping Boundary is too close to the Dover Strait Traffic Separation Scheme (TSS) and could create a pinch point for vessel traffic.	Displacement of existing routes and activity and subsequent increases in collision risk are scoped into the impact assessment undertaken in **Chapter 13, Volume 2** and quantitative modelling of collision risk has been undertaken in **Section 18**. It is noted that the PEIR Assessment Boundary represents a reduction in total area covered compared to the Scoping Boundary, including

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
			at the eastern extent in proximity to the Dover Strait TSS (see **Section 8.1**).
		Recreational traffic ceased entirely at Newhaven at the start of the COVID-19 outbreak but has now [as of August 2020] returned to normal levels.	The summer vessel traffic survey was undertaken between 8 and 22 August 2020 (see **Section 7**) and the effect of COVID-19 has been acknowledged (see **paragraph 5.3.2**).
		The pilot boarding station for Newhaven is far enough from the Scoping Boundary that there is not expected to be any effect on pilot operations.	Ports and related services relating to the Port of Newhaven are described in **paragraph 9.5.5** and restrictions on port access including use of pilotage services is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
		The AIS data presented in the Scoping Report is reflective of vessel traffic movements in the area.	Noted.
		The proposed NRA methodology is satisfactory.	Noted.
MCA and Trinity House	5 August 2020 Consultation meeting	Vessel traffic issues which persisted for Rampion 1 will still be a factor for Rampion 2, including the ITZ which will need to be assessed carefully.	Displacement of existing routes and activity and subsequent increases in collision risk are scoped into the impact assessment undertaken in **Chapter 13, Volume 2** and quantitative modelling of collision risk has been undertaken in **Section 18**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
			The shipping and navigation chapter of the ES for Rampion 1 (E.ON, 2012) is considered as a data source for lessons learnt (see **Section 6**).
		The displacement of vessel traffic between the south of Rampion 1 and the Dover Strait TSS may be an issue, with a general squeezing of traffic flows and potential subsequent impact on pilotage.	Displacement of existing routes and activity and restrictions on port access including use of pilotage services are scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
		The Dover Strait User Group is a good target audience and therefore would be useful to approach.	The Applicant intends to present at the next meeting of the Dover Strait User Group in April 2021 (see **Section 4.4**).
		Rampion 1 is considered a good layout for SAR and it is important that this is not impacted by Rampion 2 noting that, given the general area, SAR access is of particular importance.	An indicative worst case layout for shipping and navigation is provided in **paragraph 8.2.1**.
		Content with the NRA methodology, in line with MGN 543 and its annexes.	Noted.
UK Chamber of Shipping	10 August 2020 Consultation meeting	Access to the St Helens anchorage may be impacted and additionally collision risk between moving and anchored vessels requires consideration.	Anchorage areas including the recommended anchorage off St Helens Fort are described in **Section 9.6** and reduced access to ports including port related activity such as

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
			anchoring is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
		The AIS data presented in the Scoping Report for cargo vessels and tankers is reflective of expectations in the area.	Noted.
		The proposed NRA methodology is satisfactory and there are no considerable issues.	Noted.
Shoreham Port	12 August 2020 Consultation meeting	The area of search and wide design envelope leads to similar concerns raised for Rampion 1, namely that there is significant uncertainty over what area will be developed.	The PEIR Assessment Boundary represents a reduction in total area covered compared to the Scoping Boundary (see **Section 8.1**).
		Should access to the Dover Strait TSS be blocked from the east of Rampion 1 then vessels will be required to travel much further west out of Shoreham to access the TSS which would have implications on the attractiveness of Shoreham as a port for commercial use, noting that the majority of commercial traffic out of Shoreham utilises the TSS. The economic effects on the port need to be considered.	The PEIR Assessment Boundary represents a reduction in total area covered compared to the Scoping boundary, including at the eastern extent in proximity to the Dover Strait TSS (see **Section 8.1**) such that vessels will be able to safely navigate between the Dover Strait TSS and Shoreham to the east of the PEIR Assessment Boundary (see **paragraph 17.6.5**). A commercial effect on port access is considered in the impact assessment

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
			undertaken in **Chapter 13, Volume 2**, noting that commercial effects are considered out with the technical scope of the NRA.
		Any extension of Rampion 1 to the west may result in vessels holing up landward of the site.	Displacement of existing routes and activity and subsequent increases in grounding risk are scoped into the impact assessment undertaken in **Chapter 13, Volume 2**. It is noted that the PEIR Assessment Boundary represents a reduction in total area covered compared to the Scoping Boundary, including at the western extent in proximity to the Owers Bank (see **Section 8.1**).
		There are no concerns with the offshore cable corridor location.	Noted.
		The effects of COVID-19 are still present [as of August 2020] with a downturn in pleasure craft and visitors to ports infrequent. No yachts from France, Belgium and Germany have visited in 2020. Commercial volumes at Shoreham are down around 30 percent and there remains uncertainty over the possible effects post Brexit. The 12-month dataset from 2019 will be reflective of commercial vessel movements.	The effect of COVID-19 has been acknowledged (see **paragraph 5.3.2**) and port related traffic out of Shoreham based on the vessel traffic survey data is described in **paragraph 13.6.3**. The effects of Brexit are considered in the establishment of the future case vessel traffic (see **Section 17.1**). An analysis of 12 months of AIS data recorded within and in proximity to the PEIR

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
			Assessment Boundary is provided in **Annex B**.
RYA	19 August 2020 Consultation meeting	The south eastern corner of the Scoping Boundary is close to the Dover Strait TSS and this causes some concern. The NRA should consider small numbers of recreational craft engaged in long distance cruising passing through the area.	Displacement of existing routes and activity and subsequent increases in collision risk are scoped into the impact assessment undertaken in **Chapter 13, Volume 2** and quantitative modelling of collision risk has been undertaken in **Section 18**. It is noted that the PEIR Assessment Boundary represents a reduction in total area covered compared to the Scoping boundary, including at the eastern extent in proximity to the Dover Strait TSS (see **Section 8.1**).
		The need to keep a safe distance when passing at the western extent of the Scoping Boundary may limit available sea room and squeeze small craft into a narrow channel given the likely presence of construction buoyage and the Owers/Looe.	Displacement of existing routes and activity and subsequent increases in collision risk are scoped into the impact assessment undertaken in **Chapter 13, Volume 2**. It is noted that the PEIR Assessment Boundary represents a reduction in total area covered compared to the Scoping Boundary, including at the western extent in proximity to the Owers Bank (see **Section 8.1**).
		The portions of the Scoping Boundary developed will determine the effects of displacement of recreational traffic with interaction more likely the closer inshore the	The PEIR Assessment Boundary represents a reduction in total area covered compared to the Scoping boundary (see **Section 8.1**).

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		development is undertaken. Refinement of the Scoping Boundary is key.	
		Initially recreational vessels were excluded from marinas and clubs due to COVID-19 but since the first lockdown [June 2020] the RYA has participated in campaigning to promote their return and a peak in recreational activity can be expected between mid-July and mid-August.	The summer vessel traffic survey was undertaken between 8 and 22 August 2020 (see **Section 7**) and the effect of COVID-19 has been acknowledged (see **paragraph 5.3.2**).
		The seasonal difference in recreational vessel traffic between summer and winter periods observed in the data used in the Scoping Report is to be expected noting that such traffic is largely located landward of Rampion 1. The displacement of any larger recreational craft into inshore waters could result in interaction with small craft and should be considered in the NRA. Otherwise, smaller craft (such as dinghies) are unlikely to be affected by the presence of Rampion 2.	The vessel traffic surveys indicated a similar seasonal difference in recreational vessel traffic to that observed in the data used in the Scoping Report (see **paragraph 13.3.10**). Displacement of existing routes and activity and subsequent increases in collision risk are scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
		East-west recreational traffic through the study area ranging between the Solent and Eastbourne will be most affected by the presence of Rampion 2 as would north-south traffic out of Newhaven and Brighton.	Recreational vessel movements across the area as a whole are described in **paragraph 13.3.10** and port related traffic out of Newhaven and Brighton based on the vessel traffic surveys is described in **paragraph 13.6.7** and **paragraph 13.6.11**, respectively.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
			Displacement of existing routes and activity are scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
		A large proportion of the recreational traffic in the area is under sail and therefore will be presented with additional challenges in certain weather conditions to make safe passage in proximity to the wind farm, particularly at the western extent of the Scoping Boundary if sailing westwards into a prevailing south westerly wind.	Drifting allision risk is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**. It is noted that the PEIR Assessment Boundary represents a reduction in total area covered compared to the Scoping Boundary, including at the western extent in proximity to the Owers Bank (see **Section 8.1**).
		From consultation undertaken by the RYA the national level of AIS uptake by recreational vessels is around 20 percent but the ratio may be higher in this area.	Approximately 78 percent of recreational vessel tracks (see **paragraph 13.3.10**) were recorded on AIS throughout the 28-day vessel traffic surveys.
Cobelfret Ferries	1 October 2020 Email correspondence	Cobelfret Ferries have a number of vessels which pass by the proposed site every week, but they are transiting through the TSS and have no need to enter the proposed site. A vessel breaking down is always an issue but that is the same for any wind farm development. There are no issues which will adversely affect Cobelfret Ferries' current trade routes for the proposed development.	Commercial ferries including those operated by Cobelfret Ferries are described in **paragraph 13.3.7**. Drifting allision risk is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
UECC	19 October 2020 Email correspondence	UECC has four vessels whose passage out of Southampton will be impacted by the south western corner of the search area. Feedback from the Masters is that this will not have much effect and safe sailing will remain. The vessels will have to make a small adjustment on one waypoint, but the total distance of the route will remain about the same.	Commercial ferries including those operated by UECC are described in **paragraph 13.3.7**. Main commercial route deviations are considered in **paragraph 17.6.5** and displacement of existing routes and activity is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
RYA and member clubs	23 October 2020 Email correspondence	Whether recreational traffic at Shoreham may be significant was queried, particularly in relation to traffic associated with the Sussex Yacht Club. Furthermore, whether there is significant traffic at Brighton and Littlehampton other than recreational boating (such as fishing, diving or sightseeing tours) was queried.	Port related traffic out of Shoreham, Brighton and Littlehampton based on the vessel traffic surveys is described in **paragraph 13.6.3**, **paragraph 13.6.11** and **paragraph 13.6.15**, respectively.
		Whether the high proportion of reported incidents being recreational vessels is a reflection of traffic volume, poor maintenance or lack of training was queried.	Analysis of historical incident data within and in proximity to the PEIR Assessment Boundary is provided in **Section 12**. The high proportion of recreational vessels involved in incidents responded to by the Royal National Lifeboat Institution (RNLI) may be attributed to the high volume of recreational activity in the nearshore area where the RNLI is most likely to respond to an incident.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		There are few safe havens for recreational craft seeking shelter along this coast with those that are available very tide dependent for access. Mitigation measures and construction should avoid restricting access to safe havens.	Access to safe havens for small craft in adverse weather conditions is assessed in **Section 14.4**.
		From a recreational boating point of view, Rampion 2 should be sited within the Scoping Boundary immediately to the west or to the south of Rampion 1 with the NRA to look very carefully at the risks to recreational boating when siting anywhere else within the Scoping Boundary.	It is noted that the PEIR Assessment Boundary represents a reduction in total area covered compared to the Scoping Boundary, including at the eastern and western extents (see **Section 8.1**). Structure deployment across the maximum extent of the array area is considered as part of the maximum design scenario for shipping and navigation used as input to the impact assessment in **Chapter 13, Volume 2**.
		In recent years the silting up of Brighton Marina has become a challenge and it is postured that disruption to the seabed from construction methods (increased sedimentation) could create coastal navigation problems.	Reduction in under keel clearance is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
Britannia Aggregates	30 October 2020 Email correspondence	Britannia Aggregates delivers cargoes into Shoreham and Newhaven (and occasionally Portsmouth and Southampton) that may be	Active marine aggregate dredging areas are described in **Section 9.4** and marine

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		dredged on marine aggregate licence areas close to the Isle of Wight, in the central English Channel and in the Outer Thames/east coast.	aggregate dredger movements are characterised in **paragraph 13.3.25**.
		Some of the routes to and from the licence areas to these ports could be impacted by Rampion 2 depending upon where the new Wind Turbine Generators (WTGs) are placed; in particular the Shoreham to East Channel licences could entail a detour of 8 to 10nm which is significant in terms of fuel and time. These transit routes should be considered.	Marine aggregate dredger movements are characterised in **paragraph 13.3.25** and are considered in the identification of main commercial routes in **Section 13.5**. The commercial risk due to vessel displacement is assessed as part of the impact assessment in **Chapter 13, Volume 2**. It is noted that the PEIR Assessment Boundary represents a reduction in total area covered compared to the Scoping Boundary, including at the eastern extent (see **Section 8.1**).
DEME	30 October 2020 Email correspondence	The Scoping Boundary covers a relatively large region and there are concerns that DEME operated vessels sail in proximity to the Scoping Boundary including over the offshore cable corridor and over the proposed area of build to reach destinations such as Shoreham and Newhaven. This may cause conflicts with transit routes and therefore these concerns should be taken into account when assessing the navigational risks and	Marine aggregate dredger movements are characterised in **paragraph 13.3.25** and are considered in the identification of main commercial routes in **Section 13.5**. Main commercial route deviations are considered in **paragraph 17.6.5** and displacement of existing routes and activity is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		determining the areas where structures are installed.	
VDL	5 November 2020 Email correspondence	VDL holds marine aggregate licences for Areas 340 and 351 East of the Isle of Wight and also for Area 461 and GIE St Nicolas in the East English Channel. Cargoes are regularly landed at Shoreham and Newhaven from the Isle of Wight and East Channel concessions and it is important that steaming times are not increased as a result of Rampion 2. Even small increases in steaming distances can have a significant impact on the profitability of operations.	Marine aggregate dredger movements are characterised in **paragraph 13.3.25** and are considered in the identification of main commercial routes in **Section 13.5**. Main commercial route deviations are considered in **paragraph 17.6.5** and displacement of existing routes and activity is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
Littlehampton Harbour Board	18 November 2020 Consultation meeting	Less than 50 percent of the small commercial vessels operating out of Littlehampton are on AIS and it is anticipated that less than 20 percent of vessels inshore at Littlehampton are on AIS.	Port related traffic out of Littlehampton based on the vessel traffic surveys is described in **paragraph 13.6.15** and includes minimal commercial vessel activity. Approximately 58 percent of recreational vessels were recorded on AIS.
		Vessels can spend anywhere between six hours and two days at the Littlehampton anchorage area awaiting suitable weather.	Littlehampton Harbour and its associated temporary anchorage is described in **paragraph 9.5.9**.
		Any vessel operating within the Competent Harbour Authority area would likely require pilotage including any cable laying vessel that	Littlehampton Harbour and its associated pilotage is described in **paragraph 9.5.9**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		may be operating in the pilotage area for Rampion 2.	
Littlehampton Harbour Board	16 December 2020 Email correspondence	The non-AIS vessels observed in the summer survey data is accurate for the routes taken.	Noted.
		A route for a monthly (on average) 80m coaster extending direct from the Dover Strait TSS to the east to the anchorage and from the harbour direct to the TSS should be included in any assessment with any detour potentially meaning that Littlehampton becomes less attractive to shipping as many vessels rushing to make the tide would have a further delay. For those without a chance of making entry on arrival locally, the detour is less of an issue but the long stay at the anchorage is our key risk with the cable.	The route between Littlehampton and the Dover Strait TSS has been included in the characterisation of the main commercial routes in **paragraph 13.5.1**. Main commercial route deviations are considered in **paragraph 17.6.5** and displacement of existing routes and activity and interaction with subsea cables is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**, including commercial risk in addition to navigational safety risk.
MCA	23 February 2021 Hazard Workshop	Infrastructure within a routeing measure is not allowed under the South Inshore and South Marine Plan, and the ITZ is part of the routeing measures referred to in the plan.	Main commercial route deviations including use of the ITZ are considered in **paragraph 17.6.5** and displacement of existing routes is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
RYA	23 February 2021 Hazard Workshop	Consideration of the spacing between structures and use of Notices to Mariners (NtM) may serve as suitable mitigation	The minimum spacing between structures is 860m (see **paragraph 8.2.5**). NtM are considered as part of the embedded environmental measures in **Section 20**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		measures for hazards associated with recreational vessels.	
		Safe havens are sparse along this part of the coast and consist primarily of harbours.	Access to safe havens for small craft in adverse weather conditions is assessed in **Section 14.4**.
		Impacts relating to emergency response for recreational activity seaward of the array should be considered.	Reduction of emergency response provision is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
Shoreham Port	23 February 2021 Hazard Workshop	The indicative worst case layout for shipping and navigation does reflect the worst case for shipping given that it blocks access to the Dover Strait TSS lanes from Shoreham.	Main commercial route deviations including routeing between Shoreham and the Dover Strait TSS are considered in **paragraph 17.6.5** and displacement of existing routes is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
		NtM for Rampion 1 became somewhat excessive.	NtM are considered as part of the embedded environmental measures in **Section 20** and feedback will be provided to the marine coordinator.
Littlehampton Harbour Board	23 February 2021 Hazard Workshop	The indicative worst case layout for shipping and navigation cuts off Littlehampton entirely.	Main commercial route deviations including routeing to/from Littlehampton are considered in **paragraph 17.6.5** and displacement of existing routes is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
Cemex UK Marine	23 February 2021 Hazard Workshop	Fishing vessels avoid passing through Rampion 1 in winter and instead pass to the west. Any decision for routeing with a wider spacing between structures at Rampion 2 would be for the individual skippers.	Fishing vessel movements are characterised in **paragraph 13.3.28** and indicate good agreement with the seasonal variation indicated.
		The risk of a marine aggregate dredger breaking down and drifting on the ebb tide into the export cable route should be considered.	Drifting allision risk is scoped into the impact assessment undertaken in **Chapter 13, Volume 2** with marine aggregate dredgers considered as a receptor.
		Radar performance should be incorporated into the assessment.	Effects on marine Radar are considered in **Section 15.7**.
Tarmac Marine	23 February 2021 Hazard Workshop	The issue of marine aggregate dredgers in transit from port to dredging areas and dredging activity itself require consideration, particularly in relation to the risk of a vessel losing power leaving to a drifting allision incident. A suitable clearance may be determined in consultation with BMAPA but should be sufficient to allow emergency anchoring in such circumstances.	Displacement of existing routes and drifting allision risk are scoped into the impact assessment undertaken in **Chapter 13, Volume 2** with marine aggregate dredgers considered as a receptor.
Tarmac Marine	19 March 2021 Email correspondence	The minimum width of the pinch point between the Owers Light Buoy and the site of 1.9nm is sufficient but there is a preference for a lit buoy to be placed on the wind farm side to better define the gap for navigation.	Noted as a potential mitigation and will be discussed with Trinity House as noted in **paragraph 20.2.4**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		There is a need for sufficient clearance between the southern limit of aggregate Area 396 and the nearest turbine in case of a loss of propulsion during future dredging operations. Based on a trial undertaken a few years ago a clearance of at least 1,000m from the licence boundary is requested. Additionally, the location of the substation south east of Area 396 would need siting somewhat further away from the licence boundary.	Noted and will be considered when refining the design envelope post PEIR in **Chapter 7: Other marine users, Volume 2**.
		Suggest consideration of the use of leading lights/lines to highlight the lay of cables from the wind farm.	Noted as a potential mitigation and will be discussed with Trinity House as noted in **paragraph 20.2.2**.
Hanson Marine	24 March 2021 Email correspondence	The minimum distance to aggregate Area 435 of 1nm is the minimum acceptable for a contingency response in deploying of an anchor. However, there is concern over the proposed proximity to other aggregate areas should they ever be used as a third party.	Noted and will be considered when refining the design envelope post PEIR in **Chapter 7, Volume 2**.
		Concerned by the potential for a concentration of commercial, fishing and leisure craft into the Owers Light Buoy east/west transit area. The pinch point of 1.9nm should be an adequate distance with buoyage.	Noted as a potential mitigation and will be discussed with Trinity House as noted in **paragraph 20.2.4**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		Concerned by the potential impact of increased craft activity and movements across the aggregate area where the wind farm may significantly condense local activity. This also applies with craft coming from the south heading to a nearby port that will funnel into the areas en-route to land.	Noted and will be considered further post PEIR.
		Concerned by Radar interference from the wind farm and, in addition, the impact the wind farm may have on VHF communications and request further investigation.	Effects on marine Radar are considered in **Section 15.7** and effects on VHF are considered in **Section 15.1** and **Section 15.2**.
		Suggest consideration of the use of leading lights/lines to highlight the lay of cables from the wind farm.	Noted as a potential mitigation and will be discussed with Trinity House as noted in **paragraph 20.2.2**.
Littlehampton Harbour Board	24 March 2021 Email correspondence	Cable burial of 1m close to Littlehampton's charted anchorage for larger vessels is concerning but content that this will be addressed in the CBRA.	The CBRA will ensure burial or protection is undertaken based on relevant mitigations and is considered as part of the embedded environmental measures in **Section 20**.
		Cable burial at 1m depth within 1nm of Mean High Water Springs (MHWS) is also concerning given the frequency of small leisure craft, fishermen, racing safety/committee boats, temporary race marks, visiting yachts and lifeboats anchoring in this area. Buoyage similar to that in place	Noted as a potential mitigation and will be discussed with Trinity House as noted in **paragraph 20.2.2**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		around the existing cable landing at Worthing will help to mitigate this.	
		All marine operations falling within Littlehampton's pilotage district should be consulted on with the Littlehampton Harbour Board in advance. Any operation of vessels over 20m in length at low under keel clearance or any vessels engaged in cable burial may be subject to pilotage.	Marine coordination to manage project vessels throughout construction and maintenance periods is considered as part of the embedded environmental measures in **Section 20**.
Cemex UK Marine	29 March 2021 Email correspondence	The natural reluctance of seafarers to enter within the established development will inevitably result in compression of traffic routes between the north west boundary and the Owers buoy and similarly between the south east boundary and the western limit of the south west lane of the Dover Strait TSS.	Displacement of existing routes and activity is scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
		The presence of the development area is likely to displace to the south, vessels making for the Dover Strait ITZ with the consequence that an increase in head-on or near head-on encounters will occur between vessels approaching the ITZ and vessels leaving the south west bound TSS.	Displacement of existing routes and activity and subsequent increases in collision risk are scoped into the impact assessment undertaken in **Chapter 13, Volume 2** and quantitative modelling of collision risk has been undertaken in **Section 18**.
		AIS indicates that during winter commercial fishing vessels following the significant transit	Fishing vessel movements are characterised in **paragraph 13.3.28** and indicate good

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		route to/from the south towards/departing Shoreham avoid passing through Rampion 1. In the case that this practice is adopted with respect to Rampion 2 there will then be significant displacement of commercial fishing vessels to the east or west of the proposed development. This would increase the number of encounters between fishing vessels in transit and marine aggregate dredgers working the current active extraction areas.	agreement with the seasonal variation indicated. Displacement of fishing vessels and subsequent increases in collision risk are scoped into the impact assessment undertaken in **Chapter 13, Volume 2**.
		The potential increase in encounters referred to should be considered in the context of potential reduced Radar performance of vessels navigating in close proximity to the wind farm structures. Radar performance considerations should be based on evidence of the Radar performance of relevant vessel types navigating in close proximity to the offshore structures proposed for the development as opposed to being based on generic Radar performance studies.	Effects on marine Radar are considered in **Section 15.7**.
		Current active aggregate areas are hemmed in to the south and west by the northern limit of the development site and the eastern limit of the export cable corridor potentially reducing available sea room for marine aggregate dredgers to operate and take	Displacement of existing routes and activity and subsequent increases in collision risk are scoped into the impact assessment undertaken in **Chapter 13, Volume 2** and quantitative modelling of collision risk has been undertaken in **Section 18**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		avoiding action in the case of encounters with other vessels.	
		Given the close proximity of current aggregate areas the adequacy of the proposed cable burial depth of 1m must be confirmed and the possibility of it being breached by the anchor penetration of a drifting vessel attempting to come to her anchor without power must be assessed.	The CBRA will ensure burial or protection is undertaken based on relevant mitigations and is considered as part of the embedded environmental measures in **Section 20**.
		The draft hazard log generally underplays the potential impact of the development on general navigation in the area (interrelationship of all impacts) and the impact on marine aggregate dredgers and commercial fishing vessels in particular.	Inter-related effects are considered in **Chapter 13, Volume 2**. The NRA will be updated post PEIR to summarise the impacts fed into the FSA.
RYA	1 April 2021 Email correspondence	Any assessment should be based on accurate surveys of recreational traffic and should avoid an emphasis on AIS as most recreational craft are not fitted with AIS transponders.	Approximately 78 percent of recreational vessel tracks (see **paragraph 13.3.10**) were recorded on AIS throughout the 28-day vessel traffic surveys, noting that vessel traffic surveys were compliant with MGN 543 and the methodology discussed with stakeholders (including the RYA) in advance.
		Any assessment should determine recreational traffic densities north (inshore) and south (offshore) of the proposed	Recreational vessel movements across the area as a whole are described in **paragraph 13.3.10**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		development to ensure an accurate assessment.	
		Recreational representatives recommend siting the development south or west of Rampion 1 to avoid navigational squeeze in the area between the development and Selsey Bill but also to avoid recreational traffic being squeezed between the southern boundary and Dover Strait TSS.	It is noted that the PEIR Assessment Boundary represents a reduction in total area covered compared to the Scoping Boundary, including at the eastern and western extents (see **Section 8.1**). Structure deployment across the maximum extent of the array area is considered as part of the maximum design scenario for shipping and navigation used as input to the impact assessment in **Chapter 13, Volume 2**.
		The NRA should: Note the number of recreational vessels using and crossing the area; Include vessel traffic survey logs as an annex; Indicate the number of vessels carrying AIS and Radar reflectors; Use vessel traffic surveys undertaken between 15 June and 15 August; Provide detailed assessments of how risk is determined as ALARP; Compare the NRA surveys and the appropriate MMO full yearly AIS survey for the UK;	Recreational vessel movements across the area as a whole are described in **paragraph 13.3.10** and the visual observations log from the vessel traffic surveys is provided in **Annex C**. it is noted that the vessel traffic surveys (and long-term vessel traffic data analysis) undertaken for the NRA are more advanced than the terrestrial MMO surveys. The summer vessel traffic survey was undertaken between 8 and 22 August 2020, noting that the RYA previously indicated that the summer vessel traffic survey should be undertaken prior to the August Bank Holiday

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		Consider the RYA Coastal Atlas and general boating areas against the vessel traffic surveys; and Consider recreational vessel movements in adverse weather.	(noting that the August bank holiday was 31 August 2020) (see 1 July 2020 entry in **Table 4-2**). It is not possible to assess use of Radar reflectors by vessels. The NRA methodology including the ALARP process (which has been applied directly in **Chapter 13, Volume 2**) is described in **Section 3**. The RYA Coastal Atlas has been used to assist with characterising recreational vessel movements within and in proximity to the PEIR Assessment Boundary (see **paragraph 13.3.14**). Access to safe havens for small craft in adverse weather conditions is assessed in **Section 14.4**.
Littlehampton Harbour Board	7 April 2021 Email correspondence	A target burial depth is not a mitigation in itself but simply an intent to mitigate. A mitigation would be a minimal depth of cover at time of installation and also a minimum depth of cover throughout the cable's lifetime.	The CBRA will ensure burial or protection is undertaken based on relevant mitigations and is considered as part of the embedded environmental measures in **Section 20**.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		A 1m actual depth of cover is not expected to be sufficient to mitigate the risk of anchor interaction. It should be confirmed if analysis such as anchor penetration trials has or will be undertaken. The CBRA may account for this but should be reviewed and approved by the Littlehampton Harbour Board.	The CBRA will ensure burial or protection is undertaken based on relevant mitigations and is considered as part of the embedded environmental measures in **Section 20**. Littlehampton Harbour Board will be noted as a consultee for the CBRA.
		Monitoring of cable burial via annual bathymetry surveys and a remedial response plan if shallower depths of cover than agreed are detected is considered as an expected mitigation.	Monitoring of cable burial will be addressed by the Cable Specification Installation and Monitoring Plan which is a consent condition.
		A line of buoyage marking the cable route up to 1nm seaward from MWHS is expected to mitigate leisure mariners anchoring off the beach.	Noted as a potential mitigation and will be discussed with Trinity House as noted in **paragraph 20.2.2**.
		A permanent relocation of the western two charted Arun Yacht Club seasonal race markers may be required.	Noted and consultation will be undertaken with Arun Yacht Club (and the RYA) on the matter prior to any construction works.
		Anchor interaction should be considered for recreational vessels with a most likely consequence of 'no interaction' challenged in favour of anchors of any type or size of vessel snagging on the cable or its protection resulting in dumping of the anchor and	Acknowledged in hazard log (see **Annex A**) although recreational vessel and small craft anchors are unlikely to penetrate the cable. This will be considered further as part of the CBRA.

Stakeholder(s)	Date and form of correspondence	Point raised	Response and where addressed in the NRA
		therefore an inability to use the anchor in an emergency thereafter.	

4.4 Hazard Workshop

Introduction

4.4.1 A key element of the consultation phase was the Hazard Workshop, a meeting of local and national marine stakeholders to identify and discuss potential shipping and navigation hazards. Using the information gathered from the Hazard Workshop, a hazard log was produced for use as input into the impact assessment undertaken in **Chapter 13, Volume 2**. This ensured that expert opinion and local knowledge was incorporated into the hazard identification process and that the hazard log was site-specific.

Hazard workshop attendance

4.4.2 The Hazard Workshop was held via teleconferencing (due to restrictions incurred by the COVID-19 pandemic) on 23 February 2021. The Hazard Workshop was attended by all of the parties listed in **Section 4.2**.

4.4.3 Regular operators were given the opportunity to attend the Hazard Workshop but other than the marine aggregate dredging companies (who were contacted through BMAPA) none did so. Likewise, the National Federation of Fishermen's Organisations (NFFO) chose not to attend.

Hazard Workshop process and hazard log

4.4.4 During the Hazard Workshop, key maritime hazards associated with the construction, operation and maintenance and decommissioning of Rampion 2 were identified and discussed. Where appropriate, hazards were considered by vessel type to ensure risk control options could be identified on a type-specific basis.

4.4.5 Following the Hazard Workshop, the risks associated with the identified hazards were ranked in the hazard log based upon the discussions held during the workshop, with appropriate commitments identified, including any additional measures required to reduce the risks to ALARP. The hazard log was then provided to the Hazard Workshop attendees for comment and their feedback incorporated into the NRA. The hazard log has been used to inform the impact assessment undertaken in **Chapter 13, Volume 2** and is provided in full in **Annex A**.

4.5 Further consultation

4.5.1 Additional consultation will be undertaken post PEIR, including dedicated meetings with stakeholders to discuss issues raised during Section 42.

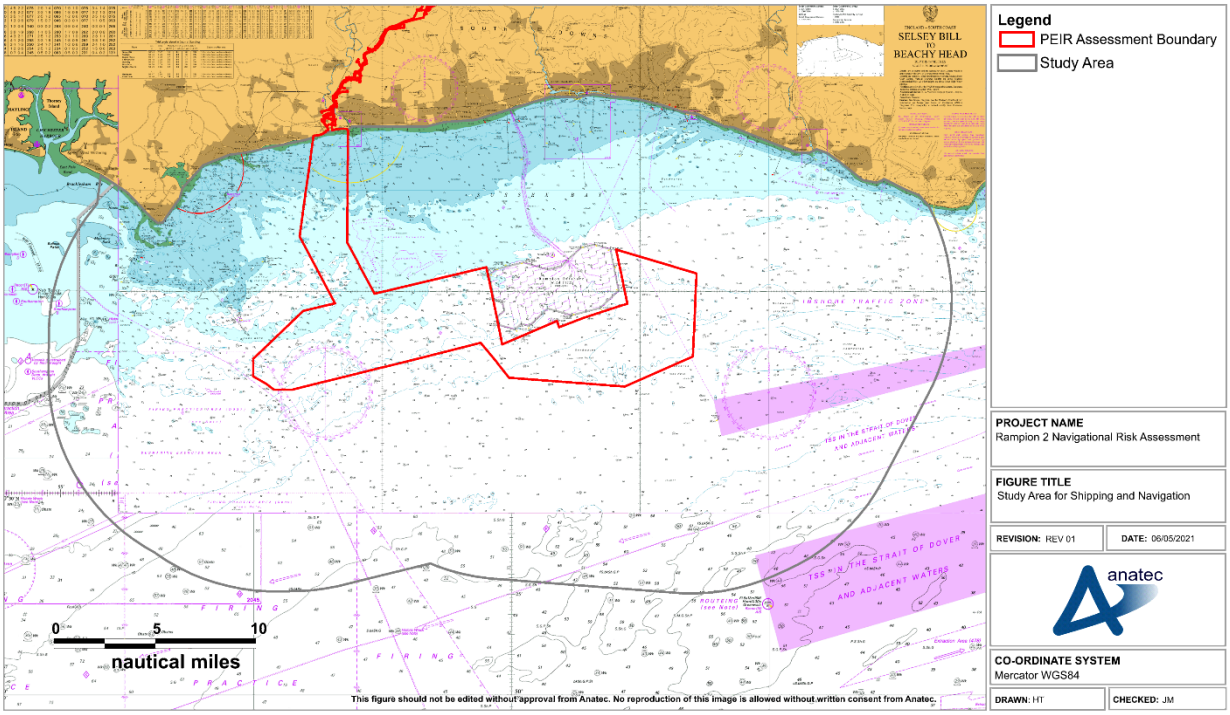
5 Data sources

This section summarises the main data sources used to characterise the shipping and navigation baseline relative to Rampion 2.

5.1 Study area

5.1.1 A buffer of up to 10nm has been applied around the PEIR Assessment Boundary, as shown in **Figure 5.1** as the study area for shipping and navigation (hereafter the study area). The study area has been defined in order to provide local context to the analysis of risks by capturing the relevant routes and vessel traffic movements within and in proximity to the PEIR Assessment Boundary. A 10nm study area has been used in the majority of UK offshore wind farm NRAs.

Figure 5.1 Study area for shipping and navigation



5.2 Summary of data sources

5.2.1 The main data sources used to characterise the shipping and navigation baseline relative to Rampion 2 are outlined in **Table 5-1**.

Table 5-1 Data sources used to inform shipping and navigation baseline

Data	Source(s)	Purpose
Vessel traffic	AIS, Radar and visual observation data for the study area (28 days, August and November 2020).	Characterising vessel traffic movements within and in proximity to the PEIR Assessment Boundary in line with MGN 543 (MCA, 2016) requirements.
	Non-AIS visual observations within and in proximity to the PEIR Assessment Boundary (July to August 2020).	Characterising non-AIS vessel traffic movements within and in proximity to the PEIR Assessment Boundary.
	AIS data for the study area (12 months 2019) (hereafter the 'long-term vessel traffic data').	Validation of the vessel traffic surveys and characterising seasonal variations and tangible effects of COVID-19.
	Anatec's ShipRoutes database (2020).	Secondary source for characterising vessel traffic movements including cumulatively within and in proximity to the PEIR Assessment Boundary.
Maritime incidents	Maritime Accident Investigation Branch (MAIB) marine accidents database (2008 to 2017).	Review of maritime incidents within and in proximity to the PEIR Assessment Boundary.
	RNLI incident data (2008 to 2017).	
	DfT UK civilian SAR helicopter taskings (2015 to 2020).	
Marine aggregate dredging	Marine aggregate dredging areas (licenced and active) (The Crown Estate (TCE), 2020).	Characterising marine aggregate dredging areas within and in proximity to the PEIR Assessment Boundary.
	Transit routes (BMAPA, published 2009, downloaded 2020)[2].	
Recreational traffic density and features	UK Coastal Atlas of Recreational Boating 2.1 (RYA, 2019).	Characterising recreational activity within and in proximity to the PEIR Assessment Boundary.

[2] Given the age of this data source it was found to not be wholly reflective of marine aggregate dredger movements within the study area. It is noted that the AIS data (both the vessel traffic survey data and long-term vessel traffic data) was considered comprehensive for marine aggregate dredgers.

Data	Source(s)	Purpose
Other navigational features	Admiralty Charts 1652, 1991, 2037, 2044, 2154, 2450 and 2675 (United Kingdom Hydrographic Office (UKHO), 2020/21).	Characterising other navigational features in proximity to the PEIR Assessment Boundary.
	Admiralty Sailing Directions Dover Strait Pilot NP28 (UKHO, 2017).	
Weather	Rampion Offshore Wind Farm Metocean Survey and Assessment (Emu, 2011)	Characterising weather conditions in proximity to the PEIR Assessment Boundary for use as input in the collision and allision risk modelling.
	Case studies of past weather events (Met Office, 2019).	Identifying periods of adverse weather in proximity to the PEIR Assessment Boundary.

5.2.2 The vessel traffic survey data recorded from a dedicated vessel on-site and used in the NRA is summarised in **Table 5-2**. Key vessel characteristics for the survey vessel are provided in **Section 7**.

Table 5-2 Summary of dedicated vessel traffic survey data

Survey	Survey Period	
	Summer	**Winter**
Survey dates	8 to 22 August 2020	1 to 15 November 2020
Location	PEIR Assessment Boundary	
Data type	AIS, Radar and visual observations	
Data capture[3]	14 days	14 days
Vessel	*Karima*	
AIS system type	JRC LHS-183	
Radar system type	JRC JMA 5300Mk2	

[3] The summer survey commenced at 02:00 on 8 August 2020 and concluded at 02:00 on 22 August 2020. Therefore, only 12 days were 'full days' but the survey duration as a whole was 14 days, as per the requirements of MGN 543. Likewise, the winter survey commenced at 09:00 on 1 November 2020 and concluded at 09:00 on 15 November 2020.

Survey	Survey Period	
	Summer	Winter
Personnel	Bridge crew (dedicated)	

5.3 Data limitations

Automatic Identification System data

5.3.1 The long-term vessel traffic data – an AIS only dataset – used to validate the vessel traffic survey data assumes that vessels under a legal obligation to broadcast via AIS will do so. Both the long-term vessel traffic data and the AIS component of the vessel traffic survey data assume that the details broadcast via AIS is accurate (such as vessel type and dimensions) unless there is clear evidence to the contrary.

COVID-19

5.3.2 It is acknowledged that COVID-19 has had a substantial effect on shipping movements globally. Therefore, the vessel traffic survey data collected may be influenced by COVID-19. However, in line with PINS Advice Note Seven: Environmental Impact Assessment (PINS, 2020), RED has agreed the approach to data collection and the results with relevant stakeholders including the MCA. Additionally, during consultation input has been sought from relevant stakeholders regarding the shifting pattern of vessel movements due to COVID-19, with the consensus that at the time of the vessel traffic surveys (undertaken in August and November 2020) commercial vessel movements could be considered to be relatively reflective of normal circumstances in the region (see various entries in **Table 4-2**).

Historical incident data

5.3.3 Although all UK commercial vessels are required to report accidents to the MAIB, non-UK vessels do not have to report unless they are in a UK port or within 12nm territorial waters (noting that the study area is not located entirely within 12nm territorial waters) or carrying passengers to a UK port. There are also no requirements for non-commercial recreational craft to report accidents to the MAIB.

5.3.4 The RNLI incident data cannot be considered comprehensive of all incidents in the study area. Although hoaxes and false alarms are excluded, any incident to which a RNLI resource was not mobilised has not been accounted for in this dataset.

United Kingdom Hydrographic Office admiralty charts

5.3.5 The UKHO admiralty charts are updated periodically and therefore the information shown may not reflect the real time features within the region with total accuracy. However, during consultation input has been sought from relevant stakeholders regarding the navigational features baseline.

6 Lessons learnt

6.1.1 There is considerable benefit for RED in the sharing of lessons learnt within the offshore industry. The NRA, and in particular the impact assessment undertaken in **Chapter 13, Volume 2**, includes general consideration for lessons learnt and expert opinion from previous offshore wind farm developments and other sea users, capitalising upon the UK's position as a leading generator of offshore wind power.

6.1.2 Data sources for lessons learnt include the following:

- Sharing the Wind – Recreational Boating in the Offshore Wind Strategic Areas (RYA and Cruising Association (CA), 2004);
- Results of the Electromagnetic Investigations (MCA and QinetiQ, 2004);
- Offshore Wind and Marine Energy Health and Safety Guidelines (RenewableUK, 2014);
- Offshore Wind Farm Helicopter Search and Rescue Trials Undertaken at the North Hoyle Wind Farm (MCA, 2005);
- Interference to Radar Imagery from Offshore Wind Farms (Port of London Authority (PLA), 2005);
- Rampion Offshore Wind Farm Environmental Statement: Chapter 14 – Shipping and Navigation (E.ON Climate & Renewables, 2012);
- Strategic Assessment of Impacts on Navigation of Shipping and Related Effects on Other Marine Activities Arising from the Development of Offshore Wind Farms in the UK Renewable Energy Zone (REZ) (Anatec & TCE, 2012); and
- G+ Global Offshore Wind Health & Safety Organisation 2019 Incident Data Report (G+, 2020).

7 Vessel traffic survey methodology

7.1 Introduction

7.1.1 In agreement with the MCA and Trinity House, the overarching NRA process for Rampion 2 considers three primary vessel traffic datasets, all within the study area:

- fourteen days of AIS, Radar and visual observation data collected between 8 and 22 August 2020 (summer survey);
- fourteen days of AIS, Radar and visual observation data collected between 1 and 15 November 2020 (winter survey); and
- twelve months of AIS data collected over the entirety of 2019.

7.2 Vessel traffic surveys

7.2.1 The vessel traffic surveys were undertaken by the guard vessel *Karima* and are considered compliant with the vessel traffic survey requirements set out in MGN 543 (MCA, 2016). An image of the vessel, and relevant key vessel characteristics are provided in **Figure 7.1** and **Table 7-1**, respectively.

Figure 7.1 Image of the Karima Survey Vessel (MarineTraffic, 2020)

Table 7-1 Key vessel characteristics

Parameter	Specification
Name	*Karima*
MMSI	232,006,310
IMO Number	7,427,403
Callsign	MPKV5
LOA	26m
Flag State	UK

7.2.2 A number of vessel tracks recorded during the survey period were classified as temporary (non-routine), such as the tracks of the survey vessel and tracks of vessels associated with wind farm support at the existing Rampion 1 offshore wind farm and were therefore excluded from the characterisation of the vessel traffic baseline. Vessels undertaking a survey at the Interconnexion France-Angleterre 2 (IFA2) project were also removed from the analysis, as well as a vessel carrying out an Unexploded Ordnance (UXO) survey at Brighton.

7.2.3 The dataset is assessed in full in **Section 13**.

7.3 Long-term vessel traffic data

7.3.1 The long-term vessel traffic data consisting of AIS covering 12 months in 2019 was collected from coastal receivers. Taking into account the distance offshore of the PEIR Assessment Boundary, the long-term vessel traffic data is considered to be comprehensive for the study area. The assessment of this dataset allowed seasonal variations to be captured and any tangible effects of COVID-19 to be observed.

7.3.2 The dataset is assessed in full in **Annex B**.

7.4 AIS carriage

7.4.1 The carriage of AIS is required on board all vessels of greater than 300 Gross Tonnage (GT) engaged on international voyages, cargo vessels of more than 500GT not engaged on international voyages, passenger vessels irrespective of size built on or after 1 July 2002, and fishing vessels over 15m LOA.

7.4.2 Therefore, for the vessel traffic surveys larger vessels were recorded on AIS, while smaller vessels without AIS installed (including fishing vessels under 15m LOA and recreational craft) were recorded, where possible, on the Automatic Radar Plotting Aid (ARPA) Radar on board the *Karima*. A proportion of smaller vessels also carry AIS voluntarily, typically utilising a Class B AIS device.

7.4.3 Throughout the summer survey, approximately 94 percent of vessel tracks were recorded via AIS with the remaining 6 percent recorded via Radar. Throughout the winter survey, approximately 98 percent of vessel tracks were recorded via AIS with the remaining 2 percent recorded via Radar.

8 Project description relevant to shipping and navigation

The NRA reflects the design envelope, which is detailed in full in **Chapter 4, Volume 2**. The following subsections outline the maximum extent of Rampion 2 for which any shipping and navigation impacts are assessed.

8.1 PEIR Assessment Boundary

8.1.1 For the purposes of the NRA, the PEIR Assessment Boundary is considered to be the offshore component of Rampion 2, consisting of the array area and offshore cable corridor.

8.1.2 The array area is located approximately 7.3nm south of the West Sussex coast. The total area covered by the array area is approximately 78 square nautical miles (nm^2) with charted water depths ranging between 14 and 60m below CD. The total area covered by the offshore cable corridor is approximately 17nm^2 with charted water depths ranging between zero (nearshore) and 21m below CD.

8.1.3 The key coordinates defining the boundary of the offshore element of the PEIR Assessment Boundary are illustrated in **Figure 8.1** and provided in **Table 8-1** using World Geodetic System 1984 (WGS84) Universal Transverse Mercator (UTM) Zone 30N.

8.1.4 It is noted that the array area represents a decrease of approximately 15 percent in total area covered compared to the equivalent area considered at Scoping, with the western and eastern extents reduced due to issues raised in relation to a number of aspects, including by shipping and navigation stakeholders (see various entries in **Table 4-2**). Subsequently, the total area covered by the offshore cable corridor is reduced by approximately 21 percent. The Scoping Boundary is included as a dashed line in **Figure 8.1**.

Figure 8.1 Key coordinates for the PEIR Assessment Boundary

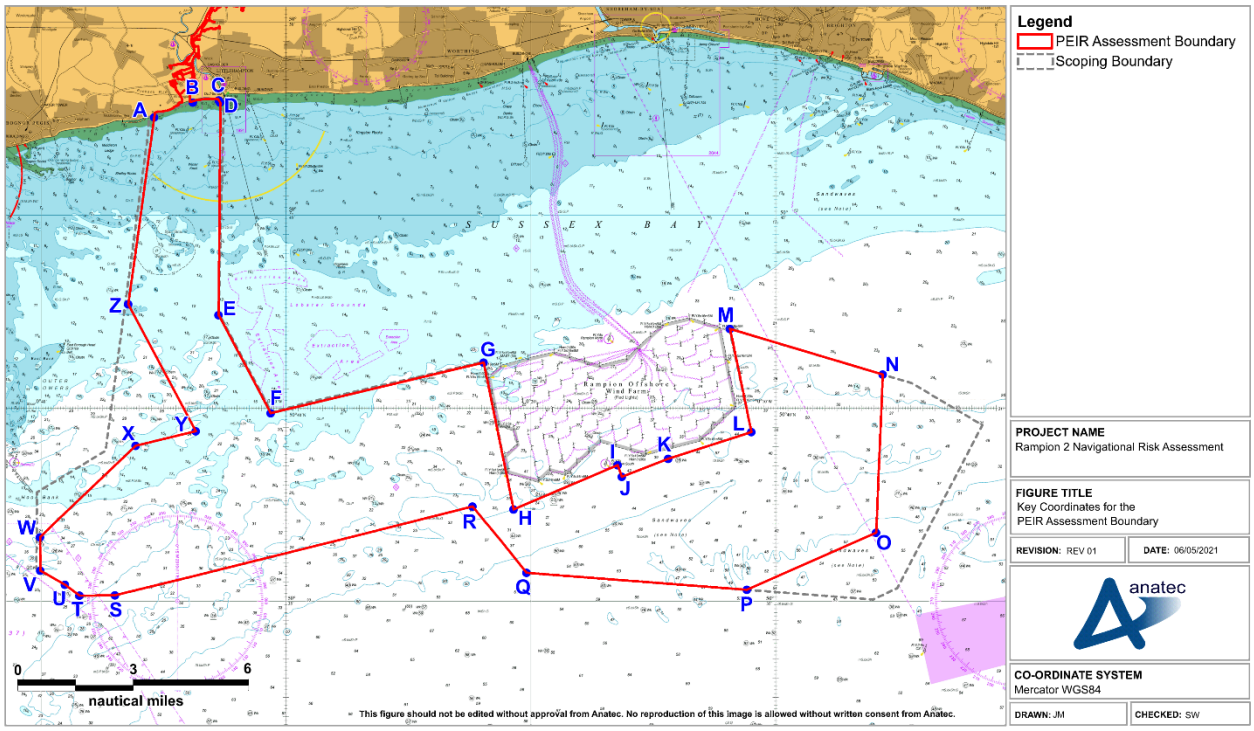


Table 8-1 Key coordinates for the PEIR Assessment Boundary

Point	Latitude	Longitude	Point	Latitude	Longitude
A	50° 47' 32.22" N	0° 35' 23.11" W	N	50° 40' 52.72" N	0° 05' 37.61" W
B	50° 47' 55.15" N	0° 33' 48.09" W	O	50° 36' 46.35" N	0° 05' 54.10" W
C	50° 47' 58.57" N	0° 32' 44.85" W	P	50° 35' 17.60" N	0° 11' 10.71" W
D	50° 47' 55.16" N	0° 32' 41.27" W	Q	50° 35' 44.11" N	0° 20' 10.65" W
E	50° 42' 25.17" N	0° 32' 45.44" W	R	50° 37' 27.15" N	0° 22' 23.04" W
F	50° 39' 52.38" N	0° 30' 37.22" W	S	50° 35' 08.69" N	0° 36' 58.91" W
G	50° 41' 11.35" N	0° 21' 55.86" W	T	50° 35' 08.43" N	0° 38' 25.72" W
H	50° 37' 22.80" N	0° 20' 42.34" W	U	50° 35' 25.56" N	0° 39' 01.56" W
I	50° 38' 31.78" N	0° 16' 26.97" W	V	50° 35' 47.45" N	0° 40' 02.29" W
J	50° 38' 13.32" N	0° 16' 17.07" W	W	50° 36' 39.44" N	0° 40' 03.04" W
K	50° 38' 41.40" N	0° 14' 22.95" W	X	50° 39' 01.79" N	0° 36' 08.73" W
L	50° 39' 23.09" N	0° 10' 59.38" W	Y	50° 39' 24.39" N	0° 33' 40.87" W
M	50° 42' 03.39" N	0° 11' 51.78" W	Z	50° 42' 42.07" N	0° 36' 26.55" W

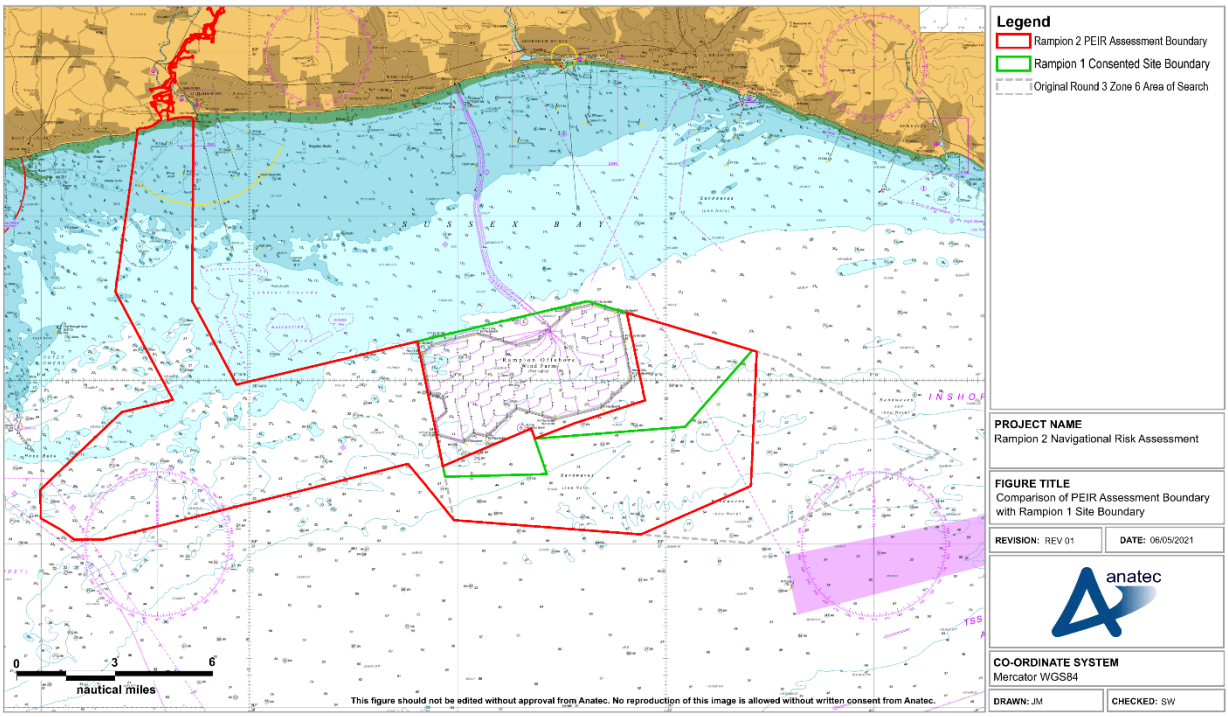
Relationship with United Kingdom Round 3 development zone

8.1.5 The PEIR Assessment Boundary represents a combination of two development zones, namely the area awarded in 2019 under the TCE wind farm extension process (to the west of Rampion 1) and the remainder of the original Round 3 Zone 6 area (to the south east of Rampion 1).

8.1.6 **Figure 8.2** presents the following:

- PEIR Assessment Boundary;
- consented Rampion 1 site boundary; and
- original Round 3 Zone 6 area of search.

Figure 8.2 Comparison of PEIR Assessment Boundary with Rampion 1 boundary



8.1.7 It can be seen that the consented site boundary for Rampion 1 covered a greater extent than the area ultimately developed, including an overlap into the Dover Strait ITZ similar to that proposed by the PEIR Assessment Boundary for Rampion 2.

8.2 Surface infrastructure

Indicative worst-case layout

8.2.1 Up to 119 surface structures will be installed, consisting of 116 WTGs and three offshore substations. Although the final locations of infrastructure have not yet been defined, an indicative worst-case layout has been determined for shipping and navigation and is presented in **Figure 8.3**.

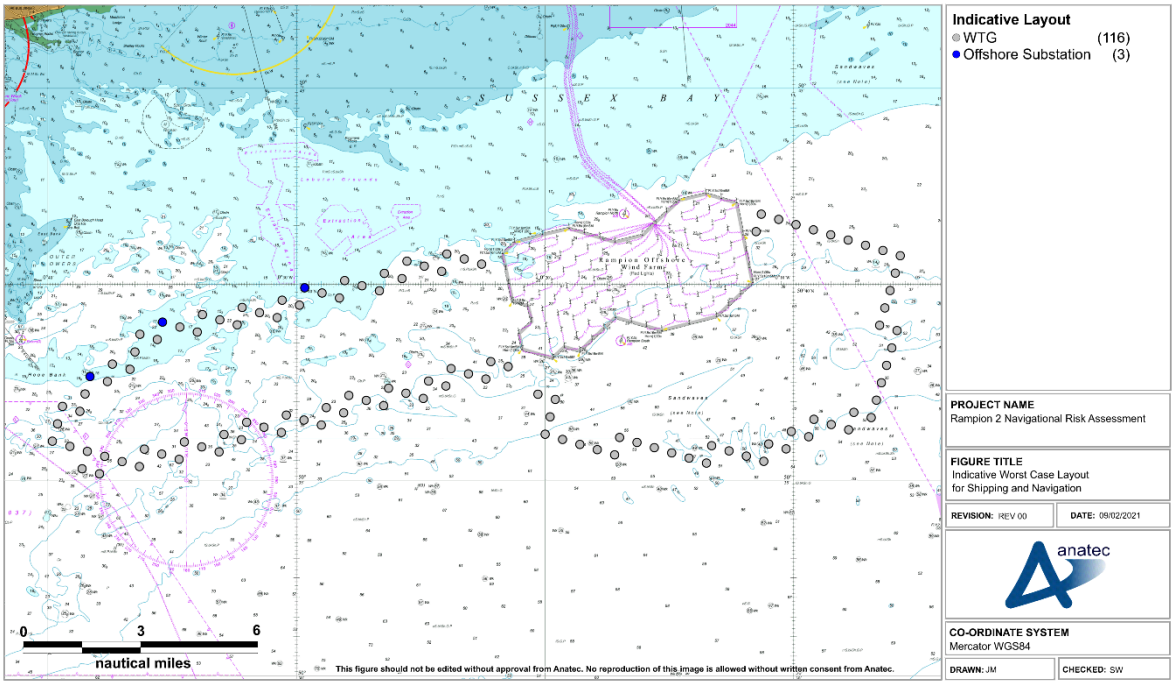
8.2.2 The nodes excluded from the layout mesh (see **Chapter 4, Volume 2**) in order to satisfy the maximum 119 surface structures requirement are all internal structures. This ensures the maximum spatial extent of the array area as a whole is maintained with maximum exposure to passing (or adrift) vessels. During the Hazard Workshop, representatives for Shoreham Port and Littlehampton Harbour Board confirmed that this layout represents a worst case for shipping (see 23 February 2021 entries in **Table 4-2**).

8.2.3 It is noted that the final array layout will incorporate more internal structures (with a lesser overall spatial extent as a result) and where appropriate this is considered qualitatively in the impact assessment (such as when assessing internal allision risk).

8.2.4 As part of the worst for shipping and navigation, the three offshore substations are all located along the northern perimeter of the western half of the array area, and in particular close to the Owers Bank where regular routeing vessel traffic is anticipated to pass in closest proximity (see **paragraph 17.6.5**).

8.2.5 The minimum spacing between structures (measured centre-to-centre) is 860m and the layout includes two main lines of orientation. The layout is considered to be in compliance with the requirements of MGN 543 (MCA, 2016).

Figure 8.3 Indicative worst case layout for shipping and navigation



Wind Turbine Generators (WTGs)

8.2.6 The WTGs within the indicative layout each have a maximum rotor diameter of 172m and maximum blade tip height (above Lowest Astronomical Tide (LAT)) of 210m, noting that these values represent the worst case for shipping and navigation rather than Rampion 2 as a whole but fall within the scope of the Project Design Envelope.

8.2.7 Four-legged jacket foundations with suction buckets have been considered as the maximum design scenario for shipping and navigation as this foundation type provides the maximum structure dimension at the sea surface. The maximum design scenario WTG measurements assuming use of four-legged jacket foundations with suction buckets are provided in **Table 8-2**, noting that the values provided are specific to the worst case selected for shipping and navigation and do not necessarily represent the maximum within the design envelope overall.

Table 8-2 Maximum design scenario for shipping and navigation – WTGs

Parameter	Maximum design scenario for shipping and navigation
Foundation type	Four-legged jacket with suction buckets
Dimensions at sea surface	20×20m
Maximum blade tip height (above LAT)	210m
Minimum air gap (above Highest Astronomical Tide (HAT))	22m
Maximum rotor diameter	172m

8.2.8 As well as four-legged jackets with suction buckets, the other foundation types under consideration include monopiles, three- or four-legged jacket foundations with pin piles and three-legged jacket foundations with suction buckets. Descriptions of each foundation type under consideration are provided in **Chapter 4, Volume 2**.

Offshore substations

8.2.9 The offshore substations may be installed on either monopile or jacket foundations, but in both cases will have maximum topside dimensions of 80×50m.

8.3 Subsea cables

Overview

8.3.1 Various types of subsea cables will be installed and can be categorised as follows: array cables, offshore interconnector cables and export cables. Each of these categories is summarised in the following subsections.

Array cables

8.3.2 The array cables will connect individual WTGs to offshore substations. Up to 135nm of array cables will be required with the final length dependent on the final array layout. All array cables will be installed within the array area component of the PEIR Assessment Boundary.

Offshore interconnector cables

8.3.3 The offshore interconnector cables will provide interlink connections between the offshore substations within the array area. Up to two offshore interconnector cables will be required with a total length of up to 27nm with the final length dependent on the final array layout.

Export cables

8.3.4 The export cables will carry the energy generated by the WTGs from the array area to shore. Up to four export cables will be required with a total length of up to 41nm and will be installed within the offshore cable corridor component of the PEIR Assessment Boundary. The export cables will make landfall at Climping, West Sussex.

Cable burial

8.3.5 Where available, the primary means of cable protection will be by seabed burial. The extent and method by which the subsea cables will be buried will depend on the results of a detailed seabed survey of the final cable routes and associated CBRA. For the array and offshore interconnector cables the target burial depth is 1.0m and for the export cables the target burial depth is between 1.0 and 1.5m.

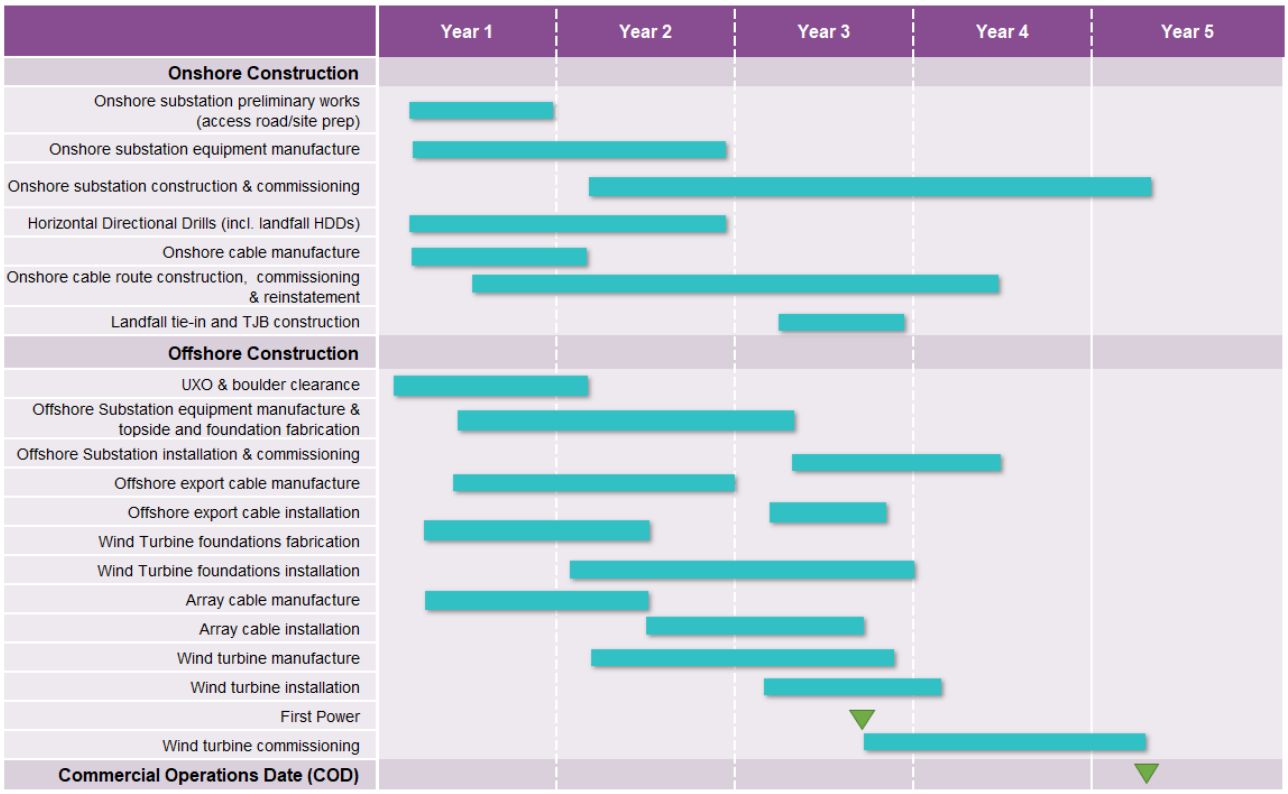
8.3.6 Where cable burial is not possible, alternative cable protection methods may be deployed which will again be determined within the CBRA. It is noted that there are no cable crossings anticipated for the export cables.

8.3.7 Cable burial and protection is captured in the embedded environmental measures (see **Section 20**).

8.4 Construction phase

8.4.1 The offshore construction phase will last for up to approximately four years. **Figure 8.4** outlines an indicative construction programme for Rampion 2 which indicates the maximum duration of construction for each element.

Figure 8.4 Indicative construction programme



8.5 Indicative vessel and helicopter numbers

Construction vessels

8.5.1 Up to 2,636 return trips by construction vessels may be made throughout the construction phase, breaking down as summarised in **Table 8-3**.

Table 8-3 Maximum vessel numbers per construction activity

Construction activity	Maximum number of vessels	Maximum number of return trips
Foundation installation	25	660
WTG installation	22	1,340
Offshore substation installation	35	96
Export cable installation	22	222
Array cable installation	19	318
Total	123	2,636

Helicopters during construction

8.5.2 Up to 530 return trips by helicopters may be made throughout the construction phase, breaking down as summarised in **Table 8-4**.

Table 8-4 Maximum helicopter numbers per construction activity

Construction activity	Maximum number of helicopters	Maximum number of return trips
Foundation installation	0	N/A
WTG installation	2	500
Offshore substation installation	2	30
Export cable installation	0	N/A
Array cable installation	0	N/A
Total	4	530

Operation and maintenance vessels

8.5.3 Up to 1,113 return trips per year by up to a peak of 21 operation and maintenance vessels at any one time may be made throughout a maximum 30-year operational lifetime operation and maintenance phase.

8.5.4 During both the construction and operation and maintenance phases logistics will be managed by a marine coordination team with integrated Health, Safety and Environment (HSE) management system in place to ensure control of all vessels and their respective works as per C-88 (**Table 20-1**). Rampion 2 will be operational 24/7.

8.6 Decommissioning phase

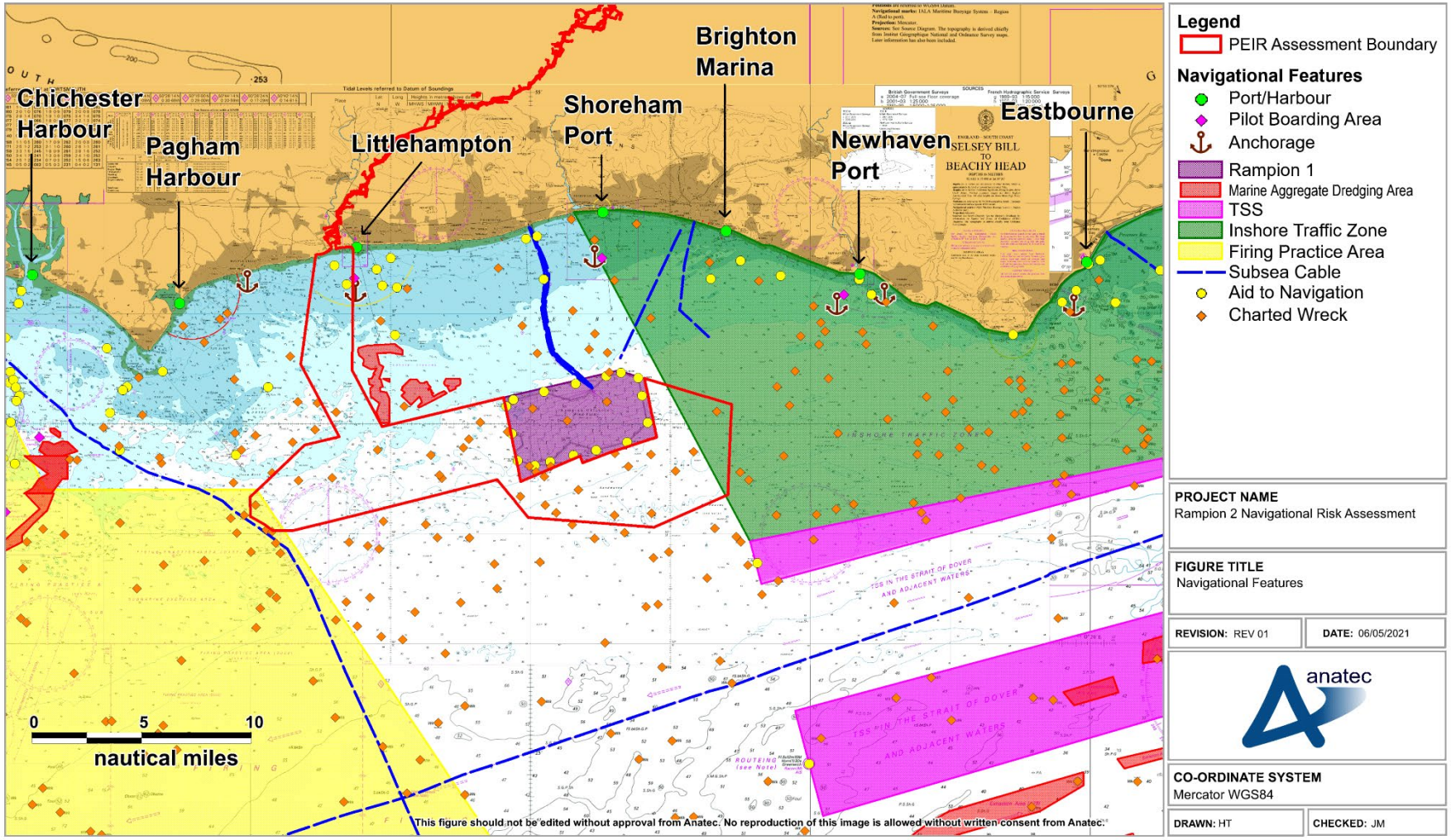
8.6.1 The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels. The decommissioning duration of the offshore infrastructure may take the same amount of time as construction of the Proposed Development, up to four years, although this indicative timing may reduce.

9 Navigational features

9.1.1 A plot of the navigational features within and in proximity to the PEIR Assessment Boundary is presented in **Figure 9.1**. Each of the features shown are discussed in the following subsections and have been identified using the most detailed UKHO admiralty chart available.

9.1.2 It is noted that no charted spoil or dumping grounds were identified in proximity to the PEIR Assessment Boundary.

Figure 9.1 Navigational features in proximity to Rampion 2



9.2 Other offshore wind farm developments

9.2.1 Rampion 1 lies immediately north of the array area, as illustrated in **Figure 9.1**, and shares its eastern, southern and western boundaries with the PEIR Assessment Boundary. Rampion 1 was fully commissioned in November 2018 and is currently the only UK offshore wind farm within the English Channel (including wind farms under construction or consented).

9.3 IMO routeing measures

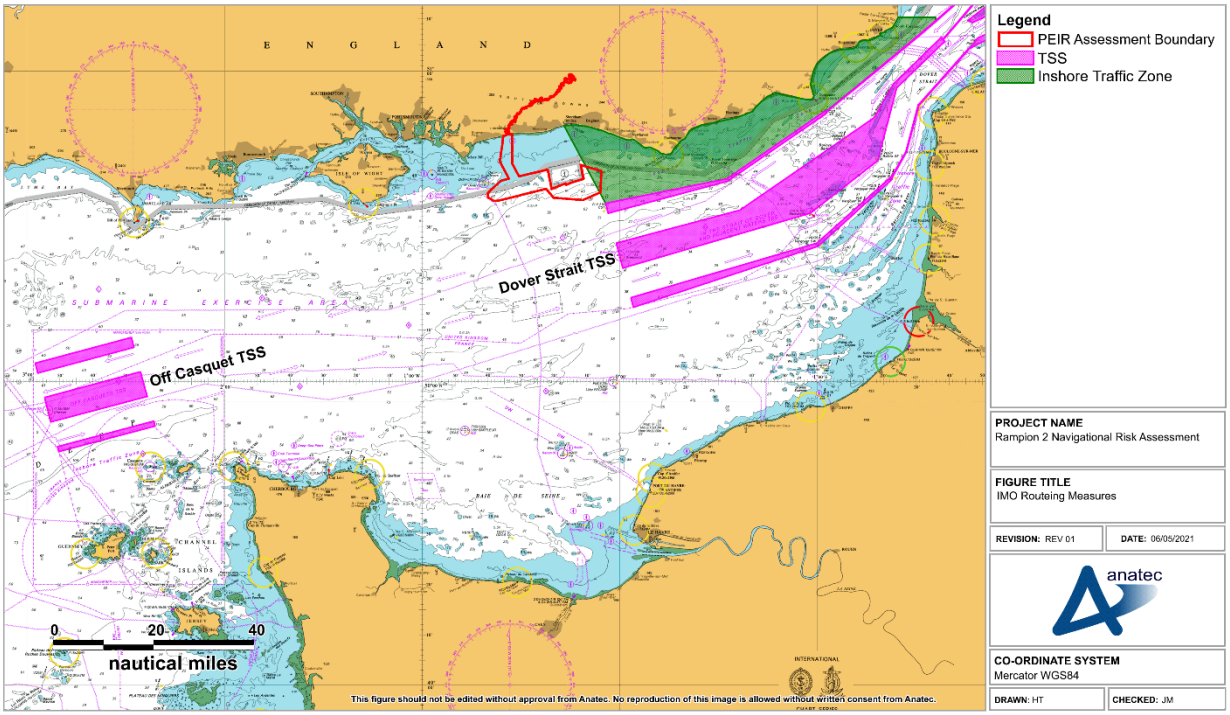
9.3.1 The IMO routeing measures within a wider area surrounding the PEIR Assessment Boundary are shown in **Figure 9.2**. The main IMO routeing measure present in the area is the Dover Strait routeing measure consisting of TSS lanes, separation zones and an ITZ.

9.3.2 The Dover Strait TSS lies approximately 2.4nm from the PEIR Assessment Boundary at the closest point, and 4.2nm from the outer edge of the westbound lane. Another TSS, the Off Casquets TSS, is located approximately 96nm south west of the Dover Strait TSS, with a large proportion of vessels utilising both TSSs when making passage within the English Channel.

9.3.3 The ITZ covers the sea area eastward of the line joining Shoreham and the CS1 light buoy (see **Section 9.7**) and intersects the eastern extent of the PEIR Assessment Boundary. The ITZ is designed to protect local traffic including small craft and its use is subject to various restrictions including (but not limited to) the following:

- vessels should not use the ITZ when they can safely use the appropriate lane within the adjacent TSS;
- vessels of less than 20m, recreational vessels, and vessels engaged in fishing may use the ITZ; and
- vessels may use the ITZ when on route to/from a port or other destination within the ITZ.

Figure 9.2 IMO routeing measures in proximity to Rampion 2



9.4 Marine aggregate dredging areas

9.4.1 Several marine aggregate dredging areas are present within the area surrounding the PEIR Assessment Boundary, as illustrated in **Figure 9.1**. The closest extraction areas lie immediately east of the offshore cable corridor, and are operated by Cemex, Tarmac Marine and Hanson Aggregates Marine. There are also groups of marine aggregate dredging areas to the west of the PEIR Assessment Boundary (near the Isle of Wight) and to the south east of the PEIR Assessment Boundary (within and south of the Dover Strait TSS).

9.5 Ports and related services

Overview

9.5.1 Several ports and harbours are located along the coast close to the PEIR Assessment Boundary, as illustrated in **Figure 9.1**. The closest port to the array area is Shoreham Port, located approximately 7.8nm to the north. Littlehampton Harbour is located immediately east the offshore cable corridor.

9.5.2 The following subsections provide further details on the main ports and harbours in proximity to the PEIR Assessment Boundary: Shoreham, Newhaven, Brighton, Littlehampton and ports located in the Solent.

Shoreham Port

9.5.3 Shoreham Port is located approximately 7.8nm north of the PEIR Assessment Boundary. The Admiralty Sailing Directions describe Shoreham as a "*medium sized port handling general cargo, timber, seaborne aggregates, quarried stone*

and slag, as well as oil, grain and scrap" (UKHO, 2017). Anchorage can be found between 1.5 and 2nm from the harbour in water depths of 6 to 8m below CD including at a recommended anchorage approximately 2nm south of the harbour entrance.

9.5.4 The pilot boarding station for Shoreham is charted adjacent to the recommended anchorage with pilots boarding within 2nm of the harbour entrance from four hours before high water until such time as tidal conditions after high water make entry to the harbour unsafe. Pilotage is compulsory for a number of vessels including those greater than 50m LOA and those carrying dangerous goods or marine pollutants in bulk.

Port of Newhaven

9.5.5 The Port of Newhaven is located approximately 8.3nm north east of the PEIR Assessment Boundary. The Admiralty Sailing Directions state that the Port of Newhaven "*is used commercially and as a cross-Channel passenger ferry terminal with services to Dieppe*" (UKHO, 2017). The passenger ferry route is considered further in **Section 13.3**.

9.5.6 Two anchorage locations are recommended in the approaches to Newhaven; one is located in the nearshore area off Seaford in water depths of 5.5m below CD and the other is located approximately 1.5nm south west of the head of the west breakwater for Newhaven in water depths of 14m below CD.

9.5.7 The pilot boarding station for Newhaven is charted inshore of the recommended anchorage to the south west, approximately 1nm from the breakwater. Pilotage is compulsory for all vessels greater than 49m LOA.

Brighton Marina

9.5.8 Brighton Marina is located approximately 7.2nm north of the PEIR Assessment Boundary. The Admiralty Sailing Directions state that Brighton Marina "*consists of an outer tidal harbour and an impounded inner harbour entered through a three gate lock system*" (UKHO, 2017). Apart from the marina there are no landing places at Brighton and no pilotage services are operated.

Littlehampton Harbour

9.5.9 Littlehampton Harbour is located approximately 8.2nm north of the array area and immediately east of the offshore cable corridor. The Admiralty Sailing Directions describe Littlehampton Harbour as a "*small commercial and yachting port*" (UKHO, 2017). A temporary anchorage is located approximately 2nm south of the harbour entrance in depths of 5m and offers reasonable shelter. Small craft may anchor nearer the harbour entrance, clear of the leading line, according to the wind. During consultation, the Littlehampton Harbour Board noted that vessels can spend anywhere between six hours and two days at the anchorage area whilst awaiting suitable weather (see 18 November 2020 entry in **Table 4-2**).

9.5.10 The pilot boarding station for Littlehampton is charted inshore of the recommended anchorage, approximately 1.5nm south of the harbour entrance. Pilotage is

compulsory for all merchant vessels and vessels should not approach closer than 1nm from the harbour entrance until the pilot is onboard.

Solent Ports

9.5.11 The Solent is the strait separating the UK mainland from the Isle of Wight and incorporates a number of ports including the Port of Southampton, Portsmouth International Port, Langstone Harbour, Chichester Harbour and Cowes Harbour. Although located west of the study area, a significant volume of vessel traffic headed to and from these ports does pass through the study area (see **Section 13),** with Southampton in particular one of the busiest ports in the UK due to its wide range of facilities and natural deep-water harbour.

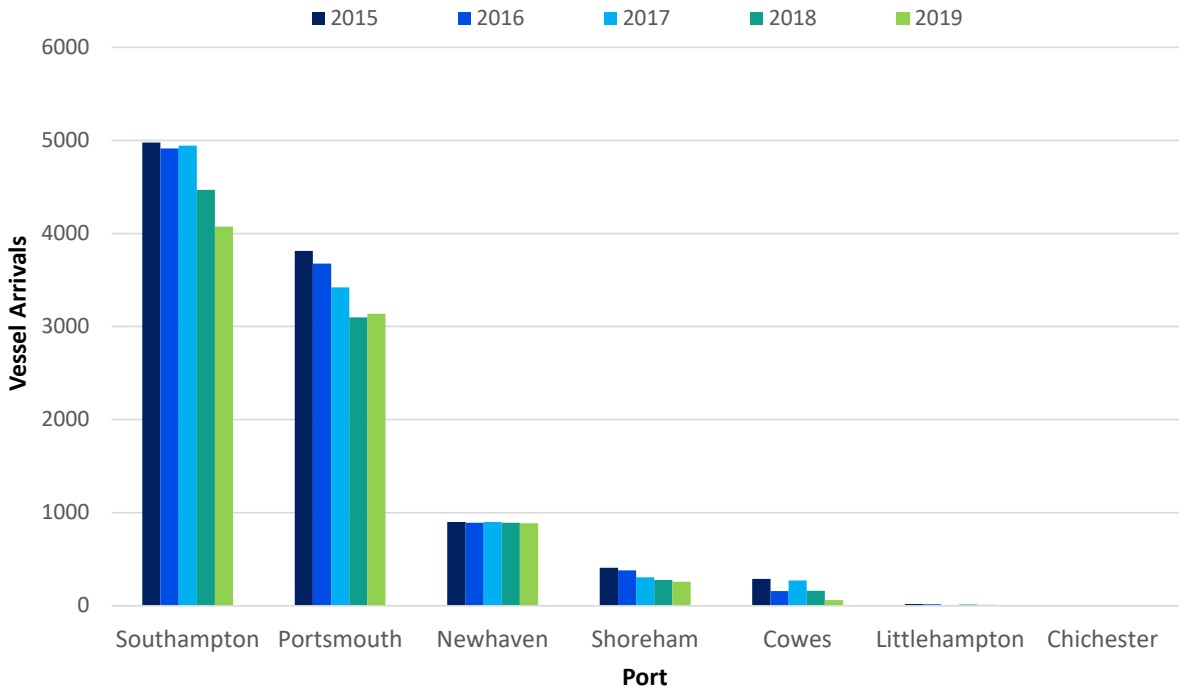
9.5.12 There are numerous navigational features located in the eastern approaches to the Solent, including the Nab Tower, Deep Water Channel and Anchorage, various pilot boarding areas and the Southampton Vessel Traffic Services (VTS). The Southampton VTS provides for safe and efficient movement of vessels within the VTS area, with the eastern extent of the VTS area defined by a 7nm radius from the Nab Tower.

Vessel arrivals

9.5.13 The number of vessel arrivals at the most visited commercial ports in the area as reported by the DfT is presented in **Figure 9.3**. These statistics exclude some vessel movements which occur within port or harbour limits, but nevertheless give a clear indication of the relative traffic levels and trends.

9.5.14 It can be seen that Southampton is the most frequented commercial port in the area followed by Portsmouth, although both ports have experienced a general downward trend in vessel arrivals in recent years. Among ports located within the study area, Newhaven is the most frequented followed by Shoreham.

Figure 9.3 Vessel Arrivals to Commercial Ports in Proximity to the PEIR Assessment Boundary (DfT, 2015 to 2019)



9.6 Anchorage areas

9.6.1 Anchorage areas associated with Shoreham Port, Port of Newhaven and Littlehampton Harbour are considered in **Section 9.5**. There are no additional anchorage areas within or in proximity to the PEIR Assessment Boundary, although an anchorage off Eastbourne (located approximately 16nm east of the PEIR Assessment Boundary) and a recommended anchorage off St Helens Fort (located approximately 16nm west of the PEIR Assessment Boundary – not shown in **Figure 9.1**) are noted.

9.7 Aids to navigation

9.7.1 Various aids to navigation are located in proximity to the PEIR Assessment Boundary, as illustrated in **Figure 9.1**. There are aids to navigation on Significant Peripheral Structures (SPS) around the perimeter of Rampion 1, as well as at the exit/entrance to the Dover Strait TSS. The CS1 light buoy, marking the end of the westbound lane of the TSS, is located approximately 3.3nm south east of the PEIR Assessment Boundary.

9.7.2 Excluding aids to navigation associated with Rampion 1, the closest aid to navigation to the PEIR Assessment Boundary is the Owers Light Buoy, a south cardinal mark located approximately 1.8nm to the west and placed to protect vessels from the shallows of the Owers Bank.

9.7.3 There are several seasonal race marks for Arun Yacht Club located in the nearshore area off Littlehampton. Two of these are located within the offshore

cable corridor and are typically present between March and November of each year.

9.8 Subsea cables

9.8.1 There are a number of subsea cables in proximity to the PEIR Assessment Boundary, including export and inter array cables for Rampion 1 and the IFA2 cable. The IFA2 cable is the closest subsea cable to the PEIR Assessment Boundary, located approximately 350m to the south west.

9.9 Military practice and exercise areas (PEXA)

9.9.1 A firing practice area (D037) is located in the area and intersects the western extent of the PEIR Assessment Boundary. No restrictions are placed on the right to transit the firing practice area at any time, with operations conducted using a clear range procedure – exercises and firing only take place when the area is considered to be clear of all shipping.

9.10 Wrecks

9.10.1 A high number of charted wrecks[4] are present within the area surrounding the PEIR Assessment Boundary; 24 such wrecks are located within the array area with the shallowest at a depth of 12m below CD. There is one wreck within the offshore cable corridor at a depth of 14m below CD.

[4] Charted wrecks represent those appearing on Admiralty Charts which potentially pose a risk to shipping and navigation receptors. Other wrecks may exist in the area.

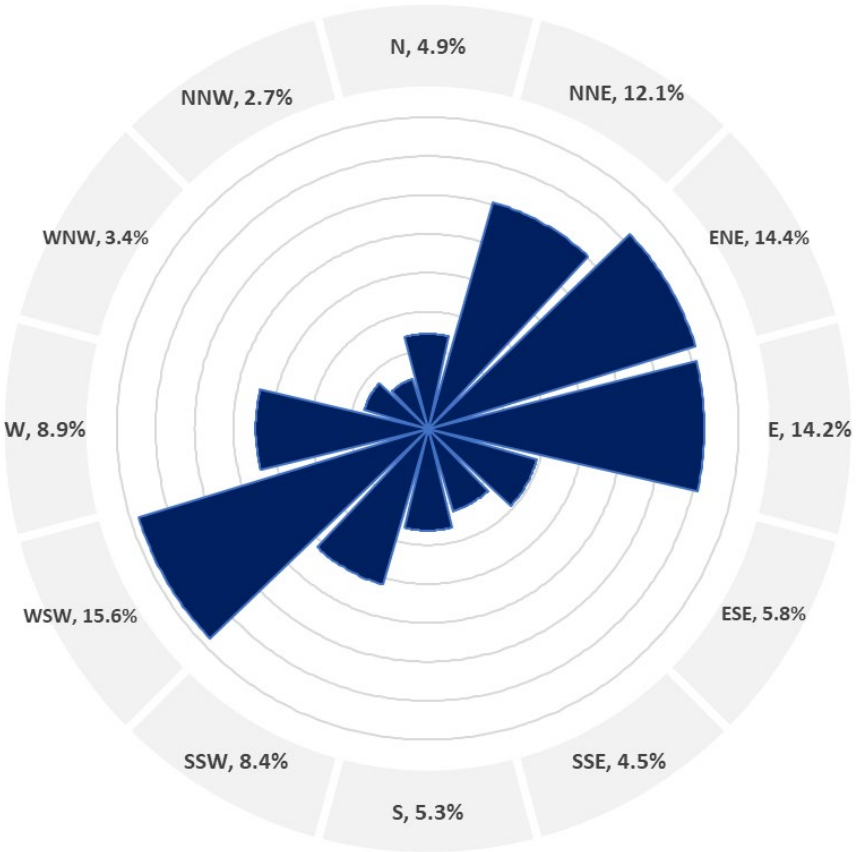
10 Meteorological ocean data

This section presents meteorological and oceanographic statistics local to the PEIR Assessment Boundary, primarily based on *Rampion Offshore Wind Farm Metocean Survey and Assessment* (Emu, 2011). The data presented in this section is used as input to the collision and allision risk modelling (see **Section 18**).

10.1 Wind

10.1.1 The distribution of wind direction data recorded within the eastern half of the PEIR Assessment Boundary between January and May 2011 is presented in **Figure 10.1**, in the form of a wind rose.

Figure 10.1 Wind direction distribution in proximity to PEIR Assessment Boundary (Emu, 2011)



10.1.2 It can be seen that winds are predominantly from the west south west (15.6 percent) and east north east (14.4 percent).

10.2 Wave

10.2.1 Significant wave height data recorded approximately 4.0nm north of the array area and 1.9nm east of the offshore cable corridor in 2003 has been analysed. **Table 10-1** presents the proportion of the significant wave height within each of three defined ranges which are categorised as calm, moderate and severe sea states.

Table 10-1 Sea State Distribution in Proximity to PEIR Assessment Boundary

Significant Wave Height (m)	Sea State	Proportion (percent)
<1	Calm	74
1 to 5	Moderate	26
≥5	Severe	0

10.3 Visibility

10.3.1 The annual average incidence of poor visibility (defined as the proportion of a year where the visibility can be expected to be less than 1 kilometre (km)) is 3 percent (UKHO, 2017).

10.4 Tide

10.4.1 Tidal speed and direction data recorded at Rampion 1 between November 2010 and February 2011 has been analysed. **Table 10-2** presents the peak flood and ebb direction and speed values obtained.

Table 10-2 Peak flood and ebb speed and direction data

Tidal Scenario	Tidal Speed (Knots (kt))	Tidal Direction (°)
Flood	2.1	065
Ebb	2.1	235

10.4.2 Based upon the available data, no impacts are expected at high water that would not also be expected at low water, and vice versa. The wind farm structures are not expected to have any additional impact on the existing tidal streams in relation to their effect on existing shipping and navigation receptors.

11 Emergency response overview

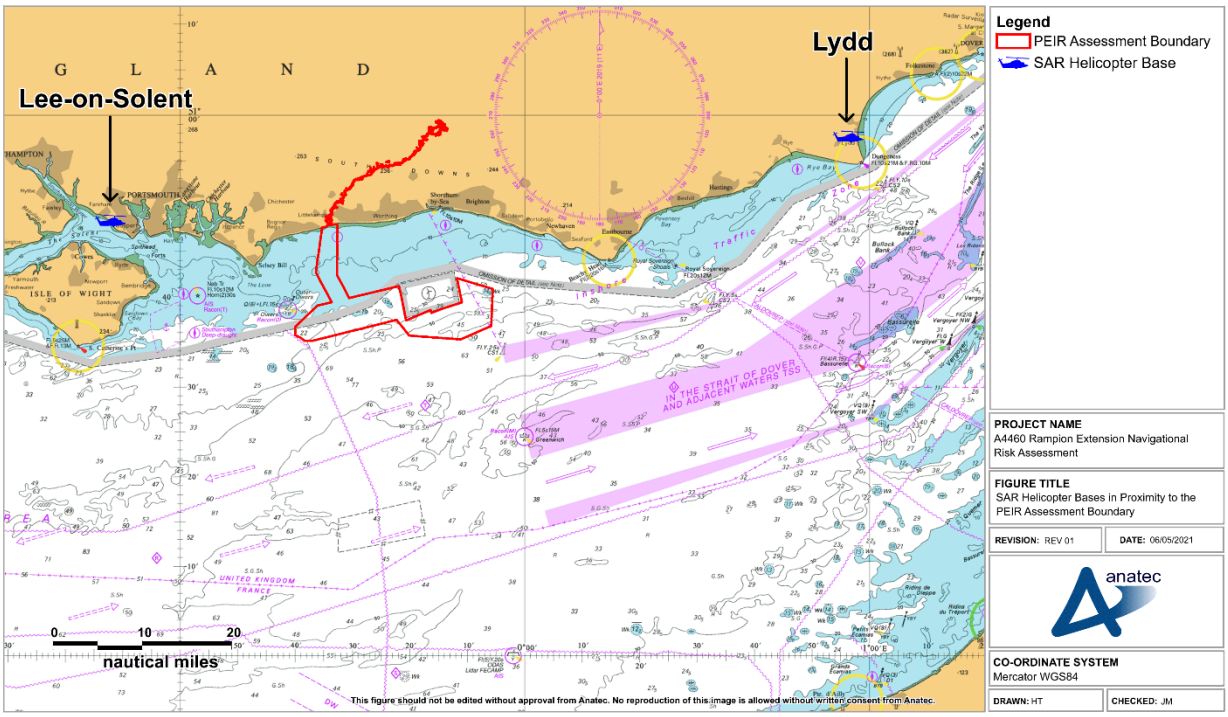
This section summarises the existing emergency response resources (including SAR) in proximity to the PEIR Assessment Boundary.

11.1 Search and rescue helicopters

11.1.1 In March 2013, the Bristow Group were awarded the contract by the MCA (as an executive agency of the DfT) to provide helicopter SAR operations in the UK over a ten-year period. Bristow have now been operating the service since April 2015 with the next contract to be awarded sometime in 2022.

11.1.2 There are ten base locations for the SAR helicopter service. The closest SAR helicopter base to the PEIR Assessment Boundary is Lee-on-Solent, located approximately 23nm to the north west, as illustrated in **Figure 11.1**. This base operates AgustaWestland 189 (AW189) helicopters. The Lydd SAR helicopter base is located approximately 43nm north east of the PEIR Assessment Boundary and also operates the AW189.

Figure 11.1 SAR helicopter bases in proximity to Rampion 2

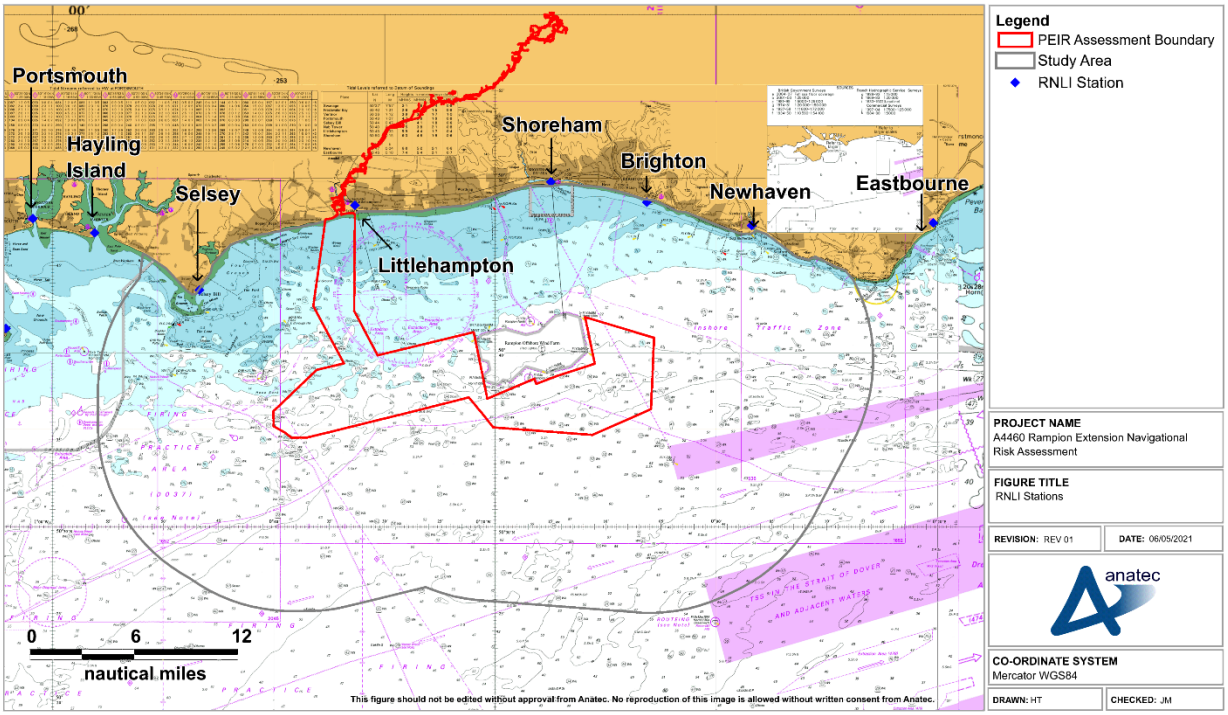


11.2 Royal National Lifeboat Institution

11.2.1 The RNLI is organised into six divisions, with the relevant region for Rampion 2 being the East division. Based out of more than 230 stations, there are over 400 active lifeboats across the RNLI fleet, including both All-Weather Lifeboats (ALB)

and Inshore Lifeboats (ILB). There are a number of RNLI stations in proximity to the PEIR Assessment Boundary, as illustrated in **Figure 11.2**.

Figure 11.2 RNLI Stations in proximity to Rampion 2



11.2.2 The closest RNLI station to the array area is at Selsey (approximately 7.9nm to the north west), where both an ALB and ILB are in use. The closest RNLI station to the offshore cable corridor is at Littlehampton (approximately 380m to the east of the landfall location).

11.2.3 **Table 11-1** summarises the types of lifeboat operated by the RNLI out of those stations in proximity to Rampion 2.

Table 11-1 Types of lifeboat at RNLI stations in proximity to Rampion 2

Station	Lifeboat(s)	ALB Class	ILB Class	Minimum Distance to array area (nm)
Brighton	ILB	–	B Class	7.4
Selsey	ALB and ILB	Shannon	D Class	7.8
Shoreham	ALB and ILB (×2)	Tamar	D Class (×2)	7.9
Littlehampton	ILB (×2)	–	B and D Class	8.2
Newhaven	ALB	Severn	–	8.4
Hayling Island	ILB (×2)	–	B and D Class	14.5

Station	Lifeboat(s)	ALB Class	ILB Class	Minimum Distance to array area (nm)
Eastbourne	ALB and ILB	Tamar	D Class	16.4

11.3 Her Majesty's Coastguard

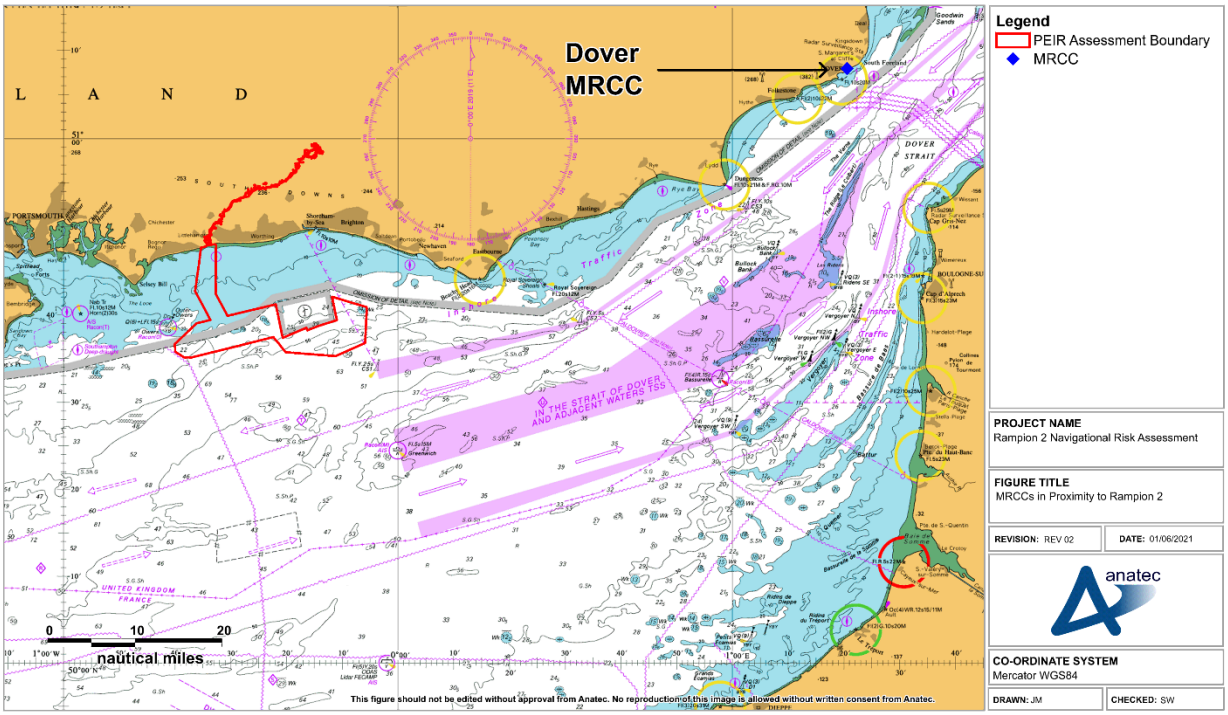
11.3.1 Her Majesty's Coastguard (HMCG), a division of the MCA, is responsible for requesting and tasking SAR resources made available to other authorities and for coordinating the subsequent SAR operations (unless they fall within military jurisdiction).

11.3.2 The HMCG coordinates SAR operations through a network of 11 Maritime Rescue Coordination Centres (MRCC), including a Joint Rescue Coordination Centre (JRCC) based in Hampshire. A corps of over 3,500 volunteer Coastguard Rescue Officers (CROs) around the UK from 352 local Coastguard Rescue Teams (CRTs) are involved in coastal rescue, searches and surveillance.

11.3.3 All of the MCA's operations, including SAR, are divided into three geographical regions. The Southern region covers the east and south coasts of England from the Lincolnshire–Norfolk border down to the Dorset–Devon border, and therefore covers the area encompassing Rampion 2.

11.3.4 Each region is divided into six districts with its own MRCC, which coordinates the SAR response for maritime and coastal emergencies within its district boundaries. The closest MRCC to Rampion 2 is the Dover MRCC, located approximately 61nm north east of the PEIR Assessment Boundary, as illustrated in **Figure 11.3**.

Figure 11.3 MRCCs in proximity to Rampion 2



12 Historical maritime incidents

12.1 Introduction

12.1.1 This section reviews historical maritime incident data to assess baseline incident rates in proximity to Rampion 2. The purpose of this assessment is to determine the risk in terms of maritime accidents in the sea area within and in proximity to the PEIR Assessment Boundary, whether offshore wind farms in general pose a high risk to vessels, and whether offshore wind farms may have any positive effect on emergency response.

12.1.2 Data from the following sources has been analysed:

- MAIB (2008 to 2017);
- RNLI (2008 to 2017); and
- DfT (2015 to 2020).

12.1.3 It should be considered that the same incident may be recorded by multiple sources.

12.2 Marine Accident Investigation Branch (MAIB)

12.2.1 All UK flagged vessels and non-UK flagged vessels in UK territorial waters (12nm), a UK port or carrying passengers to a UK port are required to report incidents to the MAIB. Data arising from these reports are assessed within this section, covering the ten-year period between 2008 and 2017.

12.2.2 The incidents recorded within the MAIB data between 2008 and 2017 occurring within the study area are presented in **Figure 12.1**, colour-coded by incident type. Following this, **Figure 12.2** shows the same data colour-coded by the type of vessel(s) involved in each incident.

12.2.3 A total of 148 incidents were recorded by the MAIB within the study area between 2008 and 2017, which corresponds to an average of 15 incidents per year. Throughout the ten-year period, 11 incidents occurred within the array area and four incidents within the offshore cable corridor.

12.2.4 The most common incident types recorded were "*machinery failure*" (37 percent) and "*accident to person*" (22 percent). The main vessel types involved in incidents were fishing vessels (39 percent), "*other commercial*" vessels (25 percent) and passenger vessels (14 percent).

Figure 12.1 MAIB incidents by incident type within study area (2008 to 2017)

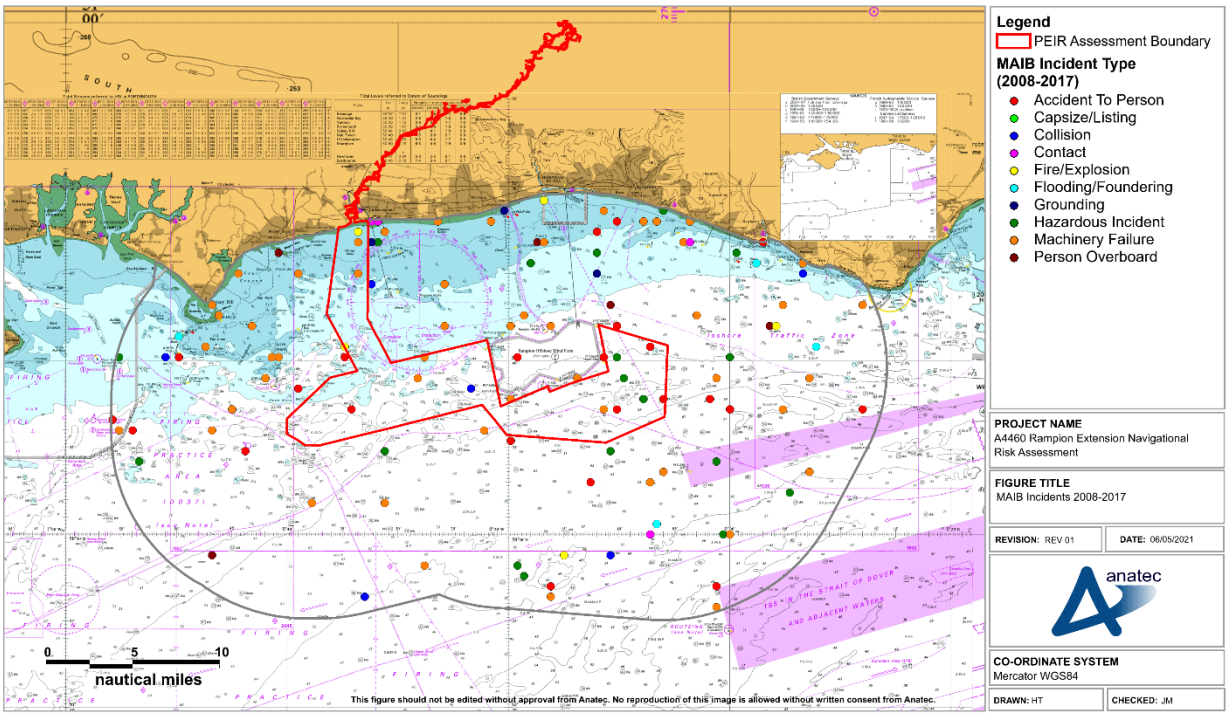
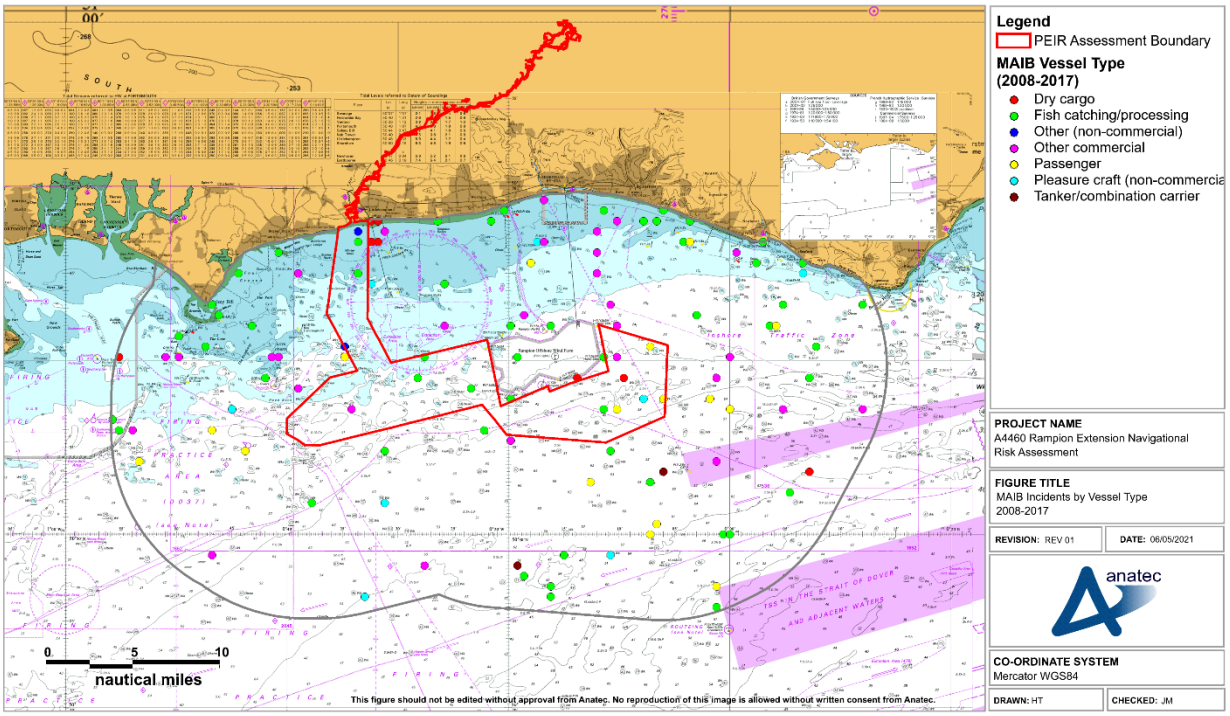


Figure 12.2 MAIB incidents by vessel type within study area (2008 to 2017)



12.3 Royal National Lifeboat Institution

12.3.1 The incidents recorded within the RNLI data between 2008 and 2017 occurring within the study area are presented in **Figure 12.3**, colour-coded by incident type.

Following this, **Figure 12.4** shows the same data colour-coded by casualty type. It is noted that incidents which were deemed hoaxes or false alarms have been excluded from the analysis.

12.3.2 A total of 1,947 incidents were responded to by the RNLI within the study area between 2008 and 2017, with a total of 2,103 lifeboats mobilised (certain incidents were responded to by multiple lifeboats). This corresponds to an average of 195 incidents per year; however, it is noted that the majority of incidents (approximately 92 percent) occurred within 5nm of the coast whilst the number of incidents further offshore was much lower. Throughout the ten-year period, eight incidents occurred within the array area, and 46 incidents within the offshore cable corridor.

12.3.3 The most common incident types recorded were "*person in danger*" (39 percent), and "*adverse conditions*" (26 percent). Excluding "*person in danger*" and non-vessel based incidents, the most common vessel types recorded were recreational vessels (77 percent) followed by fishing vessels (11 percent) and personal craft (10 percent). The high proportion of recreational vessels may be attributed to the high volume of recreational activity in the nearshore area where the RNLI is most likely to respond to an incident.

Figure 12.3 RNLI incidents by incident type within study area (2008 to 2017)

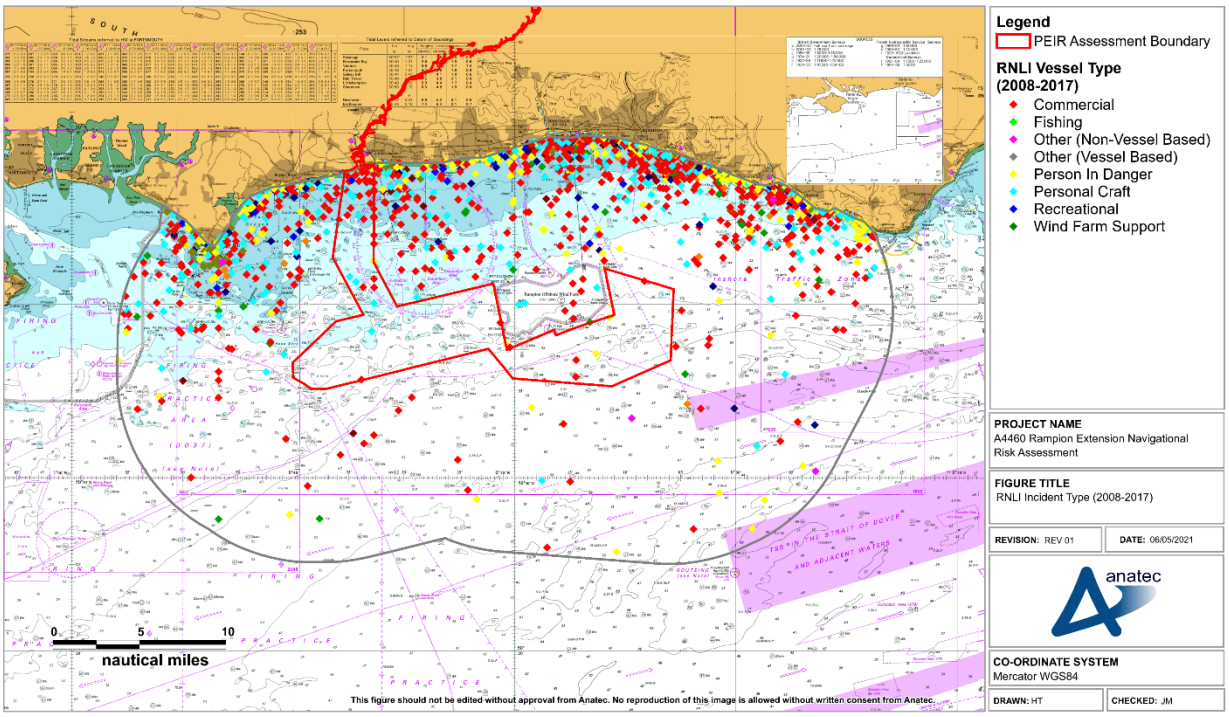
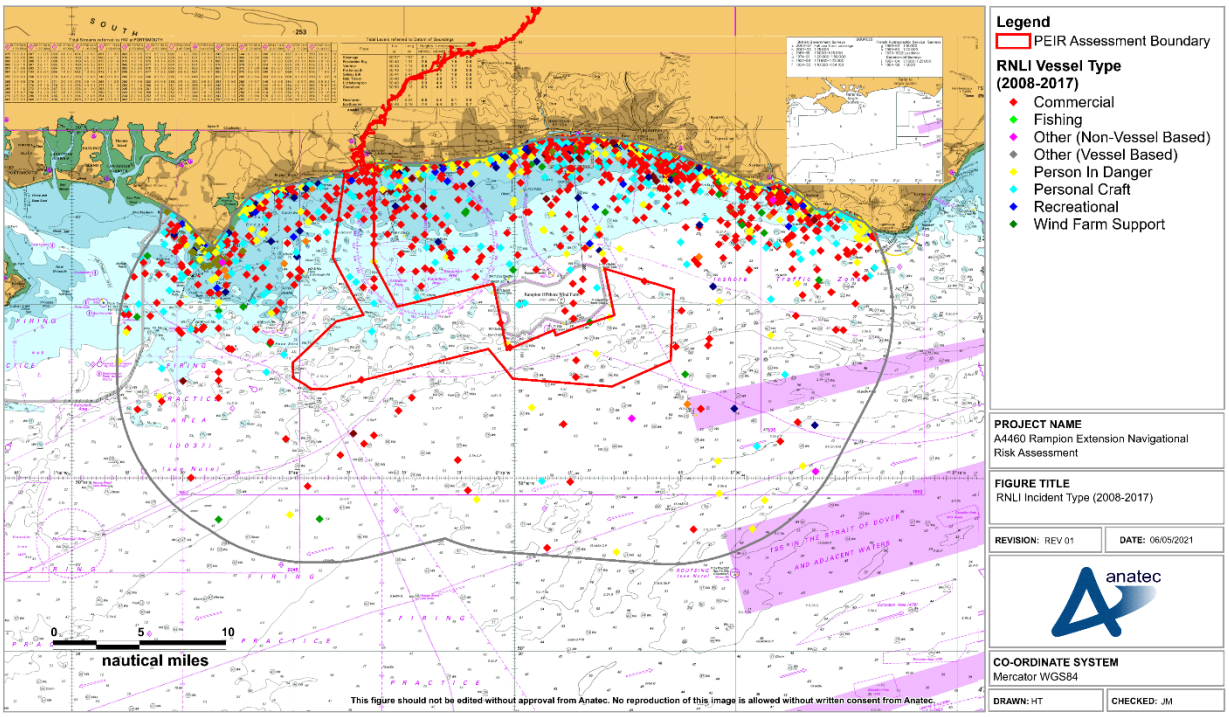


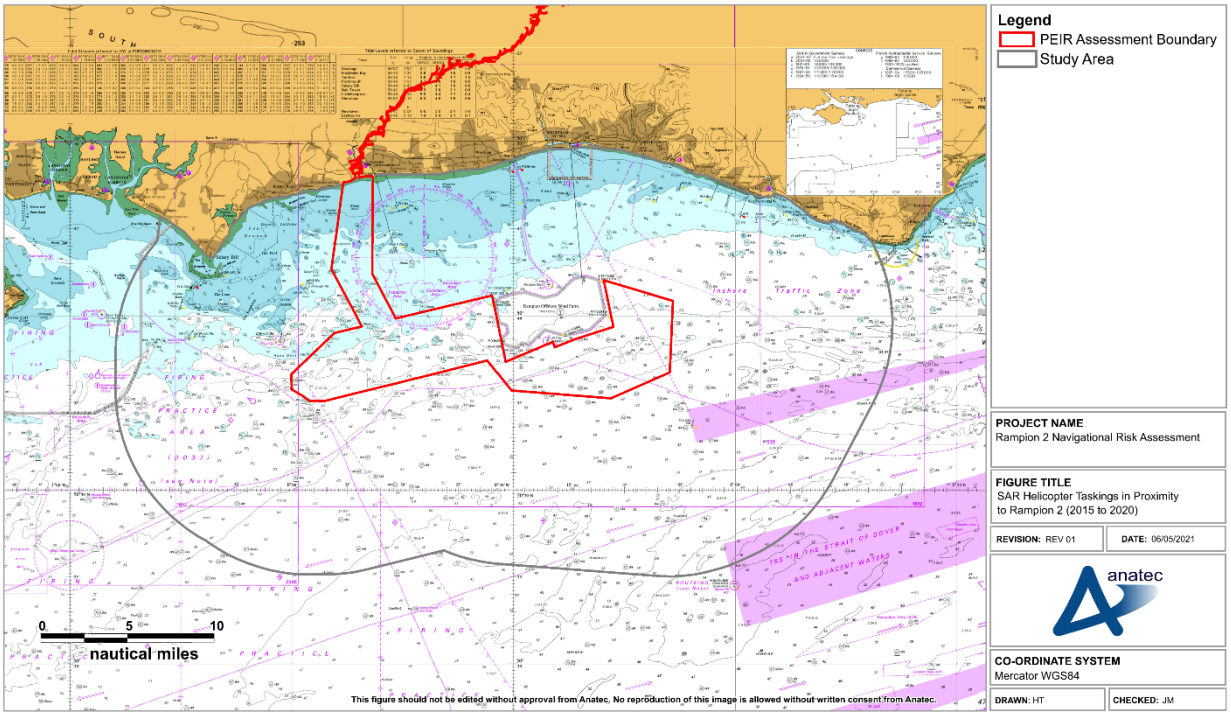
Figure 12.4 RNLI incidents by vessel type within study area (2008 to 2017)



12.4 Search and rescue helicopter taskings

12.4.1 The SAR helicopter taskings undertaken between April 2015 and March 2020 within the study area are presented in **Figure 12.5,** colour-coded by tasking type.

Figure 12.5 SAR helicopter taskings by tasking type within study area (2015 to 2020)



12.4.2 A total of 123 SAR helicopter taskings were undertaken for incidents within the study area between April 2015 and March 2020, corresponding to an average of 25 taskings per year. The majority of these taskings were "*rescue/recovery*" (37 percent) or "*search only*" (34 percent). Five SAR helicopter taskings were undertaken within the array area, and two within the offshore cable corridor.

12.5 Historical offshore wind farm incidents

Incidents involving UK offshore wind farm developments

12.5.1 As of June 2021, there are 39 operational offshore wind farms in the UK, ranging from the North Hoyle Offshore Wind Farm (fully commissioned in 2003) to Hornsea Project One (fully commissioned in 2020). Between them these developments encompass approximately 16,000 fully operational WTG years.

12.5.2 MAIB incident data has been used to collate a list of reported historical collision and allision incidents involving UK offshore wind farm developments[5], which is summarised in **Table 12-1**. Other sources have also been used to produce this list including the UK Confidential Human Factors Incident Reporting Programme (CHIRP) for Aviation and Maritime, International Marine Contractors Association (IMCA) and basic web searches.

[5] Includes only incidents reported to an accident investigation branch or an anonymous reporting service. Unconfirmed incidents have not been considered noting that to date only one further alleged incident has been rumoured but there is no evidence to confirm.

Table 12-1 Reported historical collision and allision incidents involving UK offshore wind farm developments

Incident Vessel	Incident Type	Date	Description of Incident	Vessel Damage*	Harm to Persons	Source
Project	Allision – project vessel with WTG	7 August 2005	A vessel involved with the installation of WTGs underestimated the effect of the current and allided with the base of a WTG whilst manoeuvring alongside it. Minor damage was sustained to a gangway on the vessel, the WTG tower and a WTG blade.	Minor damage to gangway on the vessel	None	MAIB
Project	Allision – project vessel with WTG	29 September 2006	When approaching a WTG, an offshore services vessel was struck by the tip of a WTG blade which was rotating rather than secured in a fixed position.	None	None	MAIB
Project	Allision – project vessel with disused pile	8 February 2010	The Skipper on-board a work boat slipped their hand on the throttle controls whilst in proximity to a disused pile. There was insufficient time to correct the error and the vessel struck the pile. A passenger moving around the interior of the vessel was thrown off his feet. Although not known at the time, the passenger was later diagnosed with back injuries. No serious damage was caused to the vessel.	Minor	Injury	MAIB
Project	Collision – third-party vessel with project vessel	23 April 2011	A third-party catamaran was hit by a project guard vessel within a harbour.	Moderate	None	MAIB

Incident Vessel	Incident Type	Date	Description of Incident	Vessel Damage*	Harm to Persons	Source
Project	Allision – project vessel with WTG	18 November 2011	The Officer of the Watch (OOW) on-board a cable-laying vessel fell asleep and woke to find the vessel inside a wind farm. He attempted to manoeuvre the vessel out of the wind farm on autopilot but the settings did not allow a quick turn and the vessel struck the foundations of a partially completed WTG. The vessel suffered two hull breaches.	Major	None	MAIB
Project	Collision – project vessel with service vessel	2 June 2012	A Crew Transfer Vessel (CTV) became lodged under the boat landing equipment of a flotel. Nine persons were safely evacuated and transferred to a nearby vessel before being brought back in to port.	Moderate	None	UK CHIRP
Project	Allision – project vessel with WTG	20 October 2012	The OOW misjudged the distance from a WTG monopile and made contact with the vessel's stern resulting in minor damage.	Minor	None	MAIB
Project	Allision – project vessel with buoy	21 November 2012	A wind farm passenger transfer catamaran struck a buoy at high speed whilst supporting operations for an offshore wind farm. The vessel was abandoned by the crew of 12 with the vessel having been holed, causing extensive flooding. There were however no injuries. It was found that the Master had unknowingly altered the vessel's course and had not been formally	Major	None	MAIB

Incident Vessel	Incident Type	Date	Description of Incident	Vessel Damage*	Harm to Persons	Source
			assessed to determine his suitability for the role.			
Project	Allision – project vessel with WTG	21 November 2012	A work boat allided with the unlit transition piece of a WTG at moderate speed. The impact caused all five persons on-board to be forced out of their seats. The vessel was able to proceed to port unassisted with no water ingress incurred, although there was some structural damage. It was found that the vessel's Master had relied too heavily on visual cues and there had been insufficient training with navigation equipment. The WTG transition piece had been reported as unlit although the defect reporting system had failed to promulgate a navigation warning.	Moderate	None	MAIB
Project	Allision – project vessel with WTG	1 July 2013	After disembarking passengers at an offshore substation, a service vessel's jets were disengaged, but the vessel jet drive suffered a failure which resulted in an allision with a WTG foundation. The vessel suffered some damage whereas the WTG foundation was not damaged.	Minor	None	IMCA Safety Flash
Project	Allision – project vessel with WTG	14 August 2014	A standby safety vessel allided with a WTG pile and consequently leaked marine gas oil and a surface sheen trailed from the vessel.	Minor with pollution	None	UK CHIRP

Incident Vessel	Incident Type	Date	Description of Incident	Vessel Damage*	Harm to Persons	Source
			Under its own power the vessel moved away from environmentally sensitive areas until the leak was stopped.			
Third-party	Allision – fishing vessel with WTG	26 May 2016	A crew member on-board a fishing vessel left the autopilot on, resulting in an allision with a WTG. A lifeboat attended the incident.	Moderate	Injury	Web search (RNLI, 2016)
Project	Allision – project vessel with WTG	16 January 2020	A project vessel servicing a number of WTGs allided with a WTG whilst transiting back to port resulting in a member of the crew coming into contact with the railings. The vessel proceeded unaided back to port where the man was subsequently taken to hospital to obtain doctors' advice.	None	Injury	Web search (Vessel Tracker, 2020)

12.5.3 The worst consequences reported for vessels involved in a collision or allision incident involving a UK offshore wind farm development has been flooding, with no life-threatening injuries to persons reported.

12.5.4 As of June 2021, there have been no collisions as a result of the presence of an offshore wind farm in the UK. The only reported collision incident in relation to a UK offshore wind farm involved a project vessel hitting a third-party vessel whilst in harbour.

12.5.5 As of June 2021, there have been nine reported cases of an allision between a vessel and a WTG (under construction, operational or disused) in the UK, with all but one involving a support vessel for the development and the errant vessel in each case under power rather than drifting. Therefore, there has been an average of 1,780 years per WTG allision incident in the UK, noting that this is a conservative calculation given that only operational WTG hours have been included (whereas allision incidents counted include non-operational WTGs.

Incidents responded to by vessels associated with UK offshore wind farms

12.5.6 From news reports, basic web searches and experience at working with existing offshore wind farm developments, a list has been collated of historical incidents responded to by vessels associated with UK offshore wind farm developments, which is summarised in **Table 12-2**. It is noted that the initial cause of these incidents is not related to the offshore wind farm in question.

Table 12-2 Historical incidents responded to by vessels associated with UK offshore wind farm developments

Incident Type	Date	Related development	Description of incident	Source
Capsize	21 June 2018	Walney Offshore Wind Farm	Following the capsize of a trimaran HMCG Holyhead issued a mayday relay broadcast requesting any vessels in the area assist. A support vessel for Walney arrived just in time to recover two persons from the water. Due to adverse conditions, the two persons were winched onboard a Coastguard helicopter and taken to shore.	Web search (4C Offshore, 2018)
Capsize	5 November 2018	Race Bank Offshore Wind Farm	A fishing vessel capsized after losing electrical power resulting in two fishermen in the water. A Belgian military helicopter spotted the casualties and dropped a life raft to assist before guiding the RNLI to the location. A vessel operating at the nearby Race Bank was also reported to have helped with the rescue.	Web search (British Broadcasting Corporation (BBC), 2018)
Vessel in trouble	15 May 2019	London Array Offshore Wind Farm	A yacht encountering difficulties in the Thames Estuary sought shelter by tying up to an offshore wind turbine. The alarm was raised by a wind farm support vessel which came across the secured yacht. The support vessel contacted the Coastguard who tasked Margate's all-weather RNLI lifeboat to assist but while on passage to the casualty position the yacht suffered further damage including the loss of its single mast. At one stage the person aboard the yacht entered the water but was recovered by the wind farm support vessel. With concern of the effects of cold water immersion the coastguard instructed the support vessel to return to	Web search (The Isle of Thanet News, 2019)

Incident Type	Date	Related development	Description of incident	Source
			Ramsgate and seek medical assistance for the yacht's occupant.	
Drifting	7 July 2019	Gwynt y Môr Offshore Wind Farm	A wind farm support vessel responded to an 'all-ships' broadcast from the Coastguard to help four people stranded on a broken down speedboat following a day of fishing south east off North Wales. The vessel went to the speedboat's aid to prevent it drifting into the Gwynt y Môr array, according to Rhyl RNLI, and later towed the boat back towards Rhyl where it met the ALB about 10km north of the harbour. The lifeboat took over the tow and brought the casualties aboard.	Web search (Renews, 2019)
Machinery failure	28 September 2019	Race Bank Offshore Wind Farm	A nearby fishing vessel lost all engine and electrical power and launched flares. The guard vessel and Service Operation Vessel (SOV) for Race Bank both immediately offered assistance until the MCA's arrival on-scene.	Internal daily progress report received by Anatec
Vessel in trouble	13 December 2019	Race Bank Offshore Wind Farm	A vessel passing Race Bank got into difficulty and the guard vessel for Race Bank was requested to assist. Once control of the situation was established, the Humber Coastguard requested that the guard vessel tow the casualty vessel into Grimsby.	Internal daily progress report received by Anatec
Search	21 May 2020	Walney Offshore Wind Farm	The guard vessel for Walney was contacted by HMCG Holyhead in the early hours of the morning reporting a red flare sighted at the wind farm. The vessel proceeded to undertake a search but did not find anything to report.	Internal daily progress report

Incident Type	Date	Related development	Description of incident	Source
				received by Anatec
Aircraft crash	15 June 2020	Hornsea Project One	A United States (US) jet operating out of Royal Air Force (RAF) Lakenheath in Suffolk crashed into the North Sea during a routine training flight, approximately 74km off the coast. Following a mayday call, the RNLI launched lifeboats from Bridlington and Scarborough and the Coastguard launched a helicopter from Humberside. A CTV and SOV for the construction of Hornsea Project One headed to the area to assist in the search for the missing pilot. The pilot was later found but was deceased.	Web search (4C Offshore, 2020)
Fire/explosion	15 December 2020	Dudgeon Offshore Wind Farm	The crew of the SOV for Dudgeon, in cooperation with the developer's medic and technicians, rescued seven fishermen in distress near the wind farm. The fishing vessel experienced explosions on board, and all seven fishermen were "*seriously injured*". The SOV deployed its Fast Rescue Boat (FRB) and started evacuating the fishing vessel. Meanwhile, the SOV's remaining crew prepared to receive the injured.	Web search (Offshore WIND, 2020)

13 Vessel traffic movements

13.1.1 This section presents an overview of vessel traffic movements within the study area, primarily based upon the findings of the summer and winter vessel traffic surveys undertaken in August and November 2020, respectively (see **Section 7.2**).

13.1.2 A number of vessel tracks recorded during the survey periods were classified as temporary (non-routine), such as the survey vessel, vessels performing wind farm duties associated with Rampion 1, vessels surveying the IFA2 cable and a vessel undertaking a UXO survey at Brighton. These have therefore been excluded from the analysis.

13.1.3 A plot of the vessel tracks recorded during the 14-day summer survey period within the study area, colour-coded by vessel type and excluding temporary traffic, is presented in **Figure 13.1**. Following this, **Figure 13.2** presents the same data converted to a density heat map.

Figure 13.1 Vessel traffic survey data by vessel type (summer 2020)

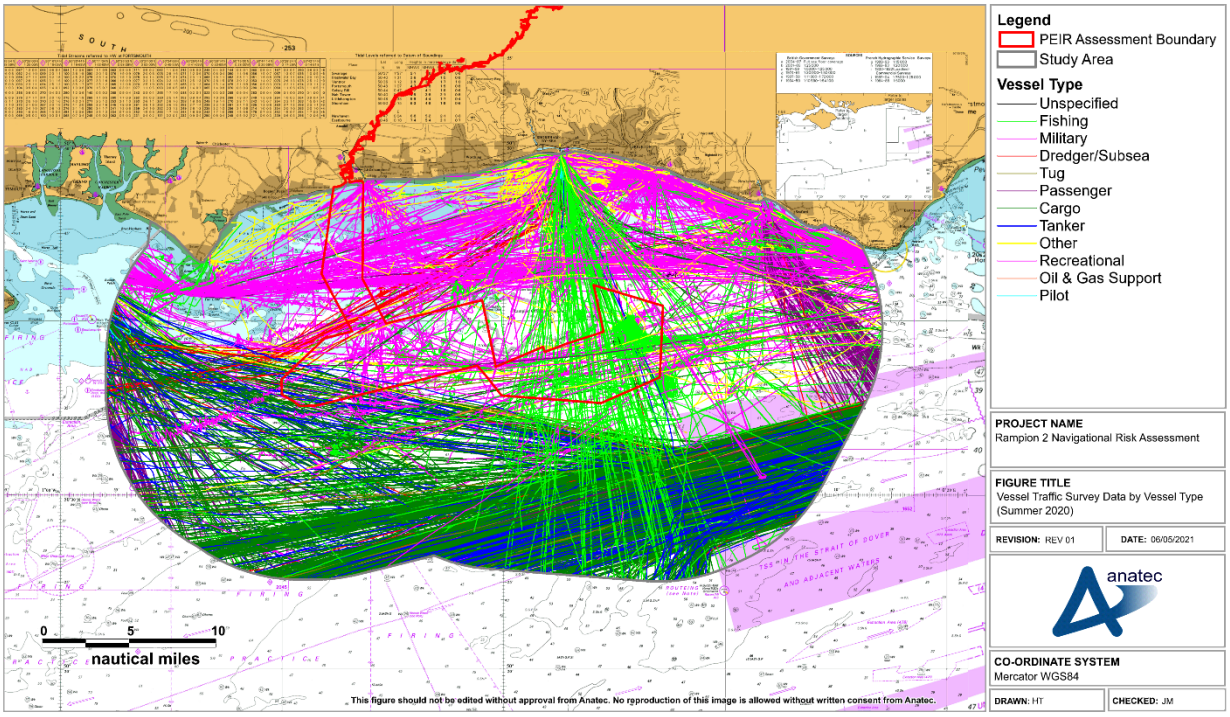
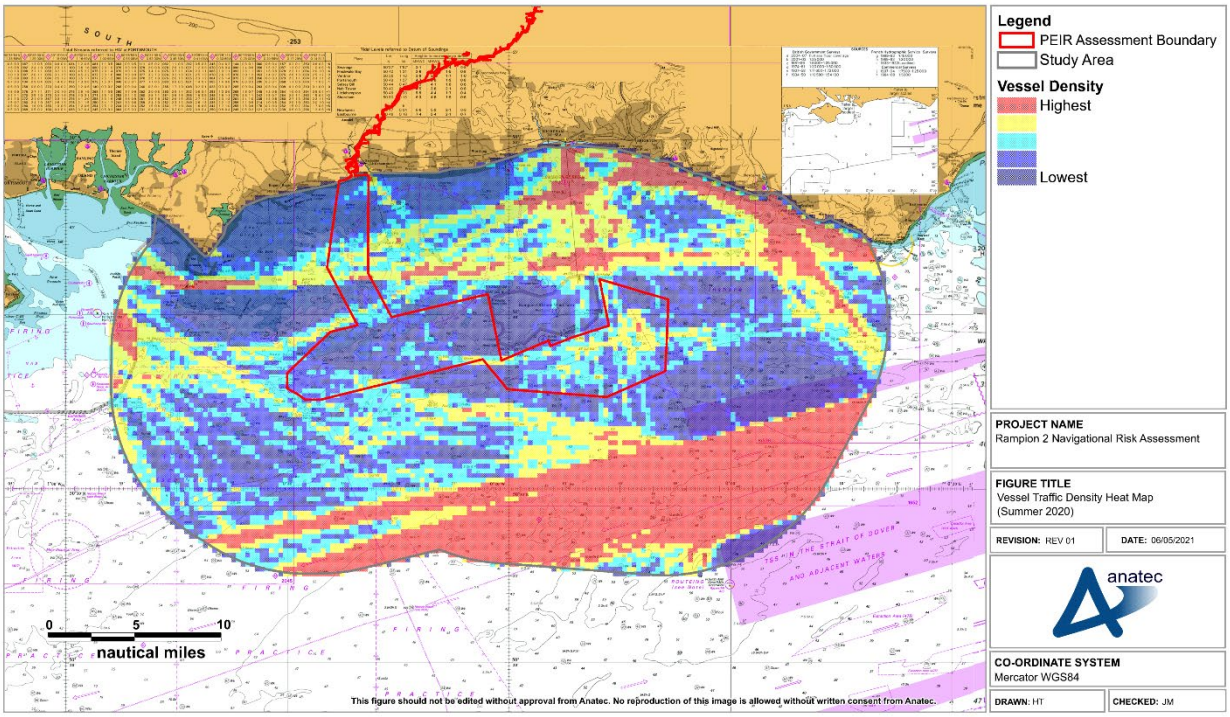


Figure 13.2 Vessel traffic density heat map (summer 2020)



13.1.4 A plot of the vessel tracks recorded during the 14-day winter survey period within the study area, colour-coded by vessel type and excluding temporary traffic, is presented in **Figure 13.3**. Following this, **Figure 13.4** presents the same data converted to a density heat map.

Figure 13.3 Vessel traffic survey data by vessel type (winter 2020)

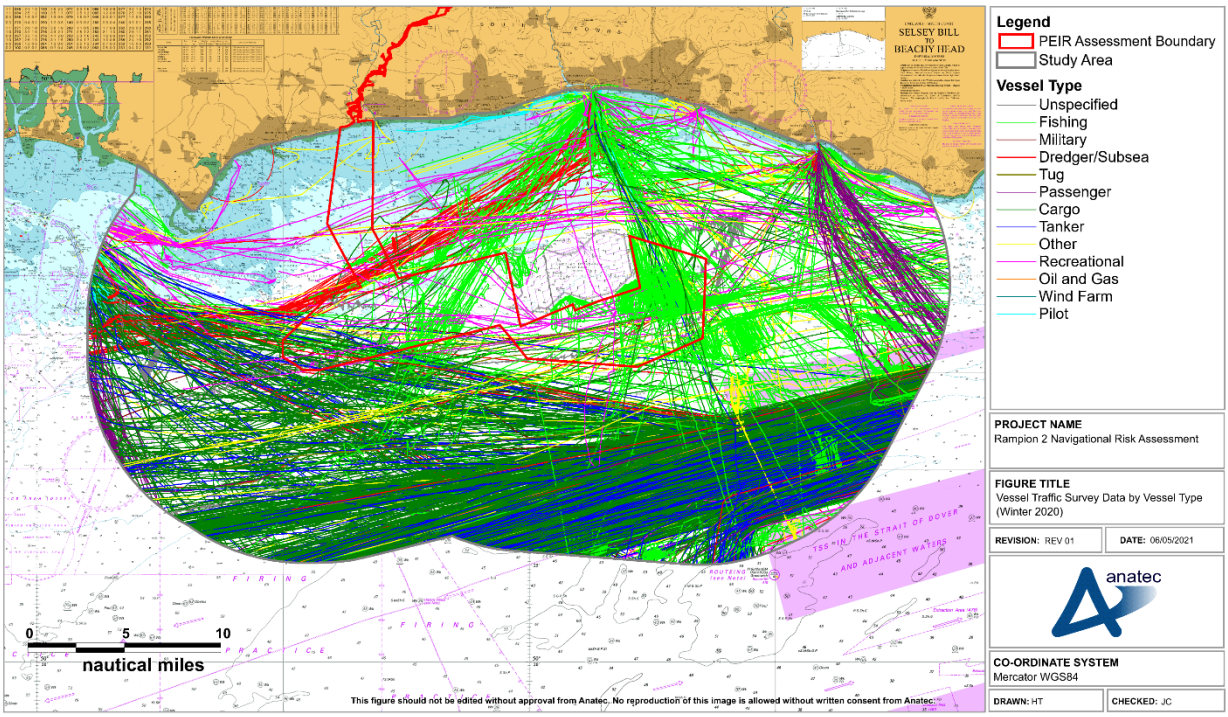
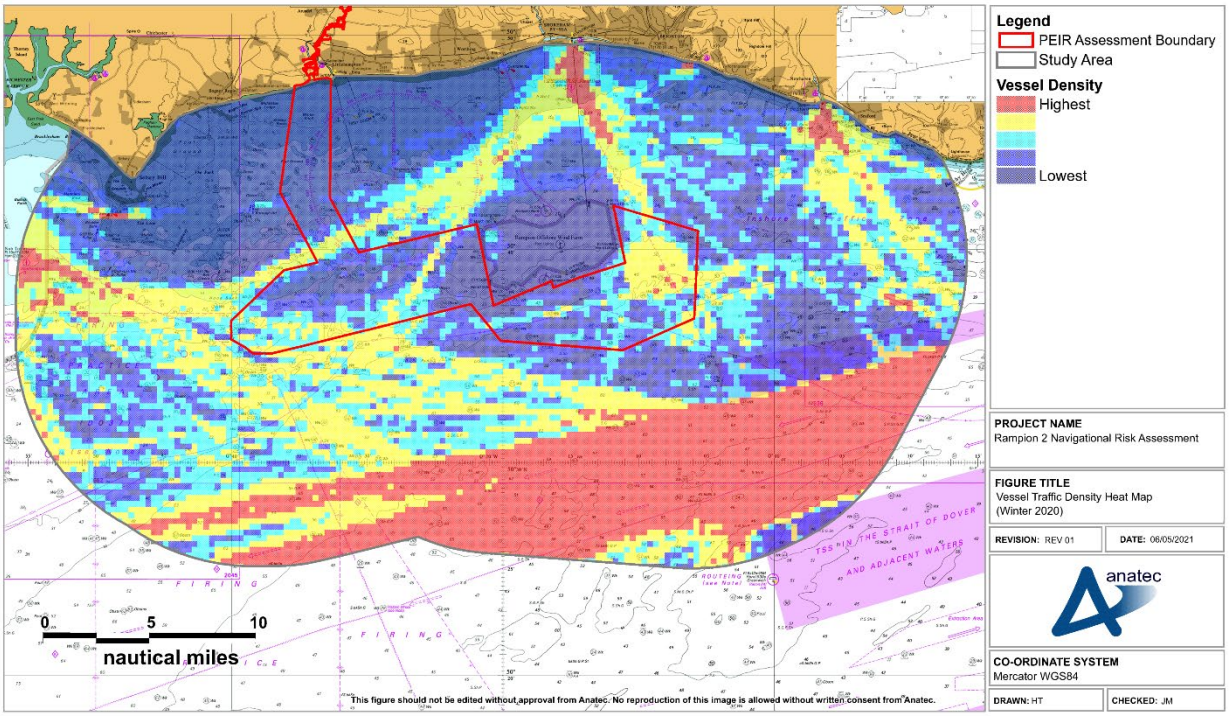


Figure 13.4 Vessel traffic density heat map (Winter 2020)



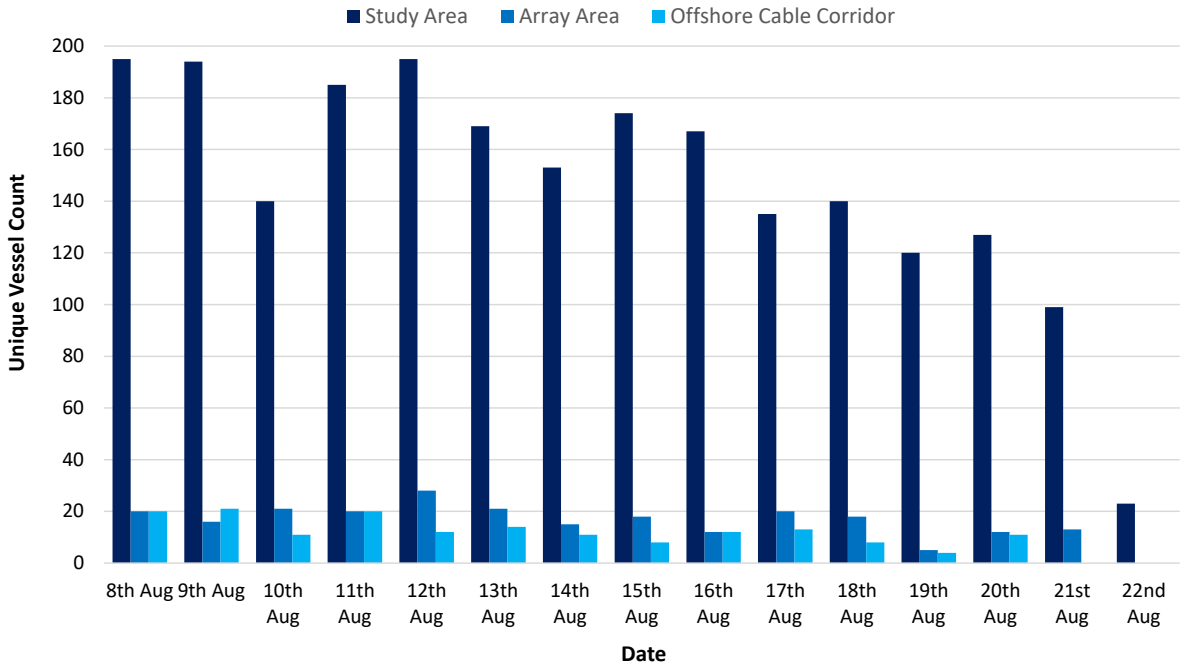
13.2 Vessel counts

13.2.1 For the 14 days analysed in summer, there was an average of 158 unique vessels per day recorded within the study area. An average of 17 unique vessels per day was recorded intersecting the array area and 12 unique vessels per day intersecting the offshore cable corridor.

13.2.2 For the 14 days analysed in winter, there was an average of 146 unique vessels per day recorded within the study area. An average of 17 unique vessels per day was recorded intersecting the array area and four unique vessels per day intersecting the offshore cable corridor.

13.2.3 **Figure 13.5** illustrates the daily number of unique vessels recorded within the study area, as well as intersecting the array area and offshore cable corridor, during the summer survey period. Throughout the summer survey period approximately 11 percent of vessel traffic recorded within the study area intersected the array area, and 7 percent intersected the offshore cable corridor.

Figure 13.5 Daily counts within study area, array area and offshore cable corridor (summer 2020)

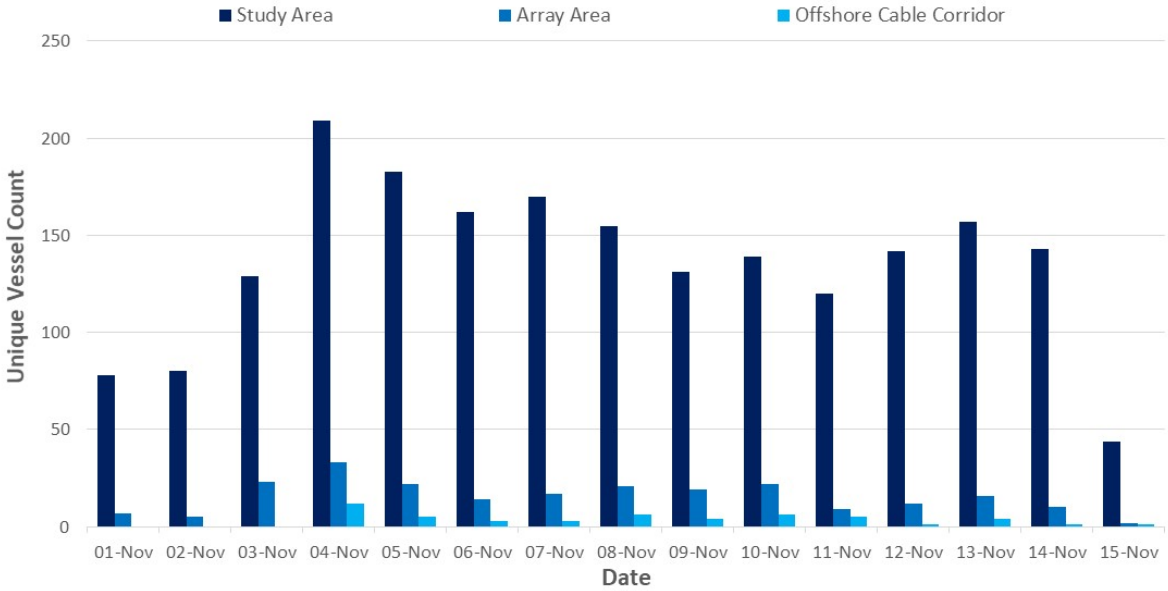


13.2.4 The busiest full day recorded within the study area throughout the summer survey period was 12 August, when 195 unique vessels were recorded. The busiest full day recorded during the summer survey period within the array area was also 12 August, when 28 unique vessels were recorded. The busiest full day recorded during the summer survey period within the offshore cable corridor was 9 August, when 21 unique vessels were recorded.

13.2.5 The quietest full day recorded within the study area throughout the summer survey period was 21 August when 99 unique vessels were recorded (noting that 22 August was not a full day). The quietest full day recorded within the array area was 19 August, when five unique vessels were recorded. The quietest full day recorded within the offshore cable corridor was 21 August, when no vessels were recorded.

13.2.6 **Figure 13.6** illustrates the daily number of unique vessels recorded within the study area, as well as intersecting the array area and offshore cable corridor, during the winter survey period. Throughout the winter survey period approximately 11 percent of vessel traffic recorded within the study area intersected the array area, and 3 percent intersected the offshore cable corridor.

Figure 13.6 Daily counts within study area, array area and offshore cable corridor (winter 2020)



13.2.7 The busiest full day recorded within the study area throughout the winter survey period was 4 November when 209 unique vessels were recorded. The busiest full day recorded during the winter survey period within the array area was also 4 November when 33 unique vessels were recorded. The busiest full day recorded during the winter survey period within the offshore cable corridor was also 4 November, when 12 unique vessels were recorded.

13.2.8 The quietest full day recorded within the study area throughout the summer survey period was 2 November when 80 unique vessels were recorded (noting that 1 and 15 November were not full days). The quietest full day recorded within the array area was also 2 November, when five unique vessels were recorded. The quietest full days recorded within the offshore cable corridor were the 2 and 3 November when no vessels were recorded.

13.3 Vessel type

13.3.1 The percentage distribution of the main vessel types recorded passing within the study area, as well as intersecting the array area and offshore cable corridor, during the summer survey period is presented in **Figure 13.7**. The same distribution for the winter survey data is presented in **Figure 13.8**.

Figure 13.7 Vessel type distribution (summer 2020)

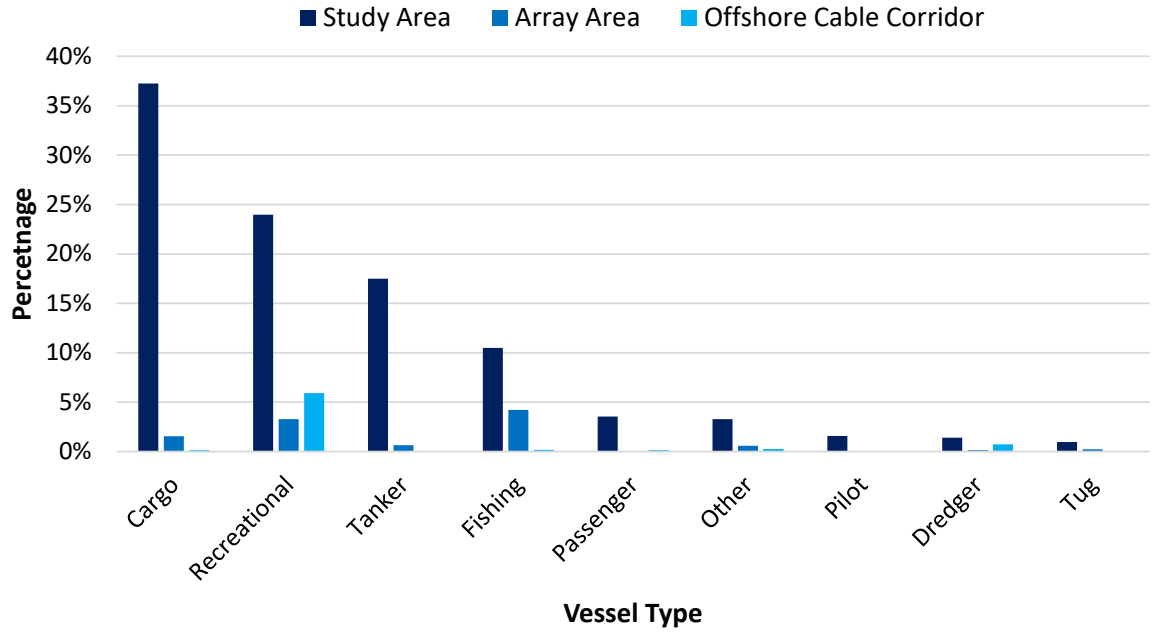
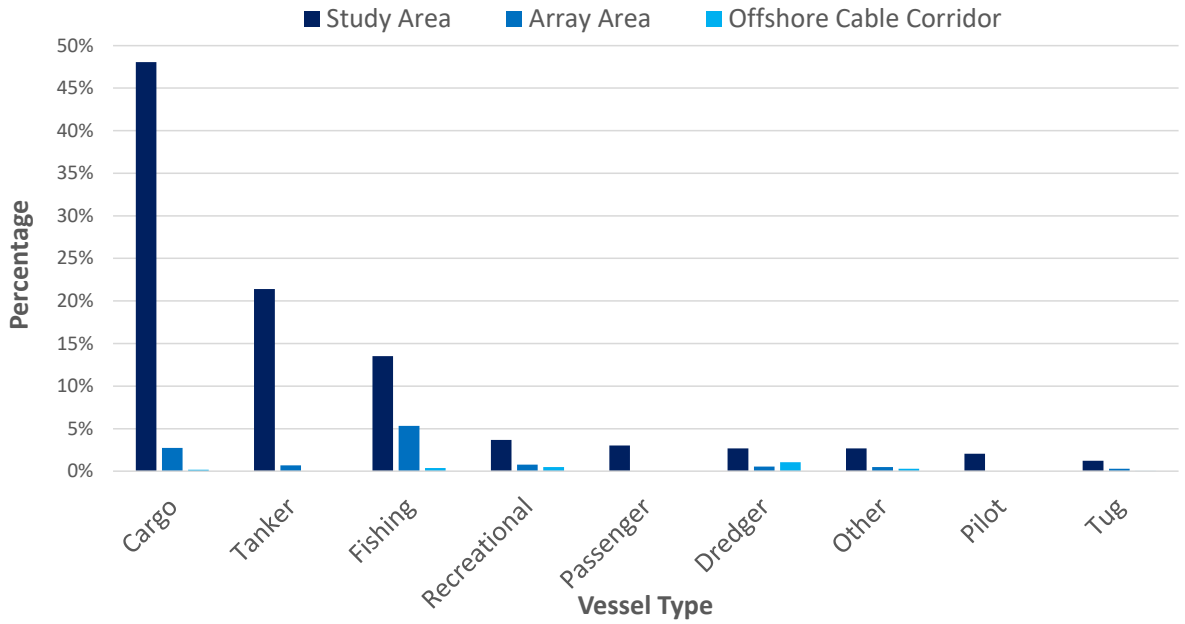


Figure 13.8 Vessel type distribution (winter 2020)



13.3.2 Throughout the summer period, the main vessel types within the study area were cargo vessels (37 percent), recreational vessels (24 percent), tankers (17 percent) and fishing vessels (10 percent). Throughout the winter period, the main vessel types were cargo vessels (48 percent), tankers (21 percent) and fishing vessels (14 percent). It should be noted that the cargo vessel category includes commercial ferries which generally broadcast their vessel types on AIS as cargo or passenger.

13.3.3 The following subsections consider each of the main vessel types individually.

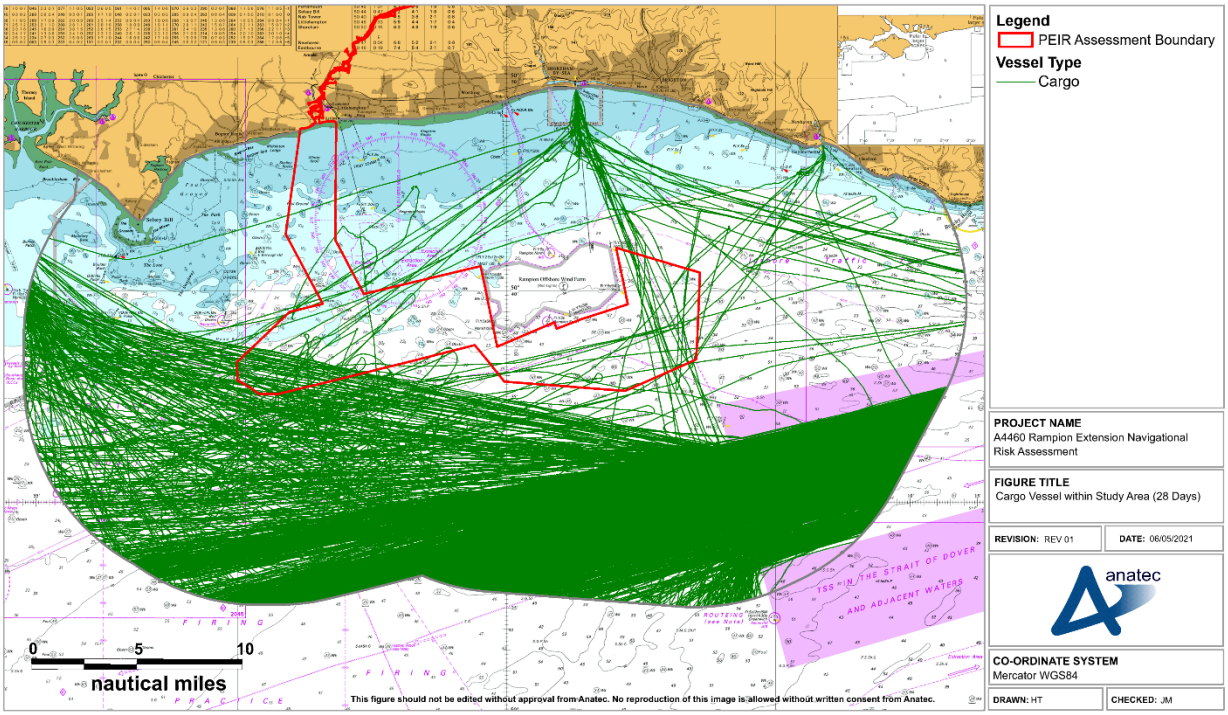
Cargo vessels

13.3.4 **Figure 13.9** presents a plot of cargo vessels, including commercial ferries, recorded within the study area during the two 14-day survey periods.

13.3.5 Throughout the summer survey period an average of 59 unique cargo vessels per day were recorded within the study area. Throughout the winter survey there was an average of 70 cargo vessels per day. The regular cargo vessels operating within the study area included Roll-On/Roll-Off (Ro Ro) vessels operated by Cobelfret Ferries.

13.3.6 Main destinations included Southampton (UK), Le Havre (France) and Dublin (Ireland), with the majority of cargo vessel traffic westbound out of the Dover Strait TSS. Only a small proportion of cargo vessels were recorded inshore of the PEIR Assessment Boundary, primarily transiting to/from Shoreham and Newhaven.

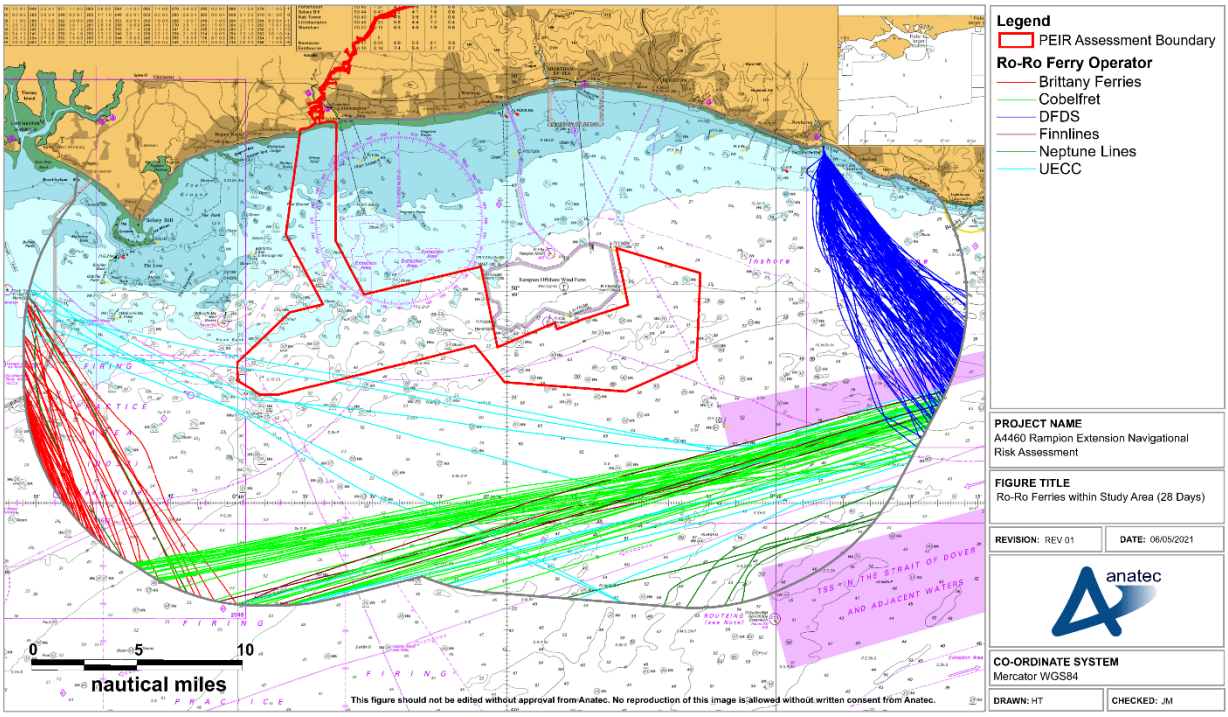
Figure 13.9 Cargo vessels within study area (28 Days)



Commercial ferries

13.3.7 **Figure 13.10** presents a plot of commercial ferries, recorded within the study area during the two 14-day survey periods, colour-coded by operator.

Figure 13.10 Commercial ferries within study area (28 Days)



13.3.8 It is noted that during the long-term vessel traffic analysis (see **Annex B**), the Ro Ro passenger ferry *Etretat*, operated by Brittany Ferries, was the most frequently recorded commercial ferry. Due to COVID-19, the *Etretat* has not been in operation since March 2020 and therefore was not recorded during either of the survey periods.

13.3.9 Brittany Ferries, DFDS Seaways and Cobelfret Ferries were the main commercial ferry operators during the survey period. Brittany Ferries primarily operated routes between Portsmouth (UK) and Ouistreham (Caen) (France)/Le Havre. DFDS Seaways primarily operated a route between Newhaven (UK) and Dieppe (France). Cobelfret Ferries primarily operated routes through the Channel utilising the IMO routeing measures.

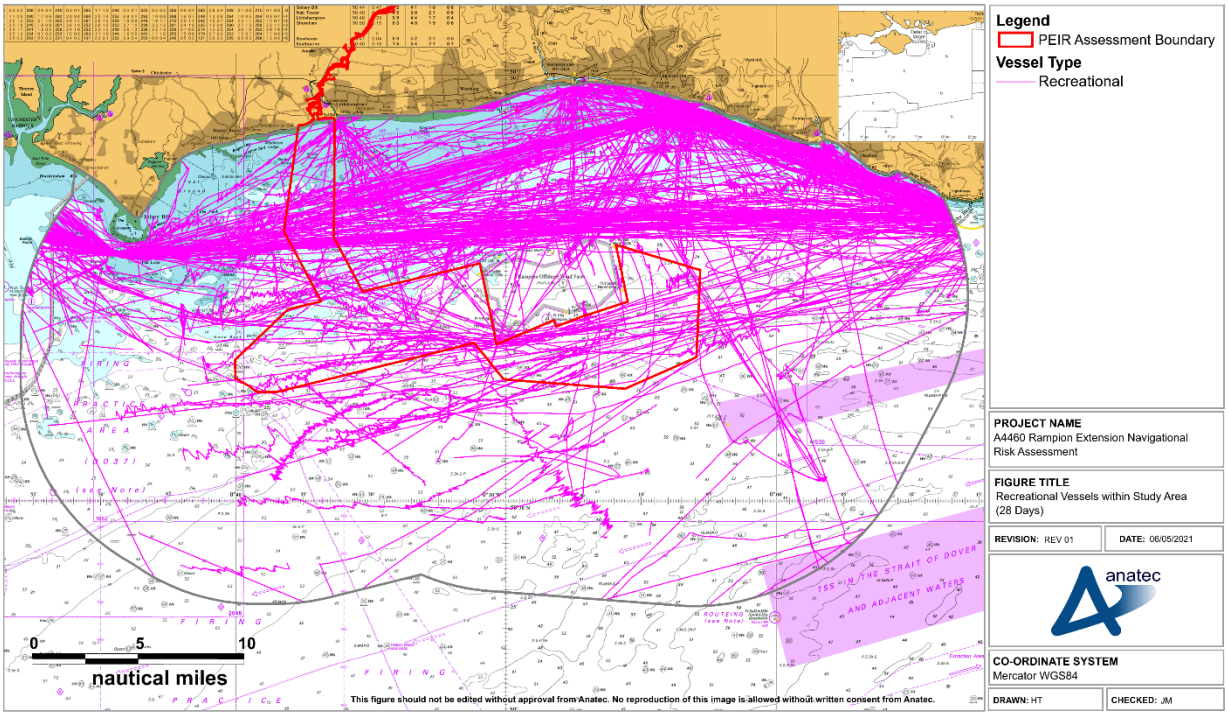
Recreational vessels

Vessel traffic survey data

13.3.10 **Figure 13.11** presents a plot of recreational vessel activity recorded within the study area throughout the two 14-day survey periods.

13.3.11 Throughout the summer survey period an average of 38 unique recreational vessels per day were recorded within the study area. Throughout the winter survey period an average of five unique recreational vessels per day was recorded in the study area.

Figure 13.11 Recreational vessels within study area (28 Days)



13.3.12 Recreational vessels were predominantly observed transiting in nearshore areas including to/from Brighton, Solent ports, Shoreham, Newhaven and Littlehampton. However, some activity was recorded further offshore including recreational dive charter vessels visiting numerous wrecks in the area. Multiple tours to Rampion 1 were also recorded based out of Brighton.

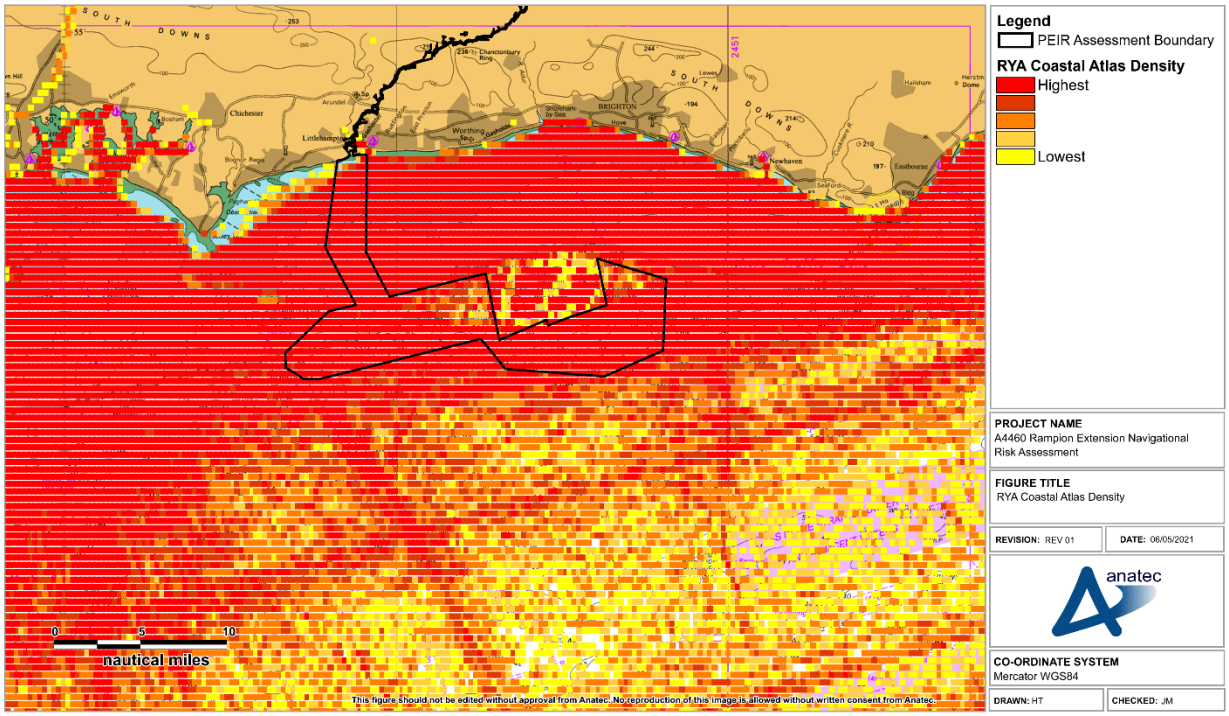
13.3.13 Approximately 78 percent of recreational vessels throughout the 28-day survey periods were recorded on AIS, with 22 percent recorded on Radar.

Royal Yachting Association Coastal Atlas

13.3.14 The RYA Coastal Atlas may be used to "*help identify and protect areas of importance to recreational boaters, to advise on new development proposals and in discussions over navigational safety*" (RYA, 2019). The RYA Coastal Atlas includes a heat map indicating the density of recreational activity around the UK coast.

13.3.15 **Figure 13.12** presents a plot of the RYA Coastal Atlas heat map relative to the PEIR Assessment Boundary.

Figure 13.12 RYA Coastal Atlas density



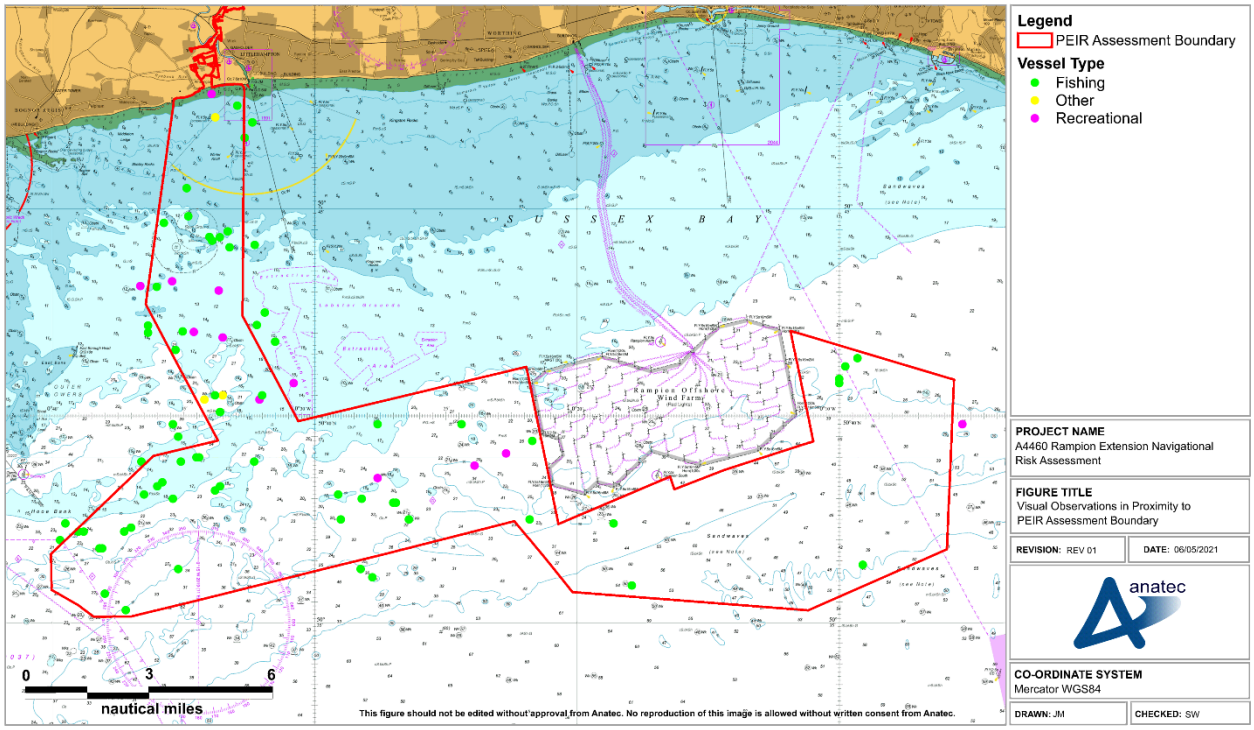
13.3.16 The overall density of recreational activity is heaviest towards the coast, with the density gradually dropping off seaward of the PEIR Assessment Boundary. Distinctive routes can be identified out of the Dover Strait TSS and the Solent, including one route which passes through the western extent of the array area.

13.3.17 It can be seen that the density of recreational activity within the existing Rampion 1 is highly variable and includes some areas of heavy use.

Visual observations during geophysical surveys

13.3.18 During geophysical surveys undertaken on-site at the offshore cable corridor in July and August 2020, further visual observations of vessels not broadcasting on AIS and located within or in proximity to the PEIR Assessment Boundary were collected. **Figure 13.13** presents a plot of the non-AIS vessel activity recorded, including recreational vessels.

Figure 13.13 Visual observations in proximity to PEIR Assessment Boundary



13.3.19 A total of nine recreational vessels were observed and logged whilst the geophysical surveys were ongoing (noting that multiple points are plotted in **Figure 13.13** for some vessels), with observations typically in the southern half of the offshore cable corridor and the portion of the array area immediately west of Rampion 1.

13.3.20 The full visual observations log is provided in **Annex C**.

Tankers

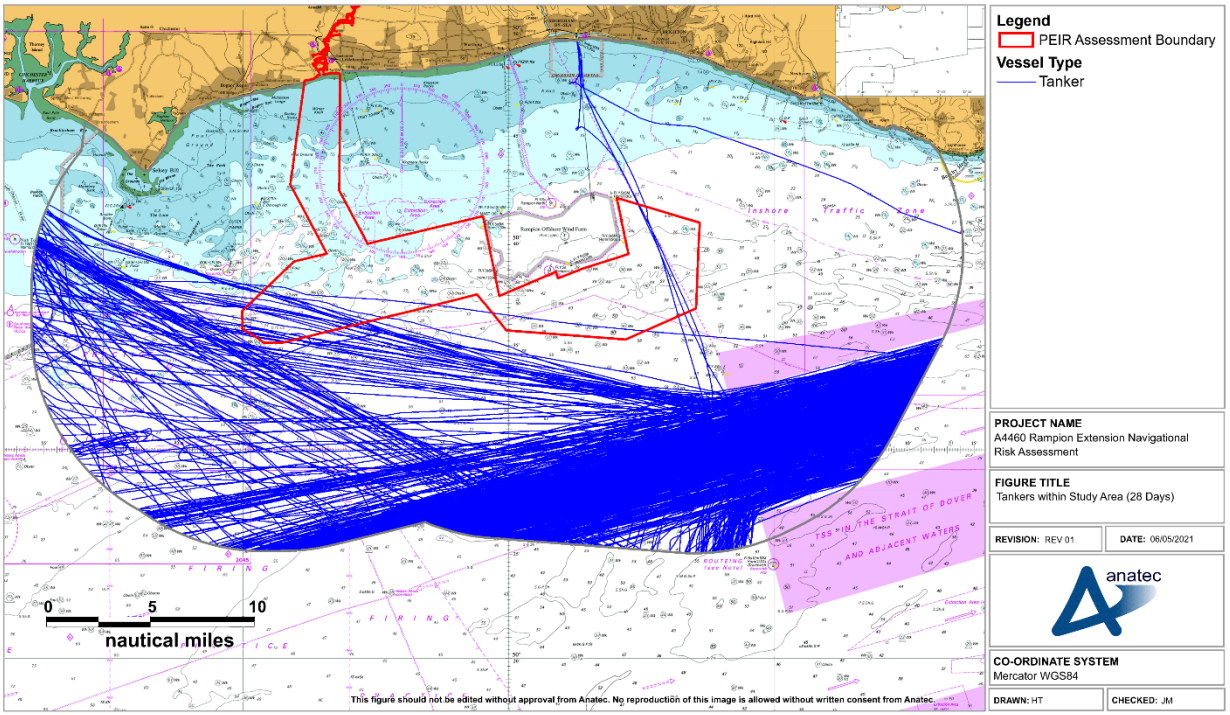
13.3.21 **Figure 13.14** presents a plot of tankers recorded within the study area during the two 14-day survey periods.

13.3.22 Throughout the summer survey period an average of 28 unique tankers per day were recorded within the study area. Throughout the winter survey period an average of 31 unique tankers per day were recorded within the study area.

13.3.23 Main destinations included Le Havre, Port Jerome (France) and Fawley (UK). Tankers were recorded transiting the Dover Strait TSS, as well as transiting to/from the Solent.

13.3.24 Tanker activity inshore of the PEIR Assessment Boundary was negligible, with two tankers recorded visiting Shoreham during the 28-day period.

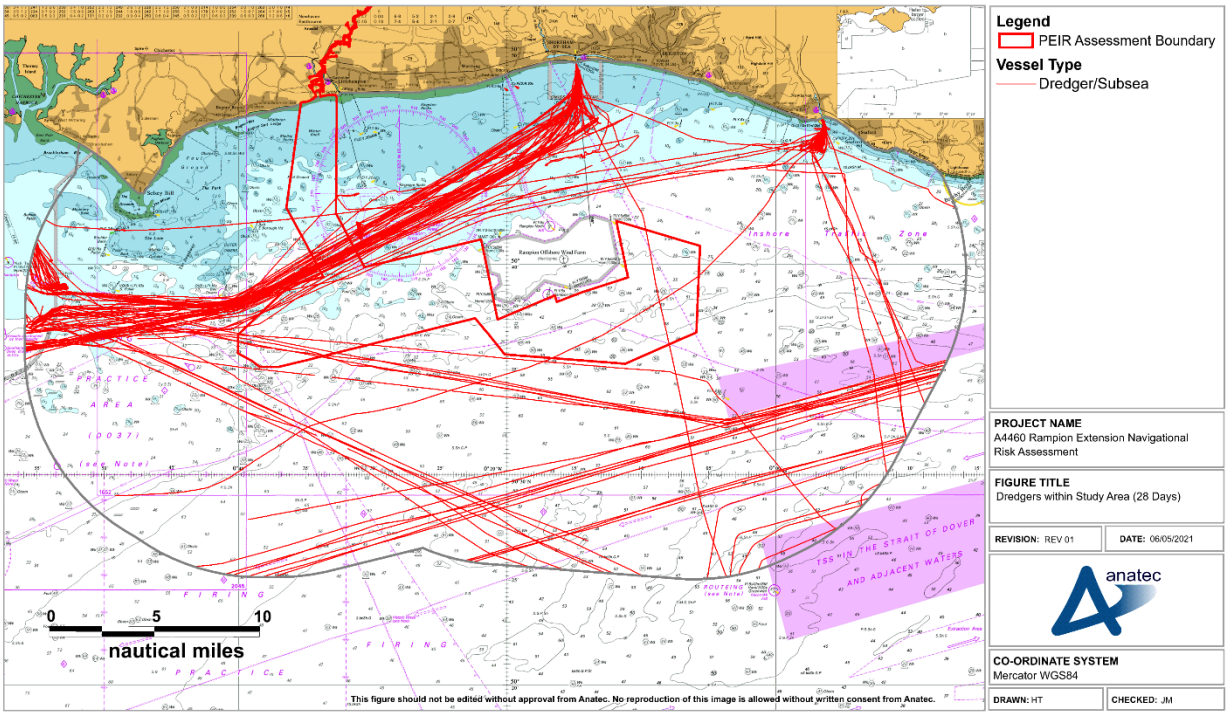
Figure 13.14 Tankers within study area (28 Days)



Marine aggregate dredgers

13.3.25 **Figure 13.15** presents a plot of the marine aggregate dredging activity recorded within the study area throughout the two 14-day survey periods.

Figure 13.15 Marine aggregate dredgers within study area (28 Days)



13.3.26 An average of two unique marine aggregate dredgers were recorded per day within the study area during each 14-day survey period. Marine aggregate dredgers were most frequently recorded transiting to various dredging areas to the west of the PEIR Assessment Boundary and immediately east of the offshore cable corridor.

13.3.27 The vessel traffic survey data shows good agreement with the description of marine aggregate dredger movements provided by marine aggregate dredging representatives during consultation (see various entries in **Table 4-2**).

Fishing vessels

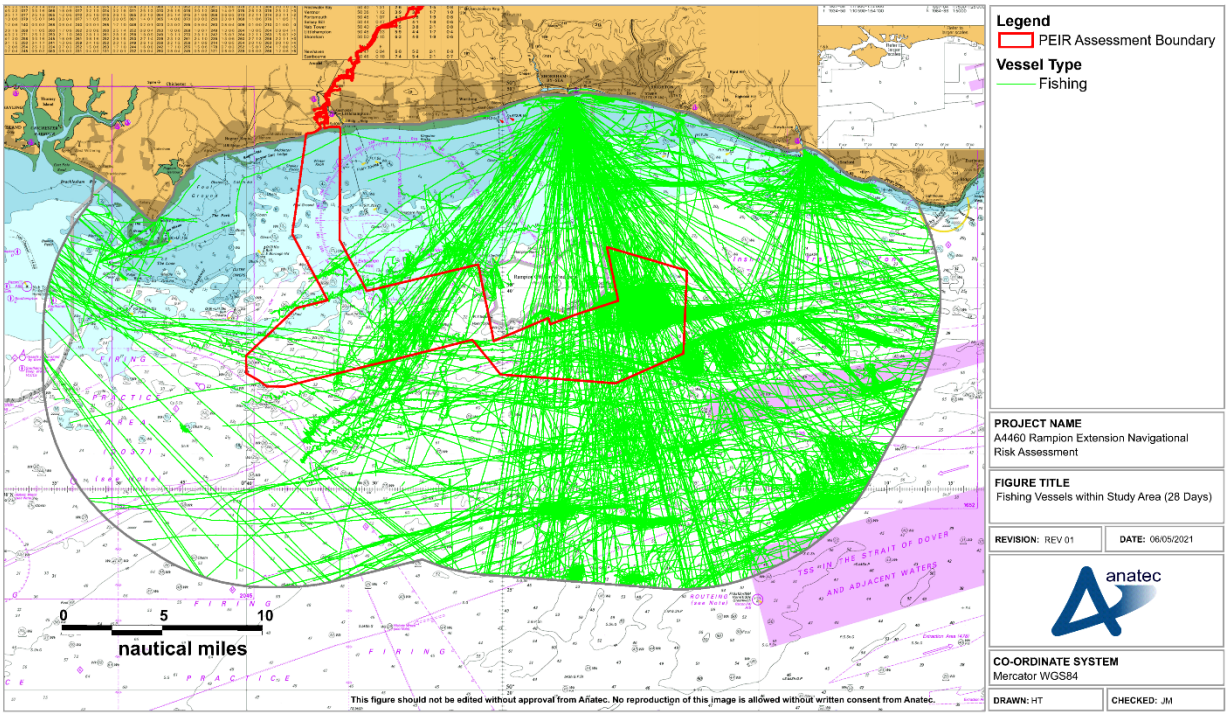
Vessel traffic survey data

13.3.28 **Figure 13.16** presents a plot of fishing vessel activity recorded within the study area throughout the two 14-day survey periods.

13.3.29 Throughout the summer survey period an average of 17 unique fishing vessels per day were recorded within the study area. Throughout the winter survey period an average of 20 unique fishing vessels per day were recorded within the study area. Fishing vessels were recorded on passage through the study area as well as actively engaged in fishing, most notably within the PEIR Assessment Boundary south and east of Rampion 1. Transits through the Rampion 1 array in and out of Shoreham were noted primarily during the summer survey period with such transits during the winter survey period typically to the west of Rampion 1.

13.3.30 Approximately 88 percent of fishing vessels throughout the 14-day summer survey period were recorded on AIS, with 12 percent recorded on Radar.

Figure 13.16 Fishing vessels within study area (28 Days)



Visual observations during geophysical surveys

13.3.31 **Figure 13.13** presents a plot of the non-AIS vessel activity recorded whilst geophysical surveys were being undertaken on-site at the offshore cable corridor in July and August 2020 (see **paragraph 13.3.18** for further information), including fishing vessels.

13.3.32 A total of 47 fishing vessels were observed and logged whilst the geophysical surveys were ongoing (noting that multiple points are plotted in **Figure 13.13** for some vessels), with observations most frequent within the central and southern portions of the offshore cable corridor and the western extent of the array area.

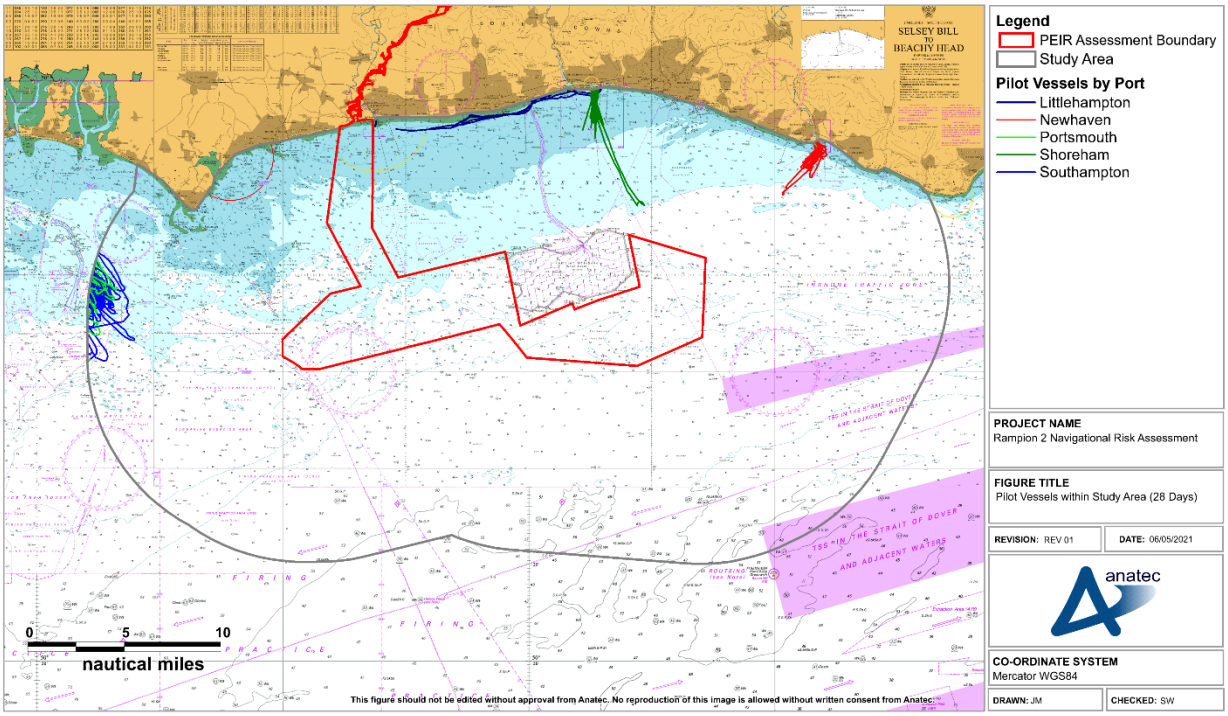
13.3.33 The full visual observations log is provided in **Annex C**.

Pilot vessels

13.3.34 **Figure 13.17** presents a plot of pilot vessels recorded within the study area during the two 14-day survey periods.

13.3.35 Throughout the summer survey period an average of two to three unique pilot vessels per day were recorded within the study area. Throughout the winter survey period an average of three unique pilot vessels per day were recorded within the study area. Pilot vessels were primarily recorded operating in nearshore areas out of their respective ports, including at Shoreham, Newhaven and the Solent.

Figure 13.17 Pilot vessels within study area (28 Days)



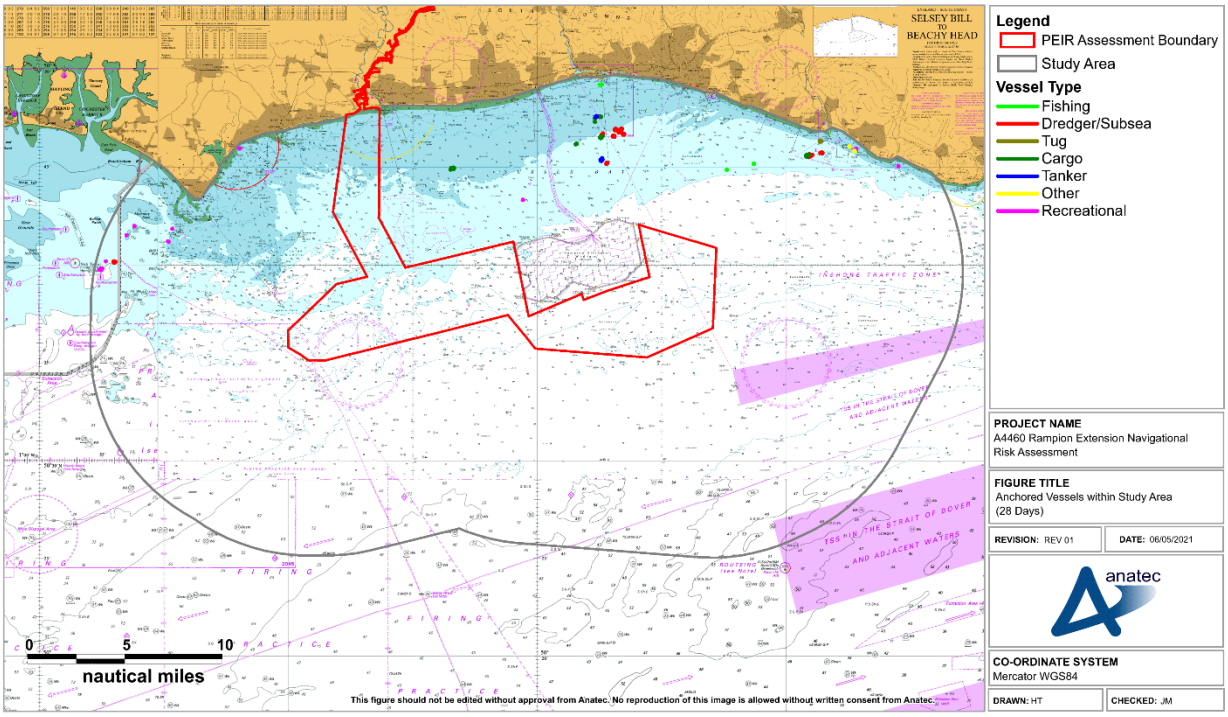
Anchored vessels

13.3.36 Anchored vessels can be identified based upon the AIS navigational status which is programmed on the AIS transmitter on board a vessel. However, information is manually entered into the AIS, and therefore it is common for vessels not to update their navigational status if only at anchor for a short period of time.

13.3.37 For this reason, those vessels which travelled at a speed of less than 1kt for more than 30 minutes had their corresponding vessel tracks individually checked for patterns characteristic of anchoring activity. After applying these criteria, 40 anchored vessels were identified within the study area, corresponding to an average of one to two anchored vessels per day. Of the anchored vessels identified, 63 percent broadcast an AIS navigational status of "*at anchor*". **Figure 13.18** presents a plot of anchored vessels recorded within the study area throughout the two 14-day survey periods.

13.3.38 The majority of anchoring activity was associated with Shoreham, Newhaven and the Solent, with only one anchored vessel associated with Littlehampton. The closest anchoring activity to the PEIR Assessment Boundary was a recreational vessel approximately 2.2nm north of the array area. Anchored vessels during the summer survey period were predominately recreational vessels (37 percent) and marine aggregate dredgers (26 percent) and during the winter survey period were predominantly marine aggregate dredgers (30 percent) and cargo vessels (26 percent).

Figure 13.18 Anchored vessels within study area (28 Days)

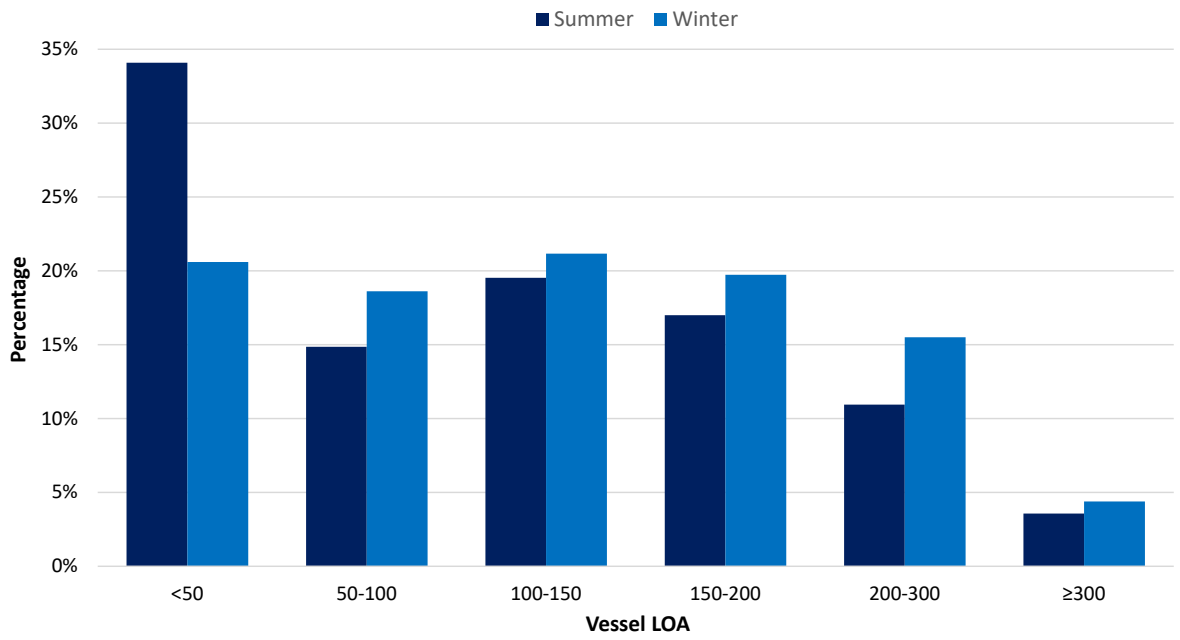


13.4 Vessel size

Vessel length

13.4.1 Vessel LOA was available for approximately 93 percent of vessels recorded throughout the two 14-day survey periods and ranged from 3m for a sailing vessel to 400m for several containerships. **Figure 13.19** illustrates the distribution of vessel lengths recorded throughout each survey period.

Figure 13.19 Vessel length distribution (summer and winter 2020)

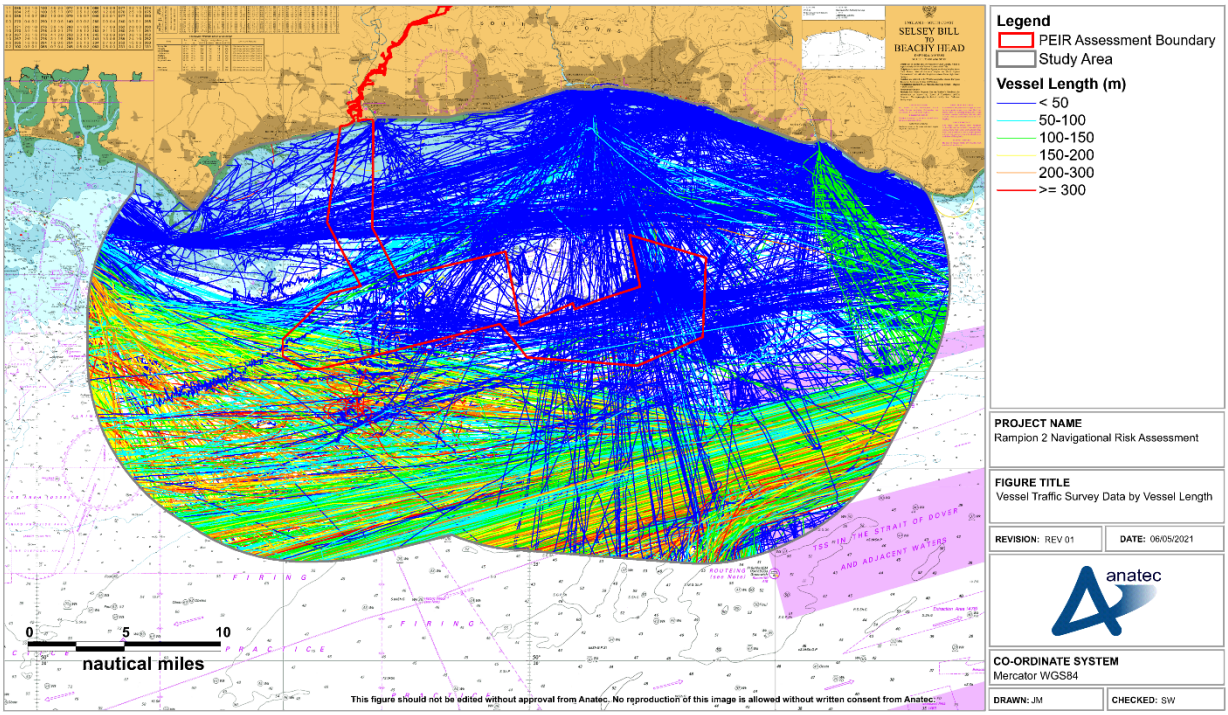


13.4.2 Excluding the proportion of vessels for which a length was not available the average length of vessels within the study area throughout the summer and winter survey periods was 112m and 135m, respectively. The difference in average vessel length between the two survey periods may be attributed to the greater presence of small recreational vessels in the summer period.

13.4.3 **Figure 13.20** presents a plot of the vessel tracks recorded throughout the survey periods, colour-coded by vessel length.

13.4.4 Larger LOA vessels were typically recorded out of the Dover Strait TSS, either continuing to make passage westbound within the English Channel or heading to ports in the Solent. Smaller LOA vessels were typically recorded within the PEIR Assessment Boundary and landward of the PEIR Assessment Boundary, with the exception of the passenger ferry route between Newhaven and Dieppe.

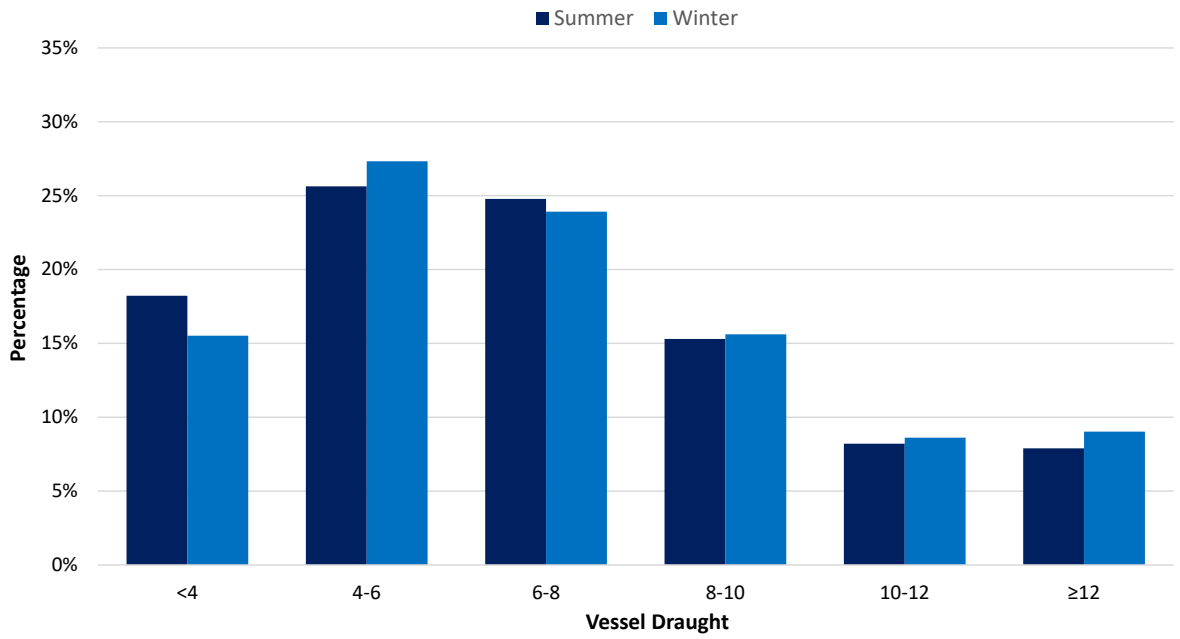
Figure 13.20 Vessel traffic survey data by vessel length (28 Days)



Vessel draught

13.4.5 Vessel draught was available for approximately 68 percent of vessels recorded throughout the two 14-day survey periods and ranged from 1.0m for a fishing vessel and pilot vessel to 21.2m for a crude oil tanker. **Figure 13.21** illustrates the distribution of vessel draughts recorded throughout each survey period.

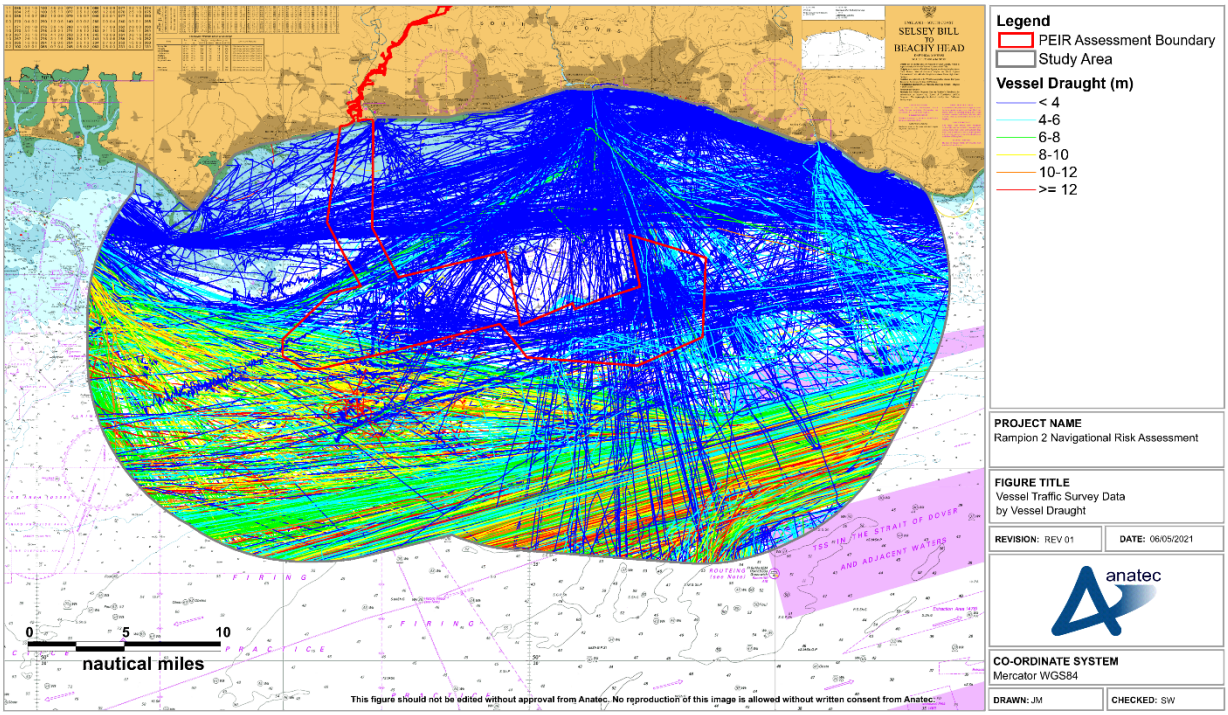
Figure 13.21 Vessel draught distribution (summer and winter 2020)



13.4.6 Excluding the proportion of vessels for which a draught was not available the average draught of vessels within the study area throughout the summer and winter survey periods was 6.8m and 7.0m, respectively.

13.4.7 **Figure 13.22** presents a plot of the vessel tracks recorded throughout the two 14-day survey periods, colour-coded by vessel draught.

Figure 13.22 Vessel Traffic survey data by vessel draught (28 Days)



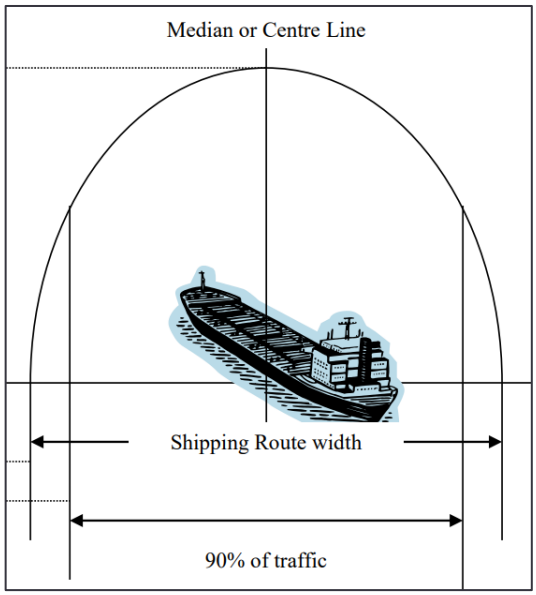
13.4.8 As with vessel LOA distribution, larger draught vessels were typically recorded out of the Dover Strait TSS, either continuing to make passage westbound within the English Channel or heading to ports in the Solent. Smaller vessels were typically recorded within the PEIR Assessment Boundary and landward of the PEIR Assessment Boundary.

13.5 Vessel routeing

Definition of a main commercial route

13.5.1 Main commercial routes have been identified using the principles set out in MGN 543 (MCA, 2016). Vessel traffic data are assessed and vessels transiting at similar headings and locations are identified as a main route. To help identify main routes, vessel traffic data can also be interrogated to show vessels (by name and/or operator) that frequently transit those routes. The route width is then calculated using the 90th percentile rule from the median line of the potential shipping route as shown in **Figure 13.23**. Additionally, the outputs of consultation undertaken with local stakeholders has assisted in the identification of the main commercial routes.

Figure 13.23 Illustration of main route calculation (MCA, 2016)



Pre-wind farm main commercial routes

13.5.2 A total of 17 main commercial routes were identified from the vessel traffic survey data and consultation. These main commercial routes and corresponding 90th percentiles within the study area are shown relative to the PEIR Assessment Boundary in **Figure 13.24**. Following this, a description of each route is provided in **Table 13-1**, including the average number of vessels per day, start and end locations, main vessel types and details of commercial ferry routeing (where applicable). It is noted that the start and end locations are based on the most common destinations transmitted via AIS by vessels on those routes. In the case of routes where a TSS is provided as the start and/or end location, this is due to there being a wide range of destinations transmitted via AIS by vessels on such routes.

13.5.3 To ensure all main commercial routes are captured, the long-term vessel traffic data has been used to validate the main commercial routes identified from the vessel traffic survey data.

Figure 13.24 Main commercial routes and 90th percentiles within study area (pre wind farm)

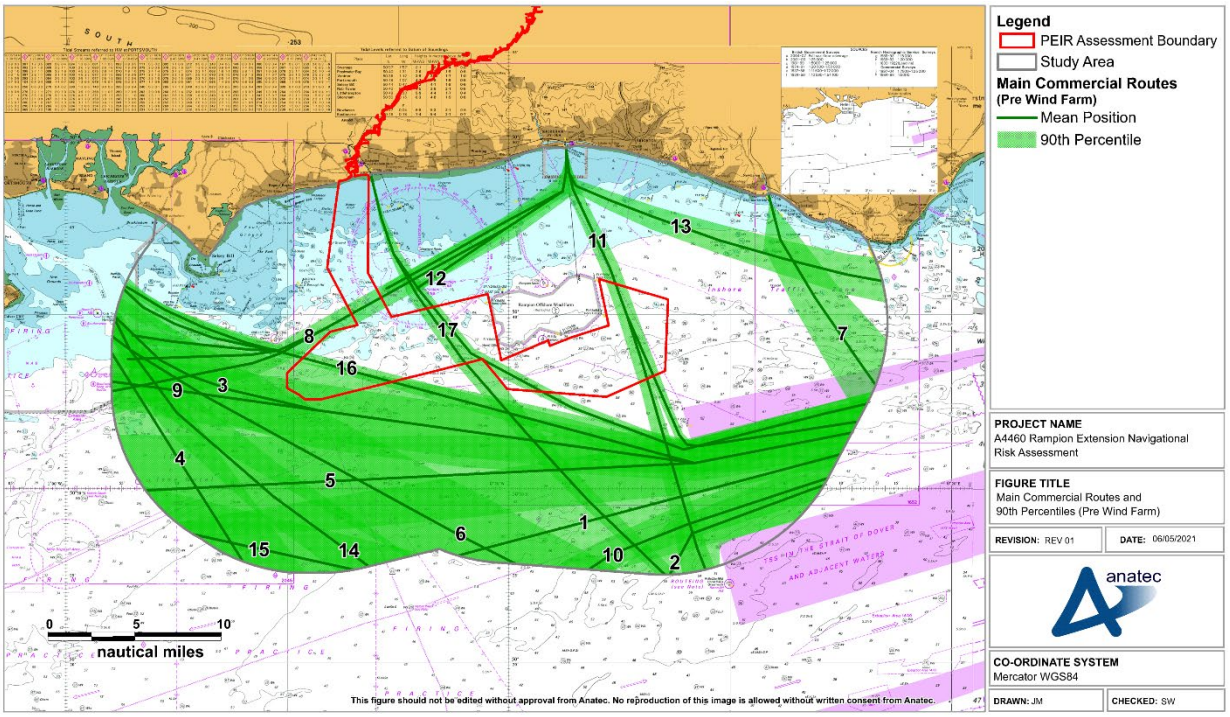


Table 13-1 Description of main commercial routes

Route number	Average vessels per day	Description
1	74	Westbound lane of Dover Strait TSS to westbound lane of Off Casquets TSS. Generally used by cargo vessels (66 percent) and tankers (30 percent). Includes regular commercial ferry traffic operated by Cobelfret Ferries.
2	10	Westbound lane of Dover Strait TSS to Le Havre. Generally used by cargo vessels (59 percent) and tankers (37 percent).
3	5	Westbound lane of Dover Strait TSS to Solent ports. Generally used by cargo vessels (62 percent), tankers (22 percent) and passenger vessels (12 percent).
4	4 to 5	Portsmouth (UK)–Le Havre. Generally used by passenger vessels (60 percent), cargo vessels (28 percent) and tankers (11 percent).
5	4 to 5	Westbound lane of Dover Strait TSS to Dublin. Generally used by cargo vessels (85 percent) and tankers (10 percent).

Route number	Average vessels per day	Description
6	4 to 5	Solent ports to eastbound lane of Dover Strait TSS. Generally used by cargo vessels (49 percent), tankers (31 percent) and passenger vessels (11 percent).
7	4	Newhaven (UK)–Dieppe. Used by passenger vessels (100 percent).
8	2	Shoreham (UK)–marine aggregate dredging areas near Isle of Wight. Generally used by marine aggregate dredgers (88 percent).
9	1 to 2	Westbound lane of Dover Strait TSS to Solent ports. Generally used by cargo vessels (42 percent), tankers (35 percent) and marine aggregate dredgers (16 percent).
10	1	Westbound lane of Dover Strait TSS to Le Havre. Generally used by cargo vessels (58 percent), tankers (30 percent) and passenger vessels (11 percent).
11	1	Shoreham–Dover Strait TSS. Generally used by cargo vessels (80 percent) and marine aggregate dredgers (13 percent).
12	0 to 1	Shoreham–marine aggregate dredging areas near Owers Bank. Used by marine aggregate dredgers (100 percent).
13	0 to 1	Shoreham–North Sea ports. Generally used by cargo vessels (80 percent).
14	0 to 1	Southampton to eastbound lane of Dover Strait TSS. Generally used by cargo vessels (63 percent), tankers (23 percent) and passenger vessels (12 percent).
15	0 to 1	Poole (UK) to eastbound lane of Dover Strait TSS. Generally used by cargo vessels (83 percent).
16	0 to 1	Westbound lane of Dover Strait TSS to Solent ports. Generally used by cargo vessels (42 percent), tankers (39 percent) and tugs (10 percent).
17	Monthly*	Littlehampton–Dover Strait TSS. Generally used by cargo vessels. Includes small coaster traffic operated by Van Dam Shipping headed to/from Antwerp (Belgium) and Amsterdam (Netherlands).

(*) Vessel traffic on this route is not considered sufficient in volume to constitute a main commercial route but has been included given sensitivities raised during consultation (see 16 December 2020 entry in **Table 4-2**).

13.6 Local port related traffic

Introduction

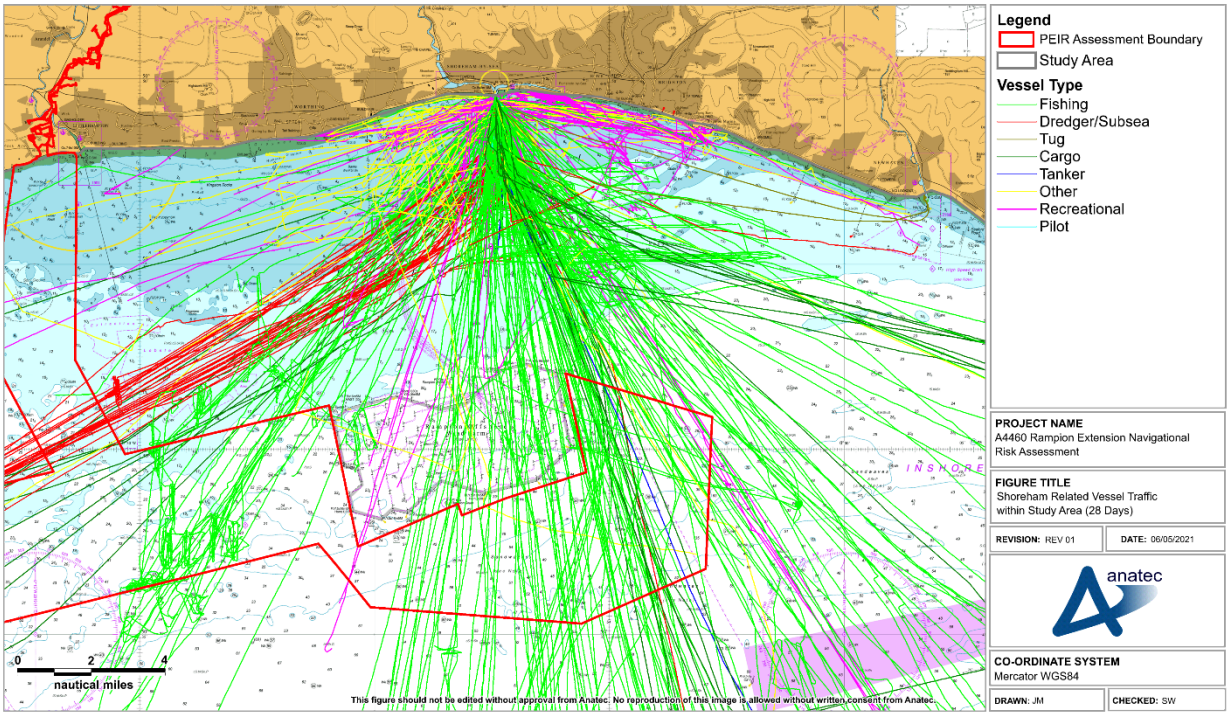
13.6.1 As noted in **Section 9.5**, there are several ports and harbours located along the coast close to the PEIR Assessment Boundary. Although some of the vessel traffic associated with these ports (both entering and exiting) is characterised in the main commercial routes, there is additional commercial vessel traffic which did not constitute a main commercial route (due to volume) and non-commercial traffic.

13.6.2 The following subsections consider each of the main ports within the study area and their associated vessel traffic.

Shoreham Port

13.6.3 A plot of the vessel tracks associated with Shoreham Port within the study area throughout the two 14-day survey periods is presented in **Figure 13.25**.

Figure 13.25 Shoreham related vessel traffic within study area (28 Days)



13.6.4 As indicated in **paragraph 13.3.28**, fishing vessels are prominent out of Shoreham, with the majority transiting south and through the existing Rampion 1 and the array area to fishing grounds. Recreational vessel activity was also notable, with the majority of such traffic recorded in the nearshore area including transits to Brighton and Newhaven. Approximately 96 percent of recreational vessel and fishing vessel tracks related to Shoreham were recorded on AIS.

13.6.5 RNLI lifeboats for Shoreham were recorded undertaking operations in proximity to Shoreham. Anchoring activity was also observed at the pilot boarding station

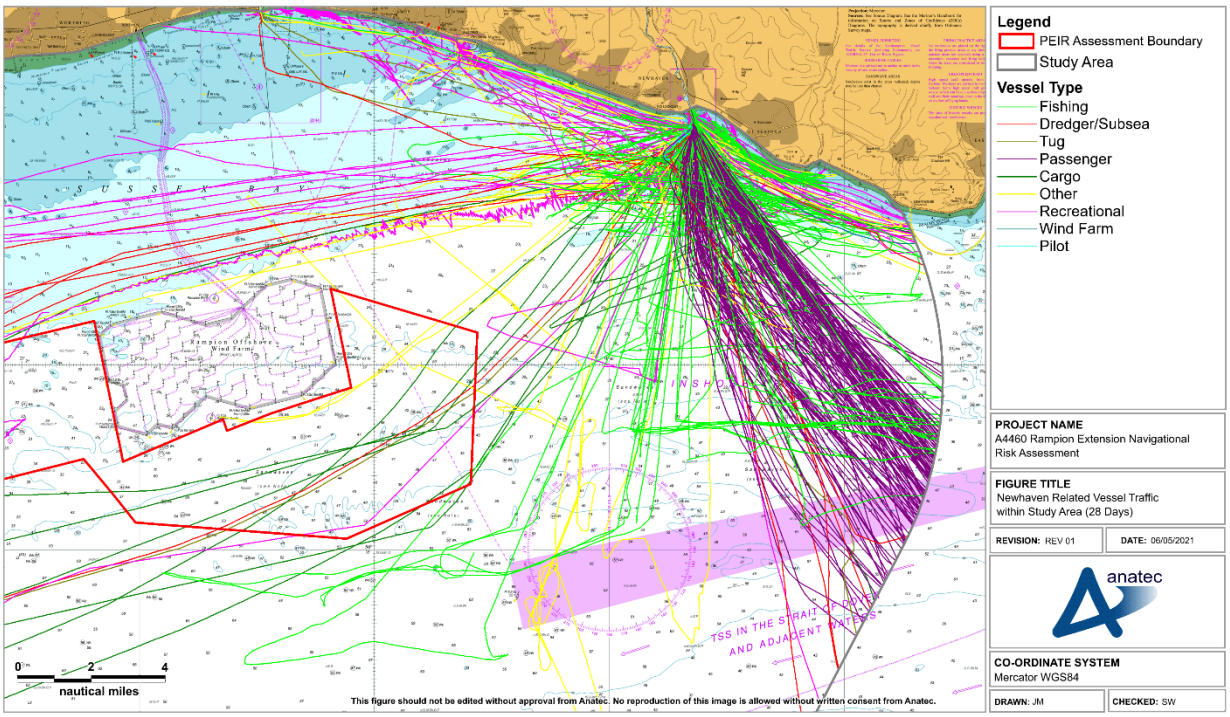
located approximately 2.1nm from the port, with the two pilot boats for Shoreham Port making multiple transits to the pilot boarding station.

13.6.6 Marine aggregate dredgers were recorded transiting to areas at the western extent of the study area. Other commercial vessel activity was limited but did include some routeing from cargo vessels to the Dover Strait TSS and through the ITZ (such traffic is characterised in **paragraph 13.5.1**). It is noted that during consultation, Shoreham Port indicated that the majority of commercial traffic out of Shoreham utilises the Dover Strait TSS (see 12 August 2020 entry in **Table 4-2**).

Port of Newhaven

13.6.7 A plot of the vessel tracks associated with the Port of Newhaven within the study area throughout the two 14-day survey periods is presented in **Figure 13.26**.

Figure 13.26 Newhaven related vessel traffic within study area (28 Days)



13.6.8 The most prominent vessel traffic out of Newhaven are two passenger ferries operated by DFDS Seaways which each operate a route between Newhaven and Dieppe twice per day. Other commercial traffic was much less frequent, with a small number of cargo vessels and marine aggregate dredgers observed making single transits. During consultation, Newhaven Port & Properties noted that the AIS data presented in the Scoping Report (which for commercial traffic shows good agreement with the vessel traffic survey data) was reflective of vessel traffic movements in the area (see 4 August 2020 entry in **Table 4-2**).

13.6.9 Recreational vessel activity was notable, with the majority of such traffic recorded in the nearshore area along the West Sussex coast including transits to/from Shoreham and Brighton or headed directly to/from ports in the Solent. Fishing

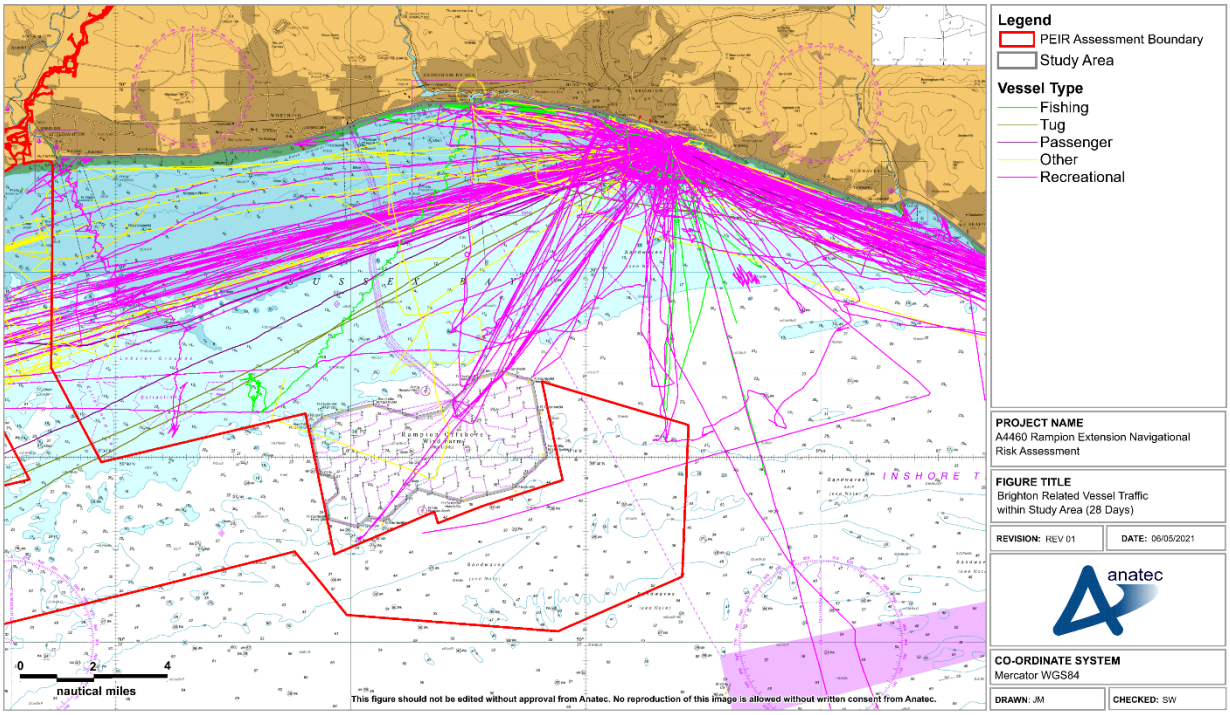
vessel activity was also notable, with the majority of such traffic recorded within 3nm of the port and characteristic of vessels engaged in fishing activity. It is noted that almost all fishing vessel tracks recorded were from one of four vessels. Approximately 98 percent of recreational vessel and fishing vessel tracks related to Newhaven were recorded on AIS.

13.6.10 Anchoring activity was also observed at the charted anchorage areas, with the pilot boat for the Port of Newhaven recorded making multiple transits to the anchorage areas and pilot boarding station.

Brighton Marina

13.6.11 A plot of the vessel tracks associated with Brighton Marina within the study area throughout the two 14-day survey periods is presented in **Figure 13.27**.

Figure 13.27 Brighton related vessel traffic within study area (28 Days)



13.6.12 Recreational vessels were most prominent out of Brighton, with the majority of such traffic recorded in the nearshore area along the West Sussex coast including transits to/from Shoreham and Newhaven or headed directly to/from ports in the Solent. There were also multiple visits to Rampion 1 recorded as well recreational dive charter vessels visiting numerous wrecks in the area.

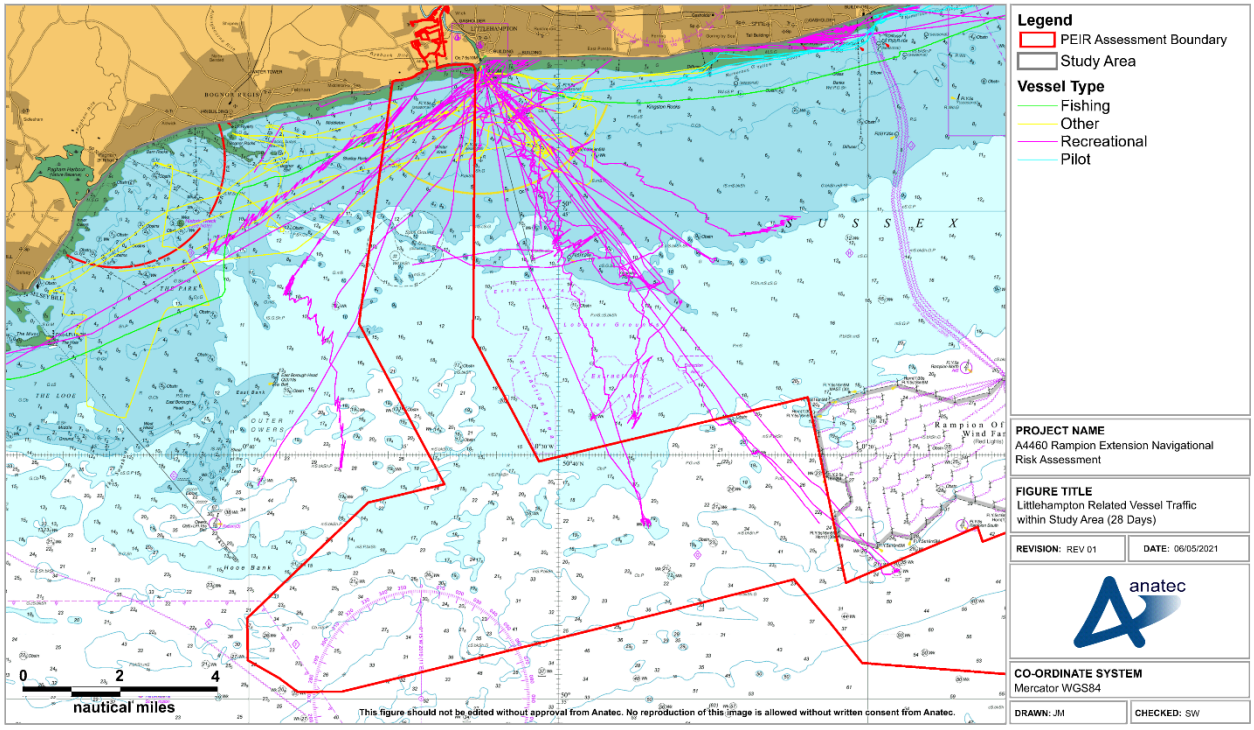
13.6.13 Activity from other vessel types included a fishing vessel which transited to and from the port on multiple occasions and the RNLI lifeboat for Brighton undertaking operations in proximity to Brighton. Commercial vessel activity including anchoring was minimal.

13.6.14 It is noted that approximately 97 percent of recreational vessel and fishing vessel tracks related to Brighton were recorded on AIS.

Littlehampton Harbour

13.6.15 A plot of the vessel tracks associated with Littlehampton Harbour within the study area throughout the two 14-day survey periods is presented in **Figure 13.28**.

Figure 13.28 Littlehampton related vessel traffic within study area (28 days)



13.6.16 Recreational vessels were most prominent out of Littlehampton, with the majority (approximately 58 percent) recorded on AIS using a B class device. The RNLI lifeboat for Littlehampton was also recorded undertaking operations. Commercial vessel activity including anchoring was minimal.

13.6.17 From consultation with the Littlehampton Harbour Board, there are currently 10 commercial fishing vessels, seven active charter angling vessels and three active resident workboats operating out of Littlehampton with very few broadcasting on AIS. However, these vessels were on the whole not recorded during the vessel traffic surveys, noting that the survey included Radar data in addition to AIS.

13.6.18 Additionally, consultation with the Littlehampton Harbour Board indicated that three small coasters operated by Van Dam Shipping carry treated granite between Littlehampton and Antwerp/Amsterdam (see 16 December 2020 entry in **Table 4-2**). Although these vessels were not observed in the vessel traffic surveys, they were observed in the long-term vessel traffic data (see **Annex B**).

14 Adverse weather impacts

14.1 Introduction

14.1.1 Some vessels and vessel operators may operate alternative routes during periods of adverse weather. This section focuses on vessel movements in adverse weather given the implications if a commercial vessel is unable to make passage or a small craft is unable to access safe havens in adverse weather due to the presence of the development or activities associated with the development. Access to safe havens in particular was raised by the RYA during consultation as an issue which should be considered.

14.1.2 Adverse weather includes wind, wave and tidal conditions as well as reduced visibility due to fog that can hinder a vessel's standard route, speed of navigation and/or ability to enter the destination port. Adverse weather routes are assessed to be significant course adjustments to mitigate vessel motion in adverse weather conditions. When transiting in adverse weather conditions, a vessel is likely to encounter various types of weather and tidal phenomena, which may lead to severe roll motions, potentially causing damage to cargo, equipment and/or discomfort and danger to persons on board. The sensitivity of a vessel to these phenomena will depend upon the actual stability parameters, hull geometry, vessel type, vessel size and speed.

14.2 Identification of periods of adverse weather

14.2.1 Historical weather information provided by the Met Office (Met Office, 2019) has been used to identify periods of adverse weather during 2019 (the year covered by the long-term vessel traffic data) when routes in proximity to Rampion 2 could be considered most likely to be altered or cancelled. The key weather events identified are detailed in **Table 14-1**.

Table 14-1 Key weather events during 2019 relevant to Rampion 2 (Met Office)

Weather event	Date(s)	Details
Storm Erik	8 to 9 February 2019	Deep Atlantic low pressure system which brought strong winds to the UK with much of the country recording gusts over 58kt.
Storm Freya	3 to 4 March 2019	Strong winds and heavy rain in England, Wales and southern Scotland.
Storm Gareth	10 to 16 March 2019	Turbulent week of very wet and windy weather.
Storm Hannah	26 to 27 April 2019	One of the most significant April storms in the last 50 years with exposed locations in west Wales recording gusts of over 60kt.

Weather event	Date(s)	Details
Storm Lorenzo	3 October 2019	Followed a spell of wet weather in late September.
Strong winds	2 November 2019	An area of low pressure brought very strong winds to south Wales and the south coast with a gust of 95kt at Needles Old Battery, Isle of Wight.

14.3 Commercial routeing changes

14.3.1 The long-term vessel traffic data has been used to identify potential commercial routeing activity related to adverse weather conditions in proximity to Rampion 2, with the periods outlined in **Table 14-1** and commercial ferries (which can be seen to make similar transits on a very regular basis) studied most closely.

14.3.2 No substantial alternative routeing was observed nor were any cancellations which could be traced to adverse weather. Additionally, as part of the Regular Operator consultation, Regular Operators identified from the 12-month AIS dataset (see **Section 4.2** and **Annex E**) were asked "*whether any aspect of the development poses any safety concern to your vessels, including any adverse weather routeing*". No feedback was received in relation to adverse weather routeing.

14.4 Small craft use of safe havens

14.4.1 Both the long-term vessel traffic data and the 28-day vessel traffic survey data have been used to identify potential small craft use of safe havens related to adverse weather conditions in proximity to Rampion 2, with the periods outlined in **Table 14-1** and fishing vessels and recreational vessels studied most closely. No substantial sheltering using safe havens was observed from the vessel traffic data considered. Additionally, during consultation the RYA noted that there are few safe havens in the area other than local harbours and those which are available are very tide dependent for access.

14.4.2 The final array layout will not be determined until post consent, but small craft will be able to safely navigate within the array in the majority of conditions should they choose to do so. As per International Convention for the Safety of Life at Sea (SOLAS) Chapter V (IMO, 1974), all vessels at sea are required to passage plan and part of the passage planning process requires them to consider forecast weather conditions. It is anticipated that vessels would then take account of these forecasts prior to embarking on a passage seaward of the array area.

14.4.3 Taking into account consultation on the final array layout and the requirements of SOLAS Chapter V, there are not considered to be any significant effect on access to safe havens due to the presence of activities associated with Rampion 2.

15 Navigation, communication and position fixing equipment

This section discusses the potential impacts upon the navigation, communication and position fixing equipment of vessels that may arise due to the infrastructure associated with Rampion 2.

15.1 Very High Frequency communications (including digital selective calling)

15.1.1 In 2004, trials were undertaken at the North Hoyle Offshore Wind Farm, located off the coast of North Wales. As part of these trials, tests were undertaken to evaluate the operational use of typical small vessel VHF transceivers (including Digital Selective Calling (DSC)) when operated close to WTGs.

15.1.2 The WTGs had no noticeable effect on voice communications within the array or ashore. It was noted that if small craft vessel to vessel and vessel to shore communications were not affected significantly by the presence of WTGs, then it is reasonable to assume that larger vessels with higher powered and more efficient systems would also be unaffected.

15.1.3 During this trial, a number of telephone calls were made from ashore, within the array, and on its seaward side. No effects were recorded using any system provider (MCA and QinetiQ, 2004).

15.1.4 Furthermore, as part of SAR trials carried out at the North Hoyle Offshore Wind Farm in 2005, radio checks were undertaken between the Sea King helicopter and both Holyhead and Liverpool coastguards. The aircraft was positioned to the seaward side of the array and communications were reported as very clear, with no apparent degradation of performance. Communications with the service vessel located within the array were also fully satisfactory throughout the trial (MCA, 2005).

15.1.5 In addition to the North Hoyle trials, a desk-based study was undertaken for the Horns Rev 3 Offshore Wind Farm in Denmark in 2014 and it was concluded that there were not expected to be any conflicts between point-to-point radio communications networks and no interference upon VHF communications (Energinet, 2014).

15.1.6 Following consideration of these reports, and noting that since the trials detailed above, there have been no significant issues with regards to VHF observed or reported, the presence of Rampion 2 is anticipated to have no significant impact upon VHF communications.

15.2 Very High Frequency direction finding

15.2.1 During the North Hoyle Offshore Wind Farm trials in 2004, the VHF Direction Finding (DF) equipment carried in the trial boats did not function correctly when very close to WTGs (within approximately 50m). This is deemed to be a relatively small-scale impact due to the limited use of VHF direction finding equipment and will not impact operational or SAR activities (MCA and QinetiQ, 2004).

15.2.2 Throughout the 2005 SAR trials carried out at North Hoyle, the Sea King radio homer system was tested. The Sea King radio homer system utilises the lateral displacement of a vertical bar on an instrument to indicate the sense of a target relative to the aircraft heading. With the aircraft and the target vessel within the array, at a range of approximately 1nm, the homer system operated as expected with no apparent degradation.

15.2.3 Since the trials detailed above, no significant issues with regards to VHF DF have been observed or reported, and therefore the presence of Rampion 2 is anticipated to have no significant impact upon VHF DF equipment.

15.3 Automatic Identification System

15.3.1 No significant issues with interference to AIS transmission from operational offshore wind farms have been observed or reported to date. Such interference was also absent in the trials carried out at the North Hoyle Offshore Wind Farm (MCA and QinetiQ, 2004).

15.3.2 In theory there could be interference when there is a structure located between the transmitting and receiving antennas (for instance, blocking line of sight) of the AIS. However, given no issues have been reported to date at operational developments or during trials, no significant impact is anticipated due to the presence of Rampion 2.

15.4 Navigational Telex system

15.4.1 The Navigational Telex (NAVTEX) system is used for the automatic broadcast of localised Maritime Safety Information (MSI) and either prints it out in hard copy or displays it on a screen, depending upon the model.

15.4.2 There are two NAVTEX frequencies. All transmissions on NAVTEX 518 Kilohertz (kHz), the international channel, are in English. NAVTEX 518kHz provides the mariner (both recreational and commercial) with weather forecasts, severe weather warnings and navigation warnings such as obstructions or buoys off station. Depending on the user's location, other information options may be available such as ice warnings for high latitude sailing.

15.4.3 The 490kHz national NAVTEX service may be transmitted in the local language. In the UK full use is made of this secondary frequency including useful information for smaller craft, such as the inshore waters forecast and actual weather observations from weather stations around the coast.

15.4.4 Although no specific trials have been undertaken, no significant effect on NAVTEX has been reported to date at operational developments, and therefore no significant impact is anticipated due to the presence of Rampion 2.

15.5 Global Positioning System

15.5.1 Global Positioning System (GPS) is a satellite based navigational system. GPS trials were also undertaken throughout the 2004 trials at North Hoyle Offshore Wind Farm, and it was stated that "*no problems with basic GPS reception or positional accuracy were reported during the trials*".

15.5.2 The additional tests showed that "*even with a very close proximity of a wind turbine to the GPS antenna, there were always enough satellites elsewhere in the sky to cover for any that might be shadowed by the wind turbine tower*" (MCA and QinetiQ, 2004).

15.5.3 Therefore, there are not expected to be any significant impacts associated with the use of GPS systems within or in proximity to Rampion 2, noting that there have been no reported issues relating to GPS within or in proximity to any operational offshore wind farms to date.

15.6 Electromagnetic interference

15.6.1 A compass, magnetic compass or mariner's compass is a navigational instrument for determining direction relative to the earth's magnetic poles. It consists of a magnetised pointer (usually marked on the north end) free to align itself with the Earth's magnetic field. A compass can be used to calculate heading, used with a sextant to calculate latitude, and with a marine chronometer to calculate longitude.

15.6.2 Like any magnetic device, compasses are affected by nearby ferrous materials as well as by strong local electromagnetic forces, such as magnetic fields emitted from power cables. As the compass still serves as an essential means of navigation in the event of power loss or as a secondary source, it should not be allowed to be affected to the extent that safe navigation is prohibited. The important factors with respect to cables that affect the resultant deviation are:

- water depth;
- burial depth;
- current (alternating or direct) running through the cables;
- spacing or separation of the two cables in a pair (balanced monopole and bipolar designs); and/or
- cable route alignment relative to the Earth's magnetic field.

15.6.3 The export and inter array cables for Rampion 2 will be Alternating Current (AC), with studies indicating that AC does not emit an Electromagnetic Field (EMF) significant enough to impact marine magnetic compasses (Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), 2008).

15.6.4 No problems with respect to magnetic compasses have been reported to date in any of the trials carried out (inclusive of SAR helicopters) nor at any operational offshore wind farms. However, small vessels with simple magnetic steering and hand bearing compasses should be wary of using these close to WTGs as with any structure in which there is a large amount of ferrous material (MCA and QinetiQ, 2004). This will be considered as part of the Cable Specification Plan (see **Section 20**).

15.7 Marine radar

15.7.1 This section summarises trials and studies undertaken in relation to Radar effects from offshore wind farms in the UK. It is important to note that since the time of the trials and studies discussed, WTG technology has advanced significantly, most notably in terms of the size of WTGs available to be installed and utilised. The use of these larger WTGs allows for a greater spacing between WTGs than was achievable at the time of the studies being undertaken, which is beneficial in terms of Radar interference effects (and surface navigation in general) as detailed below.

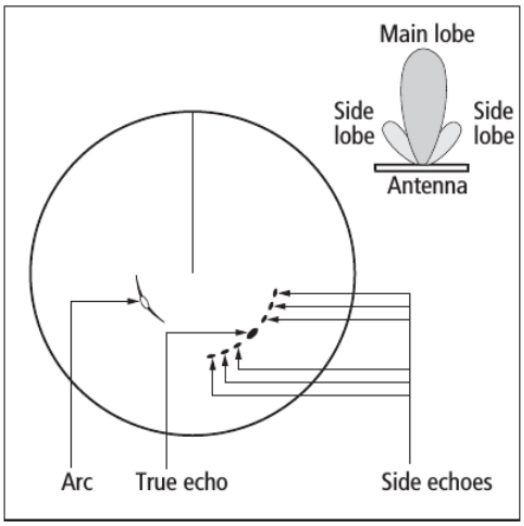
Trials

15.7.2 During the early years of offshore renewables within the UK, maritime regulators undertook a number of trials (both shore-based and vessel-based) into the effects of WTGs on the use and effectiveness of marine Radar.

15.7.3 In 2004 trials undertaken at the North Hoyle Offshore Wind Farm (MCA, 2004) identified areas of concern regarding the potential impact on marine- and shore-based Radar systems due to the large vertical extents of the WTGs (based on the technology at that time). This resulted in Radar responses strong enough to produce interfering side lobes and reflected echoes (often referred to as false targets or ghosts).

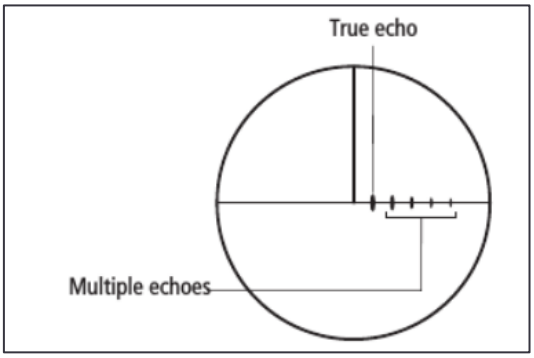
15.7.4 Side lobe patterns are produced by small amounts of energy from the transmitted pulses that are radiated outside of the narrow main beam. The effects of side lobes are most noticeable within targets at short range (below 1.5nm) and with large objects. Side lobe echoes form either an arc on the Radar screen similar to range rings, or a series of echoes forming a broken arc, as illustrated in **Figure 15.1**.

Figure 15.1 Illustration of side lobes on radar screen



15.7.5 Multiple reflected echoes are returned from a real target by reflection from some object in the Radar beam. Indirect echoes or 'ghost' images have the appearance of true echoes but are usually intermittent or poorly defined; such echoes appear at a false bearing and false range, as illustrated in **Figure 15.2**.

Figure 15.2 Illustration of multiple reflected echoes on radar screen



15.7.6 Based on the results of the North Hoyle trials, the MCA produced a Shipping Route Template designed to give guidance to mariners on the distances which should be established between shipping routes and offshore wind farms. However, as experience of effects associated with use of marine Radar in proximity to offshore wind farms grew, the MCA refined their guidance, offering more flexibility within the most recent Shipping Route Template contained within MGN 543 (MCA, 2016).

15.7.7 A second set of trials conducted at Kentish Flats Offshore Wind Farm in 2006 on behalf of the British Wind Energy Association (BWEA) – now called RenewableUK (BWEA, 2007) – also found that Radar antennas which are sited unfavourably with respect to components of the vessel's structure can exacerbate effects such as side lobes and reflected echoes. Careful adjustment of Radar controls suppressed these spurious Radar returns but mariners were warned that there is a consequent

risk of losing targets with a small Radar cross section, which may include buoys or small craft, particularly yachts or Glass Reinforced Plastic (GRP) constructed craft; therefore, due care should be taken in making such adjustments.

15.7.8 Theoretical modelling of the effects of the development of the proposed Atlantic Array Offshore Wind Farm, which was to be located off the south coast of Wales, on marine Radar systems was undertaken by the Atlantic Array project (Atlantic Array, 2012) and considered a wider spacing of WTGs than that considered within the early trials. The main outcomes of the modelling were the following:

- multiple and indirect echoes were detected under all modelled parameters;
- the main effects noticed were stretching of targets in azimuth (horizontal) and appearance of ghost targets;
- there was a significant amount of clear space amongst the returns to ensure recognition of vessels moving amongst the WTGs and safe navigation;
- even in the worst case with Radar operator settings artificially set to be poor, there is significant clear space around each WTG that does not contain any multipath or side lobe ambiguities to ensure safe navigation and allow differentiation between false and real (both static and moving) targets;
- overall, it was concluded that the amount of shadowing observed was very little (noting that the model considered lattice-type foundations which are sufficiently sparse to allow Radar energy to pass through);
- the lower the density of WTGs the easier it is to interpret the Radar returns and fewer multipath ambiguities are present;
- in dense, target rich environments S-Band Radar scanners suffer more severely from multipath effects in comparison to X-Band Radar scanners;
- it is important for passing vessels to keep a reasonable separation distance between the WTGs in order to minimise the effect of multipath and other ambiguities;
- the Atlantic Array study undertaken in 2012 noted that the potential for Radar interference was mainly a problem during periods of reduced visibility when mariners may not be able to visually confirm the presence of other vessels in proximity (those without AIS installed which are usually fishing and recreational craft). It is noted that this situation would arise with or without WTGs in place; and
- there is potential for the performance of a vessel's ARPA to be affected when tracking targets in or near the array. Although greater vigilance is required, during the Kentish Flats trials it was shown that false targets were quickly identified as such by the mariners and then by the equipment itself.

15.7.9 In summary, experience in UK waters has shown that mariners have become increasingly aware of any Radar effects as more offshore wind farms become operational. Based on this experience, the mariner can interpret the effects correctly, noting that effects are the same as those experienced by mariners in

other environments such as in close proximity to other vessels or structures. Effects can be effectively mitigated by "*careful adjustment of Radar controls*".

15.7.10 The MCA has also produced guidance to mariners operating in proximity to OREIs in the UK which highlights Radar issues amongst others to be taken into account when planning and undertaking voyages in proximity to OREIs (MCA, 2008). The interference buffers presented in **Table 15-1** are based on MGN 371 (MCA, 2008), MGN 543 (MCA, 2018) and MGN 372 (MCA, 2008).

Table 15-1 Distances at which impacts on marine radar occur

Distance at Which Effect Occurs (nm)	Identified Effects
0.5	Intolerable impacts can be experienced. X-Band Radar interference is intolerable under 0.25nm. Vessels may generate multiple echoes on shore-based Radars under 0.45nm.
1.5	Under MGN 543, impacts on Radar are considered to be tolerable with mitigation between 0.5 and 3.5nm. S-band Radar interference starts at 1.5nm. Echoes develop at approximately 1.5nm, with progressive deterioration in the Radar display as the range closes. Where a main vessel route passes within this range considerable interference may be expected along a line of WTGs. The WTGs produce strong Radar echoes giving early warning of their presence. Target size of the WTG echo increases close to the WTG with a consequent degradation on both X and S-Band Radars.

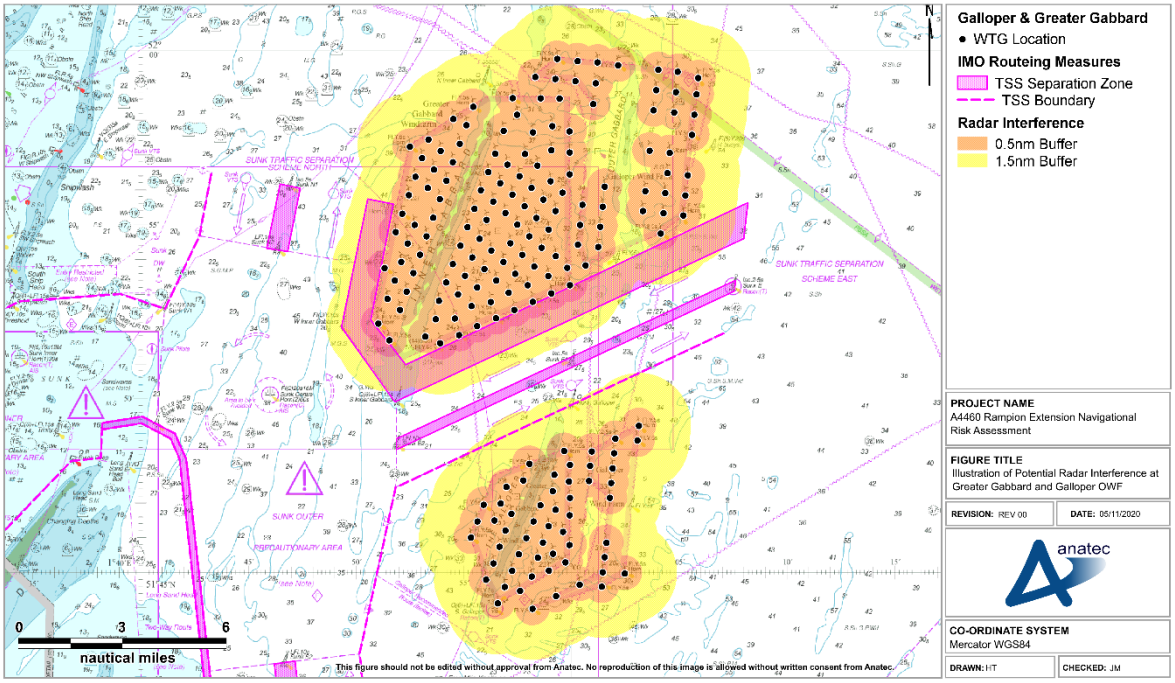
15.7.11 As noted in **Table 15-1**, the onset range from the WTGs of false returns is approximately 1.5nm, with progressive deterioration in the Radar display as the range closes. If interfering echoes develop, the requirements of the Convention on International Regulations for Preventing Collisions at Sea (COLREGs) *Rule 6 Safe Speed* are particularly applicable and must be observed with due regard to the prevailing circumstances (IMO, 1972/77). In restricted visibility, *Rule 19 Conduct of Vessels in Restricted Visibility* applies and compliance with *Rule 6* becomes especially relevant. In such conditions mariners are required, under *Rule 5 Look-out* to take into account information from other sources which may include sound signals and VHF information, for example from a VTS or AIS (MCA, 2016).

Experience from operational developments

15.7.12 The evidence from mariners operating in proximity to existing offshore wind farms is that they quickly learn to adapt to any effects. **Figure 15.3** presents the example of the Galloper and Greater Gabbard Offshore Wind Farms, which are located in

proximity to IMO routeing measures. Despite this proximity to heavily trafficked TSS lanes, there have been no reported incidents or issues raised by mariners who operate within the vicinity. The interference buffers presented in **Figure 15.3** are as per **Table 15-1**.

Figure 15.3 Illustration of potential radar interference at Greater Gabbard and Galloper Offshore Wind Farms



15.7.13 As indicated by **Figure 15.3**, vessels utilising these TSS lanes will experience some Radar interference based on the available guidance. Both developments are operational, and each of the lanes is used by a minimum of five vessels per day on average. However, to date, there have been no incidents recorded (including any related to Radar use) or concerns raised by the users.

15.7.14 AIS information can also be used to verify the targets of larger vessels (generally vessels over 15m LOA – the minimum threshold for fishing vessel AIS carriage requirements). Approximately 17 percent of the vessel traffic recorded within the study area was under 15m LOA, although throughout the vessel traffic surveys approximately 96 percent of vessel tracks were recorded on AIS, indicating a high level of AIS take-up among vessels for which AIS carriage is not mandatory.

15.7.15 For any smaller vessels, particularly fishing vessels and recreational vessels, AIS Class B devices are becoming increasingly popular and allow the position of these small craft to be verified when in proximity to an offshore wind farm.

Increased radar returns

15.7.16 Beam width is the angular width, horizontal or vertical, of the path taken by the Radar pulse. Horizontal beam width ranges from 0.75 degrees (°) to 5°, and

vertical beam width from 20° to 25°. How well an object reflects energy back towards the Radar depends upon its size, shape and aspect angle.

15.7.17 Larger WTGs (either in height or width) will return greater target sizes and/or stronger false targets. However, there is a limit to which the vertical beam width would be affected (20° to 25°) dependent upon the distance from the target. Therefore, increased WTG height in the array will not create any effects in addition to those already identified from existing operational wind farms (interfering side lobes, multiple and reflected echoes).

15.7.18 Again, when taking into consideration the potential options available to marine users (such as reducing gain to remove false returns) and feedback from operational experience, this shows that the effects of increased returns can be managed effectively.

Fixed radar antenna use in proximity to an operational wind farm

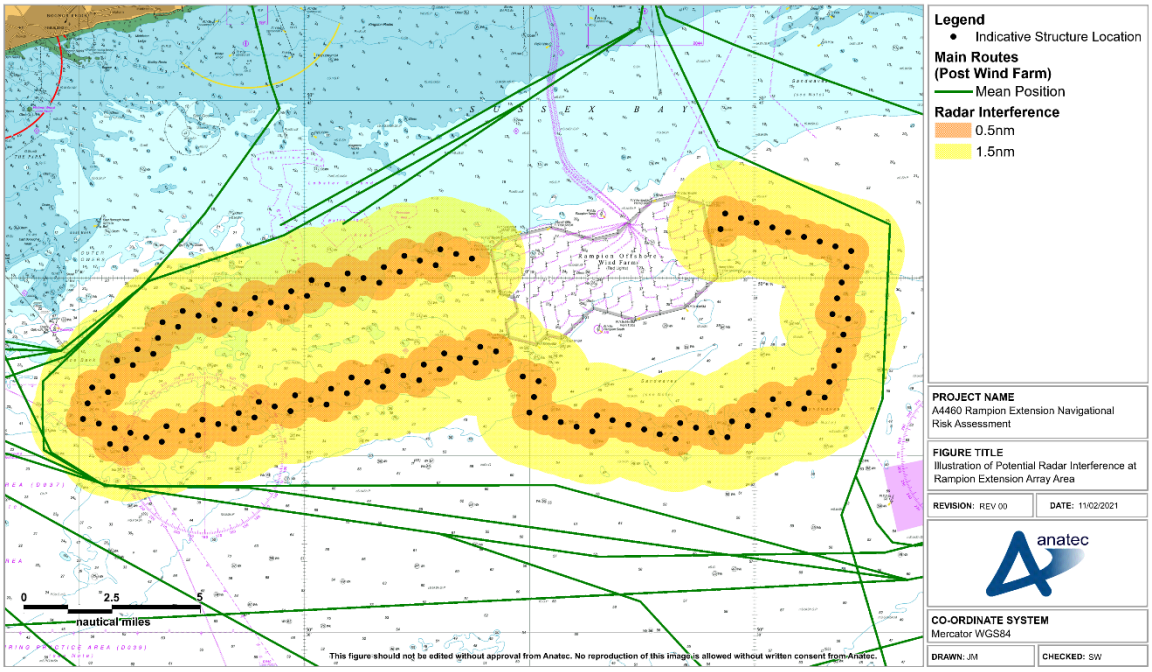
15.7.19 It is noted that there are multiple operational wind farms including Galloper that successfully operate fixed Radar antenna from locations on the periphery of the array. These antennas are able to provide accurate and useful information to onshore coordination centres.

Application to Rampion 2

15.7.20 Upon development of Rampion 2, some commercial vessels may pass within 1.5nm of the wind farm structures and therefore may be subject to a minor level of Radar interference. Trials, modelling and experience from existing developments note that any impact can be mitigated by adjustment of Radar controls.

15.7.21 **Figure 15.4** presents an illustration of potential Radar interference due to Rampion 2 relative to the post wind farm routeing illustrated in **paragraph 17.6.5**. The Radar effects have been applied to the indicative array layout introduced in **paragraph 8.2.1**.

Figure 15.4 Illustration of potential radar interference at Rampion 2



15.7.22 Vessels passing within the array will be subject to a greater level of interference with impacts becoming more substantial in close proximity to WTGs. This will require additional mitigation by any vessels including consideration of the navigational conditions (visibility) when passage planning and compliance with the COLREGs (IMO, 1972/77) will be essential.

15.7.23 Overall, the impact on marine Radar is expected to be low and no further impact upon navigational safety is anticipated outside the parameters which can be mitigated by operational controls.

15.8 Sound navigation ranging systems

15.8.1 No evidence has been found to date with regard to existing offshore wind farms to suggest that Sound Navigation Ranging (SONAR) systems produce any kind of SONAR interference which is detrimental to the fishing industry, or to military systems. No impact is therefore anticipated in relation to the presence of Rampion 2.

15.9 Noise

Surface noise

15.9.1 The sound level from an offshore wind farm at a distance of 350m has been predicted to be between 51 decibels (dB) and 54dB (A). Furthermore, modelling undertaken during the consenting process for the Atlantic Array Offshore Wind Farm showed that the highest predicted level due to operational WTG noise (for a 125m tall 8 Megawatt (MW) WTG) is around 60dB (Atlantic Array, 2012).

15.9.2 A vessel's whistle for a vessel of 75m length should generate in the order of 138dB and be audible at a range of 1.5nm (IMO, 1972/77); hence this should be heard above the background noise of the WTGs. Similarly, foghorns will also be audible over the background noise of the WTGs.

15.9.3 There are therefore no indications that the sound level of Rampion 2 will have a significant influence on marine safety.

Underwater noise

15.9.4 In 2005, the underwater noise produced by WTGs of 110m height and with 2MW capacity was measured at the Horns Rev Offshore Wind Farm in Denmark. The maximum noise levels recorded underwater at a distance of 100m from the WTGs was 122dB or 1 micropascal (µPa) (Institut für technische und angewandte Physik (ITAP), 2006).

15.9.5 During the operation and maintenance phase of Rampion 2, the subsea noise levels generated by WTGs will likely be greater than that produced at Horns Rev given the larger WTG size, but nevertheless is not anticipated to have any significant impact as they are designed to work in pre-existing noisy environments. Operational subsea noise is considered in more detail in **Chapter 22: Noise and vibration, Volume 2**.

15.10 Summary of impact

15.10.1 Based on the detailed technical assessment of the effects due to the presence of Rampion 2 on navigation, communication and position fixing equipment in the previous subsections, **Table 15-2** summarises the assessment of frequency and consequence and the resulting residual effect for each component of this impact.

Table 15-2 Summary of impact on navigation, communication and position fixing equipment

Topic	Frequency	Consequences	Residual effect
VHF	Negligible	Minor	Broadly Acceptable
VHF direction finding	Extremely Unlikely	Minor	Broadly Acceptable
AIS	Negligible	Minor	Broadly Acceptable
NAVTEX	Negligible	Minor	Broadly Acceptable
GPS	Negligible	Minor	Broadly Acceptable
EMF	Extremely Unlikely	Negligible	Broadly Acceptable
Marine Radar	Remote	Minor	Broadly Acceptable

Topic	Frequency	Consequences	Residual effect
WTG generated noise	Negligible	Minor	Broadly Acceptable
SONAR	Negligible	Minor	Broadly Acceptable

16 Cumulative and transboundary overview

16.1 Introduction

16.1.1 Cumulative effects have been considered for activities in combination and cumulatively with Rampion 2. This section provides an overview of the baseline used to inform the CEA including the pre wind farm vessel routeing and developments and proposed developments screened into the CEA based upon the criteria outlined in **Section 3.3**. Given the unique nature of shipping and navigation receptors the bespoke tiering system outlined in **Section 3.3** has been applied.

16.1.2 It is noted that port developments (and specifically the subsequent changes in vessel traffic movements) are considered as part of the future case vessel traffic (see **Section 17**).

16.2 Screened in other developments

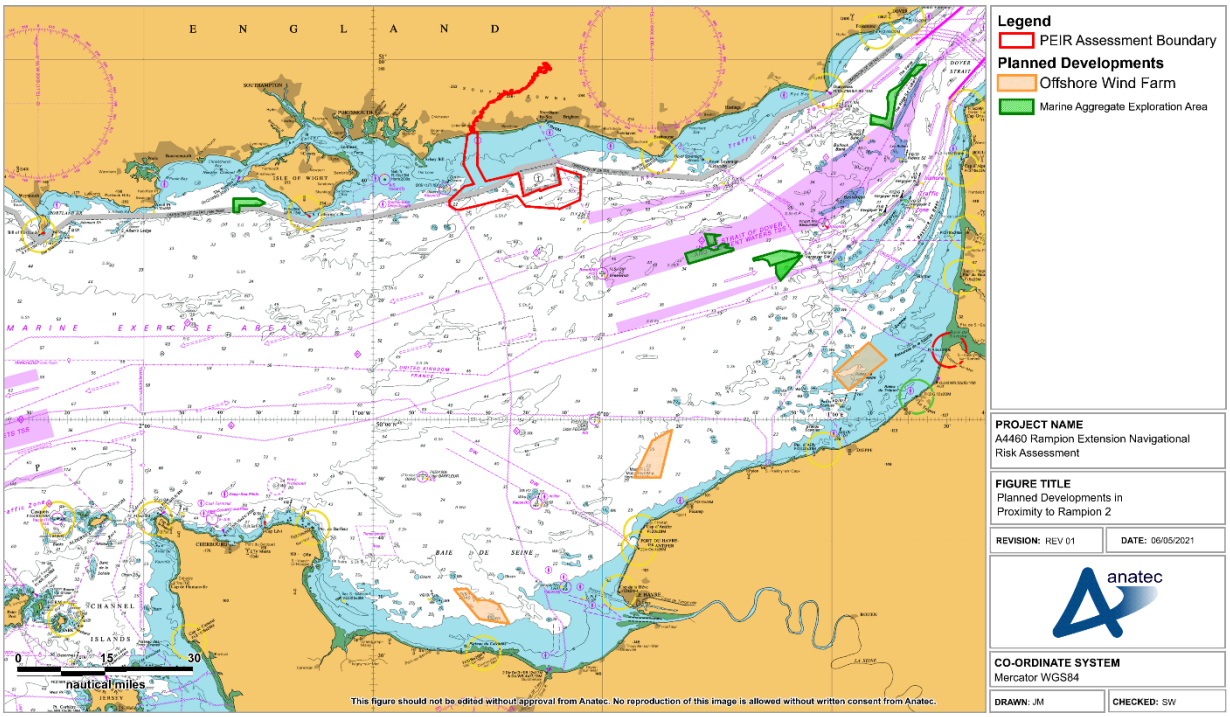
Other offshore wind farms

16.2.1 The only existing offshore wind farm (operational or otherwise) located within the English Channel is Rampion 1 but since this development is operational it is considered as part of the baseline.

16.2.2 As shown in **Figure 16.1**, there are three consented offshore wind farms located south and south east of the PEIR Assessment Boundary in French waters:

- Courseulles-sur-Mer;
- Dieppe-Le Tréport; and
- Fécamp.

Figure 16.1 Other developments in proximity to Rampion 2



16.2.3 All three developments are greater than 60nm from the PEIR Assessment Boundary and thus are screened out of the CEA.

16.2.4 Therefore, there are no offshore wind farms screened in to the CEA.

Oil and gas infrastructure

16.2.5 There is no existing or planned oil and gas infrastructure located within the English Channel.

16.2.6 Therefore, there is no oil and gas infrastructure screened in to the CEA.

Marine Aggregate Dredging Areas

16.2.7 There are a number of existing or planned marine aggregate dredging areas located within the English Channel. The majority of these are production areas (including those located near the Owers Bank and south east of the Isle of Wight) and are therefore considered as part of the baseline assessment (see **Section 9.4**).

16.2.8 There are two exploration areas located within the Dover Strait TSS which are between 15 and 30nm from the PEIR Assessment Boundary; however, since these areas are located within the separation zone of the TSS there is limited interaction with traffic which may be displaced by the array area and they are therefore screened out of the CEA.

16.2.9 There are a further three exploration areas located south west of the Isle of Wight, within the Dover Strait TSS and within the ITZ; however since these areas are

greater than 30nm from the PEIR Assessment Boundary they are screened out of the CEA.

16.2.10 Therefore, there are no marine aggregate dredging areas screened in to the CEA.

16.3 Cumulative routeing

16.3.1 Since no developments have been screened in to the CEA, it is not necessary to consider routeing in a wider study area (than the 10nm buffer of the PEIR Assessment Boundary considered for routeing in proximity to Rampion 2 in isolation).

17 Future case vessel traffic

17.1 Increases in commercial vessel activity

17.1.1 During consultation, the Littlehampton Harbour Board noted that the upcoming construction of the A27 Arundel bypass and replacement of the harbour entrance breakwaters may lead to a significant increase in traffic volumes associated with Littlehampton. Noting that such activities would be short-term in duration and that commercial vessel activity out of Littlehampton is very low currently, it is not anticipated that overall vessel traffic levels in the area will be affected substantially by the construction works.

17.1.2 Given the uncertainty associated with long-term predictions of vessel traffic growth including the potential for any other new developments in UK or transboundary ports and the long-term effects of Brexit, a conservative potential growth in commercial vessel movements of 10 percent has been estimated throughout the lifetime of Rampion 2.

17.2 Increases in commercial fishing vessel activity

17.2.1 There is similar uncertainty associated with long-term predictions for commercial fishing vessel transits given the limited reliable information on future trends upon which any firm assumption could be made. Therefore, a conservative potential growth in commercial fishing vessel movements of 10 percent has been estimated throughout the lifetime of Rampion 2. Changes in fishing activity are considered further in **Chapter 10: Commercial fisheries, Volume 2**.

17.3 Increases in recreational vessel activity

17.3.1 There are no known other major developments which would increase the activity of recreational vessels in the region. As with commercial fishing vessels, given the lack of reliable information on future activity levels or future trends, a conservative potential growth in recreational vessel movements of 10 percent has been estimated throughout the lifetime of Rampion 2.

17.4 Increases in traffic associated with Rampion 2 operations

17.4.1 During the construction phase up to 2,636 return trips will be made by vessels involved in the installation of Rampion 2 (see **paragraph 8.5.1**). During the operation and maintenance phase, up to 1,113 return trips per year will be made by vessels involved in the operation and maintenance of Rampion 2 (see **paragraph 8.5.3**).

17.5 Changes in marine activities

17.5.1 As indicated in **Section 9.4**, there are a number of marine aggregate dredging areas in proximity to the PEIR Assessment Boundary. All such areas are active and the current baseline indicates a substantial number of vessel traffic movements directly associated with such areas. In the future these areas may be discontinued, thus reducing the number of associated vessel traffic movements. Likewise, new marine aggregate dredging areas may be designated (noting that no exploration areas currently exist with the next TCE marine aggregate tender round for England and Wales scheduled for during 2021/22 (TCE, 2020)).

17.5.2 Given the lack of publicly available information on future changes to the marine aggregate dredging environment, no changes are considered in the future baseline, noting that marine aggregate dredgers are included in the 10 percent growth of commercial vessel movements described above.

17.6 Commercial traffic routeing (Rampion 2 in isolation)

Methodology

17.6.1 It is not possible to consider all potential alternative routeing options for commercial traffic and therefore worst case alternatives have been considered where possible in consultation with operators. Assumptions for re-routeing include:

- all alternative routes maintain a minimum mean distance of 1nm from offshore installations and existing offshore wind farm boundaries in line with industry experience. This distance is considered for shipping and navigation from a safety perspective as explained below; and
- all mean routes take into account sandbanks, aids to navigation and known routeing preferences.

17.6.2 Annex 3 of MGN 543 defines a methodology for assessing passing distance from offshore wind farm boundaries but states that it is "*not a prescriptive tool but needs intelligent application*".

17.6.3 To date, internal and external studies undertaken by Anatec on behalf of the UK Government and individual clients show that vessels do pass consistently and safely within 1nm of established offshore wind farms (including between distinct developments) and these distances vary depending upon the sea room available as well as the prevailing conditions. This evidence also demonstrates that the Mariner defines their own safe passing distance based upon the conditions and nature of the traffic at the time, but they are shown to frequently pass 1nm off established developments. Evidence also demonstrates that commercial vessels do not transit through arrays.

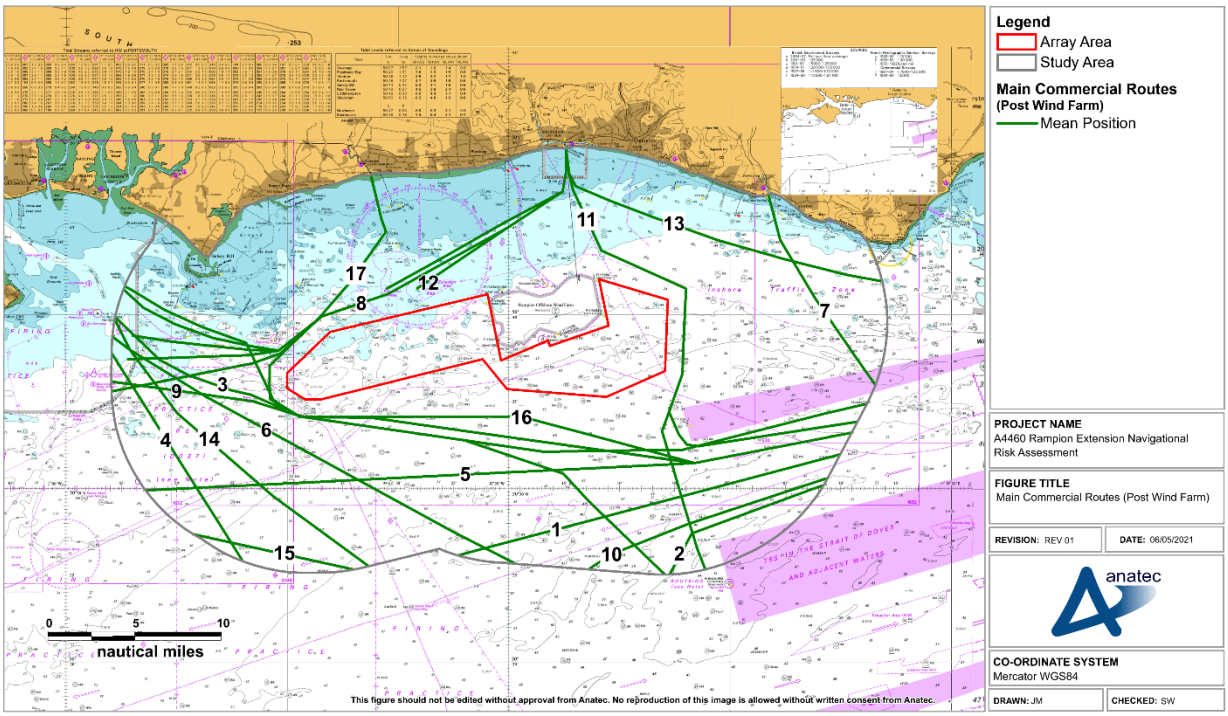
17.6.4 The NRA also aims to establish the maximum design scenario based on navigational safety parameters, and when considering this the most conservative realistic scenario for vessel routeing is considered to be when main commercial routes pass 1nm off developments. Evidence collected during numerous assessments at an industry level confirms that it is a safe and reasonable distance

for vessels to pass; however, it is likely that a large number of vessels would instead choose to pass at a greater distance depending upon their own passage plan and the current conditions.

Main commercial route deviations

17.6.5 An illustration of the anticipated worst case shift in the mean positions of the main commercial routes within the study area following the development of Rampion 2 is presented in **Figure 17.1**. These deviations are based on Anatec's assessment of the maximum design scenario including the indicative array layout presented in **paragraph 8.2.1**.

Figure 17.1 Anticipated main commercial routes within study area (post wind farm)



17.6.6 Deviations from the pre wind farm scenario would be required for six out of the 17 main commercial routes identified, with the level of deviation varying between a 0.1nm increase for Route 9 and a 14.3nm increase for Route 17. For the displaced routes, the increase in distance from the pre wind farm scenario is presented in **Table 17-1**.

Table 17-1 Summary of post wind farm main commercial route deviations within study area

Route number	Increase in route length (nm)
3	0.1
8	0.2

Route number	Increase in route length (nm)
9	0.1
11	2.8
16	1.8
17	14.3

17.7 Commercial traffic routeing (cumulative)

17.7.1 Since no developments have been screened in to the CEA, it is not necessary to consider additional main commercial route deviations at a cumulative level. In essence, the future case movement of commercial traffic for the cumulative scenario can be considered equivalent to that determined for the assessment of Rampion 2 in isolation.

18 Collision and allision risk modelling

To inform the impact assessment, a quantitative assessment of some of the major hazards associated with the Rampion 2 has been undertaken. The following subsections outline the inputs and methodology used for the collision and allision risk modelling.

18.1 Scenarios under consideration

18.1.1 For each element of the quantitative assessment both a pre and post wind farm scenario with base and future case vessel traffic levels have been considered. As a result, four distinct scenarios have been modelled:

- pre wind farm with base case traffic levels;
- pre wind farm with future case traffic levels;
- post wind farm with base case traffic levels; and
- post wind farm with future case traffic levels.

18.1.2 The results of the base case scenarios are detailed in full in the following subsections with the equivalent results for the future case scenarios provided in **Section 18.6**.

18.2 Hazards under consideration

18.2.1 Hazards considered in the quantitative assessment are as follows:

- increased vessel to vessel collision risk;
- increased powered vessel to structure allision risk;
- increased drifting vessel to structure allision risk; and
- increased fishing vessel to structure allision risk.

18.2.2 The pre wind farm assessment has been informed by the vessel traffic survey data (see **Section 13**) in combination with the outputs of consultation (see **Section 4**) and other baseline data sources (such as Anatec's ShipRoutes database and the NRA for Rampion 1 (Anatec, 2012). Conservative assumptions have been made with regard to route deviations and future shipping growth over the lifetime of Rampion 2.

18.3 Post wind farm routeing

18.3.1 The methodology for determining the post wind farm routeing is outlined in **Section 17**.

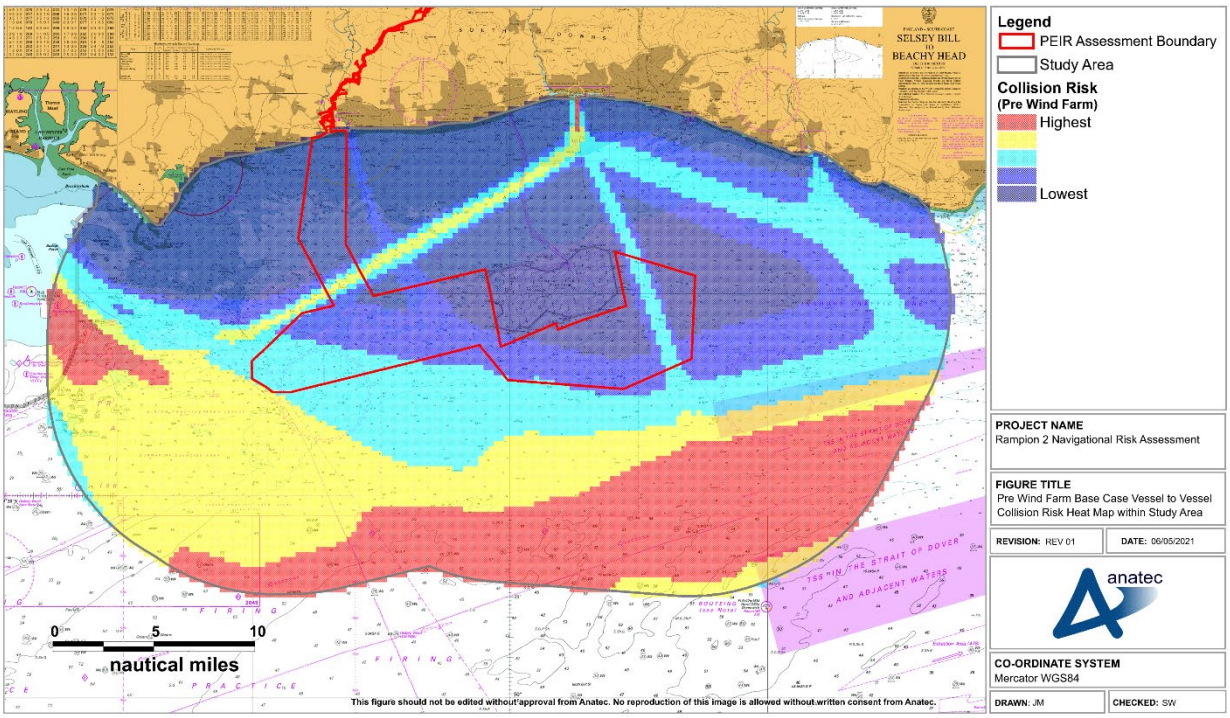
18.4 Pre wind farm modelling

Vessel to vessel collisions

18.4.1 Using the pre wind farm vessel routeing as input, Anatec's COLLRISK model has been run to estimate the existing vessel to vessel collision risk in proximity to Rampion 2. The route positions and widths are based on the vessel traffic survey data and has validated with the long-term vessel traffic data and consultation with local stakeholders.

18.4.2 A heat map based upon the geographical distribution of collision risk within a 0.25×0.25nm grid for the base case is presented in **Figure 18.1**.

Figure 18.1 Pre wind farm base case vessel to vessel collision risk heat map within study area



18.4.3 Assuming base case vessel traffic levels, the annual collision frequency pre wind farm was estimated to be 1.02×10^{-1}, corresponding to a return period of approximately one in 9.8 years. This is a relatively high return period compared to that estimated in the pre wind farm scenario for other UK offshore wind farm developments and is reflective of the high volume of vessel traffic in the area, particularly within and out of the Dover Strait TSS and out of the Solent.

18.4.4 It is noted that the model is calibrated based upon major incident data at sea which allows for benchmarking but does not cover all incidents, such as minor impacts. Other incident data, which includes minor incidents, is presented in **Section 12**.

18.5 Post wind farm

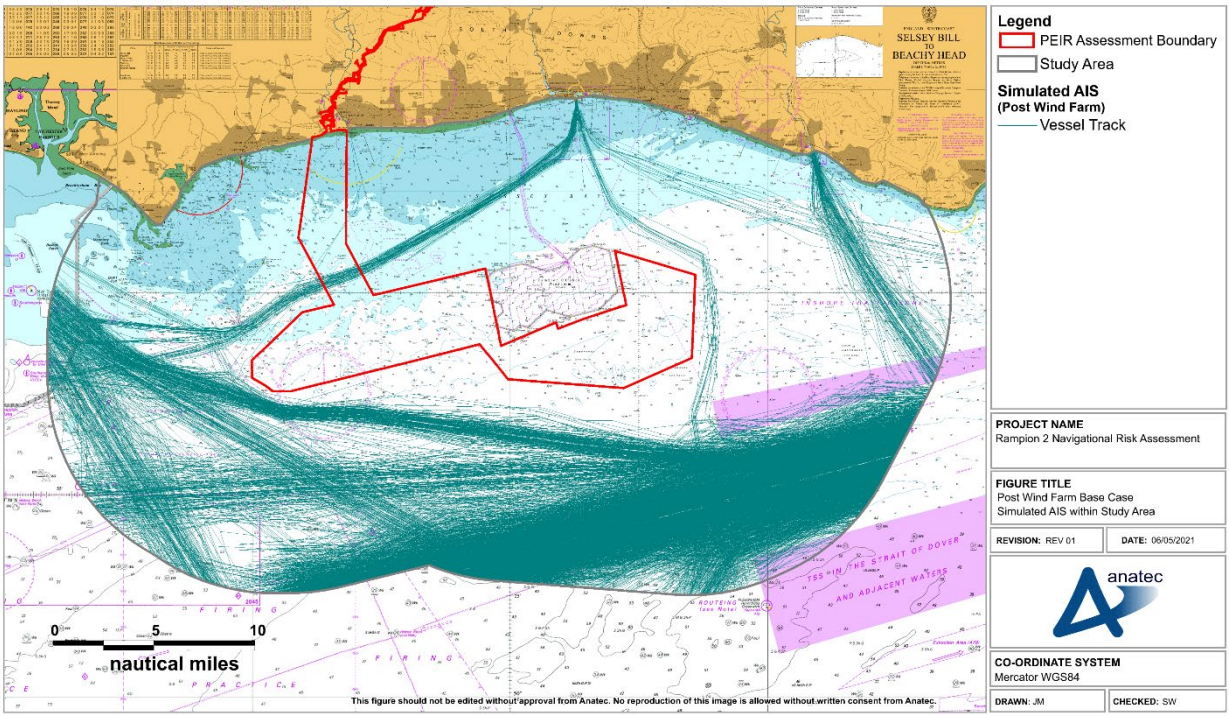
Simulated Automatic Identification System

18.5.1 Anatec's AIS Simulator software was used to gain an insight into the potential re-routed commercial traffic following the installation of the wind farm structures within the array area. The AIS Simulator uses the mean positions of identified commercial main routes within the study area and the anticipated shift post wind farm, together with the standard deviations and average number of vessels on each commercial main route to simulate tracks.

18.5.2 A plot of 28 days of simulated AIS (to match the total duration of the vessel traffic surveys) within the study area based on the deviated main commercial routes is presented in **Figure 18.2**.

18.5.3 It is noted that the simulated AIS represents a maximum design scenario based on a mean 1nm passing distance from the array area for routes.

Figure 18.2 Post wind farm simulated AIS tracks for base case within study area (28 days)

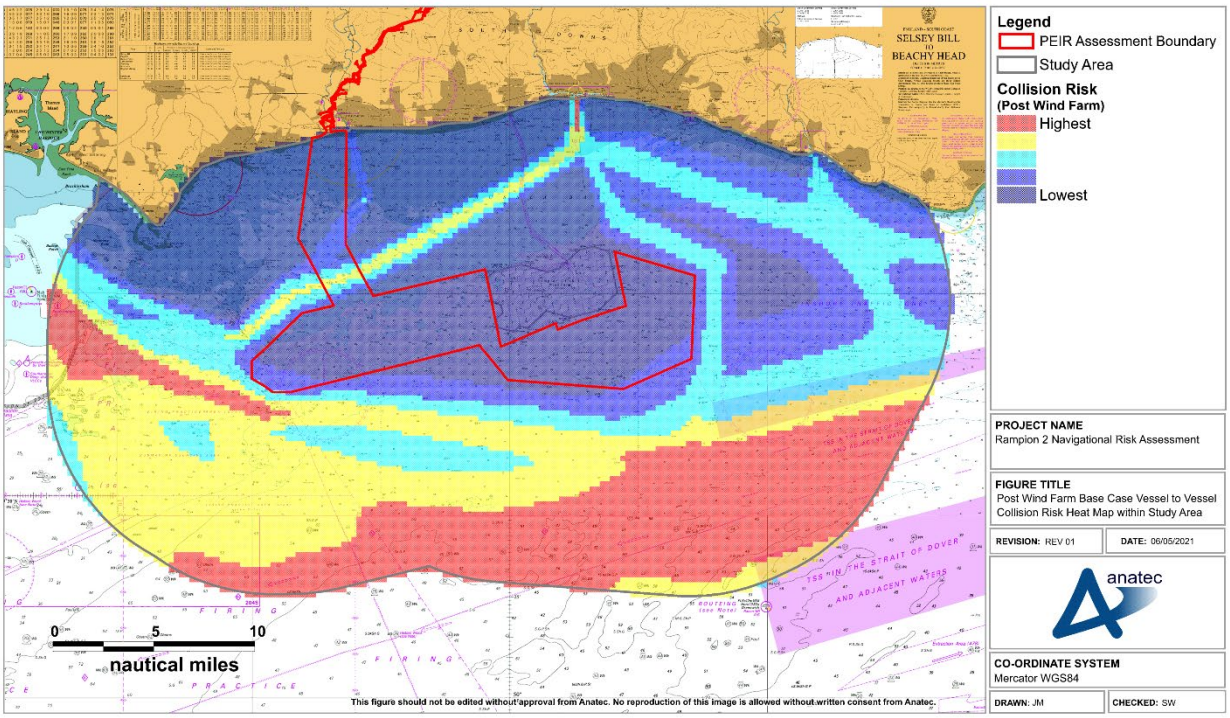


Vessel to vessel collisions

18.5.4 Using the post wind farm routeing as input, Anatec's COLLRISK model has been run to estimate the anticipated vessel to vessel collision risk in proximity to Rampion 2.

18.5.5 A heat map based upon the geographical distribution of collision risk within a 0.25×0.25nm grid for the base case is presented in **Figure 18.3**.

Figure 18.3 Post wind farm base case vessel to vessel collision risk heat map within study area



18.5.6 Assuming base case vessel traffic levels, the annual collision frequency post wind farm was estimated to be 1.03×10^{-1}, corresponding to a return period of approximately one in 9.7 years. This represents a 1.2 percent increase in collision frequency compared to the pre wind farm base case result.

18.5.7 The increase in vessel to vessel collision risk was greatest close to the western extent of the PEIR Assessment Boundary where several main commercial routes were deviated to pass around the array area, effectively extending the area within which the high collision risk out of the Solent applies. Changes in collision risk associated with the deviation of main commercial routes out of Shoreham passing around the eastern edge or west of the array area was relatively small given the much lower volume of traffic associated with these routes.

Powered vessel to structure allision

18.5.8 Based upon the vessel routeing identified in the study area, the anticipated re-routeing as a result of the presence of Rampion 2, and assumptions that relevant embedded environmental measures are in place (see **Section 20**), the frequency of an errant vessel under power deviating from its route to the extent that it came into proximity with a wind farm structure associated with Rampion 2 is considered to be low.

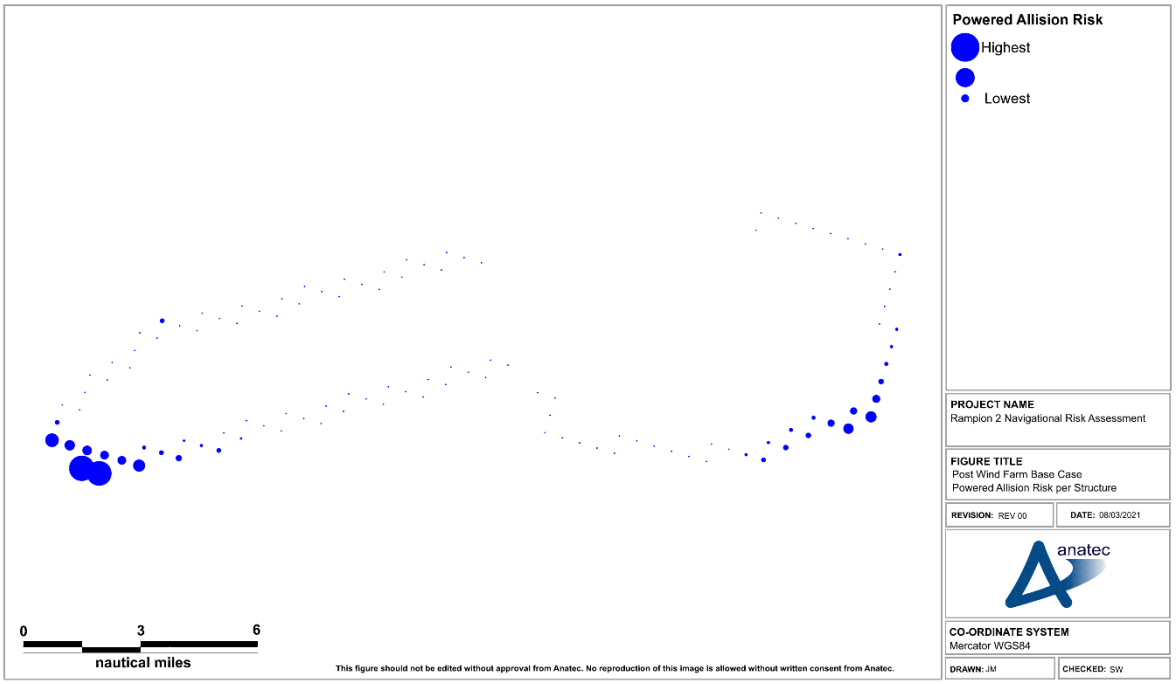
18.5.9 From consultation with the shipping industry, it is also assumed that commercial vessels would be highly unlikely to navigate between wind farm structures due to the restricted sea room and will instead be directed by the aids to navigation located in the region and those present at Rampion 2. During the construction and decommissioning phases this will primarily consist of the buoyed construction area

whilst during the operation and maintenance phase this will primarily consist of the lighting and marking of the wind farm structures themselves.

18.5.10 Using the post wind farm routeing as input, together with the worst case indicative array layout and local meteorological ocean data, Anatec's COLLRISK model was run to estimate the likelihood of a commercial vessel alliding with one of the wind farm structures within the array area whilst under power. In order to maintain a maximum design scenario, the model did not consider one structure shielding another.

18.5.11 A plot of the annual powered allision frequency per structure for the base case is presented in **Figure 18.4**, with the chart background removed to increase the visibility of those structures with lower allision frequencies.

Figure 18.4 Base case powered allision risk per structure



18.5.12 Assuming base case vessel traffic levels, the annual powered allision frequency was estimated to be 1.25×10^{-3}, corresponding to a return period of approximately one in 799 years.

18.5.13 The greatest powered vessel to structure allision risk was associated with structures at the western extent of the array area where multiple main commercial routes pass at the minimum mean distance from the array area (1nm) headed into the Solent. The greatest individual allision risk was associated with one of the two structures on the south western edge of the array area (approximately 2.44×10^{-4} or one in 4,090 years).

Drifting vessel to structure allision

18.5.14 Using the post wind farm routeing as input, together with the worst case indicative array layout and local meteorological ocean data, Anatec's COLLRISK model was

run to estimate the likelihood of a commercial vessel alliding with one of the wind farm structures within the array area. The model is based on the premise that propulsion on a vessel must fail before drifting will occur. The model takes account of the type and size of the vessel, the number of engines and the average time required to repair but does not consider navigational errors caused by human actions.

18.5.15 The exposure times for a drifting scenario are based upon the vessel hours spent in proximity to the array area (up to 10nm from the array area). These have been estimated based on the vessel traffic levels, speeds, and revised routeing patterns. The exposure is divided by vessel type and size to ensure that these specific factors, which based upon analysis of historical incident data have been shown to influence incident rates, are taken into account for the modelling.

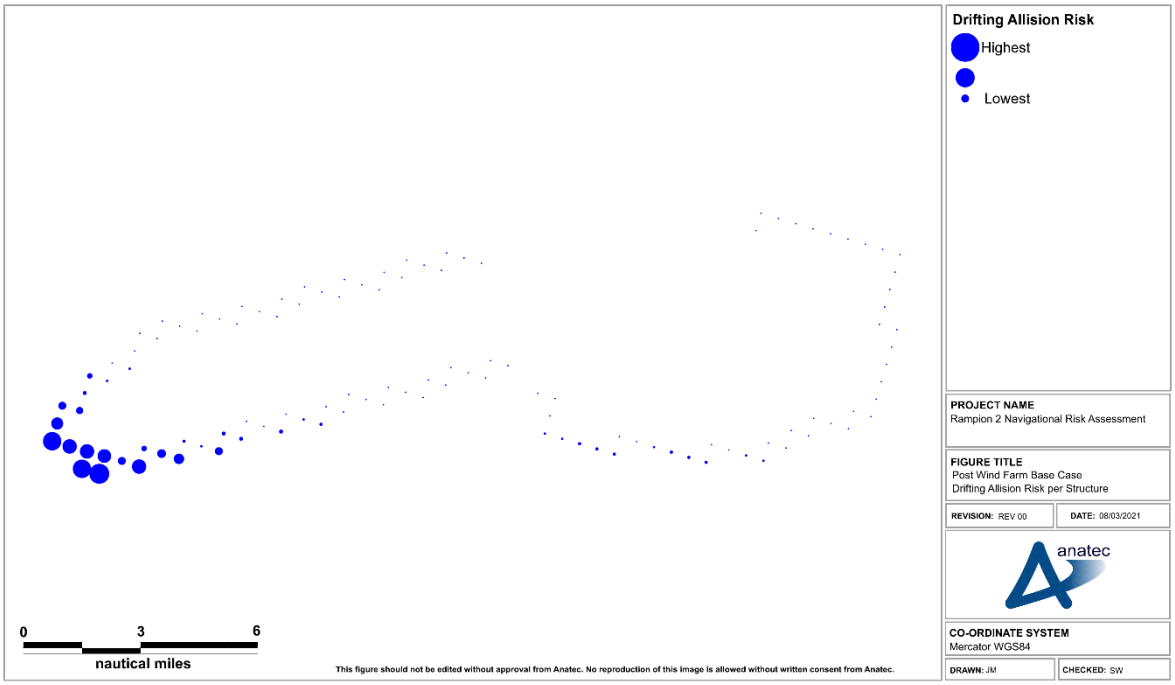
18.5.16 Using this information, the overall rate of mechanical failure in proximity to the array area was estimated. The probability of a vessel drifting towards a wind farm structure and the drift speed are dependent on the prevailing wind, wave, and tidal conditions at the time of the incident. Therefore, three drift scenarios were modelled, each using the meteorological ocean data provided in **Section 10**:

- wind;
- peak spring flood tide; and
- peak spring ebb tide.

18.5.17 The probability of vessel recovery from drift is estimated based upon the speed of the drift and hence the time available before arriving at a wind farm structure. Vessels which do not recover within this time are assumed to allide. Conservatively, no account is made for another vessel (including a project vessel) rendering assistance.

18.5.18 After modelling the three drifting scenarios, it was established that the flood tide dominated scenario produced the worst case results. A plot of the annual powered allision frequency per structure for the base case is presented in **Figure 18.5**, with the chart background removed to increase the visibility of those structures with a low allision frequency.

Figure 18.5 Base case drifting allision risk per structure



18.5.19 Assuming base case vessel traffic levels, the annual drifting allision frequency was estimated to be 1.26×10^{-3}, corresponding to a return period of approximately one in 792 years.

18.5.20 The greatest drifting vessel to structure allision risk was again associated with structures at the western extent of the array area where multiple main commercial routes pass at the minimum mean distance from the array area (1nm) headed into the Solent and on the flood tide would drift towards these structures. The greatest individual allision risk was associated with one of the two structures on the south western edge of the array area (approximately 1.55×10^{-4} or one in 6,470 years).

18.5.21 It is noted that historically there have been no reported drifting allision incidents with wind farm structures in the UK. Whilst drifting vessels do occur every year in UK waters, in most cases the vessel has been recovered prior to any allision incident occurring (such as by anchoring, restarting engines, or being taken in tow).

Fishing vessel to structure allision

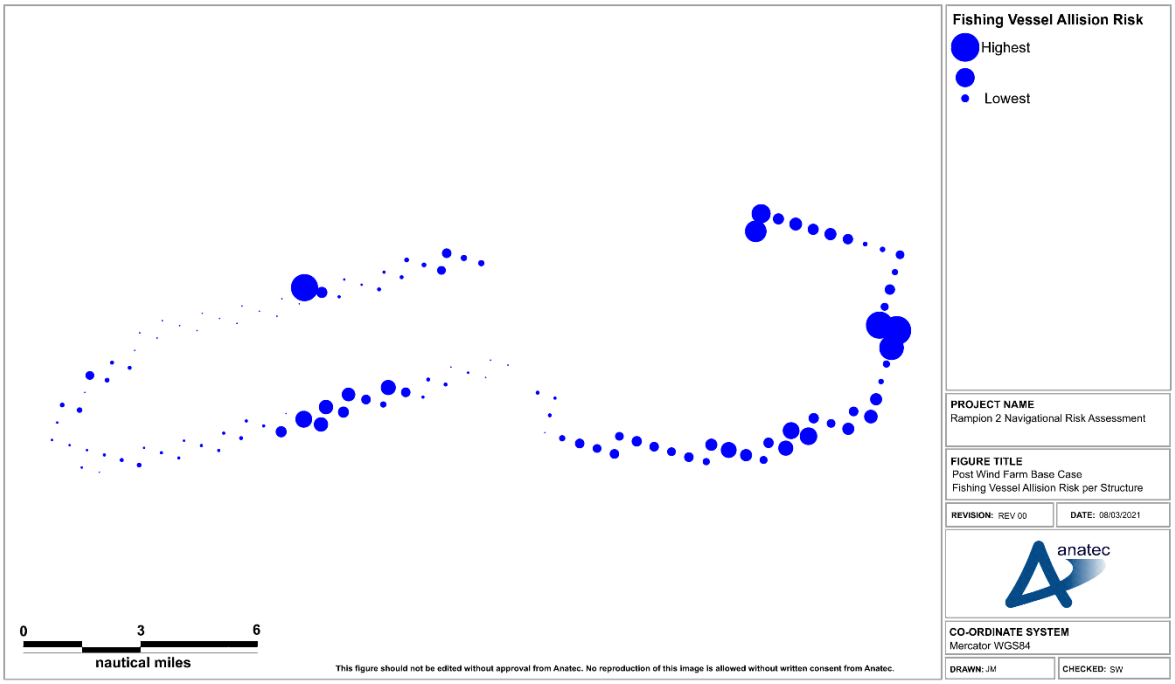
18.5.22 Using the vessel traffic survey data as input, Anatec's COLLRISK model was run to estimate the likelihood of a fishing vessel alliding with one of the wind farm structures within the array area.

18.5.23 A fishing vessel allision is classified separately from other allisions since, unlike in the case of the commercial traffic characterised using the main commercial routes, fishing vessels may be either in transit or actively fishing within the study area. Moreover, fishing vessels could be observed internally within the array in addition to externally. Anatec's COLLRISK model uses vessel numbers, sizes (length and beam), array layout and structure dimensions. The likelihood of a major allision

incident has been calibrated against historical maritime incident data and historical AIS vessel traffic data within operational offshore wind farm arrays. Given that not all fishing vessels broadcast on AIS, the vessel density observed is scaled up to account for non-AIS fishing vessels, with the scaling factor dependent on the distance of the array offshore.

18.5.24 A plot of the annual fishing vessel allision frequency per structure for the base case is presented in **Figure 18.6**.

Figure 18.6 Base case fishing vessel allision risk per structure



18.5.25 Assuming base case vessel traffic levels, the annual fishing vessel to structure allision frequency was estimated to be 4.54×10^{-1}, corresponding to a return period of approximately one in 2.2 years.

18.5.26 The greatest fishing vessel to structure allision risk was associated with structures at the eastern extent of the array area where active fishing activity was observed and west of Rampion 1 where fishing vessels regularly north east-south west out of Shoreham. The greatest individual allision risk was associated with one of the structures on the eastern edge of the array area (approximately 3.00×10^{-2} or one in 33 years).

18.6 Risk results summary

18.6.1 The previous sections modelled two scenarios, namely the pre and post wind farm scenarios with base case traffic levels. In order to incorporate the potential for future traffic growth pre and post wind farm scenarios each with future case traffic levels have also been modelled. **Table 18-1** summarises the results of all four scenarios.

Table 18-1 Risk results summary

Collision/ allision scenario	Base case			Future case		
	Pre wind farm	Post wind farm	Change	Pre wind farm	Post wind farm	Change
Vessel to vessel collision	1.02×10^{-1} (1 in 9.8 years)	1.03×10^{-1} (1 in 9.7 years)	1.24×10^{-3} (1 in 806 years)	1.24×10^{-1} (1 in 8.1 years)	1.25×10^{-1} (1 in 8.0 years)	1.52×10^{-3} (1 in 660 years)
Powered vessel to structure allision	N/A	1.25×10^{-3} (1 in 799 years)	1.25×10^{-3} (1 in 799 years)	N/A	1.38×10^{-3} (1 in 722 years)	1.38×10^{-3} (1 in 722 years)
Drifting vessel to structure allision	N/A	1.26×10^{-3} (1 in 792 years)	1.26×10^{-3} (1 in 792 years)	N/A	1.39×10^{-3} (1 in 717 years)	1.39×10^{-3} (1 in 717 years)
Fishing vessel to structure allision	N/A	4.54×10^{-1} (1 in 2.2 years)	4.54×10^{-1} (1 in 2.2 years)	N/A	4.98×10^{-1} (1 in 2.0 years)	4.98×10^{-1} (1 in 2.0 years)
Total	1.02×10^{-1} (1 in 9.8 years)	5.59×10^{-1} (1 in 1.8 years)	4.57×10^{-1} (1 in 2.2 years)	1.24×10^{-1} (1 in 8.1 years)	46.26×10^{-1} (1 in 1.6 years)	5.02×10^{-1} (1 in 2.0 years)

18.6.2 Overall, the collision and allision frequency due to the presence of Rampion 2 was estimated to increase by approximately 4.57×10^{-1} (one incident in 2.2 years) for the base case and 5.02×10^{-1} (one incident in 2.0 years) for the future case, with the majority of the risk associated with fishing vessel to structure allision.

19 Impact identification

19.1 Introduction

19.1.1 This section outlines the shipping and navigation impacts which have been identified (scoped in) based upon the baseline data and consultation undertaken. These impacts have been fed into the FSA undertaken in **Chapter 13, Volume 2** where the magnitude of impact and sensitivity of the receptor are assessed to provide a significance of effect. Where appropriate, both navigational safety and commercial risks associated with impacts are considered in the impact assessment but are assessed separately.

19.1.2 It is noted that impacts associated with vessels engaged in fishing are considered in **Chapter 10, Volume 2**.

19.2 Construction phase

19.2.1 Construction activities associated with the installation of structures and cables may displace existing routes/activity, increase grounding risk, increase encounters and collision risk with other third-party vessels.

19.2.2 Vessels associated with construction activities may increase encounters and collision risk for other vessels already operating in the area.

19.2.3 Construction activities associated with the installation of structures and cables may displace existing routes/activity restricting access to ports.

19.3 Operation and maintenance phase

19.3.1 Presence of structures may displace existing routes/activity, increase grounding risk, increase encounters and collision risk with other third-party vessels.

19.3.2 Vessels associated with operation and maintenance activities may increase encounters and collision risk for other vessels already operating in the area.

19.3.3 Presence of structures in the offshore environment may increase allision risk for vessels (both powered and drifting).

19.3.4 Presence of structures in the offshore environment may displace existing routes/activity restricting access to ports and prevent use of existing aids to navigation.

19.3.5 Presence of export and inter array cable protection in the offshore environment may reduce charted water depths creating underwater allision risk.

19.3.6 Presence of export and inter array cables in the offshore environment may increase the potential for interaction with subsea cables.

19.3.7 Presence of structures in the offshore environment including increased vessel activity and personnel numbers may reduce emergency response capability by

increasing the number of incidents, increase consequences or reducing access for the responders.

19.4 Decommissioning phase

19.4.1 Decommissioning activities associated with the removal of structures and cables may displace existing routes/activity, increase grounding risk, increase encounters and collision risk with other third-party vessels.

19.4.2 Vessels associated with decommissioning activities may increase encounters and collision risk for other vessels already operating in the area.

19.4.3 Decommissioning activities associated with the removal of structures and cables may displace existing routes/activity restricting access to ports.

20 Embedded environmental measures

20.1.1 As part of the Rampion 2 design process, a number of embedded environmental measures have been adopted to reduce the potential for impacts on shipping and navigation. These measures have and will continue to evolve over the development process as the EIA progresses and in response to consultation.

20.1.2 These measures typically include those that have been identified as good or standard practice and include actions that would be undertaken to meet existing legislation requirements. As there is a commitment to implementing these measures, and also to various standard sectoral practices and procedures, they are considered inherently part of the design of Rampion 2.

20.1.3 The embedded environmental measures within the design relevant to shipping and navigation (together with their ID applied in the Commitments Register (see **Appendix 4.1: Commitments register**)) are outlined in **Table 20-1**.

Table 20-1 Embedded environmental measures relevant to shipping and navigation

ID	Subject matter	Details	How the environmental measures will be secured
C-41	Cable burial	The array cables will typically be buried at a target burial depth of 1m below the seabed surface. The final depth of the cables will be dependent on the seabed geological conditions and the risks to the cable (for example, from anchor drag damage).	Development Consent Order (DCO) requirements or deemed Marine Licence (dML) conditions.
C-45	Cable burial	Where possible, cable burial will be the preferred option for cable protection. Cable burial will be informed by the CBRA and detailed within the Cable Specification Plan.	DCO requirements or dML conditions.
C-46	Promulgation of information[6]	Advance warning and accurate location details of construction, maintenance and decommissioning operations, associated Safety Zones and advisory passing distances will be given via Notices to Mariners and Kingfisher Bulletins. The	DCO requirements or dML conditions.

[6] Promulgation of information will include the charting of all project infrastructure (including subsea cables) on appropriately scaled nautical charts.

ID	Subject matter	Details	How the environmental measures will be secured
		undertaker must ensure that a local notice to mariners is issued at least 14 days prior to the commencement of the authorised project or any part thereof advising of the start date of each activity and the expected vessel routes from the construction ports to the relevant location.	
C-47	Fishing liaison	Ongoing liaison with fishing fleets will be maintained during construction, maintenance and decommissioning operations via an appointed Fisheries Liaison Officer (FLO) and Fishing Industry Representative.	DCO requirements or dML conditions.
C-48	Traffic monitoring	Monitoring of vessel traffic will be undertaken for the duration of the construction period.	DCO requirements or dML conditions.
C-53	Pollution planning	A Marine Pollution Contingency Plan (MPCP) will be developed. This MPCP will outline procedures to protect personnel working and to safeguard the marine environment and mitigation measures in the event of an accidental pollution event arising from offshore operations relating to Rampion 2. The MPCP will also include relevant key emergency contact details.	DCO requirements or dML conditions.
C-56	Safety Zones	Rampion 2 will apply for Safety Zones post consent. Safety Zones of up to 500m will be sought during construction, maintenance and decommissioning phases. Where appropriate, guard vessels will also be used to ensure adherence with Safety Zones or advisory passing distances, as defined by risk assessment, to mitigate any impact which poses a risk to surface	Electricity application procedures (Section 95 of Energy Act 2004).

ID	Subject matter	Details	How the environmental measures will be secured
		navigation during construction, maintenance and decommissioning phases. Such impacts may include partially installed structures or cables, extinguished navigation lights or other unmarked hazards.	
C-83	Water depth change	Where scour protection is required, MGN 543 (or the latest relevant available guidance) will be adhered to with respect to changes greater than 5 percent to the under-keel clearance in consultation with the MCA and Trinity House.	dML conditions.
C-84	Lighting and marking	Rampion 2 will exhibit lights, marks, sounds, signals and other aids to navigation as required by Trinity House, MCA and CAA. This will include a buoyed construction area around the Rampion 2 array.	dML conditions.
C-85	Promulgation of information	Rampion 2 will ensure that local notice to mariners are updated and reissued at weekly intervals during construction activities and at least five days before any planned operations and maintenance works and supplemented with VHF radio broadcasts agreed with the MCA in accordance with the construction and monitoring programme approved under dML conditions.	dML conditions.
C-86	Layout	A layout plan (including cables) will be agreed with the MMO following appropriate consultation with Trinity House and the MCA setting out proposed details of the authorised Proposed Development.	dML conditions.
C-87	MGN 543 compliance	No part of the authorised Proposed Development may commence until the MMO, in consultation with the MCA, has confirmed in writing that	dML conditions.

ID	Subject matter	Details	How the environmental measures will be secured
		the undertaker has taken into account and, so far as is applicable to the stage of the Proposed Development, adequately addressed all MCA recommendations as appropriate to the authorised Proposed Development contained within MGN 543 (MCA, 2016) and its annexes.	
C-88	Marine coordination	Marine coordination will be implemented to manage project vessels throughout construction and maintenance periods.	Secured in the description of the development.
C-89	Blade clearance	There will a minimum blade tip clearance of at least 22m above Highest Astronomical Tide (HAT).	Secured in the description of the development.

20.2 Marine aids to navigation

Introduction

20.2.1 Throughout all phases, aids to navigation will be provided in accordance with Trinity House and MCA requirements, with consideration being given to IALA Recommendation O-139 (IALA, 2013), the Standard Marking Schedule for Offshore Installations (DECC, 2011) and MGN 543 (MCA, 2016).

Construction and decommissioning phases

20.2.2 During the construction and decommissioning phases, buoyed construction and decommissioning areas will be established and marked, where required, in accordance with Trinity House requirements based on the IALA Maritime Buoyage System. In addition, where advised by Trinity House, additional marking on structures may also be applied and may include use of leading lights/lines to highlight the lay of the export cables, as raised by Tarmac Marine during consultation.

Operation and maintenance phase

Overview

20.2.3 Marking during the operation and maintenance phase will be agreed in consultation with Trinity House once the final array layout has been selected post consent; however, the following subsections summarise likely requirements.

20.2.4 Of particular note, during consultation Tarmac Marine and Hanson Marine indicated that the presence of a lit buoy to clearly designate the gap between the array and the Owers Light Buoy at the western extent of the array area would preferable. This will be incorporated into discussions with Trinity House.

Marking of individual array structures

20.2.5 As per IALA Recommendation O-139, each surface structure within the array area will be painted yellow from the level of HAT to 15m above HAT. Each structure will also be clearly marked with a unique alphanumeric identifier which will be clearly visible from all directions. The MCA will advise post consent on the specific requirements for the identifiers, but a logical pattern with potential for additional visual marks may be considered by statutory stakeholders. Each identifier will be illuminated by a low-intensity light such that the sign is available from a vessel thus enabling the structure to be identified at a suitable distance to avoid an allision incident.

20.2.6 The identifiers will be situated such that under normal conditions of visibility and all known tidal conditions, they are clearly readable by an observer (with the naked eye), stationed 3m above sea level and at a distance of at least 150m from the WTG. The light will be either hooded or baffled so as to avoid unnecessary light pollution or confusion with navigational marks.

Marking of array as a whole

20.2.7 The marking of the array as a whole will be agreed with Trinity House once the final array layout has been selected and will be in line with IALA Recommendation O-139. As per the IALA guidance, and in consultation with Trinity House, it will be ensured that:

- all corner structures will be marked as an SPS and where necessary, to satisfy the spacing requirements between SPSs, additional periphery structures may also be marked as SPSs;
- structures designated as an SPS will exhibit a flashing yellow five second (flash yellow every five seconds) light of at least 5nm nominal range and omnidirectional fog signals as appropriate and where prescribed by Trinity House, and will be sounded at least when the visibility is 2nm or less;
- all lights will be visible to shipping through 360˚ and if more than one lantern is required on a structure to meet the all-round visibility requirement, then all the lanterns on that structure will be synchronised;
- all lights will be exhibited at the same height at least 6m above HAT and below the arc of the lowest WTG blades;

- all lights will be exhibited at least at night and when visibility is reduced to 2nm or less;
- remote monitoring sensors using Supervisory Control and Data Acquisition (SCADA) will be included as part of the lighting and marking scope to ensure a high level of availability for all aids to navigation;
- aviation lighting will be as per CAA requirements; however will likely be synchronised Morse “W” at the request of Trinity House; and
- all lighting will be considered cumulatively with existing aids to navigation (including that associated with Rampion 1) to avoid the potential for light confusion to passing traffic.

20.2.8 It is noted that Trinity House are currently phasing out the use of Intermediate Peripheral Structures (IPS) which have typically been used in the past.

20.2.9 Consideration will also be given to the use of marking via AIS, or other electronic means (such as Radar Beacons (Racon)) to assist safe navigation particularly in reduced visibility. AIS transmitters or virtual buoys could also be considered internally to assist with safe navigation within the array. Any such marking will be agreed in consultation with Trinity House.

Marking of export cables

20.2.10 No lighting or physical marking will be required during the operation and maintenance phase for the export cables.

20.3 Design specifications noted in Marine Guidance Note 543

20.3.1 The individual WTGs and other structures will have functions and procedures in place for generator shut down in emergency situations, as per MGN 543 (MCA, 2016).

21 Through life safety management

21.1 Quality, Health, Safety and Environment (QHSE)

21.1.1 Quality, Health, Safety and Environment (QHSE) documentation including a Safety Management System (SMS) will be in place for Rampion 2 and will be continually updated throughout the development process. The following subsections provide an overview of this documentation and how it will be maintained and reviewed with reference, where required, to specific marine documentation.

21.1.2 Monitoring, reviewing and auditing will be carried out on all procedures and activities and feedback actively sought. Any designated person (identified in QHSE documentation), managers and supervisors are to maintain continuous monitoring of all marine operations and determine if all required procedures and processes are being correctly implemented.

21.2 Incident reporting

21.2.1 After any incidents, including near misses, an incident report form will be completed in line with the Rampion 2 QHSE documentation. This will then be assessed for relevant outcomes and reviewed for possible changes required to operations.

21.2.2 RED will maintain records of investigation and analyse incidents in order to:

- determine underlying deficiencies and other factors that may be causing or contributing to the occurrence of incidents;
- identify the need for corrective action;
- identify opportunities for preventative action;
- identify opportunities for continual improvement; and
- communicate the results of such investigations.

21.2.3 All investigations shall be performed in a timely manner.

21.2.4 A database (lessons learnt) of all marine incidents will be developed. It will include the outcomes of investigations and any resulting actions. RED will promote awareness of their potential occurrence and provide information to assist monitoring, inspection and auditing of documentation.

21.2.5 When appropriate, the designated person (noted within the ERCoP) should inform the MCA of any exercise or incidents including any implications on emergency response. If required, the MCA should be invited to take part in incident debriefs.

21.3 Review of documentation

21.3.1 The Applicant will be responsible for reviewing and updating all documentation including the risk assessments, ERCoP, SMS and, if required, will convene a review panel of stakeholders to quantify risk.

21.3.2 Reviews of the risk register should be made after any of the following occurrences:

- changes to the development, conditions of operation and prior to decommissioning;
- planned reviews; and
- following an incident or exercise.

21.3.3 A review of potential risks should be carried out annually. A review of the response charts should be undertaken annually to ensure that response procedures are up to date and should include any amendments from audits, incident reports and identified deficiencies.

21.4 Inspection of resources

21.4.1 All vessels, facilities, and equipment necessary for marine operations are to be subject to appropriate inspection and testing to determine fitness for purpose and availability in relation to their performance standards. This will include monitoring and inspection of all aids to navigation to determine compliance with the performance standards specified by Trinity House.

21.5 Audit performance

21.5.1 Auditing and performance review are the final steps in QHSE management systems. The feedback loop enables an organisation to reinforce, maintain and develop its ability to reduce risks to the fullest extent and to ensure the continued effectiveness of the system. The Applicant will carry out audits and periodically evaluate the efficiency of the marine safety documentation.

21.5.2 The audits and possible corrective actions should be undertaken in accordance with standard procedures and results of the audits and reviews should be brought to the attention of all personnel having responsibility in the area involved.

21.6 Safety management system

21.6.1 The Applicant will manage the risk associated with the activities undertaken at Rampion 2. An integrated SMS which ensures that the safety and environmental impacts of those activities are ALARP will be established. This includes the use of remote monitoring and switching for aids to navigation to ensure that if a light is faulty a quick fix can be instigated from the Marine Helicopter Coordination Centre (MHCC) (to be included in the Aids to Navigation Management Plan which is required under the dMLs for Rampion 2).

21.7 Future monitoring of vessel traffic

21.7.1 The DCO is expected to include the requirement for construction traffic monitoring by AIS, including continual collection of data from a suitable location within the array area. An assessment of a minimum of 28 days will be submitted to the MCA annually throughout the construction phase and is likely to continue through the first year of the operation and maintenance phase to ensure measures implemented are effective.

21.7.2 The data collected will be compared against the results of the vessel traffic analysis (see **Section 13**) and predicted future case routeing (see **Section 17**) to ensure the findings of the NRA remain valid. Details of this will be provided in the Vessel Traffic Monitoring Plan.

21.8 Cable monitoring

21.8.1 The subsea cable routes will be subject to periodic inspection post construction to monitor the cable protection, including burial depths. Maintenance of the protection will be undertaken as necessary.

21.8.2 If exposed cables or ineffective protection measures are identified during post construction monitoring, these would be promulgated to relevant sea users including via NtM and Kingfisher bulletins. Where immediate risk was observed, RED would also employ additional temporary measures (such as a guard vessel or temporary buoyage) until such time as the risk was permanently mitigated.

21.8.3 Details will be included in full within the assessment of cable burial and protection document, to be produced post consent.

21.9 Hydrographic surveys

21.9.1 As required by MGN 543, detailed and accurate hydrographic surveys will be undertaken periodically at intervals agreed with the MCA.

21.10 Decommissioning plan

21.10.1 A decommissioning plan will be developed post consent. With regards to impacts on shipping and navigation, this will also include consideration of the scenario where upon decommissioning and completion of removal operations, an obstruction is left on-site (attributable to Rampion 2) which is considered to be a danger to navigation and which it has not proved possible to remove. Such an obstruction may require marking until such time as it is either removed or no longer considered a danger to navigation, the continuing cost of which would need to be met by RED.

22 Summary and next steps

22.1 Introduction

22.1.1 Using baseline data, collision and allision risk modelling and the outputs of consultation, impacts relating to shipping and navigation have been identified for Rampion 2 for all phases of the development (construction, operation and maintenance and decommissioning). This has been fed into an FSA undertaken in **Chapter 13, Volume 2**. A cumulative baseline has also been determined to inform the CEA undertaken **Chapter 13, Volume 2** (noting that at this time no cumulative developments have been identified).

22.2 Consultation

22.2.1 Throughout the NRA process, consultation has been undertaken with key shipping and navigation stakeholders including:

- MCA;
- Trinity House;
- UK Chamber of Shipping;
- RYA and member clubs;
- Local ports including Shoreham Port, Newhaven Port & Properties and Littlehampton Harbour Board;
- Regular Operators; and
- Marine aggregate dredging representatives including from Britannia Aggregates, Cemex, DEME, Hanson Marine, Tarmac Marine and Volker Dredging.

22.3 Existing environment

22.3.1 Rampion 1 which was fully commissioned in November 2018, shares its eastern, southern and western boundaries with the PEIR Assessment Boundary for Rampion 2 and is the only existing UK offshore wind farm within the English Channel.

22.3.2 The Dover Strait TSS lies approximately 2.4nm from the PEIR Assessment Boundary at the closest point and an ITZ covers the sea area eastward of the line joining Shoreham and the CS1 light buoy marking the end of the westbound lane of the TSS.

22.3.3 Several marine aggregate dredging areas are located in proximity to the PEIR Assessment Boundary including immediately east of the offshore cable corridor, to the west (near the Isle of Wight) and to the south east (within and south of the Dover Strait TSS).

22.3.4 Several ports and harbours are located along the coast close to the PEIR Assessment Boundary with the closest to the array area being Shoreham Port (7.8nm) and the closest to the offshore cable corridor being Littlehampton Harbour (immediately east). There are anchorage areas and pilotage services associated with Shoreham, Littlehampton and the Port of Newhaven.

22.4 Maritime incidents

22.4.1 From MAIB incident data recorded between 2008 and 2017 within 10nm of the PEIR Assessment Boundary, there was an average of 15 incidents per year. Throughout the ten-year period, 11 incidents occurred within the array area and four within the offshore cable corridor. The most common incident types were "*machinery failure*" (37 percent) and "*accident to person*" (22 percent). The main vessel types involved in incidents were fishing vessels (39 percent), "*other commercial*" vessels (25 percent) and passenger vessels (14 percent).

22.4.2 From RNLI incident data recorded between 2008 and 2017 within 10nm of the PEIR Assessment Boundary, there was an average of 195 incidents per year, with the majority (92 percent) occurring within 5nm of the coast. Eight incidents were recorded within the array area and 46 within the offshore cable corridor. The most common incident types were "*person in danger*" (39 percent) and "*adverse conditions*" (26 percent). Excluding "*person in danger*" and non-vessel based incidents, the main vessel types involved in incidents were recreational vessels (77 percent), fishing vessels (11 percent) and personal craft (10 percent).

22.5 Vessel traffic movements

22.5.1 From 14 days of vessel traffic survey data recorded in August 2020 (summer) within 10nm of the PEIR Assessment Boundary, there was an average of 158 unique vessels per day. An average of 17 unique vessels per day was recorded intersecting the array area and 12 unique vessels per day intersecting the offshore cable corridor.

22.5.2 Throughout the summer survey period, the main vessel types recorded within 10nm of the PEIR Assessment Boundary were cargo vessels (37 percent), recreational vessels (24 percent), tankers (17 percent) and fishing vessels (10 percent).

22.5.3 From 14 days of vessel traffic survey data recorded in November 2020 (winter) within 10nm of the PEIR Assessment Boundary, there was an average of 146 unique vessels per day. An average of 17 unique vessels per day was recorded intersecting the array area and four unique vessels per day intersecting the offshore cable corridor.

22.5.4 Throughout the winter survey period, the main vessel types recorded within 10nm of the PEIR Assessment Boundary were cargo vessels (48 percent), tankers (21 percent) and fishing vessels (14 percent).

22.5.5 A total of 17 main commercial routes were identified from the vessel traffic survey data. The highest use main commercial route was between the westbound lane of the Dover Strait TSS and the westbound lane of the Off Casquets TSS with an

average of 74 unique vessels per day. A number of other routes were identified in and out of the Dover Strait TSS including routes to and from Solent ports and Shoreham.

22.6 Future case vessel traffic

22.6.1 An indicative 10 percent increase in vessel traffic associated with commercial vessels, commercial fishing vessels and recreational vessels has been considered for the future case scenario. Additionally, transits made by vessels involved in the construction and operation and maintenance of Rampion 2 have been considered.

22.6.2 Deviations could be required for six out of the 17 main commercial routes identified, with the level of deviation varying between a 0.1nm increase for a route between the westbound lane of the Dover Strait TSS and Solent ports and a 14.3nm increase for a route between the westbound lane of the Dover Strait TSS and Littlehampton.

22.7 Collision and allision risk modelling

22.7.1 The annual vessel to vessel collision risk in proximity to Rampion 2 was estimated to be 1.03×10^{-1}, corresponding to a collision return period of approximately one in 9.7 years. This represents a 1.2 percent increase in collision frequency compared to the pre wind farm result.

22.7.2 The annual powered vessel to structure allision risk following installation of Rampion 2 was estimated to be 1.25×10^{-3}, corresponding to a return period of approximately one in 799 years.

22.7.3 After modelling three drift scenarios it was established that the ebb tide dominated scenario produced the worst case results. The annual drifting vessel to structure allision risk following installation of Rampion 2 was estimated to be 1.26×10^{-3}, corresponding to a return period of approximately one in 792 years.

22.7.4 The annual fishing vessel to structure allision risk following installation of Rampion 2 was estimated to be 4.54×10^{-1}, corresponding to a return period of approximately one in 2.2 years.

22.8 Summary of impacts for the PEIR

22.8.1 Using the baseline data, outputs of consultation including the hazard log and the collision and allision risk modelling results, a number of impacts have been identified for feeding into the FSA undertaken in **Chapter 13, Volume 2**. The impacts taken forward to the FSA are summarised below:

- displacement of vessels (all phases);
- creation of vessel to vessel collision risk between a third-party vessel and a project vessel (all phases);
- reduced access to local ports (all phases);

- creation of vessel to structure allision risk (operation and maintenance phase);
- reduction of under keel clearance (operation and maintenance phase);
- increased anchor interaction with subsea cables (operation and maintenance phase); and
- reduction of emergency response provision including SAR capability (operation and maintenance phase).

22.9 Next steps

Consequences assessment

22.9.1 Using the results of the collision and allision modelling as input, a consequences assessment will be undertaken to provide quantification to the consequences to people and the environment due to the presence of Rampion 2. This will be incorporated into the NRA for submission as part of the DCO Application at the end of 2021.

Further consultation

22.9.2 Following Section 42 consultation, additional consultation meetings will be arranged with stakeholders to discuss any issues raised in relation to the PEIR including the NRA. The shipping and navigation chapter of the ES and the NRA will then be updated accordingly, including the impact assessment, for submission as part of the DCO Application at the end of 2021.

23 Glossary of terms and abbreviations

Table 23-1 Glossary of terms and abbreviations

Term	Definition
°	Degree
µPa	Micropascal
ABP	Associated British Ports
AC	Alternating Current
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status. Most commercial vessels and European Union (EU) fishing vessels over 15m length overall (LOA) are required to carry AIS.
ALARP	As Low as Reasonably Practicable
ALB	All-Weather Lifeboat
Allision	The act or process of a moving object striking a stationary object.
ARPA	Automatic Radar Plotting Aid
Aspect	An individual environmental topic. Shipping and navigation is one of a number of offshore aspects.
ATBA	Area to Be Avoided
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status. Most commercial vessels and European Union (EU) fishing vessels over 15m length overall (LOA) are required to carry AIS.
AW189	AgustaWestland 189
Baseline	The existing conditions as represented by the latest available survey and other data which is used as a benchmark for making comparisons to assess the impact of development.
BBC	British Broadcasting Corporation
BEIS	Department for Business, Energy and Industrial Strategy
BMAPA	British Marine Aggregate Producers Association

Term	Definition
BWEA	British Wind Energy Association
CA	Cruising Association
CAA	Civil Aviation Authority
CBA	Cost Benefit Analysis
Cable Burial Risk Assessment (CBRA)	Risk assessment to determine suitable burial depths for cables, based on hazards such as anchor strike, fishing gear interaction and seabed mobility.
CCTV	Closed Circuit Television
CD	Chart Datum
Cumulative Effects Assessment (CEA)	Assessment of impacts as a result of the incremental change caused by other past, present and reasonably foreseeable human activities and natural processes together with a development.
CHIRP	Confidential Human Factors Incident Reporting Programme
Collision	The act or process of one moving object striking another moving object.
COLREGs	Convention on International Regulations for Preventing Collisions at Sea
CRO	Coastguard Rescue Officer
CRT	Coastguard Rescue Team
CTV	Crew Transfer Vessel
Cumulative effects	Additional changes caused by a development in conjunction with other similar developments or as a combined effect of a set of developments.
dB	Decibel
DCO	Development Consent Order
DCO Application	An application for consent to undertake a Nationally Significant Infrastructure Project made to the Planning Inspectorate (PINS) who will consider the application and make a recommendation to the Secretary of State, who will decide on whether development consent should be granted for the development.
DECC	Department of Energy and Climate Change

Term	Definition
Design envelope	A description of the range of possible elements that make up the design options under consideration for a development. This envelope is used to define a development for Environmental Impact Assessment (EIA) purposes when the exact engineering parameters are not yet known. This is also often referred to as the 'Rochdale Envelope' approach.
DF	Direction Finding
DfT	Department for Transport
dML	Deemed Marine Licence
DSC	Digital Selective Calling
EEZ	Exclusive Economic Zone
Embedded environmental measures	Measures to avoid or reduce environmental effects that are directly incorporated into the preferred masterplan for a development.
Electromagnetic Field (EMF)	An electric and magnetic force field that surrounds a moving electrical charge.
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed development over and above the existing circumstances (or 'baseline').
ERCoP	Emergency Response Cooperation Plan
ES	Environmental Statement. The written output presenting the full findings of the Environmental Impact Assessment (EIA).
EU	European Union. The political and economic union of 27 European member states.
FLO	Fisheries Liaison Officer
Formal Safety Assessment (FSA)	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity.
FRB	Fast Rescue Boat
Future case	The assessment of risk based on the predicted growth in future shipping densities and traffic types as well as foreseeable changes in the marine environment.
GEFO	Gesellschaft füer Oeltransporte

Term	Definition
Geophysical	Relating to the physics of the Earth.
GIS	Geographical Information System. A system that captures, stores, analyses, manages and presents data linked to location. It links spatial information to a digital database.
GLA	General Lighthouse Authority
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System
GRP	Glass Reinforced Plastic
GT	Gross Tonne
HAT	Highest Astronomical Tide
HMCG	Her Majesty's Coastguard
HSE	Health, Safety and Environment
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IFA2	Interconnexion France-Angleterre 2
IHO	International Hydrographic Organization
ILB	Inshore Lifeboat
IMCA	International Marine Contractors Association
IMO	International Maritime Organization
IMO routeing measure	Predetermined shipping routes and areas established by the IMO to improve the safety of shipping at sea.
Impact	The changes resulting from an action.
IPS	Intermediate Peripheral Structure
ITAP	Institut für technische und angewandte Physik
Inshore Traffic Zone (ITZ)	An International Maritime Organization (IMO) routeing measure designed to protect local traffic including small craft. There are various restrictions associated with its use (see **Section 9.3**).
JRCC	Joint Rescue Coordination Centre
kHz	Kilohertz

Term	Definition
km	Kilometre
kt	Knot
LAT	Lowest Astronomical Tide
LOA	Length Overall
m	Metre
MAIB	Maritime Accident Investigation Branch
Main commercial route	Defined transit route (mean position) of commercial vessels identified within the specified study area.
Marine aggregate	Marine dredged sand and/or gravel.
MCA	Maritime and Coastguard Agency
Maximum Design Scenario	The maximum design parameters of each asset for a development (both on and offshore) considered to the worst case for any given aspect.
MEPC	Marine Environment Protection Committee
Marine Guidance Note (MGN)	A system of guidance notes issued by the Maritime and Coastguard Agency (MCA) which provide significant advice relating to the improvement of the safety of shipping at sea, and to prevent or minimise pollution from shipping.
MHCC	Marine Helicopter Coordination Centre
MHWS	Mean High Water Springs
Marine Management Organisation (MMO)	An executive non-departmental public body, sponsored by the Department for Environment, Food & Rural Affairs (DEFRA).
MOD	Ministry of Defence
MPCP	Marine Pollution Contingency Plan
MRCC	Maritime Rescue Coordination Centres
MSC	Mediterranean Shipping Company
MSI	Maritime Safety Information

Term	Definition
MW	Megawatt
NAVTEX	Navigational Telex
Navigational Risk Assessment (NRA)	A document which assesses the overall impact to shipping and navigation of a proposed Offshore Renewable Energy Installation (OREI) based on Formal Safety Assessment (FSA).
Nationally Significant Infrastructure Project (NSIP)	Major infrastructure developments in England and Wales that bypass normal local planning requirements. These include proposals for renewable energy projects.
NFFO	National Federation of Fishermen's Organisations
nm	Nautical Mile
nm^2	Square Nautical Mile
NPS	National Policy Statement
NtM	Notice to Mariners
OOW	Officer of the Watch
Offshore Renewable Energy Installation (OREI)	In the context of offshore wind development, offshore Wind Turbine Generators (WTG) and the associated electrical infrastructure such as offshore substations.
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
Preliminary Environmental Information Report (PEIR)	The written output of the Environmental Impact Assessment (EIA) undertaken to date for the Proposed Development. It is developed to support formal consultation and presents the preliminary findings of the assessment to allow an informed view to be developed of the Proposed Development, the assessment approach that has been undertaken, and the preliminary conclusions on the likely significant effects of the Proposed Development and environmental measures proposed.
PEIR Assessment Boundary	Area that encompasses all planned infrastructure at the submission of the Preliminary Environmental Information Report (PEIR).
PEXA	Practice and Exercise Area

Term	Definition
The Planning Inspectorate (PINS)	An executive agency of the Ministry of Housing, Communities and Local Government which deals with planning appeals, national infrastructure planning applications, examinations of local plans and other planning related and specialist casework in England and Wales.
PLA	Port of London Authority
PNT	Positioning, Navigation and Timing
QHSE	Quality, Health, Safety and Environment
Racon	Radar Beacon
Radar	Radio Detection and Ranging. An object-detection system which uses radio waves to determine the range, altitude, direction or speed of objects.
RAF	Royal Air Force
Rampion 1	The existing Rampion Offshore Wind Farm fully commissioned in November 2018.
Receptor	These are as defined in Regulation 5(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and include population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape that may be at risk from exposure to pollutants which could potentially arise as a result of the Proposed Development.
RED	Rampion Extension Development
Regular Operator	A commercial operator whose vessel(s) are observed to transit through a particular region on a regular basis.
REZ	Renewable Energy Zone
RIB	Rigid Inflatable Boat
RNLI	Royal National Lifeboat Institution
Ro Ro	Roll-On/Roll-Off
RYA	Royal Yachting Association
Safety zone	A statutory marine zone demarcated for the purposes of safety around a possibly hazardous installation or works/construction area.
SAR	Search and Rescue

Term	Definition
SCADA	Supervisory Control and Data Acquisition
Scoping Boundary	Area that encompasses all planned infrastructure at the submission of the Scoping Report.
Scoping Opinion	A report presenting the written opinion of the Secretary of State as to the scope and level of detail of information to be provided in the Environmental Statement (ES) for a development.
Scoping Report	A report presenting the findings of an initial stage in the Environmental Impact Assessment (EIA) process.
Secretary of State	The body who makes the decision to grant development consent.
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of charge or development proposed and the value associated to that receptor.
Significance	A measure of the importance of an environmental effect, defined by criteria specific to the environmental aspect.
SMS	Safety Management System
SOLAS	Safety of Life at Sea
SONAR	Sound Navigation Ranging
SOV	Service Operation Vessel
SPS	Significant Peripheral Structure
Stakeholder	A person or organisation with a specific interest (commercial, professional or personal) in a particular issue.
Study area	A buffer of up to 10 nautical miles (nm) applied around the PEIR Assessment Boundary, defined in order to provide local context to the analysis of risks by capturing the relevant routes and vessel traffic movements within and in proximity to the PEIR Assessment Boundary (see **Section 5.1**).
TCE	The Crown Estate
Transboundary effects	Assessment of changes to the environment caused by the combined effect of past, present and future human activities and natural processes on other European Economic Area (EEA) member states.

Term	Definition
Traffic Separation Scheme (TSS)	A traffic management route system ruled by the International Maritime Organization (IMO). The traffic lanes (or clearways) indicate the general direction of transit which apply of the vessels in that zone; vessels navigating within a TSS all sail in the same direction or they cross the lane at an angle as close to 90 degrees (°) as possible.
UECC	United European Car Carriers
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
Unique vessel	An individual vessel identified on any particular calendar day, irrespective of how many tracks were recorded for that vessel on that day. This prevents vessels being over counted. Individual vessels are identified using their Maritime Mobile Service Identity (MMSI).
US	United States
UTC	Coordinated Universal Time
UTM	Universal Transverse Mercator
Unexploded Ordnance (UXO)	Explosive weapons (bombs, shells, grenades, land mines, naval mines, etc.) that did not explode when they were employed and still pose a risk of detonation, potentially may decades after they were used or discarded.
VDL	Volker Dredging Limited
VHF	Very High Frequency
Vessel Traffic Services (VTS)	A service implemented by a Competent Authority designed to improve the safety and efficiency of vessel traffic and to protect the environment. The service should have the capability to interact with the traffic and to respond to traffic situations developing in the VTS area.
WGS84	World Geodetic System 1984
WTG	Wind Turbine Generator

24 References

4C Offshore. (2018). *Wind farm support vessel to the rescue*. Lowestoft: 4C Offshore. Available at https://www.4coffshore.com/news/wind-farm-support-vessel-to-the-rescue-nid8059.html [Accessed January 2021].

4C Offshore. (2020). *Offshore wind vessel joins search for missing pilot*. Lowestoft: 4C Offshore. Available at https://www.4coffshore.com/news/offshore-wind-vessel-joins-search-for-missing-pilot-nid17573.html [Accessed January 2021].

Anatec. (2012). *Navigation Risk Assessment – Rampion Offshore Wind Farm*. Aberdeen: Anatec.

Anatec and The Crown Estate (TCE). (2012). *Strategic Assessment of Impacts on Navigation of Shipping and Related Effects on Other Marine Activities Arising from the Development of Offshore Wind Farms in the UK REZ*. Aberdeen: Anatec.

Atlantic Array. (2012). *Atlantic Array Offshore Wind Farm Draft Environmental Statement Annex 18.3: Noise and Vibration (Anthropogenic Receptors): Predictions of Operational Wind Turbine Noise Affecting Fishing Vessel Crews*. Swindon: RWE npower renewables.

British Broadcasting Corporation (BBC). (2018). *Two rescued from sinking fishing boat in North Sea*. London: BBC. Available at https://www.bbc.co.uk/news/uk-england-norfolk-46101032 [Accessed January 2021].

British Wind Energy Association (BWEA). (2007). *Investigation of Technical and Operational Effects on Marine Radar Close to Kentish Flats Offshore Wind Farm*. London, UK: BWEA (now RenewableUK), Department for Business, Energy and Industrial Strategy (BEIS), MCA & PLA.

Department of Energy and Climate Change (DECC). (2011). *National Policy Statement for Renewable Energy Infrastructure (EN-3)*. London: The Stationary Office.

Department of Energy and Climate Change (DECC). (2011). *Overarching National Policy Statement for Energy (EN-1)*. London: The Stationary Office.

Department of Energy and Climate Change (DECC). (2011). *Standard Marking Schedule for Offshore Installations*. London: DECC.

Department for transport (DfT). (2012). *National Policy Statement for Ports*. London: The Stationary Office.

Emu. (2011). *Rampion Offshore Wind Farm Metocean Survey and Assessment*. Portchester: Emu.

Energinet. (2014). *Horns Rev 3 Offshore Wind Farm Technical Report no. 12 – Radio Communication and Radars*. Fredericia, Denmark: Energinet.

E.ON Climate & Renewables. (2012). *Rampion Offshore Wind Farm Environmental Statement: Chapter 14 – Shipping and Navigation*. Coventry: E.ON Climate & Renewables.

G+ (2020). *G+ Global Offshore Wind Health & Safety Organisation 2019 Incident Data Report*. London: Energy Institute.

HM Government (2011). *UK Marine Policy Statement*. London: The Stationary Office.

International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA). (2013). *IALA Recommendation O-139 on The Marking of Man-Made Offshore Structures. Edition 2*. Saint Germain en Laye, France: IALA.

International Maritime Organization (IMO). (1972/77). *Convention on International Regulations for Preventing Collisions at Sea (COLREGs) – Annex 3*. London: IMO.

International Maritime Organization (IMO). (1974). *International Convention for the Safety of Life at Sea (SOLAS)*. London: IMO.

International Maritime Organization (IMO). (2018). *Revised Guidelines for Formal Safety Assessment (FSA) for Use in the Rule-Making Process*. MSC-MEPCC.2/Circ.12/Rev.2. London: IMO.

Institut für technische und angewandte Physik (ITAP). (2006). *Measurement of underwater noise emitted by an offshore wind turbine at Horns Rev*. Germany: ITAP.

Met Office. (2019). *Case studies of past weather events*. Exeter: Met Office. Available at https://www.metoffice.gov.uk/weather/learn-about/past-uk-weather-events#y2019 [Accessed December 2020].

Maritime and Coastguard Agency (MCA) and QinetiQ. (2004). *Results of the Electromagnetic Investigations 2nd Edition*. Southampton: MCA and Qinetic.

Maritime and Coastguard Agency (MCA). (2005). *Offshore Wind Farm Helicopter Search and Rescue Trials Undertaken at the North Hoyle Wind Farm*. Southampton: MCA.

Maritime and Coastguard Agency (MCA). (2008). *Marine Guidance Note 371 (Merchant and Fishing) Offshore Renewable Energy Installations (OREIs): Guidance on UK Navigational Practice, Safety and Emergency Response Issues*. Southampton: MCA.

Maritime and Coastguard Agency (MCA). (2008). *Marine Guidance Note 372 (Merchant and Fishing) Offshore Renewable Energy Installations (OREIs): Guidance to Mariners Operating in the Vicinity of UK OREIs*. Southampton: MCA.

Maritime and Coastguard Agency (MCA). (2013). *Methodology for Assessing the Marine Navigational Safety & Emergency Response Risks of Offshore Renewable Energy Installations (OREI)*. Southampton: MCA.

Maritime and Coastguard Agency (MCA). (2016). *Marine Guidance Note 543 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response*. Southampton: MCA.

Maritime and Coastguard Agency (MCA). (2018). *Offshore Renewable Energy Installations: Requirements, Guidance and Operational Considerations for Search and Rescue and Emergency Response*. V2.0. Southampton: MCA.

Offshore WIND. (2020). *Dudgeon Crew Rescues Injured Fishermen*. Schiedam, Netherlands: Offshore WIND. Available at https://www.offshorewind.biz/2020/12/23/dudgeon-crew-rescues-injured-fishermen/ [Accessed January 2021].

Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR). (2008). *Background Document on Potential Problems Associated with Power Cables Other Than Those for Oil and Gas Activities*. Paris, France: OSPAR Convention.

The Planning Inspectorate (PINS). (2018). *Advice Note Nine: Rochdale Envelope*. Version 3. Bristol: PINS.

The Planning Inspectorate (PINS). (2020). *Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements*. Version 7. Bristol: PINS.

Port of London Authority (PLA). (2005). *Interference to Radar Imagery from Offshore Wind Farms*. 2nd Nautical Offshore Renewable Energy Liaison (NOREL) WP4. London: PLA.

RenewableUK. (2014). *Offshore Wind and Marine Energy Health and Safety Guidelines*. Issue 2. London: RenewableUK.

Renews. (2019). *Gwynt y Mor vessel answers rescue call*. Winchester: Renews. Available at https://renews.biz/54133/gwynt-y-mor-vessel-answers-rescue-call/ [Accessed January 2021].

Royal National Lifeboat Institution (RNLI). (2016). *Barrow RNLI rescues crew after fishing vessel collides with wind turbine*. Barrow: RNLI. Available at https://rnli.org/news-and-media/2016/may/26/barrow-rnli-rescues-crew-after-fishing-vessel-collides-with-wind-turbine [Accessed February 2021].

Royal Yachting Association (RYA). (2019). *The RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy*. 5th revision. Southampton: RYA.

Royal Yachting Association (RYA). (2019). *UK Coastal Atlas of Recreational Boating 2.1*. Southampton: RYA.

Royal Yachting Association (RYA) and CA. (2004). *Sharing the Wind – Recreational Boating in the Offshore Wind Strategic Areas*. Southampton and London: RYA and CA.

The Crown Estate (TCE). (2020). *Aggregates potash and other minerals*. London: TCE. Available at https://www.thecrownestate.co.uk/en-gb/media-and-insights/seabed-and-coastal-notices/aggregates-potash-and-other-minerals/ [Accessed February 2021].

The Isle of Thanet News. (2019). *Margate RNLI call out to yacht tied to London Array wind turbine*. Ramsgate: The Isle of Thanet News. Available at https://theisleofthanetnews.com/2019/05/16/margate-rnli-call-out-to-yacht-tied-to-london-array-wind-turbine/ [Accessed January 2021].

United Kingdom Hydrographic Office (UKHO). (2017). *Admiralty Sailing Directions Dover Strait Pilot NP28*. 12th Edition. Taunton: UKHO.

Vessel Tracker. (2020). *One Injured in Hard Impact at Wind Turbine*. Vessel Tracker. Available at https://www.vesseltracker.com/en/Ships/Seacat-Ranger-I1746352.html [Accessed January 2020].

Annex A
Hazard Log

The complete hazard log – created following the Hazard Workshop and consulted on with attendees – is presented in **Table A.1**. The embedded environmental measures listed for each hazard are described in full in **Section 20**.

Table A1 Hazard log

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
Commercial vessels (excluding marine aggregate dredgers)																					
Displacement	Temporary displacement of commercial vessels from historical routes	C/D	Promulgation of information including of safety zones and advisory passing distances NtMs updated and reissued weekly Traffic monitoring Application for safety zones and use of a guard vessel as appropriate Any change in under keel clearance greater than 5 percent consulted on with MCA and Trinity House Lighting and marking including a buoyed construction/ decommissioning area Compliance with the requirements of MGN 543	Buoyed construction/ area/ decommissioning area or advisory safe passing distances causing displacement under keel clearance causing displacement Adverse weather	Increased encounters but does not impact on compliance with COLREGs Increased journey time/distance but does not impact on schedules	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters and impacts on compliance with COLREGs potentially leading to increased journey time, impacts on schedules	4	1	1	1	3	1.5	**Broadly Acceptable**	The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Littlehampton Harbour Board raised concern regarding commercial impact associated with route deviations.
Restricted access to	Temporary restrictions on	C/D	Promulgation of information	Buoyed construction/	Increased journey	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased journey	4	1	1	1	3	1.5	**Broadly Acceptable**	Commercial risk is considered

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
ports/ harbours	a commercial vessel's access route to a port/harbour (expansion on vessel displacement hazard)		including of safety zones and advisory passing distances Traffic monitoring Application for safety zones and use of a guard vessel as appropriate Any change in under keel clearance greater than 5 percent consulted on with MCA and Trinity House Lighting and marking including buoyed construction area NtMs updated and reissued weekly Compliance with the requirements of MGN 543 Marine coordination for project vessels	area/ decommissioning area or advisory safe passing distances Project vessels	time/distance but does not impact on schedules									time, impacts on schedules								separately in the PEIR chapter as not within the scope of the NRA. The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Noted that vessel movements within Littlehampton harbour limits will require pilot or PEC.
Collision	Increased collision risk involving commercial vessels due to temporary displacement	C/D	Promulgation of information including of safety zones and advisory passing distances Traffic monitoring	Human error or navigational error Mechanical or technical failure	Increased encounters between third party vessels that do not impact on	3	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters between third party vessels that do impact on	1	4	4	4	3	3.8	**Broadly Acceptable**	The placement of a system of buoyage for the export cable route during installation will be considered.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	from historical routes and reduction in available sea room		MPCP Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly	(vessel) Adverse weather	compliance with COLREGS								compliance with COLREGS and result in increased collisions								Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Collision with Projects Vessels	Increased collision risk between a commercial vessel and a project vessel due to the presence of project vessels associated with construction/ decommissioning	C/D	Promulgation of information including of safety zones and advisory passing distances Traffic monitoring MPCP Application for safety zones and use of a guard vessel as appropriate Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly Marine coordination for project vessels	Presence of project vessels associated with construction/ decommissioning Third party users not aware project vessels are engaged in operations	Increased encounters between third party vessels and project vessels that do not impact on compliance with COLREGS	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters between third party vessels and project vessels that do impact on compliance with COLREGS and result in increased collisions	2	4	4	4	3	3.8	**Broadly Acceptable**	The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Allision	New allision risk for	C/D	Promulgation of information	Presence of pre	Vessel passes structure at an	3	1	1	1	1	1.0	**Broadly Acceptable**	Vessel allides with	1	4	4	3	4	3.8	**Broadly Acceptable**	Noted during Hazard

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	commercial vessels due to presence of pre commissioned structures		including of safety zones and advisory passing distances MPCP Application for safety zones and use of a guard vessel as appropriate Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly Layout plan Compliance with the requirements of MGN 543	commissioned structures Human error or navigational error Mechanical or technical failure (vessel) Adverse weather Unfamiliarity with project Failure of Aid to Navigation	unsafe distance and has to make last minute adjustment to course/speed								structure resulting in damage to vessel, injury and potentially pollution								Workshop that NtMs became somewhat excessive for Rampion 1.
Grounding	Increased risk of grounding for commercial vessels due to displacement from historical routes, cable protection or scour protection	C/D	Cable burial informed by the cable burial risk assessment Promulgation of information including of safety zones and advisory passing distances MPCP Any change in under keel clearance greater	Deviation of vessels into waters not previously used Presence of cable protection reducing under keel clearance Human error or navigational	Vessel transits over a area of reduced clearance causing vibration etc. but does not make contact	4	1	1	1	1	1.0	**Broadly Acceptable**	Vessel makes contact with cable protection/ infrastructure resulting in damage to the vessel and potentially pollution	2	4	4	3	4	3.8	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			than 5 percent consulted on with MCA and Trinity House NtMs updated and reissued weekly Compliance with the requirements of MGN 543	error Mechanical or technical failure Adverse weather Unfamiliarity with cable locations																	
Anchor interaction	Increased anchor snagging risk for commercial vessels due to subsea cables and cable protection	C/D	Target burial depth for cables of 1m Cable burial informed by the cable burial risk assessment Promulgation of information including operation details NtMs updated and reissued weekly Compliance with the requirements of MGN 543	Presence of subsea cables or cable protection Human error or navigational error Mechanical or technical failure Adverse weather	Vessel anchors on or drags anchor over an installed cable/protection but no interaction occurs.	3	1	1	1	1	1.0	**Broadly Acceptable**	Vessel anchors on or drags anchor over an installed cable/protection resulting in damage to the cable/protection and/or anchor	2	1	1	2	2	1.5	**Broadly Acceptable**	The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Littlehampton Harbour Board noted that 1m cable burial depth may not be sufficient nearshore and permanent buoyage marking the cable is recommended.
Displacement	Displacement of commercial	O	Promulgation of information	Presence of structures	Increased encounters but	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased journey	4	1	1	1	3	1.5	**Broadly Acceptable**	Noted during Hazard

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	vessels from historical routes		including of safety zones and advisory passing distances Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Compliance with the requirements of MGN 543	Adverse weather	does not impact on compliance with COLREGs Increased journey time/distance but does not impact on schedules								time, impacts on schedules								Workshop that NtMs became somewhat excessive for Rampion 1. Littlehampton Harbour Board raised concern regarding commercial impact associated with route deviations.
Restricted access to ports/ harbours	Restrictions on a commercial vessel's access route to a port/harbour (expansion on vessel displacement hazard)	O	Promulgation of information including of safety zones and advisory passing distances Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Compliance with the requirements of MGN 543 Marine coordination for project vessels	Presence of structures Project vessels	Increased journey time/distance but does not impact on schedules	5	1	1	1	1	1.0	**Tolerable**	Increased journey time, impacts on schedules	5	1	1	1	3	1.5	**Tolerable**	Commercial risk is considered separately in the PEIR chapter as not within the scope of the NRA. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Noted that vessel movements within Littlehampton harbour limits will require pilot or PEC.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
Collision	Increased collision risk involving commercial vessels due to displacement from historical routes and reduction in available sea room	O	Promulgation of information including of safety zones and advisory passing distances MPCP Lighting and marking	Human error or navigational error Mechanical or technical failure (vessel) Adverse weather	Increased encounters between third party vessels that do not impact on compliance with COLREGS	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters between third party vessels that do not impact on compliance with COLREGS	1	4	4	4	3	3.8	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Collision with Projects Vessels	Increased collision risk between a commercial vessel and a project vessel due to the presence of project vessels associated with operation and maintenance	O	Promulgation of information including of safety zones and advisory passing distances MPCP Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Marine coordination for project vessels	Presence of project vessels associated with operation and maintenance Third party users not aware project vessels are engaged in operations	Increased encounters between third party vessels and project vessels that do not impact on compliance with COLREGS	3	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters between third party vessels and project vessels that do impact on compliance with COLREGS and result in increased collisions	1	4	4	4	3	3.8	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Allision	New allision risk for commercial vessels due to presence of structures	O	Promulgation of information including of safety zones and advisory passing distances MPCP	Presence of structures Human error or navigational error Mechanical	Vessel passes structure at an unsafe distance and has to make last minute	4	1	1	1	1	1.0	**Broadly Acceptable**	Vessel allides with structure resulting in damage to vessel, injury and	3	4	4	3	4	3.8	**Tolerable**	Increased frequency related to proximity to Dover Strait TSS, further consultation required.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Layout plan Compliance with the requirements of MGN 543	or technical failure resulting in a vessel drifting Adverse weather	adjustment to course/speed								potentially pollution								Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Grounding	Increased risk of grounding for commercial vessels due to displacement from historical routes, cable protection or scour protection	O	Cable burial informed by the cable burial risk assessment Promulgation of information including of safety zones and advisory passing distances MPCP Any change in under keel clearance greater than 5 percent consulted on with MCA and Trinity House Compliance with the requirements of MGN 543	Deviation of vessels into waters not previously used Presence of cable protection reducing under keel clearance Human error or navigational error Mechanical or technical failure Adverse weather	Vessel transits over a area of reduced clearance causing vibration etc. but does not make contact	2	1	1	1	1	1.0	**Broadly Acceptable**	Vessel makes contact with cable protection/ infrastructure resulting in damage to the vessel and potentially pollution	1	4	4	3	4	3.8	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Anchor interaction	Increased anchor snagging risk	O	Target burial depth for cables of 1m	Presence of subsea cables or	Vessel anchors on or drags anchor over an	2	1	1	1	1	1.0	**Broadly Acceptable**	Vessel anchors on or drags	1	1	1	2	2	1.5	**Broadly Acceptable**	Noted during Hazard Workshop that

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	for commercial vessels due to subsea cables and cable protection		Cable burial informed by the cable burial risk assessment Promulgation of information including operation details Compliance with the requirements of MGN 543	cable protection Human error or navigational error Mechanical or technical failure Adverse weather	installed cable/protection but no interaction occurs.								anchor over an installed cable/protection resulting in damage to the cable/protection and/or anchor								NtMs became somewhat excessive for Rampion 1. Littlehampton Harbour Board noted that 1m cable burial depth may not be sufficient nearshore and permanent buoyage marking the cable is recommended.
Marine aggregate dredgers (in transit)																					
Displacement	Temporary displacement of marine aggregate dredgers from historical routes	C/D	Promulgation of information including of safety zones and advisory passing distances Traffic monitoring Application for safety zones and use of a guard vessel as appropriate Any change in under keel clearance greater than 5 percent consulted on with MCA and Trinity House Lighting and marking including	Buoyed construction/ area/ decommissioning area or advisory safe passing distances causing displacement under keel clearance causing displacement Adverse weather	Increased encounters but does not impact on compliance with COLREGs Increased journey time/distance but does not impact on schedules	3	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters and impacts on compliance with COLREGs potentially leading to increased journey time, impacts on schedules	3	1	1	1	3	1.5	**Broadly Acceptable**	Marine aggregate dredging representatives indicated at the Hazard Workshop that the impact applies to transits both to port and to aggregate areas. The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			a buoyed construction/ decommissioning area NtMs updated and reissued weekly Compliance with the requirements of MGN 543																		NtMs became somewhat excessive for Rampion 1. Marine aggregate dredging representative content with 1.9nm gap between Owers Light Buoy and array area but recommend use of a lit buoy marking the edge of the array. Noted that this is within Trinity House's remit. Cemex noted reduction in sea room available for operations.
Restricted access to ports/ harbours	Temporary restrictions on a marine aggregate dredger's access route to a port/harbour (expansion on vessel displacement hazard)	C/D	Promulgation of information including of safety zones and advisory passing distances Traffic monitoring Application for safety zones and use of a guard vessel as appropriate Any change in under keel	Buoyed construction/ area/ decommissioning area or advisory safe passing distances Project vessels	Increased journey time/distance but does not impact on schedules	3	1	1	1	1	1.0	**Broadly Acceptable**	Increased journey time, impacts on schedules	3	1	1	1	3	1.5	**Broadly Acceptable**	Commercial risk is considered separately in the PEIR chapter as not within the scope of the NRA. The placement of a system of buoyage for the export cable route during installation will be considered.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			clearance greater than 5 percent consulted on with MCA and Trinity House Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly MGN 543 compliance Marine coordination for project vessels																		Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Collision	Increased collision risk involving marine aggregate dredgers due to temporary displacement from historical routes and reduction in available sea room	C/D	Promulgation of information including of safety zones and advisory passing distances Traffic monitoring MPCP Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly	Human error or navigational error Mechanical or technical failure (vessel) Adverse weather	Increased encounters between third party vessels that do not impact on compliance with COLREGS	2	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters between third party vessels that do impact on compliance with COLREGS and result in increased collisions	1	4	4	4	3	3.8	**Broadly Acceptable**	The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Cemex concerned by potential for squeeze at

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
																					western extent of the array area. Hanson Marine and Cemex concerned over increased third-party traffic within dredge areas especially recreational and fishing activity.
Collision with Projects Vessels	Increased collision risk between a marine aggregate dredger and a project vessel due to the presence of project vessels associated with construction/ decommissioning	C/D	Promulgation of information including of safety zones and advisory passing distances Traffic monitoring MPCP Application for safety zones and use of a guard vessel as appropriate Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly Marine coordination for project vessels	Presence of project vessels associated with construction/ decommissioning Third party users not aware project vessels are engaged in operations	Increased encounters between third party vessels and project vessels that do not impact on compliance with COLREGS	3	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters between third party vessels and project vessels that do impact on compliance with COLREGS and result in increased collisions	2	4	4	4	3	3.8	**Broadly Acceptable**	The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Hanson Marine noted concerns about conflicts with project vessels.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
Allision	New allision risk for marine aggregate dredgers due to presence of pre commissioned structures	C/D	Promulgation of information including of safety zones and advisory passing distances MPCP Application for safety zones and use of a guard vessel as appropriate Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly Layout plan Compliance with the requirements of MGN 543	Presence of pre commissioned structures Human error or navigational error Mechanical or technical failure (vessel) Adverse weather Unfamiliarity with project Failure of Aid to Navigation	Vessel passes structure at an unsafe distance and has to make last minute adjustment to course/speed	4	1	1	1	1	1.0	**Broadly Acceptable**	Vessel allides with structure resulting in damage to vessel, injury and potentially pollution	2	4	2	3	4	3.3	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Noted during Hazard Workshop that thre should be a suitable clearance from marine aggregate dredging areas to ensure emergency anchoring is possible. Tarmac Marine noted concern over siting of structures near active dredging areas, particularly substations, and request a 1,000m clearance. Hanson Marine request a 1nm clearance as a minimum.
Grounding	Increased risk of grounding for marine aggregate dredgers due	C/D	Cable burial informed by the cable burial risk assessment Promulgation of	Deviation of vessels into waters not previously used	Vessel transits over a area of reduced clearance causing	5	1	1	1	1	1.0	**Tolerable**	Vessel makes contact with cable protection/	3	4	2	3	4	3.3	**Tolerable**	Noted during Hazard Workshop that NtMs became somewhat

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	to vessel displacement from historical routes, cable protection or scour protection		information including of safety zones and advisory passing distances MPCP Any change in under keel clearance greater than 5 percent consulted on with MCA and Trinity House NtMs updated and reissued weekly Compliance with the requirements of MGN 543	Presence of cable protection reducing under keel clearance Human error or navigational error Mechanical or technical failure Adverse weather Unfamiliarity with cable locations	vibration etc. but does not make contact								infrastructure resulting in damage to the vessel and potentially pollution								excessive for Rampion 1.
Anchor interaction	Increased anchor snagging risk for marine aggregate dredgers due to subsea cables and cable protection	C/D	Target burial depth for cables of 1m Cable burial informed by the cable burial risk assessment NtMs updated and reissued weekly Compliance with the requirements of MGN 543	Presence of subsea cables or cable protection Human error or navigational error Mechanical or technical failure Adverse weather	Vessel anchors on or drags anchor over an installed cable/protection but no interaction occurs	3	1	1	1	1	1.0	**Broadly Acceptable**	Vessel anchors on or drags anchor over an installed cable/protection resulting in damage to the cable/protection and/or anchor	2	1	1	2	2	1.5	**Broadly Acceptable**	The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Noted during Hazard Workshop that on an ebb tide a

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
																					marine aggregate dredger may drift into the Offshore Cable Corridor. Littlehampton Harbour Board noted that 1m cable burial depth may not be sufficient nearshore. Permanent buoyage marking the cable is recommended. Tarmac Marine and Hanson Marine suggested consideration for use of leading lights to mark the export cable.
Displacement	Displacement of marine aggregate dredgers from historical routes	O	Promulgation of information including of safety zones and advisory passing distances Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and	Presence of structures Adverse weather	Increased encounters but does not impact on compliance with COLREGs Increased journey time/distance but does not impact on schedules	3	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters and impacts on compliance with COLREGs potentially leading to increased journey time, impacts on schedules	3	1	1	1	3	1.5	**Broadly Acceptable**	Marine aggregate dredging representatives indicated at the Hazard Workshop that the impact applies to transits both to port and to aggregate areas. Noted during Hazard Workshop that

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			marking NtMs updated and reissued weekly Compliance with the requirements of MGN 543																		NtMs became somewhat excessive for Rampion 1. Marine aggregate dredging representative content with 1.9nm gap between Owers Light Buoy and array area but recommend use of a lit buoy marking the edge of the array. Noted that this is within Trinity House's remit. Cemex noted reduction in sea room available for operations.
Restricted access to ports/ harbours	Restrictions on a marine aggregate dredger's access route to a port/harbour (expansion on vessel displacement hazard)	O	Promulgation of information including of safety zones and advisory passing distances Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and	Presence of structures Project vessels	Increased journey time/distance but does not impact on schedules	3	1	1	1	1	1.0	**Broadly Acceptable**	Increased journey time, impacts on schedules	3	1	1	1	3	1.5	**Broadly Acceptable**	Commercial risk is considered separately in the PEIR chapter as not within the scope of the NRA. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			marking Compliance with the requirements of MGN 543 Marine coordination for project vessels																		
Collision	Increased collision risk involving marine aggregate dredgers due to displacement from historical routes and reduction in available sea room	O	Promulgation of information including of safety zones and advisory passing distances MPCP Lighting and marking	Human error or navigational error Mechanical or technical failure (vessel) Adverse weather	Increased encounters between third party vessels that do not impact on compliance with COLREGS	3	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters between third party vessels that do not impact on compliance with COLREGS	1	4	4	4	3	3.8	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Cemex concerned by potential for squeeze at western extent of the array area. Hanson Marine and Cemex concerned over increased third-party traffic within dredge areas especially recreational and fishing activity.
Collision with Projects Vessels	Increased collision risk between a marine aggregate dredger and a project vessel due to the	O	Promulgation of information including of safety zones and advisory passing distances MPCP Application for	Presence of project vessels associated with operation and maintenance	Increased encounters between third party vessels and project vessels that do not impact on	2	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters between third party vessels and project vessels that do impact	1	4	4	4	3	3.8	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Hanson Marine

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	presence of project vessels associated with operation and maintenance		safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Marine coordination for project vessels	Third party users not aware project vessels are engaged in operations	compliance with COLREGS								on compliance with COLREGS and result in increased collisions								noted concerns about conflicts with project vessels.
Allision	New allision risk for marine aggregate dredgers due to presence of structures	O	Promulgation of information including of safety zones and advisory passing distances MPCP Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Layout plan Compliance with the requirements of MGN 543	Presence of structures Human error or navigational error Mechanical or technical failure resulting in a vessel drifting Adverse weather	Vessel passes structure at an unsafe distance and has to make last minute adjustment to course/speed	5	1	1	1	1	1.0	**Tolerable**	Vessel allides with structure resulting in damage to vessel, injury and potentially pollution	3	4	2	3	4	3.3	**Tolerable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Tarmac Marine noted concern over siting of structures near active dredging areas, particularly substations, and request a 1,000m clearance. Hanson Marine request a 1nm clearance as a minimum.
Grounding	Increased risk of grounding for marine aggregate dredgers due to vessel	O	Cable burial informed by the cable burial risk assessment Promulgation of information	Deviation of vessels into waters not previously used Presence of	Vessel transits over a area of reduced clearance causing vibration etc.	4	1	1	1	1	1.0	**Broadly Acceptable**	Vessel makes contact with cable protection / infrastructur	2	4	2	3	4	3.3	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	displacement from historical routes, cable protection or scour protection		including of safety zones and advisory passing distances MPCP Any change in under keel clearance greater than 5 percent consulted on with MCA and Trinity House Compliance with the requirements of MGN 543	cable protection reducing under keel clearance Human error or navigational error Mechanical or technical failure Adverse weather	but does not make contact								e resulting in damage to the vessel and potentially pollution								excessive for Rampion 1.
Anchor interaction	Increased anchor snagging risk for marine aggregate dredgers due to subsea cables and cable protection	O	Target burial depth for cables of 1m Cable burial informed by the cable burial risk assessment Compliance with the requirements of MGN 543	Presence of subsea cables or cable protection Human error or navigational error Mechanical or technical failure Adverse weather	Vessel anchors on or drags anchor over an installed cable/protection but no interaction occurs	2	1	1	1	1	1.0	**Broadly Acceptable**	Vessel anchors on or drags anchor over an installed cable/protection resulting in damage to the cable/protection and/or anchor	1	1	1	2	2	1.5	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Noted during Hazard Workshop that on an ebb tide a marine aggregate dredger may drift into the Offshore Cable Corridor. Littlehampton Harbour Board noted that 1m cable burial depth may not be sufficient nearshore.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
																					Permanent buoyage marking the cable is recommended. Tarmac Marine and Hanson Marine suggested consideration for use of leading lights to mark the export cable.
Commercial fishing vessels (in transit)																					
Displacement	Temporary displacement of commercial fishing vessels from historical transits to fishing grounds	C/D	Promulgation of information including of safety zones and advisory passing distances Fishing liaison FLO Traffic monitoring Application for safety zones and use of a guard vessel as appropriate Any change in under keel clearance greater than 5 percent consulted on with MCA and Trinity House Lighting and marking including a buoyed	Buoyed construction/ area/ decommissioning area or advisory safe passing distances causing displacement under keel clearance causing displacement Adverse weather	Increased encounters but does not impact on compliance with COLREGs Increased journey time/distance but does not impact journey time	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters and impacts on compliance with COLREGs potentially leading to increased journey time Could result in restricted movements associated with adverse weather	4	2	1	2	2	1.8	**Broadly Acceptable**	Further consultation required in relation to internal navigation and array layouts. Noted in Hazard Workshop that fishing vessels in winter avoid navigating internally within Rampion 1. The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			construction/ decommissioning area NtMs updated and reissued weekly Compliance with the requirements of MGN 543																		NtMs became somewhat excessive for Rampion 1.
Restricted access to ports/ harbours	Temporary restrictions on a commercial fishing vessel's access route to a port/harbour (expansion on vessel displacement hazard)	C/D	Promulgation of information including of safety zones and advisory passing distances Fishing liaison FLO Traffic monitoring Application for safety zones and use of a guard vessel as appropriate Any change in under keel clearance greater than 5 percent consulted on with MCA and Trinity House Lighting and marking including a buoyed construction/ decommissioning area NtMs updated	Buoyed construction/ area/ decommissioning area or advisory safe passing distances Project vessels	Increased journey time/distance but does not impact on schedules	5	1	1	1	1	1.0	**Tolerable**	Increased journey time, impacts on schedules Could result in restricted movements associated with adverse weather	5	1	1	1	3	1.5	**Tolerable**	Further consultation required in relation to internal navigation and array layouts. The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			and reissued weekly Compliance with the requirements of MGN 543 Marine coordination for project vessels																		
Collision	Increased collision risk involving commercial fishing vessels due to temporary displacement from historical transits to fishing grounds and reduction in available sea room	C/D	Promulgation of information including of safety zones and advisory passing distances Fishing liaison FLO Traffic monitoring MPCP Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly	Human error or navigational error Mechanical or technical failure (vessel) Adverse weather	Increased encounters between third party vessels that do not impact on compliance with COLREGS	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters between third party vessels that do impact on compliance with COLREGS and result in increased collisions	1	5	2	3	3	3.3	**Broadly Acceptable**	The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Collision with Projects Vessels	Increased collision risk between a commercial fishing vessel and a project vessel due to the presence of project vessels	C/D	Promulgation of information including of safety zones and advisory passing distances Fishing liaison FLO Traffic monitoring MPCP	Presence of project vessels associated with construction/ decommissioning Third party users not	Increased encounters between third party vessels and project vessels that do not impact on compliance with COLREGS	5	1	1	1	1	1.0	**Tolerable**	Increased encounters between third party vessels and project vessels that do impact on compliance	2	5	2	3	3	3.3	**Broadly Acceptable**	The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	associated with construction/ decommissioning		Application for safety zones and use of a guard vessel as appropriate Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly Marine coordination for project vessels	aware project vessels are engaged in operations									with COLREGS and result in increased collisions								NtMs became somewhat excessive for Rampion 1.
Allision	New allision risk for commercial fishing vessels due to presence of pre commissioned structures	C/D	Promulgation of information including of safety zones and advisory passing distances MPCP Application for safety zones and use of a guard vessel as appropriate Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued	Presence of pre commissioned structures Human error or navigational error Mechanical or technical failure (vessel) Adverse weather Failure of Aid to Navigation Failure to take note of advisory safe	Vessel passes structure at an unsafe distance and has to make last minute adjustment to course/speed	4	1	1	1	1	1.0	**Broadly Acceptable**	Vessel allides with structure resulting in damage to vessel, injury and potentially pollution	2	4	2	4	3	3.3	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			weekly Layout plan Compliance with the requirements of MGN 543	passing distance																	
Grounding	Increased risk of grounding for commercial fishing vessels due to displacement from historical transits to fishing grounds, cable protection or scour protection	C/D	Cable burial informed by the cable burial risk assessment Promulgation of information including of safety zones and advisory passing distances MPCP Any change in under keel clearance greater than 5 percent consulted on with MCA and Trinity House NtMs updated and reissued weekly Compliance with the requirements of MGN 543	Deviation of vessels into waters not previously used Presence of cable protection reducing under keel clearance Human error or navigational error Mechanical or technical failure Adverse weather Unfamiliarity with cable locations	Vessel transits over a area of reduced clearance causing vibration etc. but does not make contact	5	1	1	1	1	1.0	**Tolerable**	Vessel makes contact with cable protection/ infrastructure resulting in damage to the vessel and potentially pollution	3	4	2	4	3	3.3	**Tolerable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Littlehampton Harbour Board noted a concern in relation to small craft including the use of marker buoys.
Anchor interaction	Increased anchor snagging risk for commercial fishing vessels due to subsea cables and cable	C/D	Target burial depth for cables of 1m Cable burial informed by the cable burial risk assessment NtMs updated	Presence of subsea cables or cable protection Human error or navigational	Vessel anchors on or drags anchor over an installed cable/protection but no interaction occurs	3	1	1	1	1	1.0	**Broadly Acceptable**	Vessel anchors on or drags anchor over an installed cable/protection resulting in	2	4	2	5	4	3.8	**Broadly Acceptable**	The placement of a system of buoyage for the export cable route during installation will be considered. Noted during

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	protection *Note impacts associated with commercial fishing gear are outside of the scope of the NRA process, and will therefore be assessed separately.		and reissued weekly Compliance with the requirements of MGN 543	error Mechanical or technical failure Adverse weather									damage to the cable/protection and/or anchor Risks to vessel stability								Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Littlehampton Harbour Board noted that 1m cable burial depth may not be sufficient nearshore. Additionally, small craft anchors are unlikely to penetrate the cable but this will be considered as part of the CBRA. Permanent buoyage marking the cable is recommended. Littlehampton Harbour Board indicated that the most likely consequence for smaller vessels would be anchor snagging with potential for the vessel having to dump its anchor. Littlehampton Harbour Board

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
																					also requested additional mitigation of annual bathymetric surveys and a remedial action plan.
Displacement	Displacement of commercial fishing vessels from historical transits to fishing grounds	O	Promulgation of information including of safety zones and advisory passing distances Fisheries liaison FLO Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Compliance with the requirements of MGN 543	Presence of structures Human error or navigational error Mechanical or technical failure Adverse weather	Increased encounters but does not impact on compliance with COLREGs increased journey time	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters and impacts on compliance with COLREGs potentially leading to increased journey time Could result in restricted movements associated with adverse weather	4	2	1	2	2	1.8	**Broadly Acceptable**	Further consultation required in relation to internal navigation and array layouts. Noted in Hazard Workshop that fishing vessels in winter avoid navigating internally within Rampion 1. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Restricted access to ports/ harbours	Restrictions on a commercial fishing vessel's access route to a port/harbour (expansion on vessel	O	Promulgation of information including of safety zones and advisory passing distances Fishing liaison FLO	Presence of structures Project vessels	Increased journey time/distance but does not impact on schedules	5	1	1	1	1	1.0	**Tolerable**	Increased journey time, impacts on schedules Could result in restricted	5	1	1	1	3	1.5	**Tolerable**	Further consultation required in relation to internal navigation and array layouts.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	displacement hazard)		Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Compliance with the requirements of MGN 543 Marine coordination for project vessels										movements associated with adverse weather								Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Collision	Increased collision risk involving commercial fishing vessels due to displacement from historical transits to fishing grounds and reduction in available sea room	O	Promulgation of information including of safety zones and advisory passing distances Fishing liaison FLO MPCP Lighting and marking	Human error or navigational error Mechanical or technical failure (vessel) Adverse weather	Increased encounters between third party vessels that do not impact on compliance with COLREGS	5	1	1	1	1	1.0	**Tolerable**	Increased encounters between third party vessels that do impact on compliance with COLREGS and result in increased collisions	1	5	2	3	3	3.3	**Broadly Acceptable**	Creation of a fisheries liaison plan. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Collision with Projects Vessels	Increased collision risk between a commercial fishing vessel and a project vessel due to the presence	O	Promulgation of information including of safety zones and advisory passing distances Fishing liaison FLO	Presence of project vessels associated with operation and maintenance	Increased encounters between third party vessels and project vessels that do not impact on	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters between third party vessels and project vessels that do impact	1	5	2	3	3	3.3	**Broadly Acceptable**	Creation of a fisheries liaison plan. Noted during Hazard Workshop that NtMs became somewhat

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	of project vessels associated with operation and maintenance		MPCP Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Marine coordination for project vessels	Third party users not aware project vessels are engaged in operations	compliance with COLREGS								on compliance with COLREGS and result in increased collisions								excessive for Rampion 1.
Allision	New allision risk for commercial fishing vessels due to presence of structures	O	Promulgation of information including of safety zones and advisory passing distances MPCP Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Layout plan Compliance with the requirements of MGN 543	Presence of structures Human error or navigational error Mechanical or technical failure resulting in a vessel drifting Adverse weather	Vessel passes structure at an unsafe distance and has to make last minute adjustment to course/speed	5	1	1	1	1	1.0	**Tolerable**	Vessel allides with structure resulting in damage to vessel, injury and potentially pollution	3	4	2	4	3	3.3	**Tolerable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Grounding	Increased risk of grounding for commercial fishing vessels	O	Cable burial informed by the cable burial risk assessment	Deviation of vessels into waters not previously	Vessel transits over a area of reduced clearance	3	1	1	1	1	1.0	**Broadly Acceptable**	Vessel makes contact with cable	2	4	2	4	3	3.3	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	due to displacement from historical transits to fishing grounds, cable protection or scour protection		Promulgation of information including of safety zones and advisory passing distances MPCP Any change in under keel clearance greater than 5 percent consulted on with MCA and Trinity House Compliance with the requirements of MGN 543	used Presence of cable protection reducing under keel clearance Human error or navigational error Mechanical or technical failure Adverse weather	causing vibration etc. but does not make contact								protection / infrastructure resulting in damage to the vessel and potentially pollution								somewhat excessive for Rampion 1. Littlehampton Harbour Board noted a concern in relation to small craft including the use of marker buoys.
Anchor interaction	Increased anchor snagging risk for commercial fishing vessels due to subsea cables and cable protection *Note impacts associated with commercial fishing gear are outside of the scope of the NRA process, and will therefore	O	Target burial depth for cables of 1m Cable burial informed by the cable burial risk assessment Compliance with the requirements of MGN 543	Presence of subsea cables or cable protection Human error or navigational error Mechanical or technical failure Adverse weather	Vessel anchors on or drags anchor over an installed cable/protection but no interaction occurs	2	1	1	1	1	1.0	**Broadly Acceptable**	Vessel anchors on or drags anchor over an installed cable/protection resulting in damage to the cable/protection and/or anchor Risks to vessel stability	1	4	2	5	4	3.8	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. Littlehampton Harbour Board noted that 1m cable burial depth may not be sufficient nearshore. Additionally, small craft anchors are unlikely to penetrate the cable but this will

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	be assessed separately.																				be considered as part of the CBRA. Permanent buoyage marking the cable is recommended. Littlehampton Harbour Board indicated that the most likely consequence for smaller vessels would be anchor snagging with potential for the vessel having to dump its anchor. Littlehampton Harbour Board also requested additional mitigation of annual bathymetric surveys and a remedial action plan.
Recreational vessels (2.5 to 24m)																					
Displacement	Temporary displacement of recreational vessels from historical cruising routes	C/D	Promulgation of information including of safety zones and advisory passing distances Traffic monitoring Application for safety zones and	Buoyed construction area/ decommissioning area or advisory safe passing distances causing	Increased encounters but does not impact on compliance with COLREGs increased journey time/distance but does not	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters and impacts on compliance with COLREGs potentially leading to	3	2	1	2	1	1.5	**Broadly Acceptable**	Further consultation required in relation to internal navigation and array layouts. The placement of a system of

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			use of a guard vessel as appropriate Any change in under keel clearance greater than 5 percent consulted with MCA and Trinity House Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly Compliance with the requirements of MGN 543	displacement under keel clearance causing displacement Adverse weather	impact journey time									increased journey time Could result in restricted movements associated with adverse weather								buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. RYA noted that the area has only a few safe havens.
Restricted access to safe havens	Temporary restrictions on a recreational vessel's access route to a safe haven including a port/harbour (expansion on vessel displacement hazard)	C/D	Promulgation of information including of safety zones and advisory passing distances Traffic monitoring Application for safety zones and use of a guard vessel as appropriate Any change in under keel clearance greater	Buoyed construction area/ decommissioning area or advisory safe passing distances Project vessels	Increased journey time/distance but does not impact on schedules	5	1	1	1	1	1.0	**Tolerable**	Increased journey time, impacts on schedules Could result in restricted movements associated with adverse weather	5	3	1	2	1	1.8	**Tolerable**	Further consultation required in relation to internal navigation and array layouts. The placement of a system of buoyage for the export cable route during installation will be considered. Noted during

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			than 5 percent consulted on with MCA and Trinity House Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly Compliance with the requirements of MGN 543 Marine coordination for project vessels																		Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Collision	Increased collision risk involving recreational vessels due to temporary displacement from historical cruising routes and reduction in available sea room	C/D	Promulgation of information including of safety zones and advisory passing distances Traffic monitoring MPCP Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly	Human error or navigational error Mechanical or technical failure (vessel) Adverse weather	Increased encounters between third party vessels that do not impact on compliance with COLREGS	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters between third party vessels that do impact on compliance with COLREGS and result in increased collisions	1	5	2	3	2	3.0	**Broadly Acceptable**	The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. RYA noted that 53 percent of incidents in the area involve a

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
																					recreational vessel and mitigations should ensure that risk of navigation squeeze near the Owers and thus collision risk is avoided.
Collision with Projects Vessels	Increased collision risk between a recreational vessel and a project vessel due to the presence of project vessels associated with construction/ decommissioning	C/D	Promulgation of information including of safety zones and advisory passing distances Traffic monitoring MPCP Application for safety zones and use of a guard vessel as appropriate Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly Marine coordination for project vessels	Presence of project vessels associated with construction/ decommissioning Third party users not aware project vessels are engaged in operations	Increased encounters between third party vessels and project vessels that do not impact on compliance with COLREGS	5	1	1	1	1	1.0	**Tolerable**	Increased encounters between third party vessels and project vessels that do impact on compliance with COLREGS and result in increased collisions	2	5	2	3	2	3.0	**Broadly Acceptable**	The placement of a system of buoyage for the export cable route during installation will be considered. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Allision	New allision risk for	C/D	Promulgation of information	Presence of pre	Vessel passes structure at an	4	1	1	1	1	1.0	**Broadly Acceptable**	Vessel allides with	2	4	1	4	3	3.0	**Broadly Acceptable**	Noted during Hazard

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	recreational vessels due to presence of pre commissioned structures		including of safety zones and advisory passing distances MPCP Application for safety zones and use of a guard vessel as appropriate Lighting and marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly Layout plan Compliance with the requirements of MGN 543 Minimum blade clearance of 22m above HAT	commissioned structures Human error or navigational error Mechanical or technical failure (vessel) Adverse weather Failure of Aid to Navigation Failure to take note of advisory safe passing distance	unsafe distance and has to make last minute adjustment to course/speed								structure resulting in damage to vessel, injury and potentially pollution								Workshop that NtMs became somewhat excessive for Rampion 1.
Grounding	Increased risk of grounding for recreational vessels due to displacement from historical cruising routes, cable protection or scour protection	C/D	Cable burial informed by the cable burial risk assessment Promulgation of information including of safety zones and advisory passing distances MPCP	Deviation of vessels into waters not previously used Presence of cable protection reducing under keel clearance	Vessel transits over a area of reduced clearance causing vibration etc. but does not make contact	5	1	1	1	1	1.0	**Tolerable**	Vessel makes contact with cable protection/ infrastructure resulting in damage to the vessel and	3	4	1	4	3	3.0	**Tolerable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			Any change in under keel clearance greater than 5 percent consulted on with MCA and Trinity House NtMs updated and reissued weekly Compliance with the requirements of MGN 543	Human error or navigational error Mechanical or technical failure Adverse weather Unfamiliarity with cable locations									potentially pollution								
Displacement	Displacement of recreational vessels from historical cruising routes	O	Promulgation of information including of safety zones and advisory passing distances Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Compliance with the requirements of MGN 543	Presence of structures Adverse weather	Increased encounters but does not impact on compliance with COLREGs increased journey time/distance but does not impact journey time	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters and impacts on compliance with COLREGs potentially leading to increased journey time Could result in restricted movements associated with adverse weather	3	2	1	2	1	1.5	**Broadly Acceptable**	Further consultation required in relation to internal navigation and array layouts. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. RYA noted that the area has only a few safe havens.
Restricted access to safe havens	Restrictions on a recreational vessel's access route	O	Promulgation of information including of safety zones and	Presence of structures Project vessels	Increased journey time/distance but does not	5	1	1	1	1	1.0	**Tolerable**	Increased journey time, impacts on	5	3	1	2	1	1.8	**Tolerable**	Further consultation required in relation to

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
	to a safe haven including a port/harbour (expansion on vessel displacement hazard)		advisory passing distances Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Compliance with the requirements of MGN 543 Marine coordination for project vessels		impact on schedules								schedules Could result in restricted movements associated with adverse weather								internal navigation and array layouts. Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Collision	Increased collision risk involving recreational vessels due to temporary displacement from historical cruising routes and reduction in available sea room	O	Promulgation of information including of safety zones and advisory passing distances MPCP Lighting and marking	Human error or navigational error Mechanical or technical failure (vessel) Adverse weather	Increased encounters that do not impact on compliance with COLREGS	5	1	1	1	1	1.0	**Tolerable**	Increased encounters that do impact on compliance with COLREGS and result in increased collisions	1	5	2	3	2	3.0	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1. RYA noted that 53 percent of incidents in the area involve a recreational vessel and mitigations should ensure that risk of navigation squeeze near the Owers and thus

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
																					collision risk is avoided.
Collision with Projects Vessels	Increased collision risk between a recreational vessel and a project vessel due to the presence of project vessels associated with operation and maintenance	O	Promulgation of information including of safety zones and advisory passing distances MPCP Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking Marine coordination for project vessels	Presence of project vessels associated with operation and maintenance Third party users not aware project vessels are engaged in operations	Increased encounters between third party vessels and project vessels that do not impact on compliance with COLREGS	4	1	1	1	1	1.0	**Broadly Acceptable**	Increased encounters between third party vessels and project vessels that do impact on compliance with COLREGS and result in increased collisions	1	5	2	3	2	3.0	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Allision	New allision risk for recreational vessels due to presence of structures	O	Promulgation of information including of safety zones and advisory passing distances MPCP Application for safety zones and use of a guard vessel as appropriate (maintenance only) Lighting and marking	Presence of structures Human error or navigational error Mechanical or technical failure resulting in a vessel drifting Adverse weather	Vessel passes structure at an unsafe distance and has to make last minute adjustment to course/speed	5	1	1	1	1	1.0	**Tolerable**	Vessel allides with structure resulting in damage to vessel, injury and potentially pollution	3	4	1	4	3	3.0	**Tolerable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			Compliance with the requirements of MGN 543 Minimum blade clearance of 22m above HAT																		
Grounding	Increased risk of grounding for recreational vessels due to displacement from historical cruising routes, cable protection or scour protection	O	Cable burial informed by the cable burial risk assessment Promulgation of information including of safety zones and advisory passing distances MPCP Any change in under keel clearance greater than 5 percent consulted on with MCA and Trinity House Compliance with the requirements of MGN 543	Deviation of vessels into waters not previously used Presence of cable protection reducing under keel clearance Human error or navigational error Mechanical or technical failure Adverse weather	Vessel transits over a area of reduced clearance causing vibration etc. but does not make contact	4	1	1	1	1	1.0	**Broadly Acceptable**	Vessel makes contact with cable protection / infrastructure resulting in damage to the vessel and potentially pollution	2	4	1	4	3	3.0	**Broadly Acceptable**	Noted during Hazard Workshop that NtMs became somewhat excessive for Rampion 1.
Emergency response																					
Emergency response	Presence of structures may restrict access/response for existing emergency responders	C/O/D	Promulgation of information including of safety zones and advisory passing distances MPCP Lighting and	Wind farm array not designed to facilitate responder access Adverse weather	Delay to response request	2	1	1	1	2	1.3	**Broadly Acceptable**	Delay to response request leading to loss of life	1	5	5	5	5	5.0	**Tolerable**	Agreement with MCA post-consent on acceptability of the array layout for SAR access.

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
						Consequences						Risk		Consequences						Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
			marking including a buoyed construction/ decommissioning area NtMs updated and reissued weekly Layout plan Compliance with the requirements of MGN 543																		
All vessels																					
Interference with marine navigation, communications and position fixing equipment	Presence of structures, export and inter array cables may interfere with equipment used on board all vessels.	O	Target burial depth for cables of 1m	Human error relating to adjustment of Radar controls Presence of structures	Infrastructure has no effect upon the Radar, communications and navigation equipment on a vessel	5	1	1	1	1	1.0	**Tolerable**	Minor level of Radar interference due to the wind farm infrastructure	3	1	1	1	1	1.0	**Broadly Acceptable**	Hanson Marine noted concerns over VHF and Radar interference and requested that dedicated studies are used.
Use of aids to navigation	Presence of structures may prevent use of existing aids to navigation	O	MPCP Lighting and marking	Visual intrusion from wind farm structures	Short-term inability to utilise an aid to navigation but no effect on the vessel's transit	4	1	1	1	1	1.0	**Broadly Acceptable**	Short-term inability to utilise an aid to navigation resulting in an allision or grounding incident with damage to vessel, injury and	3	3	3	3	3	3.0	**Tolerable**	

Hazard Type	Hazard Title	Phase (C/O/D)	Embedded environmental measures	Possible causes	Most likely consequences	Realistic most likely consequences							Worst case consequences	Realistic worst case consequences							Further mitigation and additional comments
							Consequences					Risk			Consequences					Risk	
						Frequency	People	Environment	Property	Business	Average Consequence			Frequency	People	Environment	Property	Business	Average Consequence		
													potentially pollution								

Annex B
Long-term vessel traffic movements

Introduction

This annex assesses additional long-term vessel traffic data for Rampion 2. As required under MGN 543 (MCA, 2016), the NRA and **Chapter 13, Volume 2** of the PEIR consider 28 days of AIS, Radar and visual observation data as the primary vessel traffic data source. However, it should be considered that studying a 28-day period in isolation may exclude certain activities or periods of pertinence to shipping and navigation. Therefore, in line with good practice assessment procedures, this NRA has also considered a longer term dataset covering all of 2019 to ensure a comprehensive characterisation of vessel traffic movements can be established, including the capture of any seasonal variation.

This approach (for instance, the use of both short- and long-term data) has been agreed with the MCA and Trinity House.

Aims and objectives

The key aims and objectives of this annex are as follows:

- identify seasonal variations in vessel traffic via assessment of the long-term vessel traffic data;
- determine which variations are not reflected within the short-term vessel traffic survey data (and therefore should be fed into the NRA baseline);
- assess which dataset (long-term/survey or combination of both) should be utilised for each key NRA element that requires vessel traffic data input; and
- identify and account for any potential effects of the COVID-19 situation on the vessel traffic survey data (acknowledging the data limitation outlined in **Section 5.3**).

COVID-19 situation

It is noted that while the primary purpose of the long-term dataset is to ensure a comprehensive baseline can be established by ensuring seasonal variations are captured, in the case of Rampion 2, the consideration of long-term vessel traffic data also ensures that any tangible effects of the COVID-19 situation on the short-term vessel traffic survey data can be identified, noting that the summer and winter surveys were undertaken in August and November 2020, respectively, and as such some associated impact upon shipping levels or patterns may be present within the data. As per **Section 7**, the MCA and Trinity House were content with the vessel traffic surveys on the assumption that additional long-term vessel traffic data prior to COVID-19 was considered in tandem with appropriate consultation with the relevant stakeholders.

Methodology

Study area

This annex has assessed the long-term vessel traffic data within the same study area introduced in **Section 5.1**, namely a 10nm buffer around the PEIR Assessment Boundary.

Data period and temporary vessel traffic

The long-term vessel traffic data was collected from coastal AIS receivers for the entirety of 2019 (1 January to 31 December 2019). Approximately 7 percent downtime was observed throughout the data period.

As per the vessel traffic surveys, a number of vessel tracks recorded during the data period were classified as temporary (non-routine) and have been excluded from the characterisation of the vessel traffic baseline, including vessels performing wind farm duties associated with Rampion 1.

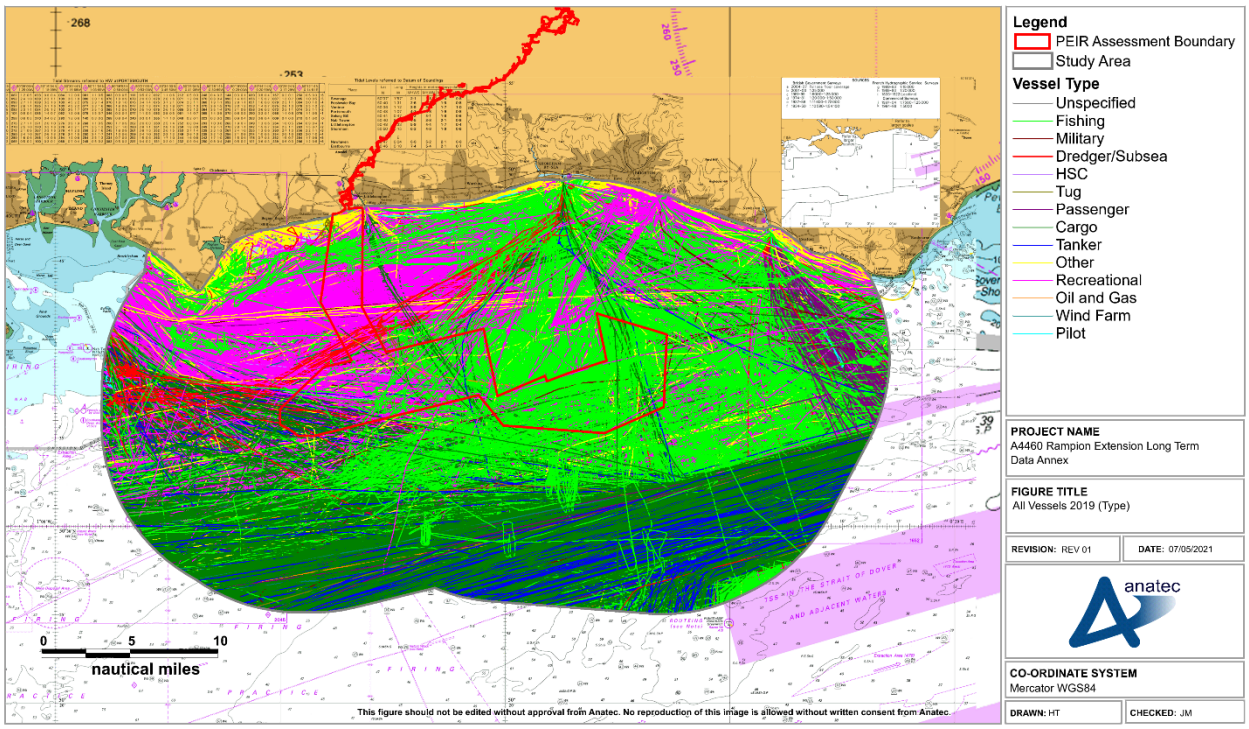
AIS carriage

General limitations associated with the use of AIS data (for example, carriage requirements) are discussed in full within **paragraph 5.3.1** and **Section 7.4**.

Long-term vessel traffic movements

A plot of the vessel tracks recorded within the study area during the data period, colour-coded by vessel type and excluding temporary traffic, is presented in **Figure B1**.

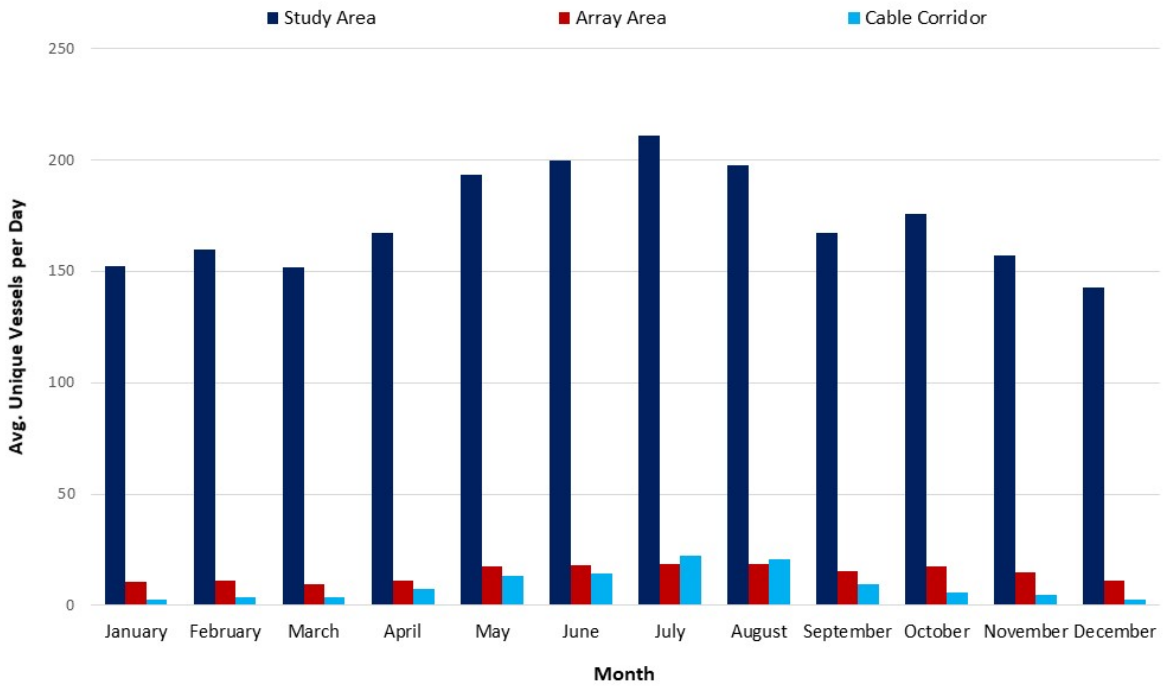
Figure B1 Long-term vessel traffic data by vessel type (12 Months, 2019)



Vessel count

The average daily number of vessels within the study area for each month of 2019 are presented in **Figure B2**. The downtime for each given month was accounted for when calculating the average daily vessels.

Figure B2 Long-term daily counts by month within study area, array area and offshore cable corridor (adjusted for downtime) (2019)

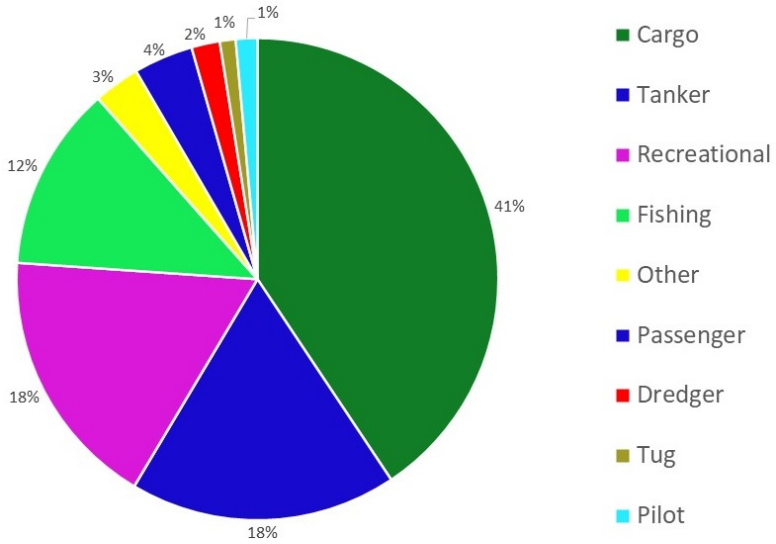


The busiest month recorded within the study area was July with approximately 211 unique vessels per day. The quietest month for the study area was December with an average of 143 unique vessels per day. Higher levels of vessel traffic was observed during the summer months, likely due to greater recreational activity given more favourable weather conditions.

Vessel type

The distribution of the main vessel types recorded during the data period are presented in **Figure B3**. Vessel types accounting for less than 1 percent of the overall activity during the data period (including military vessels, oil and gas vessels, unspecified vessels and high speed craft) have been excluded.

Figure B3 Main vessel types distribution (12 months, 2019)



The most common vessel type recorded was cargo vessels, accounting for approximately 41 percent of all traffic recorded. Other common vessel types include tankers (18 percent), recreational vessels (18 percent) and fishing vessels (12 percent).

Commercial vessels

Figure B4 presents the commercial vessels recorded within the study area during the data period, colour-coded by vessel type. Following this, **Figure B5** presents the same dataset colour-coded by average course.

Figure B4 Commercial vessels within study area by vessel type (12 months, 2019)

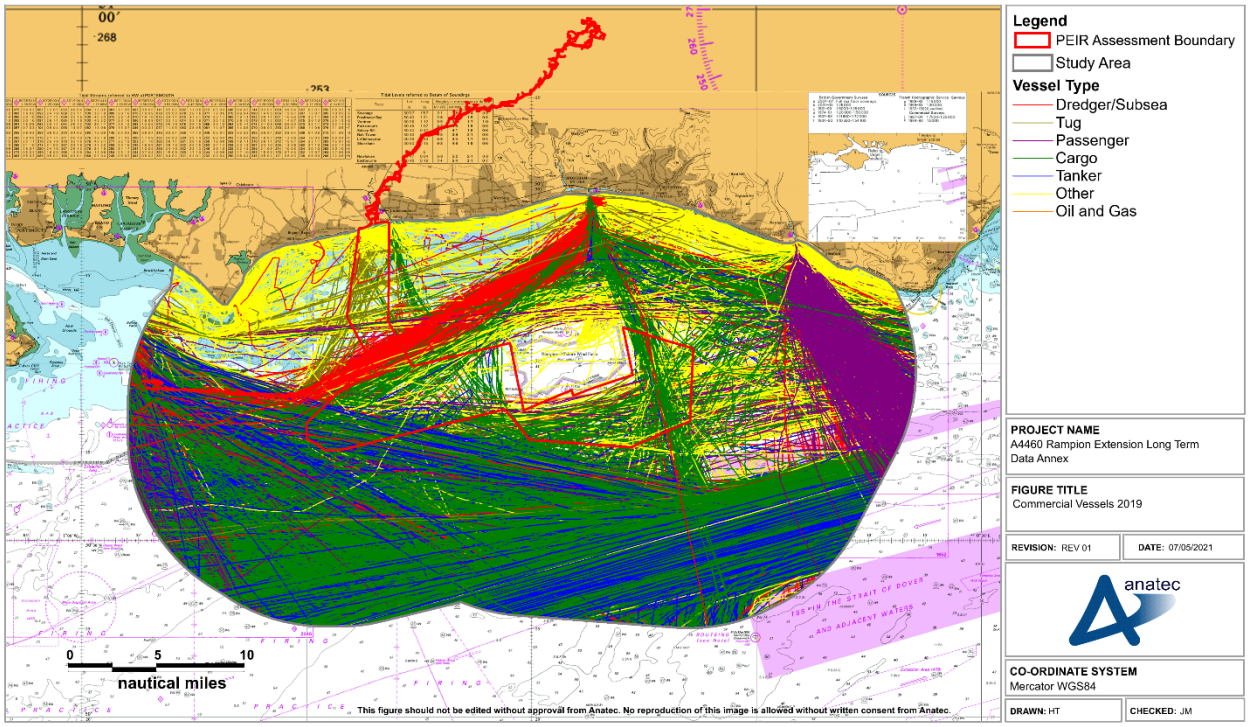
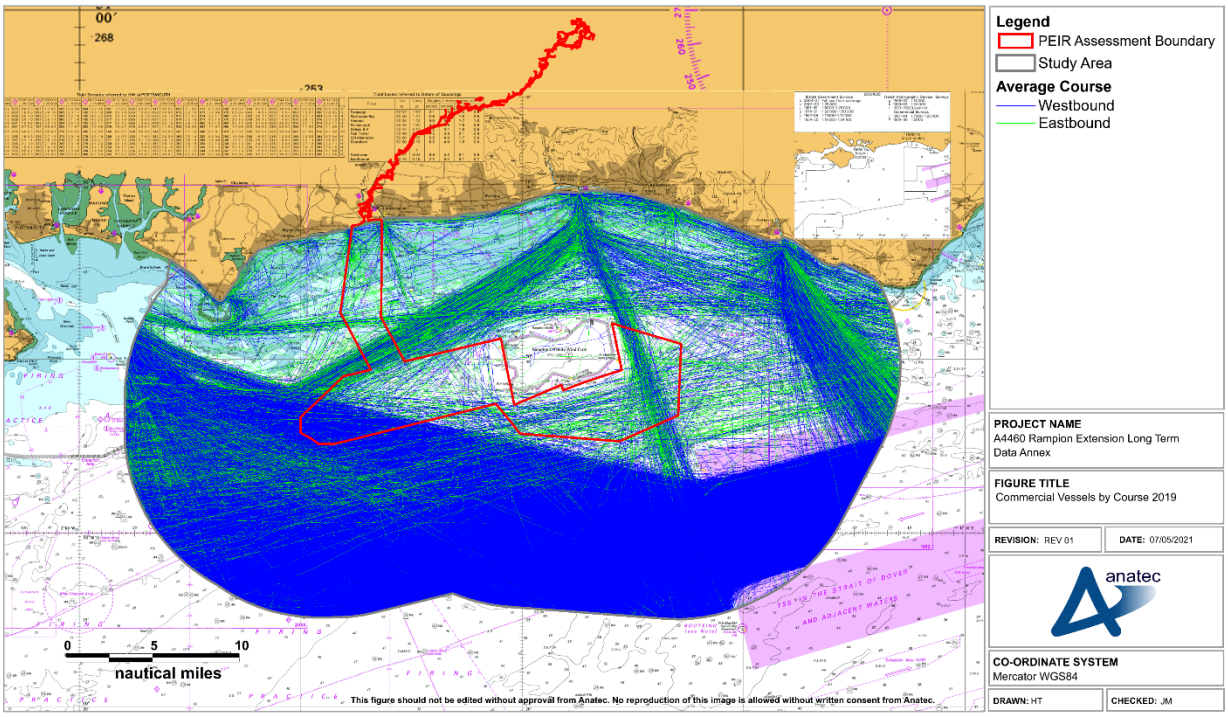


Figure B5 Commercial vessels within study area by average course (12 months, 2019)



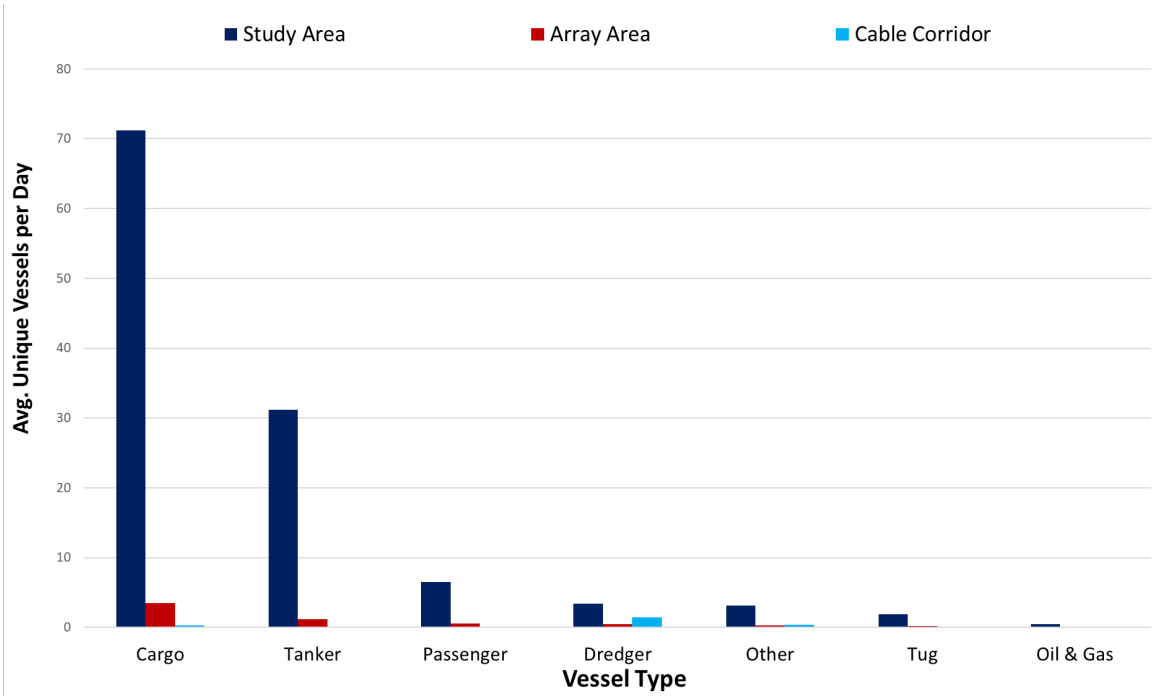
The majority of the commercial traffic within the study area is on well-defined routes with these primarily comprising the main commercial routes that have been identified from the vessel traffic survey data (see **paragraph 13.5.1**). Notably there was significant westbound traffic exiting the Dover Strait TSS, comprising primarily cargo vessels and tankers. After leaving the TSS, the majority of this traffic is observed continuing to transit westbound through the English Channel, head north west towards the Solent (partially passing through the western extent of the array area) or north to Shoreham (passing through the eastern extent of the array area).

Additionally, a main passenger vessel route was observed at the eastern extent of the study area between Newhaven and Dieppe.

Marine aggregate dredging activity was recorded within the extraction areas located at the western extent of the study area, as well as the extraction areas immediately east of the offshore cable corridor.

A breakdown of the average number of unique vessels per day for each commercial vessel type recorded within the study area, as well as intersecting the array area offshore cable corridor, is presented in **Figure B6**.

Figure B6 Average daily commercial vessels (12 months, 2019)



On average throughout the data period there were 71 unique cargo vessels, 31 unique tankers and seven unique passenger vessels per day. Approximately 5 percent of commercial vessels were recorded intersecting the array area, the majority being cargo vessels. Approximately 1 percent of commercial vessels were recorded intersecting the offshore cable corridor, the majority being marine aggregate dredgers.

Figure B7, **Figure B8** and **Figure B9** present the daily average number of unique commercial vessels for each vessel type for the study area, array area and offshore cable corridor, respectively.

Figure B7 Long-term average daily counts by month per type within study area (2019)

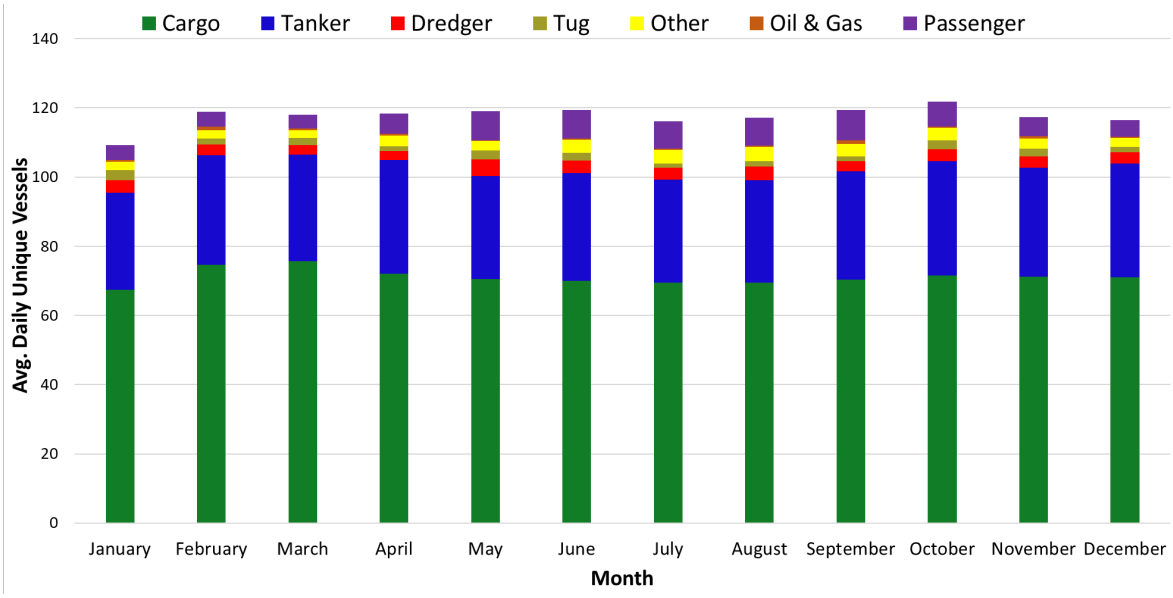


Figure B8 Long-term average daily counts by month per type within array area (2019)

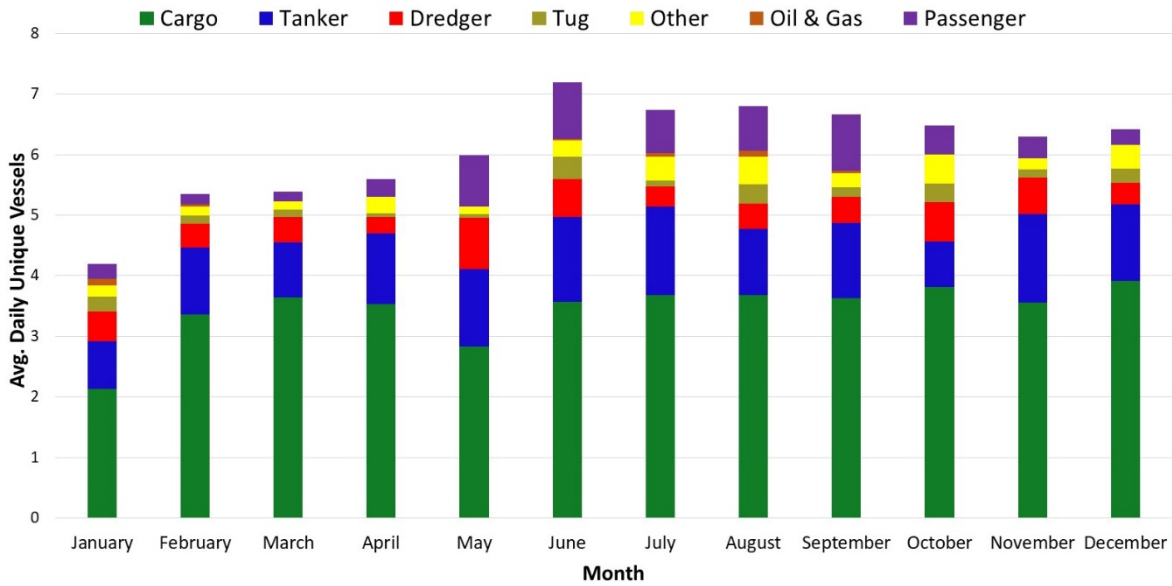
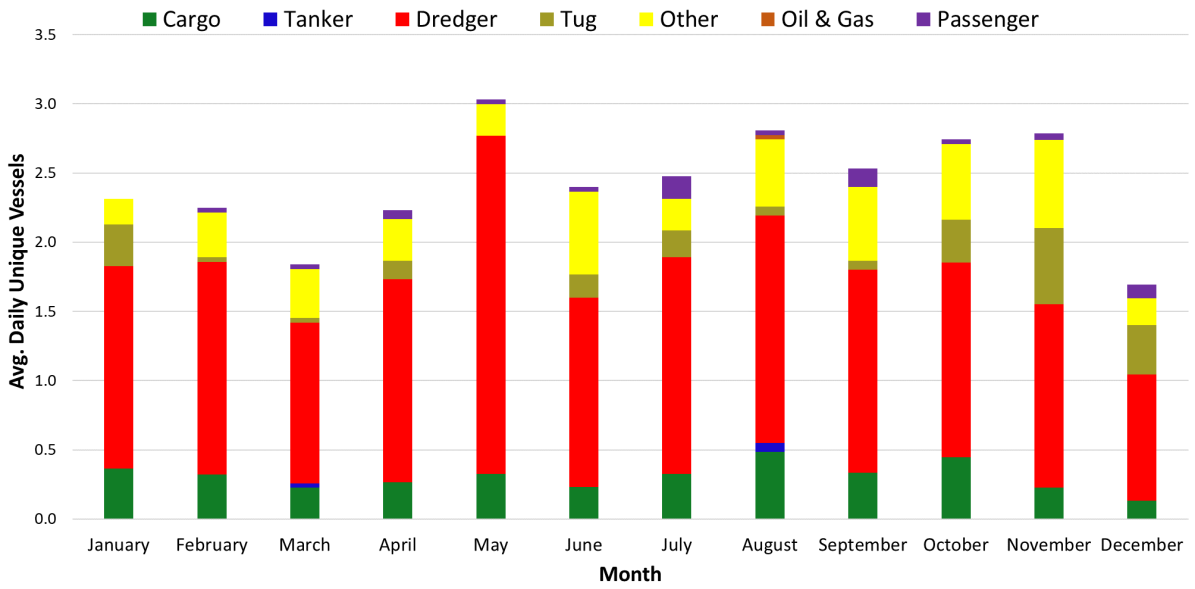


Figure B9 Long-term average daily counts by month per type within offshore cable corridor (2019)



Cargo vessels showed minimal seasonal variation with the busiest month within the study area being March with an average of 76 unique cargo vessels per day. The quietest month for cargo vessels was January with 68 unique cargo vessels per day.

Tankers similarly showed minimal seasonal variation with the busiest month within the study area being October with an average of 33 unique tankers per day. The quietest month for tankers was January with approximately 28 unique tankers per day.

Passenger vessels showed some seasonal variation, with a greater daily average of passenger vessels in the summer months. The busiest month within the study area was September with an average of nine unique passenger vessels per day. The quietest month was March with an average of four unique passenger vessels per day.

Table B1 presents a summary of the average number of vessels within the study area during the busiest month, quietest month, and the average throughout the full data period.

Table B1 Quietest month, busiest month and overall average daily count for commercial vessels (2019)

Vessel Type	Quietest month (unique vessels per day)	Busiest month (unique vessels per day)	Average (unique vessels per day)
Cargo	68	76	71
Tanker	28	33	31
Passenger	4	9	7
Marine aggregate dredger	3	5	3

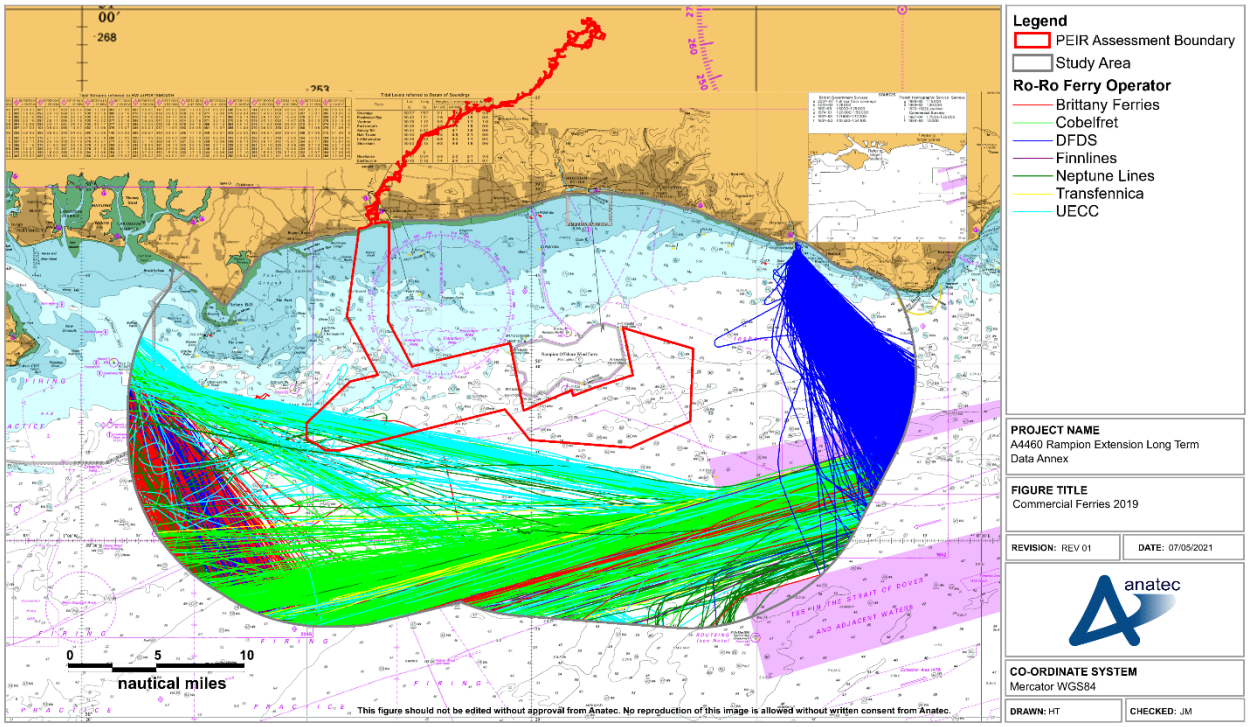
Vessel Type	Quietest month (unique vessels per day)	Busiest month (unique vessels per day)	Average (unique vessels per day)
Other	2	4	3
Tug	1	3	2
Oil and gas	0	1	1

In summary, the most common type of commercial vessel recorded withing the study area was cargo vessels. Cargo vessels and tankers showed little, if any, seasonal variation whilst passenger vessel activity was greater in the summer months.

Commercial ferries

Figure B10 presents the commercial ferries recorded within the study area during the data period, colour-coded by operator.

Figure B10 Commercial ferries within study area by operator (12 months, 2019)



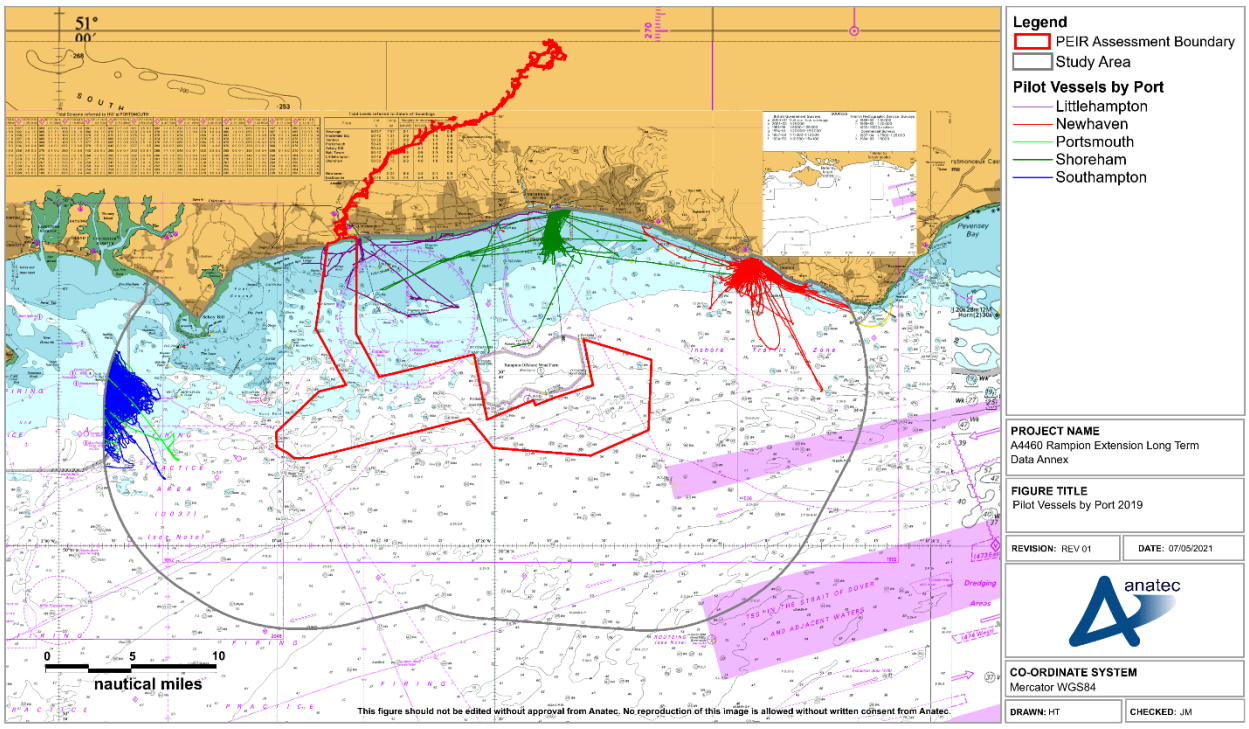
The most frequently recorded commercial ferry was the *Etretat*, a passenger ferry operated by Brittany Ferries between Portsmouth, Le Havre and Santander (Spain). Brittany Ferries was the most commonly recorded operator throughout the data period, followed by DFDS Seaways and Cobelfret Ferries.

The commercial ferry operators and their relative prominence within the study area is comparable with that observed during the vessel traffic surveys, although it is noted that the *Etretat* was not observed during the vessel traffic surveys, owing to COVID-19.

Pilot vessels

Figure B11 presents the pilot vessels recorded within the study area during the data period, colour-coded by port.

Figure B11 Pilot vessels within study area by port (12 months, 2019)



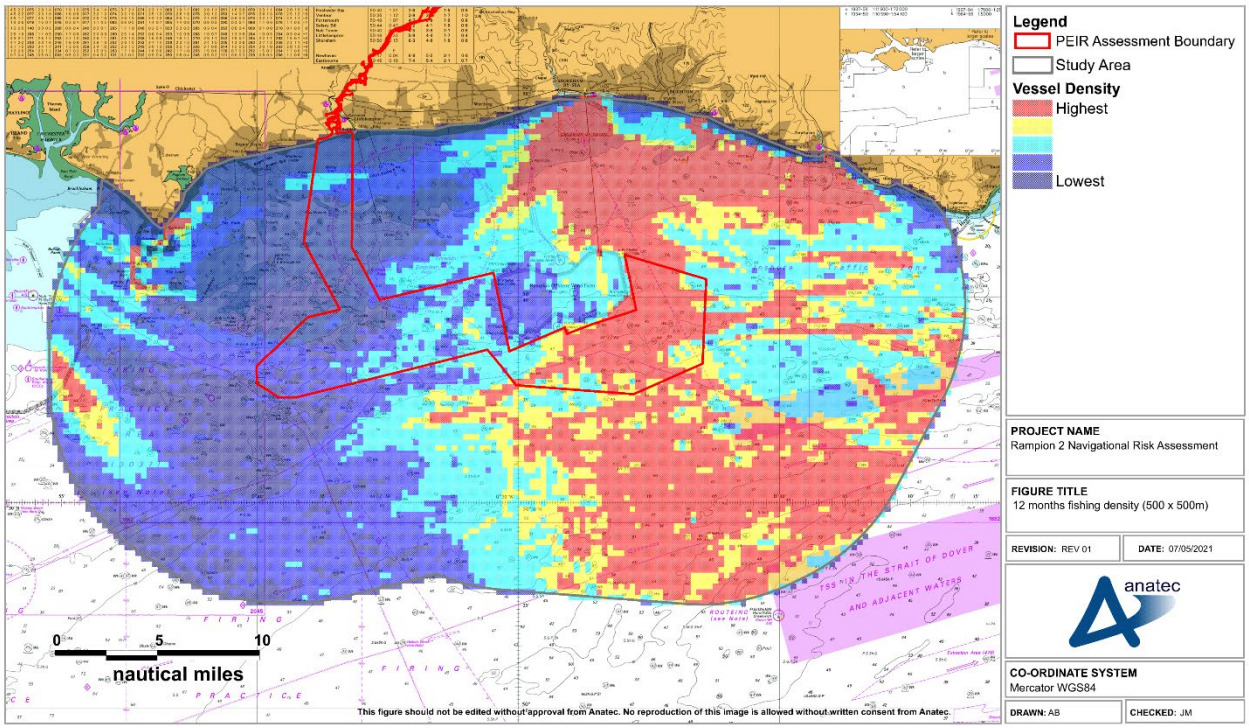
Pilot vessels were recorded operating within the study area from Shoreham, Newhaven, Littlehampton, Portsmouth and Southampton. No pilot vessels were recorded within the array area. A low level of activity was recorded within the offshore cable corridor associated with the pilot vessel for Littlehampton.

Fishing vessels

It should be considered that as this assessment considers AIS only, it is likely to be under representative of actual fishing vessel levels. Non-AIS fishing activity has been assessed within **paragraph 13.3.28**, and additional details are provided in **Chapter 10, Volume 2**.

Figure B12 presents a density plot of the AIS fishing vessel tracks recorded within the study area during the data period.

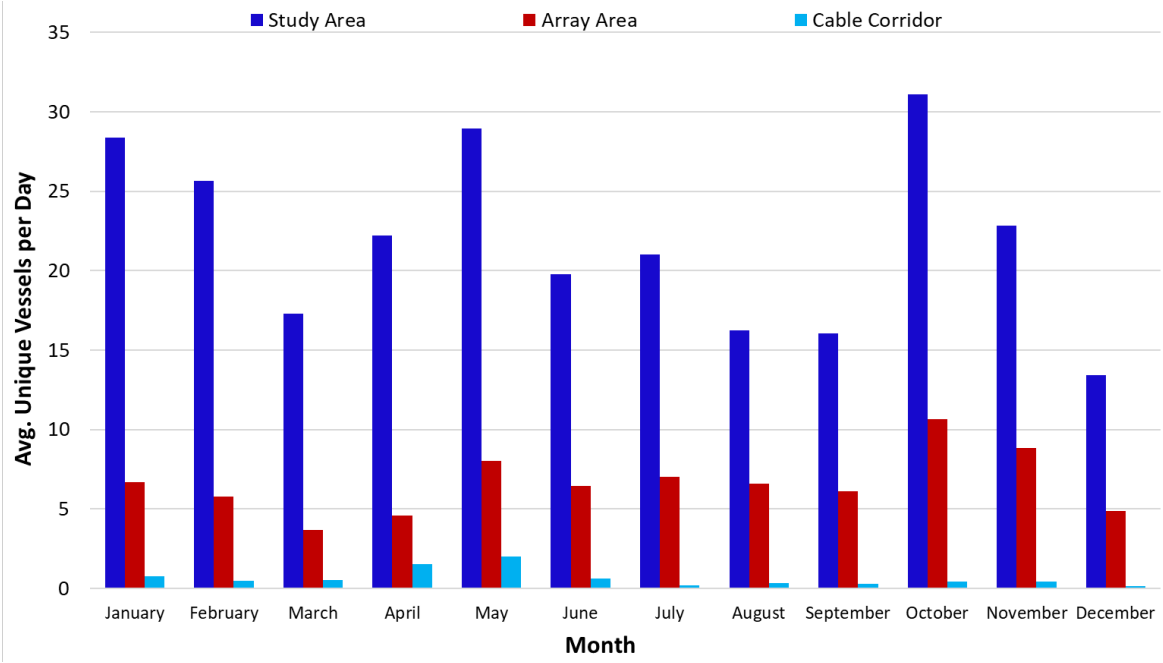
Figure B12 Fishing vessel density heat map within study area (12 months, 2019)



Fishing vessels were most frequently recorded within the eastern half of the study area. Based on the behaviour of vessel tracks, a significant number of fishing vessels were actively engaged in fishing with the majority of fishing activity taking place further offshore within the south and south east of the study area. Notable levels of transits through the array area to reach such areas are noted.

The daily average number of unique fishing vessels per day for each month recorded within the study area, as well as intersecting the array area and offshore cable corridor is summarised in **Figure B13**.

Figure B13 Average daily fishing vessels (2019)



The busiest month for fishing activity was October, with an average of 31 unique fishing vessels per day withing the study area. The quietest month for fishing within the study area was December with an average of 13 unique fishing vessels per day. Throughout all of 2019, an average of 22 unique fishing vessels per day were recorded.

Approximately 30 percent of fishing vessels were recorded intersecting the array area and approximately 7 percent of fishing vessels were recorded intersecting the offshore cable corridor.

Recreational vessels

Figure B14 presents a density plot of the AIS reactional vessel tracks recorded within the study area during the data period.

Figure B14 Recreational vessel density heat map within study area (12 months, 2019)

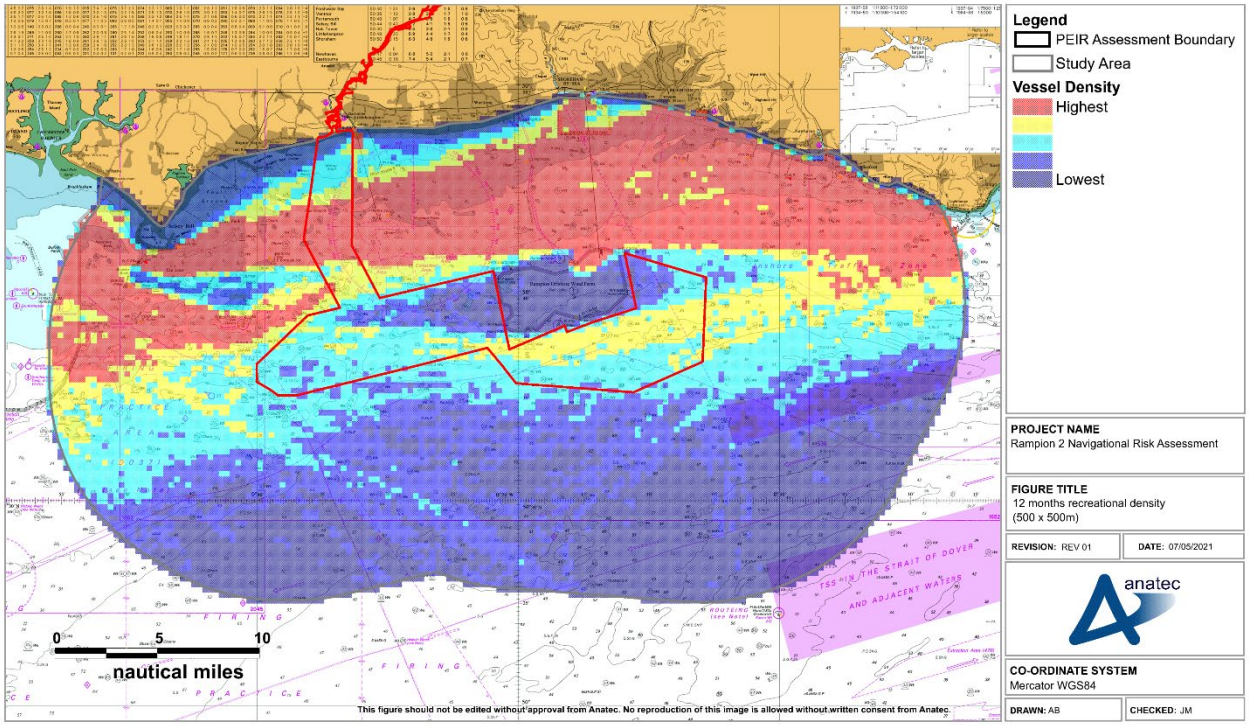
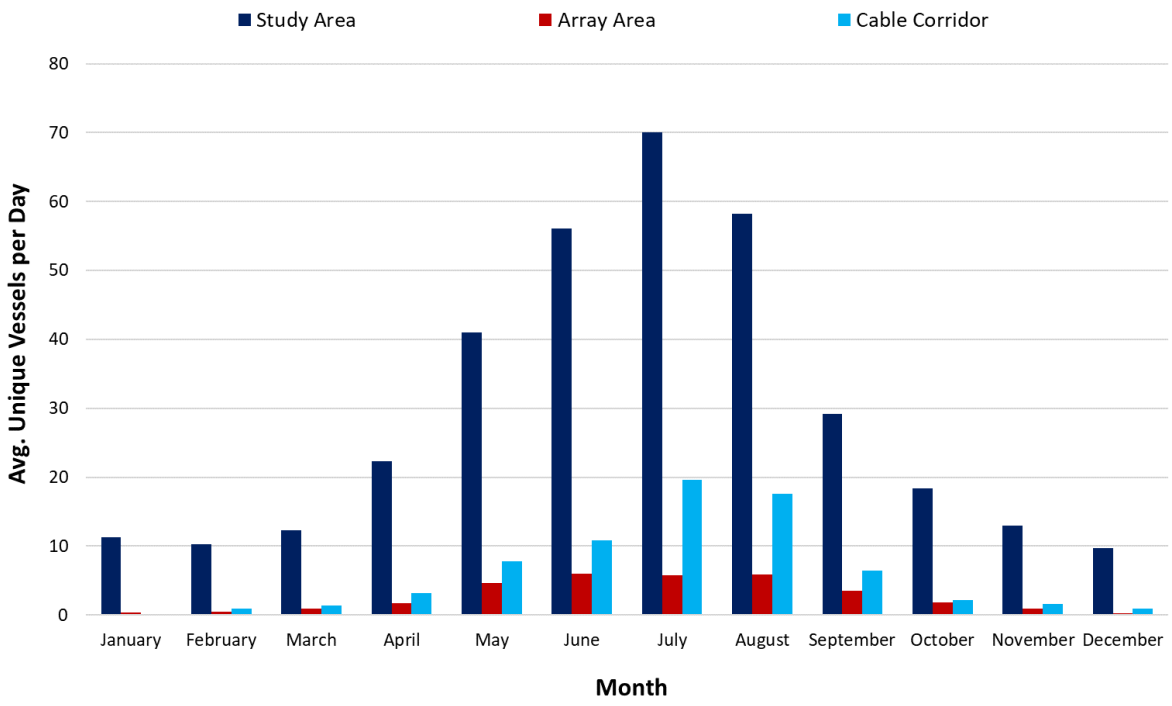


Figure B15 presents the average daily number of unique recreational vessels per month.

Figure B15 Average daily recreational vessels (2019)



The summer months of 2019 (May to August) recorded the most recreational vessel activity within the study area. This is largely due to the favourable sailing conditions that the summer weather brings.

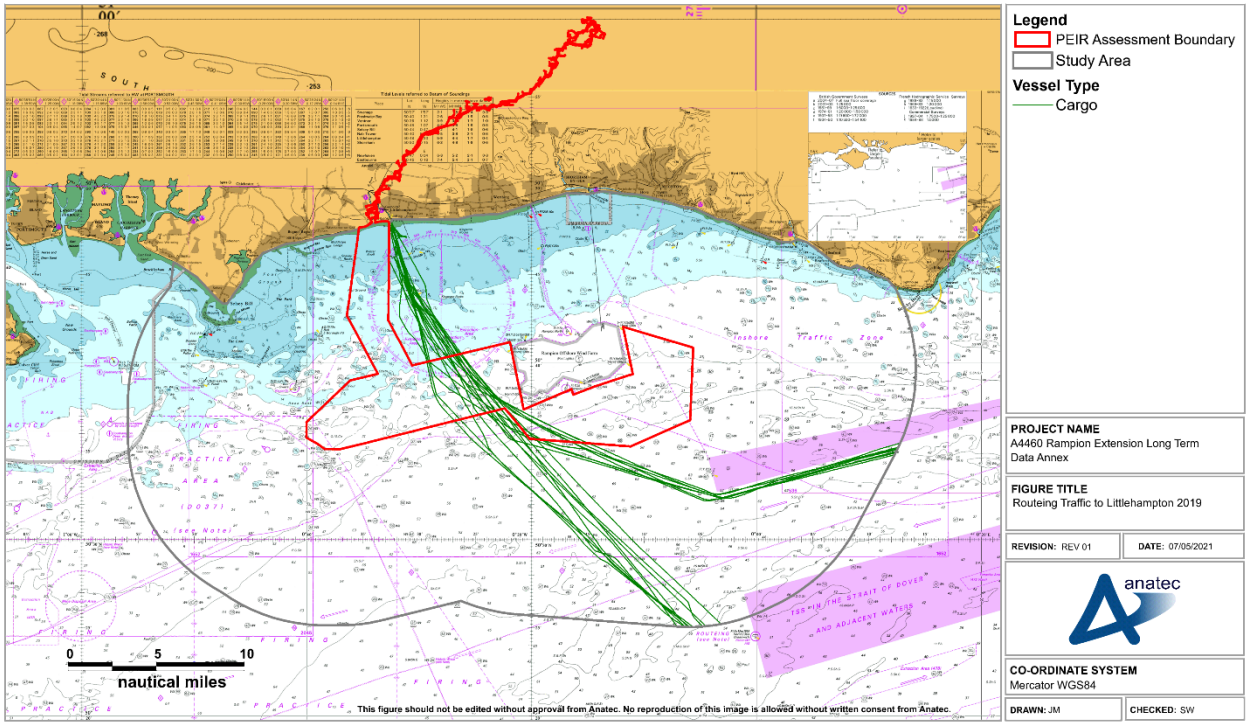
Throughout the whole of 2019, an average of 31 unique recreational vessels were recorded within the study area each day. The month with the most recreational activity was July, with an average of 70 unique recreational vessels recorded per day. The quietest month was December with an average of 10 unique recreational vessels per day.

Approximately 9 percent of recreational vessels were recorded intersecting the array area and approximately 21 percent of recreational vessels were recorded intersecting the offshore cable corridor.

Survey data comparison

The routeing of vessels during the vessel traffic surveys was similar overall to the long-term vessel traffic survey data and comparable to the routes defined in the NRA (see **paragraph 13.5.1**). However, one route was identified from the long-term data that was raised during consultation and absent from the vessel surveys. This is a route used primarily by three coasters between the Dover Strait TSS and Littlehampton. The vessel tracks identified on this route from the long-term vessel traffic data are presented in **Figure B16**.

Figure B16 Routeing traffic to Littlehampton within study area (12 months, 2019)



Fishing vessels were observed both transiting and engaged in fishing, notably within the east of the array area for the duration of both periods. The long-term vessel traffic data analysis also highlighted active fishing within the western extent of the PEIR Assessment Boundary. Actively fishing vessel activity within the south and south east of the study area was comparable for both periods.

Recreational vessel activity presence was high during the summer months of 2019, with little activity during the winter months. This is due to the favourable sailing conditions that

summer provides. This was reflected in the difference in recreational traffic levels in the two vessel traffic surveys.

A comparison of the average number of each main vessel type analysed in the previous sections recorded throughout the 2019 data period against the average number of each vessel type recorded throughout the two vessel traffic surveys are presented in **Table B2**.

Table B2 Comparison of the number of each main vessel type detected during 2019 and the vessel traffic survey data

Vessel type	Long-term AIS data			Summer survey	Winter survey
	Busiest month	Quietest month	Average vessels per day	Average vessels per day	Average vessels per day
Cargo vessels	Mar	Jan	71	59	70
Tankers	Dec	Jan	31	28	31
Passenger vessels	Sep	Jan	7	6	4
Marine aggregate dredgers	May	Apr	3	2	2
Recreational vessels	Jul	Dec	31	38	5
Fishing vessels	Oct	Dec	22	17	20

The daily average vessels were all slightly lower during the summer survey period, with the exception of recreational vessels. The slightly lower averages may be attributed to the effects of COVID-19. Whilst recreational vessel activity was higher in the summer survey, this is to be expected as August provides favourable sailing weather in comparison with the winter months. This is reflected in the long-term vessel traffic data since August was the second busiest month for recreational activity during 2019.

Conclusion

A year of 2019 AIS data has been analysed to validate the 2020 vessel traffic survey data recorded within the study area.

The main type of vessels detected within the study area during 2019 were cargo vessels (41 percent), tankers (18 percent), and recreational vessels (18 percent). Similarly, the main type of vessels detected during the 2020 summer survey within the study area were cargo vessels (37 percent), recreational vessels (24 percent) and tankers (17 percent) and during the 2020 winter survey within the study area were cargo vessels (48 percent), tankers (21 percent) and fishing vessels (14 percent). Smaller but significant numbers of passenger vessels were also detected during both periods. Overall, the vessel types detected within the study area were similar between the vessel traffic survey data and long-term vessel traffic data.

The average number of vessels per day within the study area were similar between the two datasets as was the routeing of vessels within the study area, with the exception of the small coaster route between Littlehampton and the Dover Strait TSS, although it is noted that vessel traffic volumes on this route were very low.

Annex C
Visual observations log of vessel traffic movements

During geophysical surveys undertaken on-site at the offshore cable corridor in July and August 2020, visual observations of vessels not broadcasting on AIS and located within or in proximity to the PEIR Assessment Boundary were collected.

The data collected consisted primarily of recreational vessels and fishing vessels and is illustrated in **paragraph 13.3.31**. This annex provides full details of visual observations log.

The visual observations log is provided in **Table C1**, with all times shown in Coordinated Universal Time (UTC).

Table C1 Visual observations log

Date	Time (UTC)	Vessel description	Length (m)	Speed (kt)	Course (°)	Comments
10 Jul 2020	04:51	Red fishing vessel	10	6	169	Vessel turned and crossed bow at range of 0.5nm
10 Jul 2020	05:01	Red fishing vessel	10	6	169	Vessel turned and crossed bow at range of 0.5nm
10 Jul 2020	05:11	Red fishing vessel	10	6	169	Vessel turned and crossed bow at range of 0.5nm
10 Jul 2020	06:20	Small sailing vessel	8	6	270	Vessel emerged from Rampion 1
10 Jul 2020	06:34	Small sailing vessel	8	6	270	Vessel emerged from Rampion 1
10 Jul 2020	06:58	Small sailing vessel	8	6	270	Vessel emerged from Rampion 1

Date	Time (UTC)	Vessel description	Length (m)	Speed (kt)	Course (°)	Comments
10 Jul 2020	07:57	Small fishing vessel w/ blue hull	12	2	71	Deploying gear
10 Jul 2020	08:10	Small fishing vessel w/ blue hull	12	2	71	Deploying gear
10 Jul 2020	08:20	Small fishing vessel w/ blue hull	12	2	71	Deploying gear
10 Jul 2020	08:12	Fishing vessel	10	1.6	228	–
10 Jul 2020	08:20	Fishing vessel	10	1.6	228	–
11 Jul 2020	04:52	Fishing vessel	10	4.4	50	–
11 Jul 2020	05:03	Fishing vessel	10	4.4	50	–
11 Jul 2020	05:20	Fishing vessel	10	4.4	50	–
11 Jul 2020	05:38	Fishing vessel w/ turquoise hull	10	1.5	60	–
11 Jul 2020	05:55	Fishing vessel w/ turquoise hull	10	1.5	60	–
11 Jul 2020	09:50	Fishing vessel	10	1.4	45	–
11 Jul 2020	09:56	Fishing vessel	10	1.4	45	–
11 Jul 2020	09:55	Fishing vessel	10	1.9	30	–
11 Jul 2020	10:06	Fishing vessel	10	1.9	30	–

Date	Time (UTC)	Vessel description	Length (m)	Speed (kt)	Course (°)	Comments
11 Jul 2020	10:15	Fishing vessel	10	7.6	310	–
11 Jul 2020	10:21	Fishing vessel	10	7.6	310	–
11 Jul 2020	11:32	Fishing vessel	10	6	310	–
11 Jul 2020	11:35	Fishing vessel	10	6	310	–
11 Jul 2020	11:56	Angling boat	10	12	–	–
11 Jul 2020	12:04	Blue fishing boat	10	8	–	–
11 Jul 2020	12:05	Angling boat	10	–	–	At anchor
11 Jul 2020	15:53	Fishing vessel	10	–	–	–
12 Jul 2020	04:48	Fishing vessel	8	2.2	166	–
12 Jul 2020	05:20	Fishing vessel	8	2.2	166	–
12 Jul 2020	05:33	Fishing vessel	8	2.2	166	–
12 Jul 2020	11:05	Non-commercial fishing vessel	10	0.6	346	–
12 Jul 2020	11:15	Non-commercial fishing vessel	10	0.6	346	–
12 Jul 2020	12:10	Angling boat	10	–	–	At anchor
12 Jul 2020	12:15	Angling boat	10	–	–	At anchor

Date	Time (UTC)	Vessel description	Length (m)	Speed (kt)	Course (°)	Comments
12 Jul 2020	12:30	Angling boat	10	0	–	At anchor
12 Jul 2020	14:56	Angling boat, blue and white	12	10	320	–
13 Jul 2020	08:30	Fishing vessel	10	0.3	225	–
13 Jul 2020	08:36	Fishing vessel	10	0.3	225	–
13 Jul 2020	08:31	Sailing vessel under power	10	6.4	253	–
13 Jul 2020	08:37	Sailing vessel under power	10	6.4	253	–
13 Jul 2020	08:35	Fishing vessel	10	9.5	225	Bow cross at 0.3nm
13 Jul 2020	08:41	Fishing vessel	10	9.5	225	Bow cross at 0.3nm
13 Jul 2020	09:53	Rigid Inflatable Boat (RIB) (diver)	8	6	283	Asked to move as over next port turn
13 Jul 2020	09:58	RIB (diver)	8	6	283	Asked to move as over next port turn
13 Jul 2020	15:34	Fishing vessel	10	0	–	Stopped and fishing
14 Jul 2020	11:20	Sailing vessel	10	6	259	–
14 Jul 2020	11:25	Fishing vessel, maroon hull	10	7.9	201	Called on VHF, no answer. Bow cross 0.2nm
14 Jul 2020	11:30	Fishing vessel, maroon hull	10	7.9	201	Called on VHF, no answer. Bow cross 0.2nm

Date	Time (UTC)	Vessel description	Length (m)	Speed (kt)	Course (°)	Comments
15 Jul 2020	08:43	Fishing vessel - no AIS	10	6.4	136	Bow cross 0.4nm
15 Jul 2020	08:47	Fishing vessel - no AIS	10	6.4	136	Bow cross 0.4nm
15 Jul 2020	09:20	Fishing vessel	10	8.7	225	Bow no. L1.10
15 Jul 2020	09:29	Angling boat	5	0	–	At anchor
15 Jul 2020	10:29	Non-commercial fishing vessel	10	0.1	260	No answer to VHF 10:29
16 Jul 2020	07:15	Commercial fishing vessel	10	2.9	251	–
16 Jul 2020	07:18	Commercial fishing vessel	10	2.9	251	–
16 Jul 2020	07:16	Commercial fishing vessel	10	5.6	177	–
16 Jul 2020	–	Fishing vessel	10	–	–	–
16 Jul 2020	10:30	Fishing vessel w/ blue hull and white w/house	10	5.7	335	Bow cross 0.2nm
16 Jul 2020	02:04	Fishing vessel w/ blue hull and white w/house	10	5.7	335	Bow cross 0.2nm
17 Jul 2020	08:48	Angling boat (catamaran)	10	8	–	–
17 Jul 2020	15:37	Commercial fishing vessel	10	4	32	Called to inform of pots potentially on our course, black flat buoys

Date	Time (UTC)	Vessel description	Length (m)	Speed (kt)	Course (°)	Comments
18 Jul 2020	06:20	Commercial fishing vessel	10	1	170	North east of site, stopping by his pots
18 Jul 2020	07:37	Commercial fishing vessel	10	1	170	North east of site, stopping by his pots
18 Jul 2020	07:00	Commercial fishing vessel	10	2	255	AIS appeared when closer to him
19 Jul 2020	09:01	Speed boat	10	9	70	Asked to pass astern on CH15
19 Jul 2020	13:50	Black fishing boat	10	9	24	–
20 Jul 2020	13:24	Fishing boat	10	6	0	–
21 Jul 2020	07:04	Commercial fishing vessel	12	1.2	78	Blue hull
21 Jul 2020	07:16	Commercial fishing vessel	12	1.2	78	Blue hull
25 Jul 2020	07:23	Commercial fishing vessel	30	5.2	300	–
27 Jul 2020	09:21	Fishing vessel	8	4.5	0	–
29 Jul 2020	18:30	Fishing vessel	12		0	Red hull
6 Aug 2020	06:48	–	10	6	90	–
6 Aug 2020	07:00	Motor cruiser	8	15	270	–
8 Aug 2020	06:40	Fishing boat	10	4	90	–
8 Aug 2020	07:54	Small red fishing vessel	7	6	180	–

Date	Time (UTC)	Vessel description	Length (m)	Speed (kt)	Course (°)	Comments
8 Aug 2020	11:48	White sailing vessel	8	4	270	–
8 Aug 2020	13:51	Orange RIB	3	15	90	–
8 Aug 2020	14:02	White sailing vessel	7	3	270	–
9 Aug 2020	11:22	Blue angling boat	10	0	–	At anchor
9 Aug 2020	14:28	White angling boat	11.2	15	0	–
10 Aug 2020	13:32	Small fishing boat	6	10	S	–
11 Aug 2020	07:15	Angling boat	10	5	SW	–
11 Aug 2020	08:09	Sailing boat	8	6	E	–

Annex D
Marine Guidance Note 543 checklist

The MGN 543 compliance checklist is presented in **Table D1**. Following this, the MGN 543 general comments checklist is presented in **Table D2**. For both checklists, references to where the relevant content is provided in the NRA or **Chapter 13, Volume 2** is given.

Table D1 MGN 543 compliance checklist

Issue	Compliance	Comments
Annex 1: Considerations on Site Position, Structures and Safety Zones		
1. Site and Installation Coordinates. Developers are responsible for ensuring that formally agreed coordinates and subsequent variations of site perimeters and individual OREI structures are made available, on request, to interested parties at relevant project stages, including application for consent, development, array variation, operation and decommissioning. This should be supplied as authoritative Geographical Information System (GIS) data, preferably in Environmental Systems Research Institute (ESRI) format. Metadata should facilitate the identification of the data creator, its date and purpose, and the geodetic datum used. For mariners' use, appropriate data should also be provided with latitude and longitude coordinates in WGS84 (ETRS89) datum. **2. Traffic Survey.** Includes the following:		
All vessel types.	✓	**Section 13: Vessel traffic movements** Analyses the breakdown of vessel types recorded during both study periods including within the study area, array area and offshore cable corridor.
At least 28 days duration, within either 12 or 24 months prior to submission of the ES.	✓	**Section 7: Vessel traffic survey methodology** A total of 28 full days of vessel traffic survey data has been assessed, consisting of 14 full days in August 2020 and 14 full days in November 2020.
Multiple data sources.	✓	**Section 5: Data sources** A range of data sources relating to vessel traffic movements have been analysed including a long-term AIS dataset covering 12 months in 2019.
Seasonal variations.	✓	**Section 7: Vessel traffic survey methodology** A total of 28 full days of vessel traffic survey data has been assessed, consisting of 14 full days in August 2020 and 14 full days in November 2020. **Annex B: Long-term vessel traffic movements** To assist with the assessment of seasonal variation a long-term AIS dataset covering 12 months in 2019 has also been assessed.

Issue	Compliance	Comments
MCA consultation.	✓	**Section 4: Consultation** The MCA has been consulted as part of the NRA process including through the Hazard Workshop.
General Lighthouse Authority (GLA) consultation.	✓	**Section 4: Consultation** Trinity House has been consulted as part of the NRA process including through the Hazard Workshop.
UK Chamber of Shipping consultation.	✓	**Section 4: Consultation** The UK Chamber of Shipping has been consulted as part of the NRA process including through the Hazard Workshop.
Recreational and fishing vessel organisations consultation.	✓	**Section 4: Consultation** The RYA, CA and NFFO has been consulted as part of the NRA process including through the Hazard Workshop (RYA only).
Port and navigation authorities consultation, as appropriate.	✓	**Section 4: Consultation** Shoreham Port, Newhaven Port & Properties, Littlehampton Board and ABP Southampton have been consulted as part of the NRA process including through the Hazard Workshop.
Assessment of the cumulative and individual effects of (as appropriate):		
i. Proposed OREI site relative to areas used by any type of marine craft.	✓	**Section 13: Vessel traffic movements** Considers vessel behaviour in proximity to Rampion 2 including any activities undertaken by vessels. **Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase.
ii. Numbers, types and sizes of vessels presently using such areas.	✓	**Section 13: Vessel traffic movements** Analyses the vessel numbers, types, and sizes of vessels recorded in proximity to Rampion 2 throughout the vessel traffic survey periods.
iii. Non-transit uses of the areas, for example fishing, day cruising of leisure craft, racing, aggregate dredging, etc.	✓	**Section 9: Navigational features** Identifies non-transit uses of the areas in proximity to Rampion 2, including marine aggregate dredging and anchoring. **Section 13: Vessel traffic movements** Considers behaviour in proximity to Rampion 2 including any non-transit activities undertaken by vessels.

Issue	Compliance	Comments
iv. Whether these areas contain transit routes used by coastal or deep-draught vessels on passage.	✓	**Section 13: Vessel traffic movements** Analyses the sizes of vessels recorded in proximity to Rampion 2 throughout the vessel traffic survey periods and identifies the main commercial routes using the principles set out in MGN 543.
v. Alignment and proximity of the site relative to adjacent shipping lanes.	✓	**Section 9: Navigational features** Identifies the IMO routeing measures in proximity to Rampion 2.
vi. Whether the nearby area contains prescribed routeing schemes or precautionary areas.	✓	**Section 9: Navigational features** Identifies the IMO routeing measures and precautionary areas such as military PEXAs, foul grounds and spoil grounds in proximity to Rampion 2.
vii. Whether the site lies on or near a prescribed or conventionally accepted separation zone between two opposing routes.	✓	**Section 9: Navigational features** Identifies the IMO routeing measures in proximity to Rampion 2.
viii. Proximity of the site to areas used for anchorage, safe haven, port approaches and pilot boarding or landing areas.	✓	**Section 9: Navigational features** Identifies the anchorage areas, port approaches and pilot boarding stations in proximity to Rampion 2. **Section 14: Adverse Weather Impacts** Identifies safe havens in proximity to Rampion 2.
ix. Whether the site lies within the jurisdiction of a port and/or navigation authority.	✓	**Section 9: Navigational features** Identifies the locations of ports in proximity to Rampion 2.
x. Proximity of the site to existing fishing grounds, or to routes used by fishing vessels to such grounds.	✓	**Section 13 Vessel traffic movements** Analyses commercial fishing vessels activity in proximity to Rampion 2. It is noted that detailed analysis of dedicated fishing vessel activities is undertaken in **Chapter 10, Volume 2**.
xi. Proximity of the site to offshore firing/bombing ranges and areas used for any marine military purposes.	✓	**Section 9: Navigational features** Identifies military PEXAs in proximity to Rampion 2.

Issue	Compliance	Comments
xii. Proximity of the site to existing or proposed offshore oil/gas platform, marine aggregate dredging, marine archaeological sites or wrecks, Marine Protected Area or other exploration/exploitation sites.	✓	**Section 9: Navigational features** Identifies the marine aggregate dredging areas and wrecks in proximity to Rampion 2. **Section 16: Cumulative and transboundary overview** Considers exploration/exploitation sites in proximity to Rampion 2 cumulatively.
xiii. Proximity of the site to existing or proposed OREI developments, in co-operation with other relevant developers, within each round of lease awards.	✓	**Section 9: Navigational features** Identifies other offshore wind farm developments in proximity to Rampion 2. **Section 16: Cumulative and transboundary overview** Considers other OREI sites in proximity to Rampion 2 cumulatively.
xiv. Proximity of the site relative to any designated areas for the disposal of dredging spoil or other dumping ground.	✓	**Section 9: Navigational features** Identifies spoil and dumping rounds in proximity to Rampion 2.
xv. Proximity of the site to aids to navigation and/or VTS in or adjacent to the area and any impact thereon.	✓	**Section 9: Navigational features** Identifies aids to navigation and VTS in proximity to Rampion 2.
xvi. Researched opinion using computer simulation techniques with respect to the displacement of traffic and, in particular, the creation of 'choke points' in areas of high traffic density and nearby or consented OREI sites not yet constructed.	✓	**Section 18: Collision and allision risk modelling** Provides quantification of collision and allision risk resulting from Rampion 2 including choke points in proximity to Rampion 2.

Issue	Compliance	Comments
xvii. With reference to xvi. above, the number and type of incidents to vessels which have taken place in or near to the proposed site of the OREI to assess the likelihood of such events in the future and the potential impact of such a situation.	✓	**Section 12: Historical maritime incidents** Considers historical maritime incidents in proximity to Rampion 2.
3. OREI Structures. The following should be determined:		
a. Whether any feature of the OREI, including auxiliary platforms outside the main generator site, mooring and anchoring systems, inter-device and export cabling could pose any type of difficulty or danger to vessels underway, performing normal operations, including fishing, anchoring and emergency response.	✓	**Section 8: Project description relevant to shipping and navigation** Outlines the maximum design scenario for shipping and navigation for Rampion 2. **Section 15: Navigation, communication and position fixing equipment** Considers how Rampion 2 could affect vessel operations with regards to navigation, communication, and position fixing equipment. **Section 18: Collision and allision risk modelling** Provides quantification of collision and allision risk resulting from Rampion 2. **Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase including in relation to anchoring and emergency response capability.
b. Clearances of WTG blades above the sea surface are not less than 22m above MHWS.	✓	**Section 8: Project description relevant to shipping and navigation** Outlines the maximum design scenario for shipping and navigation for Rampion 2 including the minimum air gap above HAT.

Issue	Compliance	Comments
c. Underwater devices: i. Changes to charted depth; ii. Maximum height above seabed; and iii. Under keel clearance.	✓	**Section 8: Project description relevant to shipping and navigation** Outlines the maximum design scenario for shipping and navigation for Rampion 2 including the cable burial specifications. **Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase including in relation to changes in under keel clearance.
d. The burial depth of cabling and changes to charted depths associated with any protection measures.	✓	**Section 8: Project description relevant to shipping and navigation** Outlines the maximum design scenario for shipping and navigation for Rampion 2 including the cable burial specifications. **Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase including in relation to changes in under keel clearance.
4. Assessment of access to and navigation within, or close to an OREI. To determine the extent to which navigation would be feasible within the OREI site itself by assessing whether:		
Navigation within or close to the site would be safe:		
i. By all vessels.		**Section 14: Adverse weather impacts** Identifies adverse weather routeing in proximity to Rampion 2. **Section 15: Navigation, communication and position fixing equipment** Considers how Rampion 2 could affect vessel operations with regards to navigation, communication, and position fixing equipment. **Section 18: Collision and allision risk modelling** Provides quantification of collision and allision risk resulting from Rampion 2. **Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase.
ii. By specified vessel types, operations and/or sizes.		
iii. In all directions or areas.		
iv. In specified directions or areas.		
v. In specified tidal, weather or other conditions.		
b. Navigation in and/or near the site should be:		

Issue	Compliance	Comments
i. Prohibited by specified vessel types, operations and/or sizes.	✓	**Section 15: Navigation, communication and position fixing equipment** Considers how Rampion 2 could affect vessel operations with regards to navigation, communication, and position fixing equipment. **Section 18: Collision and allision risk modelling** Provides quantification of collision and allision risk resulting from Rampion 2 with the assumption that commercial vessel traffic will avoid the array area. **Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase.
ii. Prohibited in respect of specific activities.	✓	
iii. Prohibited in all areas or directions.	✓	
iv. Prohibited in specified areas or directions.	✓	
v. Prohibited in specified tidal or weather conditions.	✓	
vi. Recommended to the avoided.	✓	
c. Exclusion from the site could cause navigational, safety or routeing problems for vessels operating in the area for example, by preventing vessels from responding to calls for assistance from persons in distress.	✓	**Section 18: Collision and allision risk modelling** Provides quantification of collision and allision risk resulting from Rampion 2 with the assumption that commercial vessel traffic will avoid the array area. **Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase.
d. Relevant information concerning a decision to seek a Safety Zone for a particular site during any point in its construction, extension, operation or decommissioning should be specified in the ES accompanying the development application.	✓	**Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including the application for Safety Zones.
Annex 2: Navigation, collision avoidance and communications		
1. The effect of tides and tidal streams. It should be determined whether:		

Issue	Compliance	Comments
a. Current maritime traffic flows and operations in the general area are affected by the depth of water in which the proposed installation is situated at various states of the tide, i.e. whether the installation could pose problems at high water which do not exist at low water conditions, and vice versa.	✓	**Section 8: Project description relevant to shipping and navigation** Outlines the maximum design scenario for shipping and navigation for Rampion 2 including the range of existing water depths. **Section 10: Meteorological ocean data** Provides meteorological data in proximity to Rampion 2 including tidal data. **Section 13: Vessel traffic movements** Analyses the sizes of vessels recorded in proximity to Rampion 2 throughout the survey periods including vessel draught. **Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase including in relation to changes in under keel clearance.
b. The set and rate of the tidal stream, at any state of the tide, has a significant affect on vessels in the area of the OREI site.	✓	**Section 10: Meteorological ocean data** Provides meteorological data in proximity to Rampion 2 including tidal data. **Section 18: Collision and allision risk modelling** Provides quantification of collision and allision risk resulting from Rampion 2 with tidal conditions includes as input.
c. The maximum rate tidal stream runs parallel to the major axis of the proposed site layout, and, if so, its effect.	✓	
d. The set is across the major axis of the layout at any time, and, if so, at what rate.	✓	
e. In general, whether engine failure or other circumstance could cause vessels to be set into danger by the tidal stream.	✓	**Section 10: Meteorological ocean data** Provides meteorological data in proximity to Rampion 2 including tidal data. **Section 18: Collision and allision risk modelling** Provides quantification of collision and allision risk resulting from Rampion 2 with tidal conditions included as input and includes drifting risk.

Issue	Compliance	Comments
f. The structures themselves could cause changes in the set and rate of the tidal stream.	✓	**Section 10: Meteorological ocean data** Provides meteorological data in proximity to Rampion 2 including tidal data, noting that no effects are anticipated.
g. The structures in the tidal stream could be such as to produce siltation, deposition of sediment or scouring, affecting navigable water depths in the wind farm area or adjacent to the area	✓	**Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase including in relation to changes in under keel clearance.
2. Weather. It should be determined whether:		
a. The site, in normal, bad weather, or restricted visibility conditions, could present difficulties or dangers to craft, including sailing vessels, which might pass in close proximity to it.	✓	**Section 10: Meteorological ocean data** Provides meteorological data in proximity to Rampion 2 including visibility data. **Section 14: Adverse weather impacts** Identifies adverse weather routeing in proximity to Rampion 2. **Section 18: Collision and allision risk modelling** Provides quantification of collision and allision risk resulting from Rampion 2 with weather and visibility conditions included as input. **Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase including in relation to adverse weather routeing and drifting risk.
b. The structures could create problems in the area for vessels under sail, such as wind masking, turbulence or sheer.	✓	**Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase including in relation to allision risk internally within the array for vessels under sail.

Issue	Compliance	Comments
c. In general, taking into account the prevailing winds for the area, whether engine failure or other circumstances could cause vessels to drift into danger, particularly if in conjunction with a tidal set such as referred to above.	✓	**Section 10: Meteorological ocean data** Provides meteorological data in proximity to Rampion 2 including wind data. **Section 18: Collision and allision risk modelling** Provides quantification of collision and allision risk resulting from Rampion 2 with weather conditions includes as input and includes drifting risk.
3. Collision avoidance and visual navigation. It should be determined whether:		
a. The layout design will allow safe transit through the OREI by SAR helicopters and vessels.	✓	**Section 8: Project description relevant to shipping and navigation** Outlines the maximum design scenario for shipping and navigation for Rampion 2 including the indicative worst case layout for shipping and navigation. **Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase including in relation to emergency response capability.
b. The MCA's Navigation Safety Branch and Maritime Operations branch will be consulted on the layout design and agreement will be sought.	✓	**Section 4: Consultation** The MCA has been consulted as part of the NRA process including in relation to the array layout.
c. The layout design has been or will be determined with due regard to safety of navigation and SAR.	✓	**Section 8: Project description relevant to shipping and navigation** Outlines the maximum design scenario for shipping and navigation for Rampion 2 including the indicative worst case layout for shipping and navigation. **Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase including in relation to emergency response capability.
d.i. The structures could block or hinder the view of other vessels under way on any route.	✓	**Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase including in relation to collision risk. The issue of the wind farm structures blocking the view of vessels is considered in **Chapter 13, Volume 2**.

Issue	Compliance	Comments
d.ii. The structures could block or hinder the view of the coastline or of any other navigational feature such as aids to navigation, landmarks, promontories, etc	✓	**Section 19: Impact identification** Identifies the effects of Rampion 2 on shipping and navigation for each phase including in relation to prevention of use of existing aids to navigation. **Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including cumulative considerations when determining lighting and marking.
4. Communications, Radar and positioning systems. To provide researched opinion of a generic and, where appropriate, site specific nature concerning whether:		
a. The structures could produce radio interference such as shadowing, reflections or phase changes, and emissions with respect to any frequencies used for marine positioning, navigation and timing (PNT) or communications, including Global Maritime Distress and Safety System (GMDSS) and AIS, whether ship borne, ashore or fitted to any of the proposed structures, to:		
i. Vessels operating at a safe navigational distance.	✓	**Section 15: Navigation, communication and position fixing equipment** Considers how Rampion 2 could affect vessel operations with regards to navigation, communication, and position fixing equipment including in relation to radio interference.
ii. Vessels by the nature of their work necessarily operating at less than the safe navigational distance to the OREI, for example, support vessels, survey vessels, SAR assets.	✓	
iii. Vessels by the nature of their work necessarily operating within the OREI.	✓	
b. The structures could produce Radar reflections, blind spots, shadow areas or other adverse effects:		
i. Vessel to vessel.	✓	**Section 15: Navigation, communication and position fixing equipment** Considers how Rampion 2 could affect vessel operations with regards to navigation, communication, and position fixing equipment including in relation to Radar interference.
ii. Vessel to shore.	✓	
iii. VTS Radar to vessel.	✓	
iv. Racon to/from vessel.	✓	

Issue	Compliance	Comments
c. The structures and generators might produce SONAR interference affecting fishing, industrial or military systems used in the area.	✓	**Section 15: Navigation, communication and position fixing equipment** Considers how Rampion 2 could affect vessel operations with regards to navigation, communication, and position fixing equipment including in relation to SONAR.
d. The site might produce acoustic noise which could mask prescribed sound signals.	✓	**Section 15: Navigation, communication and position fixing equipment** Considers how Rampion 2 could affect vessel operations with regards to navigation, communication, and position fixing equipment including in relation to noise.
e. Generators and the seabed cabling within the site and onshore might produce electro-magnetic fields affecting compasses and other navigation systems.	✓	**Section 15: Navigation, communication and position fixing equipment** Considers how Rampion 2 could affect vessel operations with regards to navigation, communication, and position fixing equipment including in relation to electromagnetic interference.
5. Marine navigational marking. It should be determined:		
a. How the overall site would be marked by day and by night throughout construction, operation and decommissioning phases, taking into account that there may be an ongoing requirement for marking on completion of decommissioning, depending on individual circumstances.	✓	**Section 4: Consultation** Trinity House has been consulted as part of the NRA process including in relation to preliminary lighting and marking considerations. **Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including lighting and marking.
b. How individual structures on the perimeter of and within the site, both above and below the sea surface, would be marked by day and by night.	✓	

Issue	Compliance	Comments
c. If the specific OREI structure would be inherently Radar conspicuous from all seaward directions (and for SAR and maritime surveillance aviation purposes) or would require passive enhancers.	✓	Not applicable to Rampion 2.
d. If the site would be marked by additional electronic means, for example, Racons.	✓	**Section 4: Consultation** Trinity House has been consulted as part of the NRA process including in relation to preliminary lighting and marking considerations. **Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including lighting and marking.
e. If the site would be marked by an AIS transceiver, and if so, the data it would transmit.	✓	
f. If the site would be fitted with audible hazard warning in accordance with IALA recommendations.	✓	
g. If the structure(s) would be fitted with aviation lighting, and if so, how these would be screened from mariners or guarded against potential confusion with other navigational marks and lights.	✓	
h. Whether the proposed site and/or its individual generators complies in general with markings for such structures, as required by the relevant GLA in consideration of IALA guidelines and recommendations.	✓	

Issue	Compliance	Comments
i. The aids to navigation specified by the GLAs are being maintained such that the 'availability criteria', as laid down and applied by the GLAs, is met at all times.	✓	
j. The procedures that need to be put in place to respond to casualties to the aids to navigation specified by the GLA, within the timescales laid down and specified by the GLA.	✓	
k. The ID marking will conform to a spreadsheet layout, sequential, aligned with SAR lanes and avoid the letters O and I.	✓	
l. Working lights will not interfere with aids to navigation or create confusion for the Mariner navigating in or near the OREI.	✓	
6. Hydrography. In order to establish a baseline, confirm the safe navigable depth, monitor seabed mobility and to identify underwater hazards, detailed and accurate hydrographic surveys are included or acknowledged for the following stages and to MCA specifications:		
i. Pre-consent: The site and its immediate environs extending to 500m outside of the development area shall be undertaken as part of the licence and/or consent application. The survey shall include all proposed cable route(s).	✓	**Section 21: Through life safety management** Confirms that hydrographic surveys will be undertaken in line with MCA requirements.
ii. Post-construction: Cable route(s)	✓	

Issue	Compliance	Comments
iii. Post-decommissioning of all or part of the development: Cable route(s) and the area extending to 500m from the installed generating assets area.	✓	
Annex 3: MCA template for assessing distances between wind farm boundaries and shipping routes		
"*Shipping Route*" template and Interactive Boundaries – where appropriate, the following should be determined:		
a. The safe distance between a shipping route and turbine boundaries.	✓	**Section 17: Future case vessel traffic** Outlines the methodology for safe distances between main commercial routes and the array area.
b. The width of a corridor between sites or OREIs to allow safe passage of shipping.	✓	Not applicable to Rampion 2.
Annex 4: Safety and mitigation measures recommended for OREI during construction, operation and decommissioning		
Mitigation and safety measures will be applied to the OREI development appropriate to the level and type of risk determined during the EIA. The specific measures to be employed will be selected in consultation with the MCA and will be listed in the developer's ES. These will be consistent with international standards contained in, for example, SOLAS Chapter V (IMO, 1974), and could include any or all of the following:		
i. Promulgation of information and warnings through notices to mariners and other appropriate MSI dissemination methods.	✓	**Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including promulgation of information.
ii. Continuous watch by multi-channel VHF, including DSC.	✓	**Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including promulgation of information.

Issue	Compliance	Comments
iii. Safety zones of appropriate configuration, extent and application to specified vessels[7].	✓	**Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including the application for Safety Zones.
iv. Designation of the site as an Area to be Avoided (ATBA).	✓	There are no plans to designate Rampion 2 as an ATBA.
v. Provision of aids to navigation as determined by the GLA.		**Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including lighting and marking.
vi. Implementation of routeing measures within or near to the development.	✓	There are no plans to implement any routeing measures in proximity to Rampion 2.
vii. Monitoring by Radar, AIS, Closed Circuit Television (CCTV) or other agreed means.	✓	**Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including traffic monitoring.
viii. Appropriate means for OREI operators to notify, and provide evidence of, the infringement of Safety Zones.	✓	**Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including the application for Safety Zones and use of guard vessels.
ix. Creation of an ERCoP with the MCA's SAR Branch for the construction phase onwards.	✓	**Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including compliance with MGN 543 which include the provision of an ERCoP.
x. Use of guard vessels, where appropriate	✓	**Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including the use of guard vessels.

[7] As per SI 2007 No 1948 "The Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007.

Issue	Compliance	Comments
xi. Any other measures and procedures considered appropriate in consultation with other stakeholders.	✓	**Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts. **Section 21: Through life safety management** Outlines how QHSE documentation will be maintained and reviewed.
Annex 5: Standards, procedures and operational requirements in the event of search and rescue, maritime assistance service counter pollution or salvage incident in or around an OREI, including generator/installation control and shutdown.		
The MCA, through HM Coastguard, is required to provide Search and Rescue and emergency response within the sea area occupied by all offshore renewable energy installations in UK waters. To ensure that such operations can be safely and effectively conducted, certain requirements must be met by developers and operators.		
a. An ERCoP will be developed for the construction, operation and decommissioning phases of the OREI.	✓	**Section 20: Embedded environmental measures** Outlines the embedded environmental measures to be implemented to reduce the effects of shipping and navigation impacts including compliance with MGN 543 which include the provision of an ERCoP.
b. The MCA's guidance document *Offshore Renewable Energy Installations: Requirements, Guidance and Operational Considerations for Search and Rescue and Emergency Response* (MCA, 2018) for the design, equipment and operation requirements will be followed.	✓	**Section 2: Guidance and legislation** Outlines the guidance and legislation used within the NRA including the MCA's SAR and emergency response guidance document.

Table D2 MGN 543 general comments checklist

Issue	Compliance	Reference and notes
A1. Reference sources - lessons learnt	✓	**Section 6: Lessons learnt**
B1. Base case traffic densities and types	✓	**Section 13: Vessel traffic movements**

Issue	Compliance	Reference and notes
B2. Future case traffic densities and types	✓	**Section 17: Future case vessel traffic**
B3. The marine environment:		
B3.1 Technical & operational analysis	✓	**Section 8: Project description relevant to shipping and navigation**
B3.2 Generic technical and operational analysis (TOA)	✓	**Section 18: Collision and allision risk modelling**
B3.3 Potential accidents	✓	**Section 19: Impact identification** **Annex A: Hazard log**
B3.4 Affected navigational activities	✓	**Section 19: Impact identification**
B3.5 Effects of OREI structures	✓	**Section 15: Navigation, communication and position fixing equipment** **Section 18: Collision and allision risk modelling**
B3.6 Development phases	✓	**Section 8: Project description relevant to shipping and navigation**
B3.7 Other structures and features	✓	**Section 9: Navigational features** **Section 16: Cumulative and transboundary overview**
B3.8 Vessel types involved	✓	**Section 12: Historical maritime incidents** **Section 13: Vessel traffic movements**
B3.9 Conditions affecting navigation	✓	**Section 10: Meteorological ocean data** **Section 14: Adverse weather impacts**
B3.10 Human actions	✓	**Chapter 13, Volume 2**
C1. Hazard identification	✓	**Section 19: Impact identification** **Annex A: Hazard log**
C2. Risk assessment	✓	**Section 3: Navigational risk assessment methodology** **Annex A: Hazard log** **Chapter 13, Volume 2**
C3. Influences on level of risk	✓	
C4. Tolerability of risk	✓	
D1. Appropriate risk assessment	✓	**Section 3: Navigational risk assessment methodology** **Chapter 13, Volume 2**
D2. MCA acceptance for assessment techniques and tools	✓	**Section 2: Guidance and legislation** **Section 3: Navigational risk assessment methodology** **Section 4: Consultation**

Issue	Compliance	Reference and notes
D3. Demonstration of results	✓	Chapter 13, Volume 2
D4. Area traffic assessment	✓	Section 13: Vessel traffic movements
D5. Specific traffic assessment	✓	Section 13: Vessel traffic movements
E1. Risk control log	✓	Annex A: Hazard log
E2. Marine stakeholders	✓	Section 4: Consultation
F1. Hazard identification checklist	✓	Section 19: Impact identification Annex A: Hazard log
F2. Risk control checklist	✓	Annex A: Hazard log

Annex E
Regular operator consultation

As part of the consultation process for Rampion 2, Regular Operators identified (from the vessel traffic survey data) that would be required to deviate their routes due to the array area were consulted via electronic mail. An example of the correspondence sent to the Regular Operators is presented below.

It is noted that the area of search shown in the accompanying figure was the area of search under consideration prior to submission of the PEIR (the Scoping Boundary – see **Section 8.1**). Additionally, the proposed timeframe for the Hazard Workshop was indicative only; the Hazard Workshop was eventually held in February 2021 (see **Section 4.4**) to allow the inclusion of the winter vessel traffic survey data in discussions.

Anatec Ltd.
Cain House
10 Exchange Street
Aberdeen AB11 6PH
Tel: 01224 253700
Email: aberdeen@anatec.com
Web: www.anatec.com

Date: 1st October 2020

Consultation on the Proposed Rampion 2 Offshore Wind Farm in Relation to Shipping and Navigation

Dear Sir/Madam,

As you may be aware, RWE Renewables is currently planning to submit an application for Rampion Extension ('Rampion 2'), an extension to the existing Rampion Offshore Wind Farm ('Rampion 1') which has been operational since 2018.

Following a Scoping Report for the development submitted to the Planning Inspectorate in July 2020, RWE Renewables are now in the process of completing the Preliminary Environmental Information Report (PEIR) including the Navigational Risk Assessment (NRA). The outputs from this process will feed into the subsequent Environmental Statement (ES) with the NRA updated as required.

An overview of the Rampion 2 area of search is provided in Figure 1. The offshore array area is located approximately 7.3 nautical miles (nm) off the West Sussex coast and covers an area of approximately 92 square nautical miles (nm^2). The offshore export cable route covers an area of approximately $22nm^2$ and makes landfall near Littlehampton Harbour.

Further information about the development can be found here.

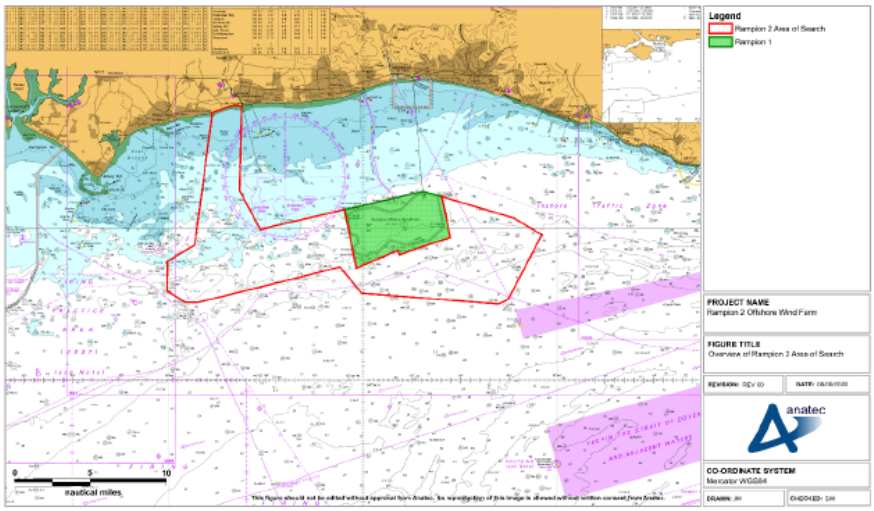


Figure 1 Overview of Rampion 2 Area of Search

Anatec has been contracted by RWE Renewables to provide technical support on shipping and navigation during the consenting process, and to coordinate consultation with relevant stakeholders. As part of the consultation process, Anatec has undertaken an assessment of 12 months of Automatic Identification System (AIS) data to identify regular commercial operators. Your company's vessel(s) has regularly navigated within and/or in proximity to the area of search and subsequently has been identified as a potential shipping and navigation stakeholder. We therefore invite your feedback on the development, including any impact it may have upon the navigation of vessels.

We would be grateful if you could provide us with any comments or feedback that you may have by the 30th October 2020. This will allow us to incorporate your input into the NRA currently being undertaken. We would also be grateful if you could forward a copy of this information to any other vessel operators/owners you feel may be interested in commenting.

As a guide, some of the points we would be particularly interested in any comments or feedback on are the following:

1. Whether the proposal to construct Rampion 2 is likely to impact the routeing of any specific vessels and/or route, including the nature of any change in regular passage.
2. Whether any aspect of the development poses any safety concern to your vessels, including any adverse weather routeing.
3. Whether you would choose to make passage internally through the array of structures.
4. Whether you are aware of any planned changes to routeing which may be relevant to Rampion 2.
5. Whether the presence of Rampion 1 has resulted in any navigational safety concerns.
6. Whether you wish to be retained on our list of shipping and navigation stakeholders and consulted throughout the NRA process.

7. Whether you wish to attend a Hazard Workshop to discuss shipping and navigation impacts in October/November 2020.

Responses should be sent via email to [redacted] Should you have any queries about the published information or require any further information to support your review, please do hesitate to get in touch.

Yours sincerely,

[redacted]
Lead Risk Analyst
Anatec Ltd.

wood.