Chapter 13:
Shipping and Navigation

Array EIA Report

2024

Version	Comments	Authored by	Reviewed by	Approved by
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Approval for Issue		
For and on behalf of Ossian OWFL	Rich Morris	28 June 2024

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13. SHIPPING AND NAVIGATION

13.1. INTRODUCTION

1. This chapter of the Array Environmental Impact Assessment (EIA) Report presents the assessment of the likely significant effects (LSE[1]) (as per the EIA Regulations) on shipping and navigation as a result of the Ossian Array which is the subject of this application (hereafter referred to as "the Array"). Specifically, this chapter considers the potential impacts of and reaches a conclusion on the LSE[1] arising from the Array on shipping and navigation during the construction, operation and maintenance, and decommissioning phases.

2. The following technical chapters also inform the assessment presented in this chapter:

   - volume 2, chapter 12: Commercial Fisheries.

3. This chapter summarises and is informed by the outputs of the Navigational Risk Assessment (NRA) (volume 3, appendix 13.1), which is the technical document required by the Maritime and Coastguard Agency (MCA) under Marine Guidance Note (MGN) 654 (MCA, 2021a) to provide a detailed assessment of shipping and navigation. Compliance with MGN 654 has been demonstrated via completion of an MGN 654 checklist included in the NRA. All relevant findings of the NRA are summarised in this chapter noting the full technical detail is provided in volume 3, appendix 13.1.

13.2. PURPOSE OF THE CHAPTER

4. The Array EIA Report provides the Scottish Ministers, statutory and non-statutory stakeholders with the required information to determine the LSE[1] of the Array on the receiving environment. This is further outlined in volume 1, chapter 1.

5. The purpose of this shipping and navigation Array EIA Report chapter is to:

   - present the existing environmental baseline established from desk studies, site-specific surveys, numerical modelling studies and consultation with stakeholders;
   - identify any assumptions and limitations encountered in compiling the environmental information;
   - present the environmental impacts on shipping and navigation arising from the Array and reach a conclusion on the LSE[1] on shipping and navigation, based on the information gathered and the analysis and assessments undertaken; and
   - highlight any necessary monitoring and/or mitigation measures which are recommended to prevent, minimise, reduce or offset the likely significant adverse environmental effects of the Array on shipping and navigation.

13.3. STUDY AREA

6. A 10 nm buffer has been applied around the site boundary (i.e. the area within which the Array is located) (hereafter referred to as the 'shipping and navigation study area'), as presented in Figure 13.1. This shipping and navigation study area has been defined to provide local context to the analysis of risks by capturing the relevant routes and vessel traffic movements within, and in proximity to, the Array. This is a standard radius for shipping and navigation, was agreed with the Scottish Ministers within the Ossian Array Scoping Opinion (MD-LOT, 2023) and has been used in the majority of United Kingdom (UK) offshore wind farm NRAs. It also aligns with the approach from the Array EIA Scoping Report (Ossian OWFL, 2023) and has been presented to key shipping and navigation stakeholders including at the Hazard Workshop for the Array (see section 13.5).

7. Cumulative routeing within the NRA and cumulative effects assessment (CEA) in section 13.12 has been considered within a 50 nm buffer of the site boundary.

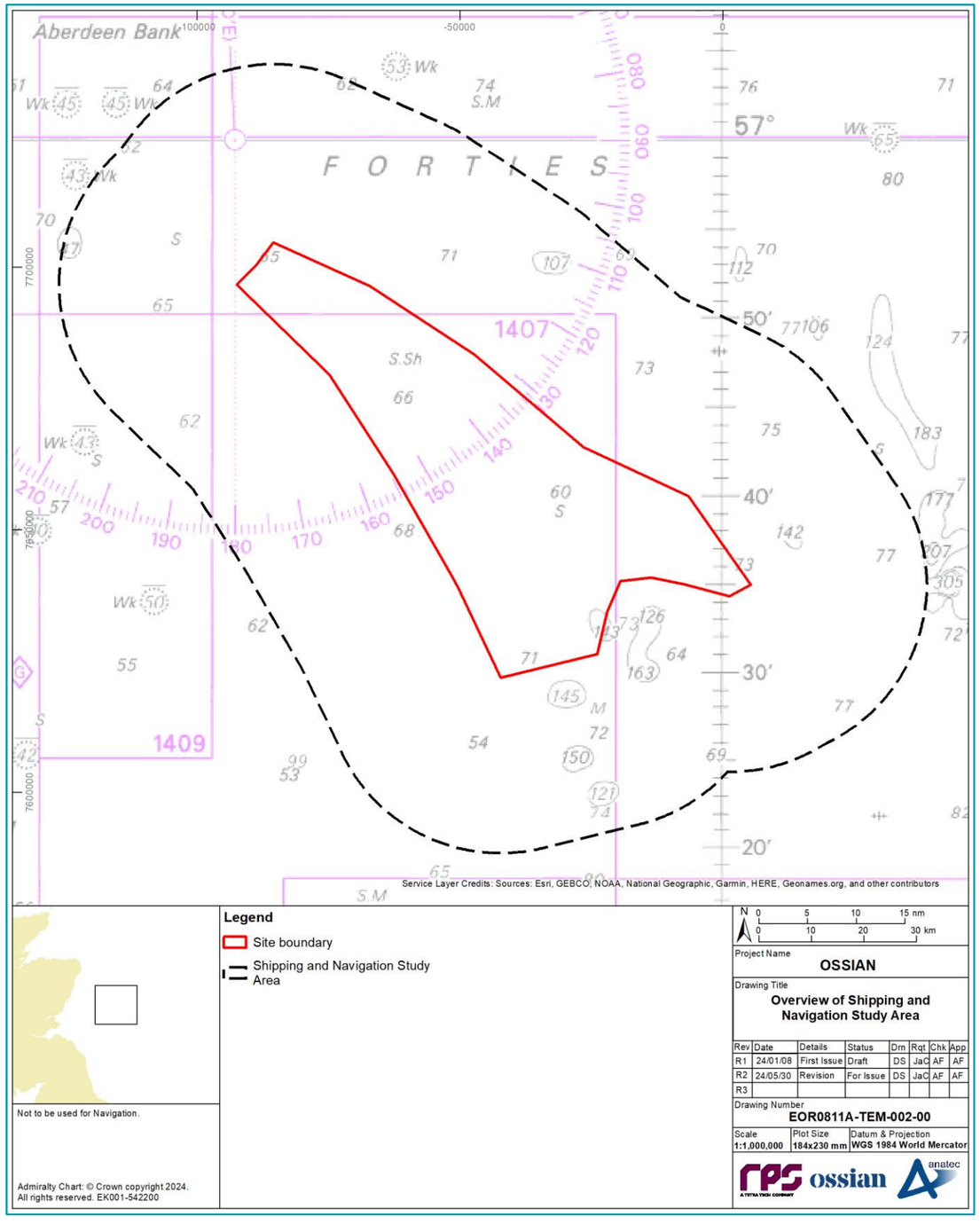

Figure 13.1: Shipping and Navigation Study Area

13.4. POLICY AND LEGISLATIVE CONTEXT

8. Policy and legislation on renewable energy infrastructure is presented in volume 1, chapter 2 of the Array EIA Report. Policy and legislation specifically in relation to shipping and navigation is contained in:

- United Nations Convention on the Law of the Sea (UNCLOS) (United Nations (UN), 1982);
- Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) (International Maritime Organization (IMO), 1972/77);
- Safety of Life at Sea (SOLAS) Chapter V (IMO, 1974);
- UK Marine Policy Statement (MPS) (HM Government, 2011);
- Scotland's National Marine Plan (NMP) (Scottish Government, 2015); and
- Scotland's Sectoral Marine Plan (SMP) for Offshore Wind Energy (Scottish Government, 2020).

9. A summary of the legislative provisions relevant to shipping and navigation are provided in Table 13.1, with other relevant policy provisions set out in Table 13.2. These are summarised here with further detail presented in volume 3, appendix 13.1.

Table 13.1: Summary of Legislation Relevant to Shipping and Navigation

Summary of Relevant Legislation	How and Where Considered in the Array EIA Report
UNCLOS (UN, 1982)	
Part V Article 60(7): *"Artificial islands, installations and structures and the safety zones around them may not be established where interference may be caused to the use of recognised sea lanes essential to international navigation."*	There are no established and defined routeing measures (e.g. traffic separation schemes, charted channels) in proximity to the Array as detailed in the NRA. Baseline routeing has been identified and detailed within the NRA (see volume 3, appendix 13.1).
COLREGs (IMO, 1972/77)	
Rule 8 (a): "*Any action taken to avoid collision shall be taken in accordance with the Rules of this Part and shall, if the circumstances of the case admit, be positive, made in ample time and with due regard to the observance of good seamanship.*"	COLREGS provisions have been considered where relevant throughout the NRA (volume 3, appendix 13.1) and this chapter. In particular, collision avoidance provisions have been considered in the relevant impact assessment sections (see section 13.11).
Rule 19 (b): "*Every vessel shall proceed at a safe speed adapted to the prevailing circumstances and conditions of restricted visibility. A power-driven vessel shall have her engines ready for immediate manoeuvre.*"	
SOLAS (IMO, 1974)	
Regulation 33: "*The master of a ship at sea which is in a position to be able to provide assistance on receiving information from any source that persons are in distress at sea, is bound to proceed with all speed to their assistance.*"	SOLAS provisions have been considered where relevant throughout the NRA (volume 3, appendix 13.1) and this chapter. In particular, the provisions associated with passage planning and obligations to render assistance to persons in distress at sea have been considered in the relevant impact assessment sections (see section 13.11).
Regulation 34: "*Prior to proceeding to sea, the master shall ensure that the intended voyage has been planned using the appropriate nautical charts and nautical publications for the area concerned.*"	

Table 13.2: Summary of Policy Relevant to Shipping and Navigation

Summary of Relevant Policy	How and Where Considered in the Array EIA Report
UK MPS (HM Government, 2011)	
Paragraph 3.4.7: "*Increased competition for marine resources may affect the sea space available for the safe navigation of ships. Marine plan authorities and decision makers should take into account and seek to minimise any negative impacts on shipping activity, freedom of navigation and navigational safety and ensure that their decisions are in compliance with international maritime law. Marine Plan development and individual decisions should also take account of environmental, social and economic effects and be in compliance with international maritime law. Marine plan authorities will also need take account of the need to protect the efficiency and resilience of continuing port operations, as well as further port development.*"	Impacts to vessel traffic, routeing and ports (where relevant) have been assessed in the relevant impact assessment sections (see section 13.11). Socio-economic impacts with regard to changes to shipping and marine recreation are considered within volume 2, chapter 18.
Scotland's NMP (Scottish Government, 2015)	
Transport 1: "*Navigational safety in relevant areas used by shipping now and in the future will be protected, adhering to the rights of innocent passage and freedom of navigation contained in UN Convention on the Law of the Sea (UNCLOS). The following factors will be taken into account when reaching decisions regarding development and use:* • *The extent to which the locational decision interferes with existing or planned routes used by shipping, access to ports and harbours and navigational safety. This includes commercial anchorages and defined approaches to ports.* • *Where interference is likely, whether reasonable alternatives can be identified.* • *Where there are no reasonable alternatives, whether mitigation through measures adopted in accordance with the principles and procedures established by the IMO can be achieved at no significant cost to the shipping or ports sector.*"	Impacts to navigational safety, ports (where relevant), vessel routeing including ferries, and displacement have been assessed in the relevant impact assessment sections (see section 13.11). Designed in measures are detailed in section 13.10.
Transport 2: "*Marine development and use should not be permitted where it will restrict access to, or future expansion of, major commercial ports or existing or proposed ports and harbours.*"	
Transport 3: "*Ferry routes and maritime transport to island and remote mainland areas provide essential connections and should be safeguarded from inappropriate marine development. Developments will not be consented where they will unacceptably interfere with lifeline ferry services.*"	

Summary of Relevant Policy	How and Where Considered in the Array EIA Report
Transport 6: "*Developers should ensure displacement of shipping is avoided where possible to mitigate against potential increased journey lengths (and associated fuel costs, emissions and impact on journey frequency).*"	
Scotland's SMP for Offshore Wind Energy (Scottish Government, 2020)	
In relation to the East region of the ScotWind leasing round (of which contains the Array), the SMP states that "*potential cost impacts and associated navigational risk from diverting key commercial shipping routes*" is a "*key risk*" factor. (4.5) A key step recognised as "likely to form part of the development process" was "*consultation with the Maritime and Coastguard Agency*". (4.5.4)	Navigational safety impacts including on a cumulative basis have been assessed in section 13.11 and 13.12. Socioeconomic impacts are considered in volume 2, chapter 18. The MCA have been consulted throughout the assessment process (see section 13.5).

13.5. CONSULTATION

10. Table 13.3 presents a summary of the key issues raised during consultation activities undertaken to date specific to shipping and navigation for the Array and in the Ossian Array Scoping Opinion (MD-LOT, 2023) along with how these have these have been considered in the development of this shipping and navigation Array EIA Report chapter. Further detail is presented within volume 1, chapter 5.

Table 13.3: Summary of Issues Raised During Consultation and Scoping Opinion Representations Relevant to Shipping and Navigation

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
Scoping Opinion			
June 2023	NLB Scoping Representation (March 2023)	*"Northern Lighthouse Board note the inclusion of Section 7.2 – Shipping and Navigation, within the report, with particular reference to 7.2.7, where you confirm your intention to comply with MGN 654 covering shipping and navigational risk assessment and further in section 7.2.11, where you confirm that this will lead to the development of a Navigational Risk Assessment and that you will consult with the NLB further in relation to your intended development of a Lighting and Marking Plan (LMP) and Navigational Safety Plan (NSP)."*	An NRA (volume 3, appendix 13) has been produced as required, including a completed MGN 654 checklist. NLB will be consulted on the Navigational Safety and Vessel Management Plan (NSVMP) and Lighting and Marking Plan (LMP) (outlines provided in volume 3, appendices 24 and 26, respectively).
		"NLB also note the inclusion of Cumulative Effects (Section 7.2.8) within this chapter, and the factors upon which other cumulative projects will be screened in or out of the assessment."	The NRA includes cumulative assessment of routeing, with impacts assessed in this chapter in section 13.12.
		"NLB have no objection to the content of the Scoping Report, and have no further suggestions for additional content."	Methodology and assessment are as per the Array EIA Scoping Report (Ossian OWFL, 2023) (see section 13.9).
June 2023	RYA Scotland Scoping Representation (March 2023)	*"Do you agree with the data sources, including project-specific surveys, to be used to characterise the shipping and navigation baseline within the NRA and Array EIA?* *The data to be used for recreational craft are adequate. The requirements for MGN 654 will have to be met but no additional data are needed even though only a proportion of recreational vessels transmit an AIS signal and recreational vessels can be difficult to spot on radar. It should be assumed that a small number of vessels will pass through the site each year. Clearly Shipping and Navigation should be scoped in to the EIA. RYA Scotland would like to contribute to the Navigational Risk Assessment."*	RYA Scotland has been consulted as part of the NRA process, with relevant input captured in the Hazard Workshop. The data used is as set out in the Array EIA Scoping Report (Ossian OWFL, 2023) (see section 13.6).
		"Do you agree that all potential impacts (hazards and associated risks) have been identified for shipping and navigation? *An additional risk is the failure of Aids to Navigation marking the devices. There have been several cases where lights or AIS transmissions have failed on wind farms off the coast of Scotland and it has taken several days to replace them due to adverse weather. Mitigation might include the use of virtual AtNs."*	The Array complies with the relevant IALA requirements, including with regards to aid to navigation availability. The NLB have been consulted during the NRA process and lighting and marking will be agreed with NLB post-consent. An outline Aids to Navigation Management Plan is provided in volume 4, appendix 26, annex A.
		"Do you agree with the proposed approach to assessment? *Yes."*	Noted. Approach is as per the Array EIA Scoping Report (Ossian OWFL, 2023) (see section 13.9).
		"Do you agree with the approach to screening other developments in or out of the cumulative assessment? *Yes."*	Noted. Approach is as per the Array EIA Scoping Report (Ossian OWFL, 2023) (see section 13.12.1).
		"Do you have any additional comments relating to the use of floating technology specifically and potential associated additional mitigation options (e.g., operational safety zones) in relation to navigational safety impacts? *From experience with existing floating wind farms we cannot see that the risks are significantly different from conventional schemes. A little depends on where the anchor chains are connected but we see no reason for operational safety zones and would be opposed to them being granted. I feel that creating safety zones by itself is not mitigation. It only becomes mitigation when the zone is actively enforced. Most recreational sailors will keep well clear off wind turbines, as they would when passing a ship at anchor."*	Ossian Offshore Wind Farm Limited (Ossian OWFL) (hereafter referred to as 'the Applicant') will determine which safety zones will be applied for post-consent in consultation with key stakeholders including RYA Scotland. The Array application will include procedures by which the safety zones will be monitored and policed.
June 2023	MCA Scoping Representation (April 2023)	*"The Environmental Impact Report 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.* • *The likely squeeze of small craft into the routes of larger commercial vessels."*	The listed impacts have all been assessed in section 13.11. Mitigations are discussed in section 13.10.
		"The development area carries a moderate amount of traffic with several important commercial shipping routes to/from UK ports and the North Sea. Attention needs to be paid to routing, particularly in heavy weather so that vessels can continue to make safe passage without large-scale deviations. The likely cumulative and in combination effects on shipping routes should be considered for this project. It should consider the proximity to other wind farm developments, other infrastructure, and the impact on safe navigable sea room."	Routes pre wind farm and post wind farm have been assessed in detail within the NRA, routeing in adverse weather has been assessed within the NRA (and its associated impact in section 13.11) and routeing on a cumulative basis has been assessed in detail within the NRA.

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		"A Navigational Risk Assessment will need to be submitted in accordance with MGN 654.This NRA should be accompanied by a detailed MGN 654 Checklist which can be found at https://www.gov.uk/guidance/offshore-renewable-energy-installations-impact-on-shipping"	An NRA has been produced as required, including a completed MGN 654 checklist.
		"A vessel traffic survey will be undertaken to the standard of MGN 654 – at least 28 days which is to include seasonal data (two x 14-day surveys) collected from a vessel-based survey using AIS, radar and visual observations to capture all vessels navigating in the study area. We understand from the information presented in table 7.5 and paragraph 523 that in addition to the preliminary assessment of 28 days (13 – 26 January 2022 and 08 – 21 July 2022) of Automatic Identification System (AIS) data, a dedicated survey vessel located on-site in December 2022 carried out a traffic survey to the standard required in MGN 654. This data will be updated further once the project-specific summer vessel traffic survey has been completed in 2023."	The NRA has assessed vessel traffic survey data that is fully compliant with MGN 654 in addition to 12 months of AIS (see section 13.6).
		"The Development Specification and Layout Plan referred to in Chapter 7.2.5, paragraph 533 and table 2.1 in Annex 2 will require MCA approval prior to construction to minimise the risks to surface vessels, including rescue boats, and Search and Rescue aircraft operating within the site. Any additional navigation safety and/or Search and Rescue requirements, as per MGN 654 Annex 5, will be agreed at the approval stage."	The Applicant will align with MGN 654 in consultation with the MCA, including in relation to layout and the Search and Rescue (SAR) checklist (see section 13.10).
		"We note in Chapter 4.3.7, para 198 that Cumulative Effects Assessment will be carried out. As highlighted in paragraph 200, the proximity to other offshore wind farms in particular the proposed Morven and Bell Rock offshore wind farms will need to be fully considered, with an appropriate assessment of the distances between OREI boundaries and shipping routes as per MGN 654."	Cumulative routeing has been assessed within the NRA and associated impacts assessed in section 13.11 which includes consideration of Morven and Bellrock. The MCA have been consulted as part of this assessment.
		"It is noted that this scoping report concentrates on the array area only. However, attention should still be paid to cabling routes and where appropriate burial depth for which a Burial Protection Index study should be completed and subject to the traffic volumes, an anchor penetration study may be necessary. If cable protection measures are required e.g., rock bags or concrete mattresses, the MCA would be willing to accept a 5% reduction in surrounding depths referenced to Chart Datum. This will be particularly relevant where depths are decreasing towards shore and potential impacts on navigable water increase, such as at the HDD location."	MGN 654 requirements will be fully complied with, including in relation to underkeel clearance. A Burial Protection Index study will be completed, and an anchoring penetration study if required, post-consent. See section 13.10.
		"In Chapter 7.2.5, paragraph 533 compliance with regulatory expectations on moorings for floating wind and marine devices (HSE and MCA, 2017) is identified as a designed in mitigation measure for floating infrastructure. This guidance should be followed, and a Third-Party Verification of mooring arrangements will be required."	The requirements of the Regulatory Expectations will be followed, and Third-Party Verification (TPV) of all mooring and anchoring arrangements will be completed. See section 13.4 and section 13.10.
		"Particular consideration will need to be given to the implications of the site size and location on SAR resources and Emergency Response Co-operation Plans (ERCoP). The report must recognise the level of radar surveillance, AIS and shore-based VHF radio coverage and give due consideration for appropriate mitigation such as radar, AIS receivers and in-field, Marine Band VHF radio communications aerial(s) (VHF voice with Digital Selective Calling (DSC)). A SAR checklist will also need to be completed in consultation with MCA, as per MGN 654 Annex 5 SAR requirements."	The Array will comply with MGN 654 requirements including in relation to the completion of a SAR checklist. See section 13.10.
		"MGN 654 Annex 4 requires that hydrographic surveys should fulfil the requirements of the International Hydrographic Organisation (IHO) Order 1a standard, with the final data supplied as a digital full density data set, and survey report to the MCA Hydrography Manager. Failure to report the survey or conduct it to Order 1a might invalidate the Navigational Risk Assessment if it was deemed not fit for purpose."	Hydrographic surveys will be undertaken as per MGN 654.
		"It is noted that the use of HVAC and HVDC transmission infrastructure is not discussed in this report. We would however like to remind the applicant when considering this that in the case of HVDC installation, consideration must be given to the effect of electromagnetic deviation on ships' compasses. The MCA would be willing to accept a three-degree deviation for 95% of the cable route. For the remaining 5% of the cable route no more than five degrees will be attained. If an HVDC cable is being used, we would expect the applicant to do a desk based compass deviation study based on the specifications of the cable lay proposed and assess the effect of EMF on ship's compasses. MCA may request for a deviation survey post the cable being laid; this will confirm conformity with the consent condition. The developer should then provide this data to UKHO via a hydrographic note (H102), as they may want a precautionary notation on the appropriate Admiralty Charts (actions at a later stage depending upon the desk-based study and post installation deviation survey)."	This NRA does not consider the Proposed offshore export cable corridor(s). Potential electromagnetic field (EMF) effects associated with other infrastructure are considered in the NRA.

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		"Chapter 7.2.10, Scoping Questions to Consultees: 1- Do you agree with the data sources, including project-specific surveys, to be used to characterise the shipping and navigation baseline within the NRA and Array EIA? Yes. *2- Do you agree that all potential impacts (hazards and associated risks) have been identified for shipping and navigation? Yes* *3- Do you agree with the proposed approach to assessment? Yes* *4- Do you agree with the approach to screening other developments in or out of the cumulative assessment? Yes.* *5- Do you have any additional comments relating to the use of floating technology specifically and potential associated additional mitigation options (e.g., operational safety zones) in relation to navigational safety impacts? None.* *On the understanding that the Shipping and Navigation aspects are undertaken in accordance with MGN 654 and its annexes, along with a completed MGN checklist, MCA is likely to be content with the approach."*	Noted. Approach is as per the Array EIA Scoping Report (Ossian OWFL, 2023) (see section 13.6).
June 2023	Cruising Association Scoping Representation (April 2023)	*"The area chosen for the Ossian OWF is not in an area which has a high concentration of recreational boats so the array will not have a big impact either during construction or when operational. However, there will be some traffic north and south along the coast and a small amount of traffic across the North Sea to Denmark, Norway and Sweden, all mostly in the summer months, perhaps as boats make for the Baltic Sea which is a popular cruising area. It should be borne in mind that sailing boats do not necessarily follow direct routes, depending on wind direction."*	Recreational vessel traffic has been captured and assessed in the NRA.
		"We have some concerns that when new arrays are being planned not enough consideration is given to the interaction with existing arrays of those being earmarked for the future. Each new array displaces larger commercial and fishing vessels which can result in increased concentration of traffic between arrays. This can present an increased hazard for small craft who do not wish to pass through the arrays. It would be good if these issues of interaction could be considered in more detail"	Cumulative assessment has been undertaken in detail within the NRA. Impacts to small craft have been assessed in section 13.11.
		"We consider it important that vessels have the right of passage through arrays both during their construction and when they are operational (subject of course to the guidance given in the MCA MGN 372 Amendment 1 (M+F)) so we would not want to see any objections raised to this. In fact, given the point above regarding the concentration of traffic between arrays it can sometimes be safer for small craft to traverse an array I [sic] order to avoid shipping channels."	Impacts to small craft have been assessed in section 13.11.
		"When considering the density of traffic passing through the area proposed for the array the analysis should not depend on AIS data for small craft. Many still do not carry AIS and many that do only receive and do not transmit their position. There are no numbers available to quantify this but my guess is that it would be prudent to assume that less than 20% transmit."	The vessel traffic survey data assessed in section 13.7.1 accounts for non-AIS traffic.
June 2023	UK CoS Scoping Representation (April 2023)	*"The list of documentation looks broadly as expected to assess the shipping and navigation impact, however should also include Scotland's National Marine Plan and its policies and Scotland's Sectoral Marine Plan for Offshore Wind Energy and its policies."*	All relevant policy has been considered (see section 13.4).
		"Yes the 10nm study area is an accepted standard. The Chamber recommends a wider routeing study area of 50nm, which may be included as part of the wider cumulative impact assessment to consider routeing impacts of the proposed development in combination with other developments."	A 50 nm study area has been used for cumulative assessment within the NRA (see section 13.12.1).
		"The Chamber would recommend in addition to the MGN 654 compliant 2 x 14 day periods of vessel traffic data, additional AIS only data for a prolonged period to assist with analysis of seasonal variation and weather routeing which may be get picked up from only the short survey period. *This is widely available and commonplace for large proposed developments such as Ossian."*	Twelve months of AIS data has been assessed within the NRA (see section 13.6).
		"The Chamber would expect to see inclusion of all the embedded mitigation measures as a minimum."	The designed in measures will be implemented and are discussed in section 13.10.

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		"The receptors and impacts are broadly as one would expect for a fixed turbine development, however there are some additional receptors for floating which have are not yet considered. *What will be the construction phase of the build out? Will wet storage be required for turbines not at station? What is the navigational risk for these?"*	Associated impacts are considered in section 13.11, based on worst-case parameters including in relation to construction, which includes consideration of wet storage. The location of the final integration and marshalling port is currently unknown. The Applicant is currently developing a fabrication, delivery and integration strategy and engaging with a number of port and harbour operators to identify an optimised approach. In the absence of an integration and marshalling yard it is not possible, at this stage, to consider the potential site-specific impacts on relevant receptors. Enabling works, including integration, and marshalling activities, required within the final integration port to cover turbine pre-commissioning, testing and storage (if required) will be covered by the consenting requirements applying to them (including any requirements for environmental assessment) and will be managed by the port or harbour authority with support where appropriate from the Applicant. The Ossian construction programme will be managed to reduce the requirement for storage of integrated pre-commissioned turbines within port. A stock of floating foundations will be accumulated, and mooring lines and cables would be installed within the array in advance of turbine integration. The Applicant aims to minimise any wet storage requirements by towing integrated turbines to their final location within the array as soon as they are ready, subject to suitable weather conditions for transfer.
		"Floating platforms are inherently mobile assets and the greater movement of them will increase the range of impacts that a project has. Platforms will be towed to/from the array area, construction base or wet storage sites and may encounter other traffic or activities whilst on route."	Associated impacts are considered in section 13.11.
		"What will be the O&M phase, will it carried out at the array area or is there a need to bring the turbines into more sheltered locations?"	Routine maintenance will be carried out with the wind turbine *in-situ*. Wind turbines would be removed from stations and towed to an operation and maintenance port facility for any major component replacements, or similar. Lighting and marking will consider this, with mitigations agreed with the NLB.
		"In addition, vessel displacement leading to deviation, longer journey time and other environmental/economic impacts besides additional collision risk should be considered and does not present appear."	See volume 2, chapter 18
		"The Chamber agrees that no potential impacts should be scoped out."	Impacts have been assessed as per the Array EIA Scoping Report (Ossian OWFL, 2023); see section 13.11.
		"The Chamber does not agree that the following should be scoped out of the Construction and Decommissioning phase as there will still be an impact. Whilst the impact will be less than during the O&M phase it will nevertheless still be present particularly when the developments are half built/decommissioned: *• Loss of station;* *• Interference with navigation, communications, and position-fixing equipment* *• Reduction of SAR capability."*	These impacts are considered for all phases in section 13.11.
		"The Chamber agrees that cumulative and transboundary impacts need to be considered and is satisfied with a 50nm study area."	Cumulative and transboundary impacts have been assessed using a 50 nm study area within the NRA (see section 13.12.1).
		"Do you agree with the proposed assessment approach and list of planned consultees? *Yes"*	The assessment approach undertaken (see section 13.6) and the consultees (see section 13.5) are as per the Array EIA Scoping Report (Ossian OWFL, 2023).
June 2023	Marine Directorate - Licensing Operations Team (MD-LOT)	*"The Scottish Ministers are content with the study area identified in Section 7.2.2 of the Scoping Report however note the representation from UKCoS which recommends a wider routeing study area of 50 nautical miles when considering the cumulative impact assessment with regards to routeing impacts in combination with other developments."*	A 50 nm study area has been used for cumulative assessment within the NRA (see section 13.12.1).

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		"With regards to the shipping and navigation baseline, in line with the representation from the MCA, the Scottish Ministers are content that that the two separate 14 day periods of Automatic Identification System ("AIS") data set out in the Scoping Report meets the standard MGN 654, however highlight the advice from UKCoS that additional AIS data over a prolonged period is obtained to assist with analysis of seasonal variation and weather routeing should be considered in the EIA Report. The Scottish Ministers advise that the Developer must engage further with the MCA and UKCoS to reach a suitable agreement on the provision of AIS data and document the rationale for the final approach within the EIA Report. Additionally, the Scottish Ministers highlight the representation from the CA regarding the limitations of AIS data for smaller craft which should be taken into consideration in the EIA Report."	Data sources were agreed with the MCA, NLB and UK CoS in consultation. The project has collected non-AIS data as required under MGN 654, with this data assessed in section 13.7.1. Twelve months of AIS data has been assessed within the NRA. Adverse weather routeing has been assessed within the NRA and in section 13.11. Consultation with recreational representatives has also been undertaken to ensure the baseline data is validated.
		"Table 7.7 of the Scoping Report summarises the potential impacts on shipping and navigation for each phase of the Proposed Development. The Scottish Ministers agree with the impacts scoped into the EIA Report, however the Developer is directed to the advice from the UKCoS that loss of station, interference with navigation, communications and positioning-fixing equipment and reduction of SAR capability should be scoped into the EIA Report during construction and decommissioning phases in addition to operation and maintenance. The UKCoS also identifies additional receptors in respect of floating offshore wind which the Scottish Ministers advise should be scoped into the EIA Report. Additionally, for the avoidance of doubt, the Developer must ensure that each of the possible impacts on navigational issues, including routing and effects on shipping, outlined in the MCA representation are addressed within the EIA Report. Finally, the Scottish Ministers highlight the RYA representation around failure of Aids to Navigation marking the devices which should be fully addressed in the EIA Report."	These impacts are considered for all phases of the Array in section 13.11. An outline Aid to Navigation Management Plan (ANMP) is provided in volume 4, appendix 26, annex A.
		"With regards to approach to assessment, the Scottish Ministers confirm that, in line with NLB and MCA representations, the Developer will be required to submit a Navigational Risk Assessment in accordance with MGN 654, accompanied by a detailed MGN 654 checklist. Hydrographic surveys should fulfil the requirements set out in Annex 4 of MGN 654. In addition, the Scottish Ministers direct the Developer to the representation from the UKCoS and advise that the additional documentation highlighted should be considered when assessing the impact on shipping and navigation from the Proposed Development."	An NRA has been produced as required, including a completed MGN 654 checklist. Hydrographic surveys will be completed as required. The referenced documents have been considered in volume 2, chapter 13.
		"The Scottish Ministers also highlight the MCA representation regarding SAR, Emergency Response Co-operation Plans, levels of radar surveillance, AIS and shore-based VHF radio coverage. The Scottish Ministers advise that the MCA representation must be fully addressed within the EIA Report and that a SAR checklist must be completed by the Developer in consultation with the MCA."	A SAR checklist will be agreed with the MCA post-consent (see section 13.10).
		"Representation from the CA notes the preference of smaller craft to traverse wind farm arrays throughout all stages of its development due to the reduced risk from traversing busy shipping channels and that sailing boats don't necessarily follow direct routes – this should be taken into consideration in the EIA Report."	Impacts to small craft have been assessed in section 13.11.
		"With regards to cabling routes and cable burial, the Scottish Ministers advise that a Burial Protection Index should be completed and, subject to the traffic volumes, an anchor penetration study may be necessary. The Scottish Ministers advise that this should be fully addressed in the EIA Report and highlight the MCA advice on a maximum 5% reduction in surrounding depth referenced to Chart Datum if cable protection measures are required."	MGN 654 requirements will be fully complied with including in relation to underkeel clearance. A Burial Protection Index study will be completed, and an anchoring penetration study if required, post-consent. See section 13.10.
		"With regards to the proposed mitigation in Section 7.2.5 of the Scoping Report, the Scottish Ministers highlight the representation from the RYA regarding its objection to operational safety zones, which should be taken into consideration when finalising the proposed designed in measures. In line with the representation from the MCA, the Developer should note that compliance with regulatory expectations for floating infrastructure, as stated in Section 7.2.5, is required and Third-Party Verification of the mooring arrangements will also be required."	The project will determine safety zones to be applied for post-consent in consultation with key stakeholders including RYA Scotland. The Array application will include procedures by which the safety zones will be monitored and policed. See section 13.10. The requirements of the Regulatory Expectations will be followed, and a TPV of mooring arrangements will be undertaken. See section 13.4.
		"With regard to potential cumulative effects summarised in Section 7.2.8 of the Scoping Report, the Scottish Ministers are broadly content with the approach proposed and highlight the MCA requirement for an appropriate assessment of the distances between the neighbouring offshore renewable project boundaries and shipping routes in line with MGN Standard 654 which must be addressed in the EIA Report. In addition, the Scottish Ministers highlight the Cruising Association representation regarding increased concentration of traffic and advise that this must be fully considered in the EIA Report."	Cumulative routeing has been assessed within the NRA and associated impacts assessed in section 13.11, with the assessment considering distances to other developments. The MCA have been consulted as part of this assessment.

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
Relevant Consultation to Date			
15 May 2023	Aurora Offshore Email correspondence	*"Navigation within wind farms is something we avoid today, unless there is a clear fairway indicated on the ENC charts allowing us to do so. There are a few farms off Holland and Belgium where this is allowed. However, the wind farms today are mostly bottom-fixed and fairly dense.* *Ossian is a floating field, and with a 1,000 m spacing distance – we would have no objections sailing internally within the array – as long as the ENC charts and sailing directions in the area allows it. When looking at the planned footprint of Ossian and our historical navigation tracks in the same area, it is clear to us that sailing within the array is something we would have to do in order to avoid additional voyage lengths. That is extra cost and extra emissions on behalf of our clients."*	Post wind farm routeing has been assessed in the NRA, with deviation impacts assessed in section 13.11.
09 May 2023 and 10 May 2023	Scotline Email correspondence	*"This will affect our vessel trading patterns due to reduction of sea room and on the passage from Inverness – Rochester, Inverness – Humber, Inverness – Thames and the reverse routes."* *"It all depends on weather and traffic density".*	Post wind farm routeing has been assessed in the NRA, with deviation impacts assessed in section 13.11. Adverse weather routeing is assessed in the NRA.
10 May 2023 and 17 May 2023	Smyril Line Email correspondence	*"I can see that the windmills themselves will [sic] have 1 nm apart. This will make your vessel able to navigate between the windmills in good weather conditions only. And for the north sea aera [sic] we often have very poor weather conditions. So, during winter times the vessel will have to sail around the wind farm.* *And then it also depends on the precise position of the wind mills themselves + the depth of underwater installations to say if the vessel will safely be able to pass between the windmills.* *Then as I understand the windmills will be floating units, this will have them shifting in position or? Thinking about currents, waves and wind.* *All these factors and most likely other factors too will have to be considered for us in a risk assessment during passage planning. Vessel safe navigation will always have highest priority.* *Just for general information, the Smyril Line Cargo Company currently is operating two RO-RO vessels that transit this aera [sic] 2 times every week all year round. Total of 4 transits for both vessels every week. Route net for both vessels is Faroe Islands-Island-Rotterdam.* *We have already sailed passed the wave and lidar buoys many times. In the Morven site and for the Pentland side just SE of Sule Skerry and Sule Stack where there are also wave and lidar buoys placed"* *"I have looked at the coordinates in your system and I can say that the Ossian project will have no impact on vessel movements. The vessel will navigate as normal with no changes in route network.* *However, the Morven north and south, is right on your [sic] current routes. But when this project starts the vessel will sail in between the two wind farms and it will not be necessary to go inside the wind farms themselves.* *See acc . Where all our normal routes are in the chart as orange lines and the projects are the blue lines. Here you can see very clearly that for the Morven project, the vessel will only do a small change in the passage planning for the transit in between the wind farms. Little to no extra distance will be added to our routes as this project starts.* *These projects Bellrock – Ossian – Morven S N. Will have very minimal to no impact on the Smyril Line Cargo Company's ships"*	Commercial route deviations, adverse weather routeing and cumulative routeing is assessed in the NRA, associated impacts are assessed in section 13.11.
15 March 2024		*"For us to go between the Windmill parks or we have to adjust our route a bit to the west, is no big deal* [sic]*."* It *"will not make any big different* [sic]*."*	

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
4 May 2023 and 5 May 2023	Tidewater Email correspondence	*"Any vessels we would have in or around that area would generally be on transit and would navigate well clear of any works or they may be involved in any of those projects and would navigate according to the scope of work as required."* *"I would imagine that North/South between Ossian and Seagreen would be the route taken for vessels in transit providing it was safe to do so whilst keeping well clear of any hazards to navigation."*	Commercial route deviations and cumulative routeing are assessed in the NRA. Associated impacts are assessed in section 13.11.
15 May 2023 and 16 May 2023	Wilson Ship Management Email correspondence	*"Understand that our commercial division have given a general feedback at an earlier stage. At that time as minimal impact for Wilson.* *To be a bit more detailed, obviously we would ask our navigators to plan voyages around the area, not sailing in between, while transiting.* *While entering ports in the area, we would prefer sailing between cumulative arrays.* *Of other comments, given the additional network of cables etc at the seabed, and high-end equipment on the surface, I trust that plans for development of the area also include emergency preparedness in terms of towing/assist-vessels in case of loss of propulsion, drifting etc. There might be further limitations of performing emergency anchoring if needed. In addition, evaluate how to collect the seabed-cables in order to maximize the area around for possible emergency anchoring"* *"It will not be our preferred transit route through the area to the reduce the risk. Obviously I cannot guarantee that we will not use it (weather permitting etc), but based on our normal routes in the area, sailing through the Morven-Ossian-Bellrock will be limited while transiting in normal trade."*	Commercial route deviations are assessed in the NRA, with associated impacts assessed in section 13.11. The risk related to interactions between anchors and subsea cables is assessed in section 13.11.
20 June 2022	MCA and NLB Dedicated meeting	*Approach to NRA and data collection agreed.* *Noted that the cumulative picture was important.*	The approach to data collection, shipping and navigation study areas and NRA approach is as agreed with the MCA and NLB. Cumulative assessment has been undertaken in the NRA (volume 3, appendix 13.1, sections 14 and 17) and section 13.12.
25 July 2023	MCA Dedicated meeting	*General discussions were held on the cumulative scenario, in particular around distances to nearby developments.*	Associated assessment and summary of consultation is provided in the NRA (volume 3, appendix 13.1, section 14).
		MCA confirmed limited concern with use of HVDC interconnector cables in the Array in terms of potential EMF effects.	This is considered in the NRA (volume 3, appendix 13.1, section 12.6).
		Confirmed content with study areas and data collection.	The approach to data collection, shipping and navigation study areas and NRA approach is as agreed with the MCA.
31 July 2023	UK CoS Dedicated meeting	*Confirmed content with study areas and data collection.* *General discussions were held on the cumulative scenario, in particular around distances to nearby developments.*	The approach to data collection, shipping and navigation study areas and NRA approach is as agreed with the UK CoS.
28 August 2023	NLB Dedicated meeting	*Indicated preference for consistency in width of any navigable areas between wind farms. General discussions were held on the cumulative scenario, in particular around distances to nearby developments.*	Associated assessment is provided in the NRA (volume 3, appendix 13.1, section 14).
		Noted that a scenario where a turbine with a marine light was towed away from the Array for maintenance would need further discussion in the LMP process.	Lighting and marking in agreement with NLB has been included as mitigation (see section 13.10).
		Confirmed content with study areas and data collection.	The approach to data collection, shipping and navigation study areas and NRA approach is as agreed with the NLB.
10 October 2023	NLB, MCA and CoS Dedicated meeting	*General discussions were held on the cumulative scenario, in particular around distances to nearby developments. MCA and NLB confirmed content with the distance between the Array and the Bellrock array.*	Considered in cumulative routeing assessment within the NRA (volume 3, appendix 13.1, section 14.2).

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
20 March 2024	NLB Dedicated meeting	*General discussions were held on the cumulative scenario, in particular cumulative routeing options for vessels. Agreed outputs of this NLB consultation include:* • *"the optimal safe passage in terms of available sea area and minor deviations would likely involve most vessels passing west of Bowdun and east of Seagreen".* • *The Array and other local developments (and the space between them) will remain open for navigation should vessels choose, however it is considered likely that most vessels will pass inshore given route length changes were negligible.* • *"Depending on weather conditions and vessel types some vessels may go further offshore east of Bellrock".* • *Key cumulative mitigations include* – *Cumulative approach to lighting and marking of the Array and nearby developments.* – *Cooperation between both projects during the operational phases i.e. between marine coordinators.* – *Enhanced surveillance.*	The output of the NLB consultation is considered in cumulative routeing assessment within the NRA (volume 3, appendix 13.1, section 14.2).
23 April 2024	UK CoS Dedicated meeting	*General discussions around cumulative routeing options in the area. The CoS highlighted importance of maintaining optionality for vessel routeing within the region.*	Considered in cumulative routeing assessment within the NRA (volume 3, appendix 13.1, section 14.2), including cumulative routeing options available to vessels.
02 May 2024	MCA	• *Cumulative routeing options were discussed with the MCA at a meeting on the 02 May, with a focus on how vessels may route regionally in the area. This included presentation of the outputs of routeing assessment undertaken which showed usable routeing options to the east and west of the Ossian and Morven arrays, and evidence that local traffic volumes were relatively low.* • *The sea space between Morven and Ossian was considered within these discussions, noting that general consultation input undertaken for Ossian has indicated that any use of this area would be limited, with vessels preferring to pass further inshore or further offshore. Feedback from the MCA post meeting indicated agreement that use of this area (sea space between Morven and Ossian) was unlikely, given the current activity, overall length of the gap formed by the sea space between the projects, other future case developments and expert opinion. On this basis the MCA confirmed they were content for the boundaries bordering the sea space between Morven and Ossian to remain as they were.* • *The MCA noted in the same correspondence preference for developers to maximise searoom where practicable, with a focus of this additional searoom being beneficial to Shipping and Navigation and indicated this should be considered in future layout discussions.*	The output of the NLB consultation is considered in cumulative routeing assessment within the NRA (volume 3, appendix 13.1, section 14.2). The MCA comment on sea room is noted, and final build out within the Array will be agreed with the MCA and NLB as part of the Development Specification and Layout Plan (DSLP) process, noting this will consider the most up to date cumulative picture at the time.

13.6. METHODOLOGY TO INFORM BASELINE

11. Desktop data sources, detailed in Table 13.4, as well as site-specific vessel traffic survey data, detailed in Table 13.5, have been reviewed and analysed to inform this shipping and navigation baseline. In addition, consultation with stakeholders via the Array EIA Scoping Report (Ossian OWFL, 2023) has been carried out to aid the collection of baseline information by establishing agreement on data sources. Data collection has followed the principles of and is compliant with MGN 654 (MCA, 2021a).

13.6.1. DESKTOP STUDY

12. Information on shipping and navigation within the shipping and navigation study area was collected through a detailed desktop review of existing studies and datasets which are summarised in Table 13.4. It is noted that MGN 654 (MCA, 2021a) compliant vessel traffic surveys have also been undertaken (section 13.6.2).

13. Both general assessment of the data and numerical analysis using the datasets were used to characterise the baseline. The NRA (volume 3, appendix 13.1) includes full details of the analysis undertaken to develop the shipping and navigation baseline.

Table 13.4: Data Sources Used to Inform the Shipping and Navigation Baseline

Data	Source(s)	Purpose
Vessel traffic	Automatic Identification System (AIS) data for the shipping and navigation study area (12 months, 2022) recorded from coastal and satellite receivers.	Validation of the vessel traffic surveys and characterising seasonal variations.
	Anatec's ShipRoutes database (2023).	Secondary source for characterising vessel traffic movements including cumulatively within and in proximity to the Array.
Maritime incidents	Maritime Accident Investigation Branch (MAIB) marine accidents database (2002 to 2021).	Review of maritime incidents within and in proximity to the Array.
	Royal National Lifeboat Institution (v) incident data (2013 to 2022).	
	Department for Transport (DfT) UK civilian Search and Rescue (SAR) helicopter taskings (April 2015 to March 2023).	
Recreational traffic density and features	UK Coastal Atlas of Recreational Boating 2.1 (Royal Yachting Association (RYA), 2019b).	Characterising recreational activity within and in proximity to the Array.
Other navigational features	Admiralty Charts 273 (United Kingdom Hydrographic Office (UKHO), 2023).	Characterising other navigational features in proximity to the Array.
	Admiralty Sailing Directions NP54 (UKHO, 2021).	
Weather	Wind direction data measured from the metocean buoys deployed on site between August 2022 and August 2023.	Characterising weather conditions in proximity to the Array for use as input to the collision and allision risk modelling.
	Site-specific hindcast sea state dataset measured from the metocean buoys deployed on site between August 2022 and August 2023.	
	Visibility data provided in Admiralty Sailing Directions NP54 (UKHO, 2021).	
	Site-specific hydrodynamic hindcast dataset.	

13.6.2. SITE-SPECIFIC SURVEYS

14. Site-specific surveys were undertaken, as agreed with the MCA and the Northern Lighthouse Board (NLB) in a meeting on the 20 June 2022, and in compliance with MGN 654 (MCA, 2021a), to inform this chapter (see Table 13.3 for further details). A summary of the surveys undertaken used to inform the shipping and navigation assessment of effects is outlined in Table 13.5.

Table 13.5: Summary of Site-Specific Survey Data

Title	Extent of Survey	Overview of Survey	Survey Contractor	Date	Reference to Further Information
Winter 2022 vessel traffic survey	Throughout the shipping and navigation study area.	Winter vessel traffic survey data consisting of AIS, Radio Detection and Ranging (Radar) and visual observations recorded from a dedicated survey vessel on-site.	Survey undertaken by the *Star of Hope* vessel in liaison with Anatec Ltd.	07 December 2022 to 21 December 2022.	Volume 3, appendix 13.1.
Summer 2023 vessel traffic survey	Throughout the shipping and navigation study area.	Summer vessel traffic survey data consisting of AIS, Radar and visual observations recorded from a dedicated survey vessel on-site.	Survey undertaken by the *Star of Hope* vessel in liaison with Anatec Ltd.	02 July 2023 to 18 July 2023.	Volume 3, appendix 13.1.

13.7. BASELINE ENVIRONMENT

13.7.1. OVERVIEW OF BASELINE ENVIRONMENT

15. The following sections provide a summary of the shipping and navigation baseline environment. The NRA (volume 3, appendix 13.1) includes full details of the analysis undertaken to develop the shipping and navigation baseline.

16. Any proposed developments that have not yet begun construction are not considered baseline but have been considered cumulatively in section 13.12.

Navigational features

17. A plot of navigational features in proximity to the Array is presented in Figure 13.2 based on the Admiralty Charts (UKHO, 2023) and Sailing Directions (UKHO, 2021).

18. Three charted buoy positions are located within the site boundary, noting these are metocean buoys deployed on site. There are three additional aids to navigation in proximity to the site boundary, each equipped with an AIS transmitter; two inshore of the site boundary and within the shipping and navigation study area, and one offshore of the site boundary (approximately 1 nm outside of the shipping and navigation study area).

19. There are charted wrecks and obstructions in vicinity of the site boundary, more commonly seen inshore. The closest is a charted wreck located 3 nm from the north-western corner of the site boundary, at an approximate depth of 67 m below Chart Datum (CD). Further details of wrecks, including non-charted wrecks which are not considered in this chapter, are provided in volume 2, chapter 19 (which classified two wrecks and one potential wreck in the Array).

20. Seagreen 1 Offshore Wind Farm is the closest baseline offshore wind farm to the Array, located approximately 27 nm inshore of the site boundary.

21. The Catcher Area Development (a development area, i.e. an area charted around some oil and gas fields) is charted approximately 21 nm to the east of the site boundary. Within the limits of this development area is the BW Catcher Floating, Production, Storage and Offloading (FPSO) unit with a chains and anchors zone surrounding it, as well as templates (subsea oil and gas infrastructure). A pipeline connecting to the FPSO exits the development area to its east.

22. A subsea power cable lies south-east of the site boundary, at a minimum distance of approximately 19 nm.

23. Further details on navigational features can be found in the NRA (volume 3, appendix 13.1).

Emergency response and incident overview

24. The SAR helicopter service is operated by the Bristow Group, with the nearest base being located at Inverness Airport, approximately 113 nm north-west of the site boundary. A total of two helicopter taskings were located within the shipping and navigation study area between April 2015 and March 2023, with neither within the site boundary itself. This corresponds to an average frequency of one every four years.

25. The closest RNLI station to the site boundary is at Aberdeen (approximately 44 nm to the north-west), where both an All-Weather Lifeboat (ALB) and Inshore Lifeboat (ILB) are in use. A total of three incidents were documented by the RNLI within the shipping and navigation study area between 2013 and 2022, corresponding to an average of one incident every three years. One of these incidents occurred within the site boundary, in 2016.

26. A total of four incidents documented by the MAIB occurred within the shipping and navigation study area between 2012 and 2021, corresponding to an average of one incident every two to three years. Two of these incidents occurred within the site boundary, in 2015 and 2018.

27. Further details on emergency response resources and maritime incidents can be found in the NRA (volume 3, appendix 13.1).

Vessel traffic movements

28. A plot of vessel traffic survey data recorded within the shipping and navigation study area, colour-coded by vessel type, is presented in Figure 13.3.

29. During the winter survey period, an average of nine vessels per day was recorded within the shipping and navigation study area with two to three vessels per day recorded within the site boundary. During the summer survey period, an average of 11 vessels per day was recorded within the shipping and navigation study area with three to four vessels per day recorded within the site boundary.

30. The most common vessel type across the 28 days was cargo, with four vessels per day within the shipping and navigation study area, followed by oil and gas, with three to four vessels per day. Fishing vessel and recreational vessel activity was low due to the distance of the Array offshore, which aligns with input received during consultation (see section 13.5). Within the shipping and navigation study area, there was one fishing vessel every two to three days (the majority of which were likely in transit based on speed and behaviour) and one recreational vessel every three to four days.

31. There was broad correlation between the vessel traffic surveys and the long term data, i.e. oil and gas and cargo vessels being the most common vessel types, with minimal levels of fishing and recreational vessels.

32. Using the principles of MGN 654 (MCA, 2021a), a total of 11 main commercial routes were identified from the long term data, presented in Figure 13.4. The busiest routes were 1 and 2, which each comprised approximately two vessels per day. Routes 3 and 4 comprised approximately one vessel per day, all other routes comprised less than one vessel per day.

33. Detailed analysis of the vessel traffic data and the methodology behind the collection and preparation of this data are provided in the NRA (volume 3, appendix 13.1).

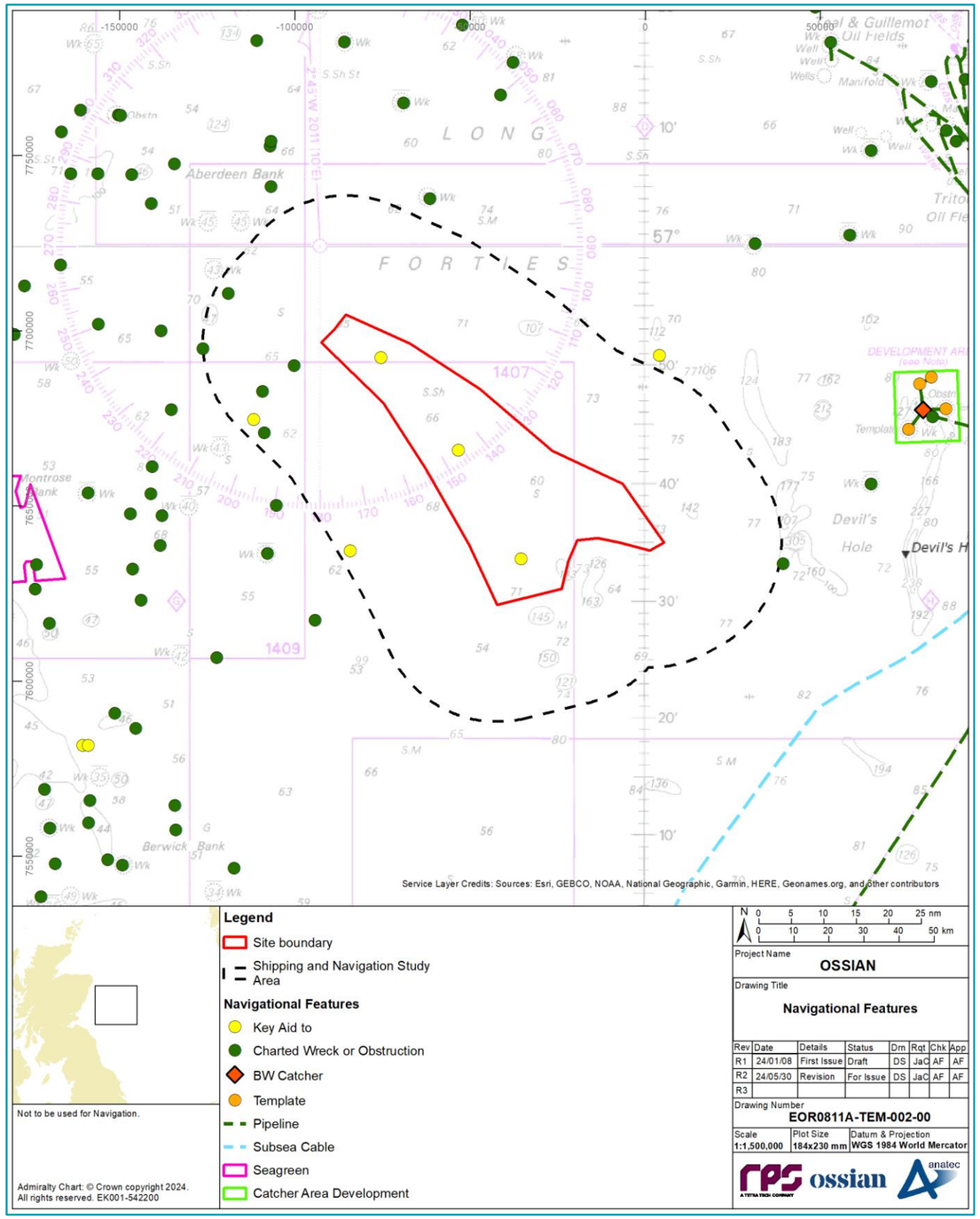

Figure 13.2: Navigational Features in the Vicinity of the Array

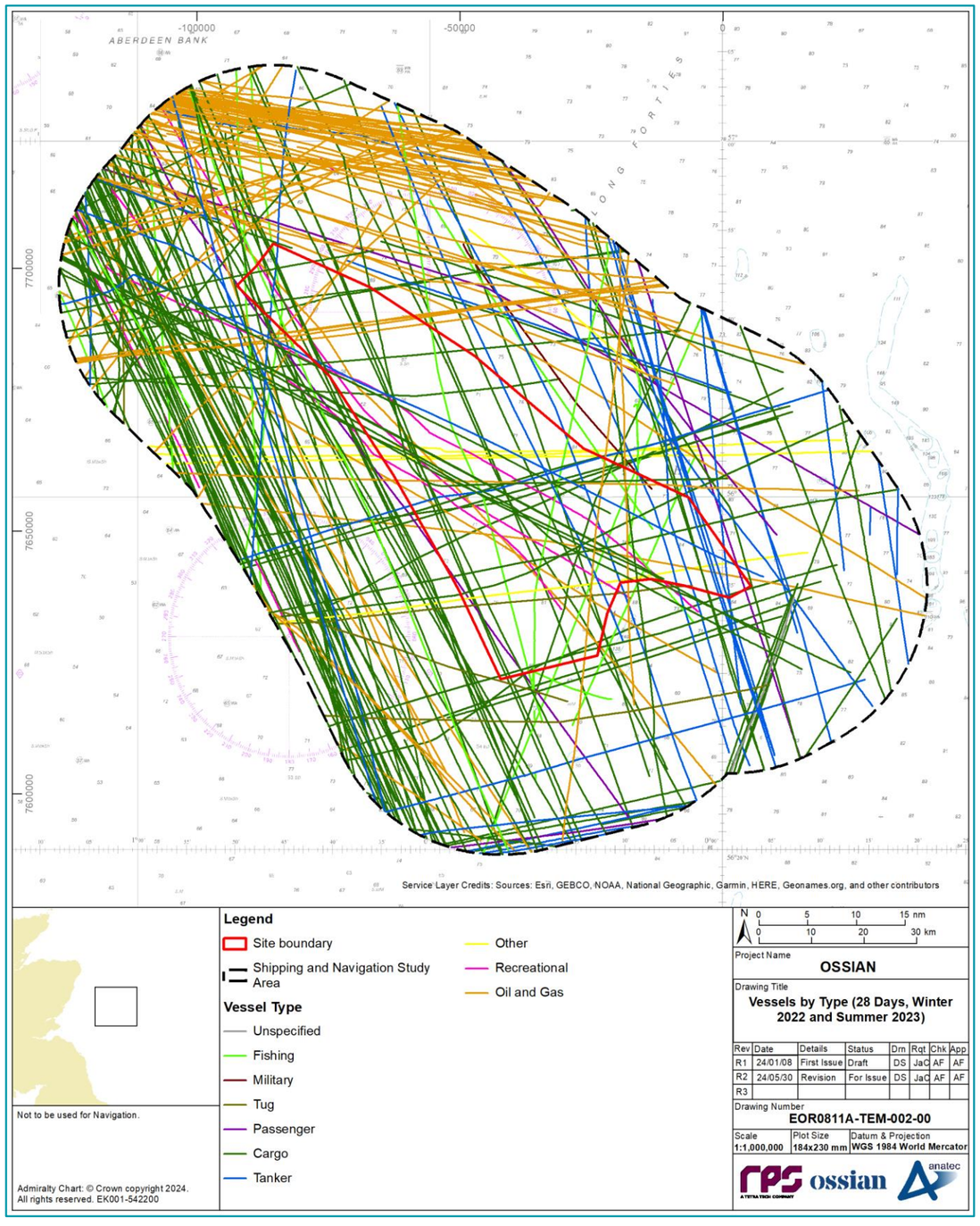

Figure 13.3: Vessels by Type (28 Days, Winter 2022 and Summer 2023)

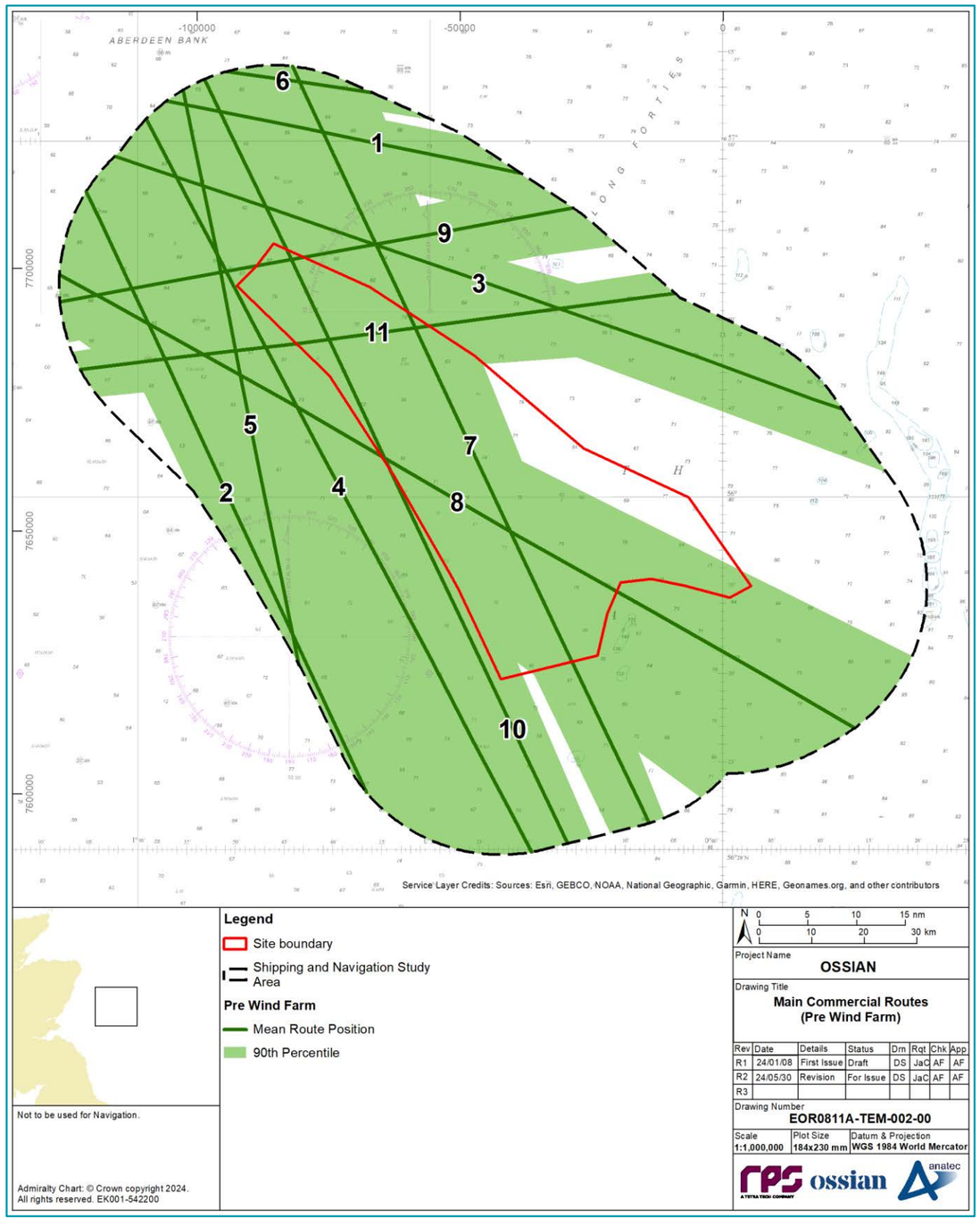

Figure 13.4: Main Commercial Routes (Pre Wind Farm)

13.7.2. FUTURE BASELINE SCENARIO

34. The EIA Regulations require that "*a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project, as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge*" is included within the Array EIA Report.

35. If the Array does not come forward, an assessment of the 'without development' future baseline conditions has therefore also been carried out and is described within this section.

36. For commercial vessels, potential future changes in traffic volumes are complex to predict, noting actual changes will be based on multiple factors including general market trends. Therefore, the NRA (volume 3, appendix 13.1) has considered two independent scenarios of potential growth in commercial vessel movements of 10% and 20%, with the outputs of this process accounted for within this chapter. It is likely that commercial vessels will deviate to avoid any other future wind farm developments that are under construction or in operation. This is in line with vessel behaviours observed at other UK offshore wind farms including Seagreen 1 Offshore Wind Farm and Neart na Gaoithe Offshore Wind Farm (Anatec, 2016).

37. It should also be considered that there may be an increase in vessels associated with offshore wind farm construction and operation as further future wind farm developments are developed. Furthermore, fluctuations in oil and gas vessel activity will depend on future development and/or decommissioning, which again is heavily dependent on market conditions and is therefore difficult to predict. Precautionary future case assumptions have therefore been made with taking into account 10% and 20% increases in traffic.

38. For commercial fishing and recreational vessel activity, there is similar uncertainty associated with long-term predictions given the limited reliable information on future trends upon which any firm assumptions can be made. Therefore, to ensure a conservative approach, 10% and 20% growth scenarios in commercial fishing vessel and recreational vessel movements have also been assumed in the NRA (volume 3, appendix 13.1).

13.7.3. DATA LIMITATIONS AND ASSUMPTIONS

39. Data limitations and assumptions are summarised below, with further details presented in the NRA (volume 3, appendix 13.1).

Automatic identification system data

40. It is assumed that vessels under an obligation to broadcast information via AIS have done so, across all vessel traffic datasets. It has also been assumed that the details broadcast via AIS (such as vessel type and dimensions) are accurate unless clear evidence to the contrary was identified.

Historical incident data

41. Although all UK commercial vessels are required to report incidents to the MAIB, this is not mandatory for non-UK vessels unless they are in a UK port, within UK territorial waters or carrying passengers to a UK port. There are also no requirements for non-commercial recreational craft to report incidents to the MAIB. Nevertheless, the MAIB incident database is considered to be a suitable source for the characterisation of historical incidents and adequate for the assessment.

42. The RNLI incident data cannot be considered comprehensive of all incidents in the shipping and navigation study areas. Although hoax and false alarms are excluded, any incident to which a RNLI resource was not mobilised has not been accounted for in this dataset. Nevertheless, the RNLI incident data is considered to be a suitable source for the characterisation of historical incidents and adequate for the assessment.

United Kingdom Hydrographic Office Admiralty Charts

43. The Admiralty charts published by the UKHO are updated periodically, and therefore the information shown may not reflect the real-time features within the region with total accuracy. Taking into account consultation undertaken, the characterisation of navigational features is considered to be suitably comprehensive and adequate for the assessment. For aids to navigation and wrecks/obstructions, only those charted and considered key to establishing the shipping and navigation baseline are shown.

13.8. KEY PARAMETERS FOR ASSESSMENT

13.8.1. MAXIMUM DESIGN SCENARIO

44. The Maximum Design Scenario (MDS) identified in Table 13.6 are those expected to have the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the details provided in volume 1, chapter 3 of the Array EIA Report. Effects of greater significance are not predicted to arise should any other development scenario, based on details within the Project Description (volume 1, chapter 3) (e.g. different infrastructure layout), to that assessed here, be taken forward in the final design scheme.

Table 13.6: Maximum Design Scenario Considered for Each Potential Impact as Part of the Assessment of LSE[1] on Shipping and Navigation

Potential Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
Increased vessel to vessel collision risk resulting from displacement (third-party to third-party)	✓	✓	✓	**Construction Phase** • buoyed construction area around maximum extent of Array; • 500 m safety zones around structures where active construction works are ongoing, 50 m otherwise up until commissioning of the Array; • up to 265 floating wind turbines, with up to 6 mooring lines each; • floating wind turbine foundations, 130 m x 110 m; • up to 3 large Offshore Substation Platforms (OSPs), and 12 small OSPs; • large OSP topside of 121 m x 89 m and small OSP topside of 41 m x 37 m; • construction phase up to 8 years; and • up to 1,497 km in total Array cable length (inter-array and interconnector cables connecting OSPs to one another). **Operation and Maintenance Phase** • full build out of site boundary; • 500 m safety zones around major maintenance works; • operational lifespan of up to 35 years; • up to 265 floating wind turbines, with up to 6 mooring lines each; • wind turbine floating foundations, 130 m x 110 m; • up to 3 large OSPs, and 12 small OSPs; • large OSP topside of 121 m x 89 m and small OSP topside of 41 m x 37 m; and • up to 1,497 km in total Array cable length (inter-array and interconnector cable connecting OSPs to one another s). **Decommissioning Phase** • anticipated that all floating structures and OSP foundations and topsides will be completely removed; • removal of mooring lines and dynamic cables; • inter-array and interconnector cables may be left *in situ* (other than dynamic sections); and • decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.	Largest possible extent of site boundary and structure size plus greatest duration resulting in the maximum effect on vessel displacement.
Displacement from adverse weather routeing	✓	✓	✓	As for 'Increased vessel to vessel collision risk resulting from displacement (third-party to third-party)' - see above.	Largest possible extent of site boundary and structure size plus greatest duration resulting in the maximum effect on vessel displacement from adverse weather routeing.

[1] C = Construction, O = Operation and maintenance, D = Decommissioning

Potential Impact	Phase[1] C	Phase[1] O	Phase[1] D	Maximum Design Scenario	Justification
Increased vessel to vessel collision risk (third-party to project vessels)	✓	✓	✓	**Site Preparation and Construction Phases** • buoyed construction area around maximum extent of Array; • up to 265 floating wind turbines, with up to 6 mooring lines each; • up to 3 large OSPs, and 12 small OSPs; • construction phase up to 8 years; • up to 1,497 km in total Array cable length (inter-array and interconnector cables connecting OSPs to one another); and • up to 7,902 vessel return trips during site preparation and construction phases. **Operation and Maintenance Phase** • full build out of site boundary; • operational lifespan of up to 35 years; • up to 265 floating wind turbines, with up to 6 mooring lines each; • floating wind turbine foundations, 130 m x 110 m; • up to 3 large OSPs, and 12 small OSPs; • large OSP topside of 121 m x 89 m and small OSP topside of 41 m x 37 m; and • up to 508 vessel trips per year for operation and maintenance. **Decommissioning Phase** • anticipated that all floating structures and OSP foundations and topsides will be completely removed; • removal of mooring lines and dynamic cables; • inter-array and interconnector cables may be left *in situ* (other than dynamic sections); and • decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.	Maximum number of project vessels and movements leading to largest collision risk.
Vessel to structure allision risk	✓	✓	✓	**Construction Phase** • buoyed construction area around maximum extent of Array; • up to 265 floating wind turbines, with up to 6 mooring lines each; • floating wind turbine foundations, 130 m x 110 m; • up to 3 large OSPs and 12 small OSPs; • large OSP topside of 121 m x 89 m and small OSP topside of 41 m x 37 m; and • construction phase up to 8 years. **Operation and Maintenance Phase** • full build out of site boundary; • operational lifespan of up to 35 years; • up to 265 floating wind turbines, with up to 6 mooring lines each; • floating wind turbine foundations, 130 m x 110 m; and • up to 3 large OSPs, and 12 small OSPs; • large OSP topside of 121 m x 89 m and small OSP topside of 41 m x 37 m. **Decommissioning Phase** • anticipated that all floating structures and OSP foundations and topsides will be completely removed; and • decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.	Largest possible extent of site boundary, greatest number of surface structures and maximum associate dimensions, plus greatest duration resulting in the maximum effect on vessel to structure allision risk.
Reduced access to local ports and harbours	✓	✓	✓	As for 'Increased vessel to vessel collision risk (third-party to project vessels)' - see above.	Maximum number of project vessels and movements leading to largest potential impact on port access.

Potential Impact	Phase[1] C	Phase[1] O	Phase[1] D	Maximum Design Scenario	Justification
Loss of station	✓	✓	✓	**Construction Phase** • up to 265 floating wind turbines, with up to 6 mooring lines each; • floating wind turbine foundations, 130 m x 110 m; • up to 3 large OSPs and 12 small OSPs; • large OSP topside of 121 m x 89 m and small OSP topside of 41 m x 37 m; and • construction phase up to 8 years. **Operation and Maintenance Phase** • full build out of site boundary; • operational lifespan of up to 35 years; • up to 265 floating wind turbines, with up to 6 mooring lines each; and • floating wind turbine foundations, 130 m x 110 m. **Decommissioning Phase** • anticipated that all floating structures and OSP foundations and topsides will be completely removed; and • decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.	Maximum number of wind turbines with greatest surface dimensions leading to largest loss of station risk.
Reduction of underkeel clearance as a result of subsea infrastructure	✓	✓	✓	**Construction Phase** • buoyed construction area around maximum extent of Array; • 500 m safety zones around structures where active construction works are ongoing, 50 m otherwise up until commissioning of wind farm; • up to 265 floating wind turbines, with up to 6 mooring lines each; • mooring line connection point 5 m below surface, angle of descent of 82 degrees from horizontal; • up to 3 large OSPs and 12 small OSPs; • up to 1,497 km in total Array cable length (inter-array and interconnector cables); • dynamic inter-array cables with buoyancy modules; • minimum target burial depth of 0.4 m subject to Cable Burial Risk Assessment (CBRA); • cable protection required for up to 20% of inter-array cables and up to 30% of interconnector cables; • maximum cable protection height of 3 m and width of 20 m for all subsea cables (excluding crossings); • up to 12 inter-array and 12 interconnector cable crossings, with a maximum height of 4 m; and • construction phase up to 8 years. **Operation and Maintenance Phase** As for the construction phase. **Decommissioning Phase** • anticipated that all floating structures and OSP foundations and topsides will be completely removed; • removal of mooring lines and dynamic cables; • inter-array and interconnector cables may be left *in situ* (other than dynamic sections); and • decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.	Maximum number of mooring lines, plus longest length of inter-array and interconnector cables.

Potential Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
Anchor interaction with subsea cables (including dynamic cabling)	✓	✓	✓	**Construction Phase** • buoyed construction area around maximum extent of Array; • 500 m safety zones around structures where active construction works are ongoing, 50 m otherwise up until commissioning of the Array; • up to 265 floating wind turbines, with up to 6 mooring lines each; • up to 3 large OSPs, and 12 small OSPs; • construction phase up to 8 years; • up to 1,497 km in total Array cable length (inter-array and interconnector cables connecting OSPs to one another); • dynamic inter-array cables with buoyancy modules; and • minimum target burial depth of 0.4 m subject to CBRA. **Operation and Maintenance Phase** • full build out of site boundary; • 500 m safety zones around major maintenance works; • up to 265 floating wind turbines, with up to 6 mooring lines each; • up to 3 large OSPs, and 12 small OSPs; • operational lifespan of up to 35 years; • up to 1,497 km in total Array cable length (inter-array and interconnector cables connecting OSPs to one another); • dynamic inter array cables with buoyancy modules; and • minimum target burial depth of 0.4 m subject to CBRA. **Decommissioning Phase** • anticipated that all floating structures and OSP foundations and topsides will be completely removed; • removal of mooring lines and dynamic cables; • inter-array and interconnector cables may be left *in situ* (other than dynamic sections); and • decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.	Maximum length of inter array and interconnector cables.

Potential Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
Anchor interaction with mooring lines	✓	✓	✓	**Construction Phase** • buoyed construction area around maximum extent of Array; • 500 m safety zones around structures where active construction works are ongoing, 50 m otherwise up until commissioning of wind farm; • up to 265 floating wind turbines, with up to 6 mooring lines each; • mooring line connection point 5 m below surface, angle of descent of 82 degrees from horizontal; • mooring line radius up to 700 m; and • construction phase up to 8 years. **Operation and Maintenance Phase** • full build out of site boundary; • 500 m safety zones around major maintenance works; • up to 265 floating wind turbines, with up to 6 mooring lines each; • mooring line connection point 5 m below surface, angle of descent of 82 degrees from horizontal; • mooring line radius up to 700 m; and • operational lifespan of up to 35 years. **Decommissioning Phase** • anticipated that all floating structures and OSP foundations and topsides will be completely removed; • removal of mooring lines and dynamic cables; • inter-array and interconnector cables may be left *in situ* (other than dynamic sections); and • decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.	Maximum number of mooring lines.

Potential Impact	Phase[1] C	Phase[1] O	Phase[1] D	Maximum Design Scenario	Justification
Reduction in SAR Capability	✓	✓	✓	**Construction Phase** • 500 m safety zones around structures where active construction works are ongoing, 50 m otherwise up until commissioning of the Array; • Up to 265 floating wind turbines, with up to 6 mooring lines each; • floating wind turbine foundations, 130 m x 110 m; • up to 3 large OSPs, and 12 small OSPs; • large OSP topside of 121 m x 89 m; • small OSP topside of 41 m x 37m; • up to 1,497 km in total Array cable length (inter-array and interconnector cables connecting OSPs to one another); • up to 7,902 vessel return trips during site preparation and construction phases; and • construction phase up to 8 years; **Operation and Maintenance Phase** • full build out of site boundary; • 500 m safety zones around major maintenance works; • up to 265 floating wind turbines, with up to 6 mooring lines each; • floating wind turbine foundations, 130 m x 110 m; • up to 3 large OSPs, and 12 small OSPs; • large OSP topside of 121 m x 89 m; • small OSP topside of 41 m x 37 m; • operational lifespan of up to 35 years; • up to 1,497 km in total Array cable length (inter-array and interconnector cables connecting OSPs to one another); and • up to 508 vessel trips per year for the operation and maintenance phase. **Decommissioning Phase** • anticipated that all floating structures and OSP foundations and topsides will be completely removed; • removal of mooring lines and dynamic cables; • inter-array and interconnector cables may be left *in situ* (other than dynamic sections); and • decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.	Largest possible extent of site boundary, greatest number of vessel activities, greatest number of surface structures and greatest duration resulting in the maximum effect on emergency response capability.

13.8.2. IMPACTS SCOPED OUT OF THE ASSESSMENT

45. The shipping and navigation pre-Scoping workshop and the Array EIA Scoping Report (Ossian OWFL, 2023) process were used to facilitate stakeholder engagement on topics to be scoped out of the assessment (see Table 13.3).

46. On the basis of the baseline environment and the Project Description outlined in volume 1, chapter 3 of the Array EIA Report, no impacts are proposed to be scoped out of the assessment for shipping and navigation. It is noted that impacts to vessel communication and position fixing equipment have been assessed in the NRA (volume 3, appendix 13.1), noting it has been considered within the assessment of collisions and allisions in section 13.11.

13.9. METHODOLOGY FOR ASSESSMENT OF EFFECTS

13.9.1. OVERVIEW

47. The shipping and navigation assessment of effects has followed the Formal Safety Assessment (FSA) methodology since this is the internationally recognised approach for assessing the impact to shipping and navigation receptors, and is the approach required under the MCA's methodology (Annex 1 of MGN 654). The following guidance documents have been considered:

- MGN 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response and its annexes (MCA, 2021a);
- MGN 372 Amendment 1 (Merchant and Fishing) Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2022);
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) O-139 on The Marking of Man-Made Offshore Structures (IALA, 2021a);
- IALA G1162 The Marking of Offshore Man-Made Structures (IALA, 2021b);
- The RYA Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy (RYA, 2019a); and
- Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA and Health and Safety Executive (HSE), 2017).

13.9.2. CRITERIA FOR ASSESSMENT OF EFFECTS

48. The criteria for determining the likely significance of effects for shipping and navigation are derived from a two-stage process that considers the severity of consequence and frequency of occurrence. This section describes the criteria applied in this chapter to assign values to each of these two factors.

49. The criteria for defining severity of consequence in this chapter are outlined in Table 13.7. For the level of assistance required to manage environmental damage, the tiers indicated relate to the incident response matrix provided in the National Contingency Plan (NCP) (MCA, 2014).

Table 13.7: Definition of Terms Relating to the Severity of Consequence (MCA, 2014)

Severity of Consequence	Definition
Negligible	No perceptible risk to people, property, the environment or business.
Minor	• Slight injury(s) to people; • Minor damage to property, i.e. superficial damage; • Tier 1 environmental damage with local assistance required; and • Minor reputational risk to business limited to users.
Moderate	• Multiple minor or single serious injury to people; • Damage to property not critical to operations; • Tier 2 environmental damage with limited external assistance required; and • Local reputational risk to business.
Serious	• Multiple serious injuries or single fatality to people; • Damage to property resulting in critical risk to operations; • Tier 2 environmental damage with regional assistance required; and • National reputational risk to business.
Major	• Multiple fatalities to people; • Total loss of property; • Tier 3 environmental damage with national assistance required; and • International reputational risk to business.

50. The criteria for defining frequency of occurrence in this shipping and navigation Array EIA Report chapter are outlined in Table 13.8.

Table 13.8: Definition of Terms Relating to the Frequency of Occurrence

Frequency of Occurrence	Description
Frequent	Yearly
Reasonably probable	One per one to ten years
Remote	One per 10 to 100 years
Extremely unlikely	One per 100 to 10,000 years
Negligible	Less than one occurrence per 10,000 years

51. The significance of the effect upon shipping and navigation is determined by correlating the severity of consequence and frequency of occurrence, as shown in in Table 13.9.

52. For the purposes of this assessment:

- a level of effect of Unacceptable will be considered a 'significant' effect in terms of the EIA Regulations;
- a level of effect of Broadly Acceptable will be considered 'not significant' in terms of the EIA Regulations; and
- a level of effect of Tolerable will be considered 'not significant' in terms of the EIA Regulations assuming the risks have been reduced to As Low As Reasonably Practicable (ALARP) through application of mitigation.

Table 13.9: Matrix Used for the Assessment of the Significance of the Effect

Severity of Consequence	Frequency of Occurrence: Negligible	Extremely Unlikely	Remote	Reasonably Probable	Frequent
Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
Minor	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
Moderate	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
Serious	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
Major	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable

53. Additionally, differences in terminology between this chapter (which uses EIA terminology) and the NRA (which uses FSA terminology) are summarised in Table 13.10. Further details of the EIA methodology are provided in volume 1, chapter 6.

Table 13.10: Summary of Differences in Terminology Between EIA and NRA

EIA Term	NRA Term	Definition
Action	Cause	An event or activity that may create an impact.
Impact	Hazard	A potential to threaten human life, health, property or the environment.
Designed in measure	Embedded mitigation measure	A means of controlling a single element of impact which is embedded (standard or good practice measures utilised or in place).
Secondary mitigation	Additional mitigation measures	A means of controlling a single element of an impact which is additional to the risk with the designed in measures (or embedded mitigation) in place (required to reduce impact to not significant or ALARP).
Effect	Risk	The combination of the frequency of occurrence and the severity of consequence of an impact which results in a statement of significance.
Receptor	User	The receiver of the impact

13.10. MEASURES ADOPTED AS PART OF THE ARRAY

54. As part of the Array design process, a number of designed in measures have been proposed to reduce the potential for impacts on shipping and navigation (see Table 13.11). They are considered inherently part of the design of the Array and, as there is a commitment to implementing these measures, these have been considered in the assessment presented in section 13.11 (i.e. the determination of significance assumes implementation of these measures). These designed in measures are considered standard industry practice for this type of development.

Table 13.11: Designed in Measures Adopted as Part of the Array

Designed In Measures Adopted as Part of the Array	Justification
Apply for and implement safety zones during major construction and operation and maintenance activities.	Application for safety zones up to 500 m around structures where vessels are undertaking construction work during construction and periods of major operation and maintenance and 50 m around partially completed or completed but not yet fully commissioned surface piercing structures during construction. Advisory temporary safe passing distances to be promulgated to mariners, including fishermen, around installation/maintenance vessels actively engaged in works. Similar approach likely during decommissioning noting this will be a separate application.
Deployment of a buoyed construction area in agreement with the NLB.	Protects third-party vessels from project vessels involved in construction activities which may be Restricted in Ability to Manoeuvre (RAM), and partially completed structures.
Completion of, and adherence to a Cable Burial Risk Assessment (CBRA).	The CBRA will consider relevant activities in the vicinity of inter-array and interconnector cables and confirm appropriate means of protection taking account of the final inter-array and interconnector cable. The CBRA will identify the appropriate target burial depth to ensure the cable remain buried, or appropriately protected, where target burial depths cannot be achieved, for the duration of Ossian, to minimise the risk of interaction with other sea users or cable exposure.
Compliance with MGN 654 and its annexes (in particular SAR annex 5 and completion of a SAR checklist) where applicable.	Ensures the final Array layout is suitable for SAR operations and that reductions in underkeel clearance are acceptable.
Use of guard vessel(s) as required by risk assessment.	Maximises awareness of temporary hazards, and ensures vessel presence where necessary to alert passing mariners to a hazard.
Development of, and adherence to, a DSLP to confirm the final layout and design in consultation with the MCA and NLB.	Ensures the final Array layout is suitable for both surface and air based (for SAR purposes) navigation and is compliant with MGN 654. Will also confirm adherence to key project design conditions including ensuring a safe underkeel clearance is maintained around mooring line arrangements.
Development of, and adherence to an LMP.	The LMP will confirm compliance with legal requirements including IALA G1162 (IALA, 2021b), with regards to shipping, navigation and aviation marking and lighting to increases awareness of the Array in both day and night conditions for vessel and aviation operators including in restricted visibility and assists with SAR operations. Consideration of UK MGN 654 with respect to wind turbine design and construction, so that recognised safe standards are met with regards to navigational safety and emergency response (SAR, salvage and towing, counter pollution).
Appropriate marking of structures on UKHO Admiralty Charts and other electronic charts as appropriate.	Ensure the appropriate marking of structures on UKHO Admiralty Charts to maximise the awareness of the Array allowing vessels to plan their passage in advance.
Minimum blade tip clearance height of 36 m above LAT.	This minimises the risk of blade allision particularly for sailing vessels with a mast and surpasses the requirements set by the Royal Yachting Association (RYA) policy (RYA, 2019) and MGN 654 (MCA, 2021).

Designed In Measures Adopted as Part of the Array	Justification
Development of, and adherence to a Navigational Safety and Vessel Management Plan (NSVMP).	The NSVMP will confirm the types and numbers of vessels that will be engaged in activities associated with the Array and consider vessel coordination including indicative transit route planning (Marine Coordination). All contractors undertaking works to be contractually obliged to ensure compliance with standard offshore policies, including those that prohibit the discarding of objects or materials overboard and that require the rapid recovery of accidentally dropped objects where feasible. Development and issue of a Code of Conduct to all project vessel operators to advise on how to avoid impacts on marine megafauna and interference with fishing activities. Compliance of all project vessels with maritime regulations as adopted by the relevant flag state including the COLREGs IMO, 1974a) and the SOLAS (IMO, 1974b). Promulgation of information for vessel routes, timings and locations, safety zones and advisory safe passing distances as required via Kingfisher Bulletins. Compliance with the Regulatory Expectations on Moorings for Floating Wind and Marine Devices, in particular independent TPV and monitoring/tracking.
Development and implementation of an Emergency Response Co-operation Plan (ERCoP).	In line with MGN 654 (MCA, 2021) Annex 5 SAR requirements.
Promulgation of information through timely and efficient posting of NtM, Kingfisher Bulletins and navigational warnings, as appropriate. Information will include but not be limited to vessel routes, timings and locations, safety zones and advisory safe passing distances as required.	Maximises awareness of the Array allowing vessels to passage plan in advance.
Establishment of a Marine Coordinator and communication procedures to manage project vessel movements.	Ensure project vessels are suitably managed to minimise the likelihood of involvement in incidents and ensure the safe operation during all phases of project development. Increases the ability to assist in the event of a third-party incident.
Compliance with the Regulatory Expectations on Moorings for Floating Wind and Marine Devices (Health and Safety Executive (HSE) and MCA, 2017).	Ensure that the final design is appropriately designed, constructed to an appropriate standard and structural integrity maintained during the operation and maintenance phase of the project. MGN 654 requirement, to manage risk of loss of station and to ensure procedures are in place in the event of loss of station.
Array infrastructure will be subject to third party verification where applicable.	Ensure that the final design is appropriately designed, constructed to an appropriate standard and structural integrity maintained during the operation and maintenance phase of the project.
Production and implementation of a Marine Pollution Contingency Plan (MPCP).	To reduce the potential for release of pollutants from construction, operation and maintenance and decommissioning plant is reduced so far as reasonably practicable. These will likely include designated areas for refuelling where spillages can be easily contained, storage of chemicals in secure designated areas in line with appropriate regulations and guidelines, double skinning of pipes containing hazardous substances, and storage of these substances in impenetrable bunds. All vessels associated with the Array will be required to comply with the standards set out by MARPOL. Measures will be in place to reduce the risk that accidental pollution poses to personnel, third party vessels and the environment. An outline MPCP is provided in volume 4, appendix 21, annex A.
Installation of remote discrete condition monitoring equipment	Installation of appropriate system, such as sensors, cameras, dataloggers, etc. to ensure the safe and efficient operation of the Array infrastructure.
Construction Method Statement (CMS)	The CMS will confirm certain construction activities and how these will be managed. This will include plans on wet storage within the Array.

13.11. ASSESSMENT OF SIGNIFICANCE

55. Table 13.6 summarises the impacts arising from the construction, operation and maintenance and decommissioning phases of the Array, as well as the MDS against which each impact has been assessed. An assessment of the likely significance of the effects of the Array on the shipping and navigation receptors caused by each identified impact is given below.

INCREASED VESSEL TO VESSEL COLLISION RISK RESULTING FROM DISPLACEMENT (THIRD-PARTY TO THIRD-PARTY)

Construction phase

56. There will be no restrictions on entry to the Array other than through any active safety zones. However, it is considered likely that commercial vessels will deviate to avoid the Array during construction, which will be marked as a buoyed construction area as directed by NLB. This aligns with input received in the Hazard Workshop including from commercial vessel representation, and operational experience of other UK wind farms including the nearby Seagreen 1 Offshore Wind Farm and Neart na Gaoithe Offshore Wind Farm.

57. Anticipated deviations for the main commercial routes identified from the vessel traffic data have been defined. The full methodology for main route deviations is provided in volume 3, appendix 13.1, section 13.4.1, with reasonable worst case deviation assumptions established in line with industry experience and consultation feedback.

58. Deviations from the pre wind farm scenario (current baseline) would be required for seven out of the 11 main commercial routes identified (routes 4, 5, 7, 8, 9, 10 and 12 as per Figure 13.4). However, it should be noted that the busiest routes (routes 4 and 5 in Figure 13.4, which have six vessels per week and two to three vessels per week, respectively) would have very low deviation (less than 0.1 nm) while the routes with larger deviation (routes 7 and 8 in Figure 13.4, which would have a deviation of 5.7 nm and 4.9 nm, respectively) are quieter routes (with only one to two vessels per week each). Further, worst case assumptions have been made in terms of deviations as set out in volume 3, appendix 13.1, section 13.4.1.

59. It is noted that one regular commercial ferry operator was identified in the area, namely Smyril Line, who run a service between the Faroe Islands, Iceland and Rotterdam.

60. With the main commercial route deviations in place, the base case annual vessel to vessel collision frequency for commercial vessels is estimated to be 5.42×10^{-4}, corresponding to a return period of approximately one in 1,845 years. This represents a 31% increase in collision frequency compared to the pre wind farm base case scenario (see volume 3, appendix 13.1).

61. The return period of one in 1,845 years is reflective of the low volume of vessel traffic in the area compared to elsewhere in the UK. Experience from previous under construction offshore wind farms indicates that Masters regularly choose to transit greater than 1 nm from construction works, and there is sufficient sea room available for vessels to do so around the Array (see volume 3, appendix 13.1).

62. Smaller vessel types (e.g. fishing, recreation) may still choose to transit through the Array during construction, noting this would be at the discretion of individual vessels. In this regard it should be considered that there is limited experience of deployment of large scale floating offshore wind projects, and as such vessels may be less likely to transit through floating structures than those on fixed foundations (this assumption aligns with consultation input, see section 13.5). However, there is considered to be sufficient sea room to accommodate any vessels that chose to avoid the Array without notably increasing vessel density around the site boundary, given that the nearest baseline offshore wind farm (Seagreen 1 Offshore Wind Farm) is approximately 27 nm inshore of the Array.

63. The impact will be present throughout the construction phase which will last for up to eight years. Given that third-party vessels are expected to be compliant with relevant Flag State regulations including the COLREGs, the likes of collision avoidance action seek to ensure that the likelihood of an encounter developing into a collision incident is low. This is furthered by the promulgation of information and charting of the buoyed construction area which will increase awareness of ongoing construction activities, thus allowing third-party vessels to passage plan in advance (see section 13.10).

64. Based on the incident data studied for the NRA, the most likely consequences in the event of a collision incident between third-party vessels are minor contact between the vessels resulting in minor damage to property and minor reputational effects on business but no perceptible effect on people. Although considered less likely, collision between third party vessels could involve one of the vessels foundering resulting in Potential Loss of Life (PLL) and the environmental consequence of pollution. Such a scenario would be more likely if one of the vessels involved was a small craft which may have weaker structural integrity than a commercial vessel. The Array's MPCP will be implemented to reduce the environmental impacts should pollution occur (volume 4, appendix 21, annex A).

Frequency of occurrence

65. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, the outputs of the modelling, and consideration of historical incident data.

Severity of consequence

66. The severity of consequence is considered to be serious.

Significance of the effect

67. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will, therefore, be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

68. No secondary shipping and navigation mitigation is considered necessary because the likely effect, in the absence of mitigation beyond the designed in measures outlined in Table 13.11, is of tolerable significance and ALARP which is not significant in EIA terms.

Operation and maintenance phase

69. Based on experience at existing operational offshore wind farms and consultation undertaken (see section 13.5), it is anticipated that commercial vessels will generally choose not to navigate internally within the Array. Therefore, the anticipated deviations discussed for the construction phase are directly applicable to the operation and maintenance phase, and it is likely that the deviations already established during construction will continue into the operation and maintenance phase. On this basis, the risk of third-party to third-party vessel collision for commercial vessels is considered analogous during the operation and maintenance phase as during the construction phase.

70. It is anticipated that commercial fishing vessels and recreational vessels may choose to navigate internally within the Array (and this may be more likely during the operation and maintenance phase than in the construction phase given there will be no construction buoys or construction activities) based on experience at existing operational offshore wind farms, particularly in favourable weather conditions. Such navigation may result in an additional encounter and collision risk associated with these small craft exiting the Array. However, with the application of good seamanship and given the high minimum spacing between wind turbines (1,000 m), there is not expected to be a visual obstruction to vessels passing at the edge of the Array. It is also noted that most small vessels this far offshore would be expected to be broadcasting on AIS. This assumption aligns with both consultation input (section 13.5), and the vessel traffic survey data collected (section 13.7.1).

71. The impact will be present throughout the operation and maintenance phase which will last for up to 35 years. Given that third-party vessels are expected to be compliant with Flag State regulations including the COLREGs, the likes of collision avoidance action seek to ensure that the likelihood of an encounter developing into a collision incident is low. This is furthered by the promulgation of information and charting of infrastructure associated with the Array which will increase awareness of the Array and any ongoing major maintenance activities, thus allowing third-party vessels to passage plan in advance (see section 13.10).

72. The most likely consequences of the impact are as per the equivalent construction phase impact, namely minor contact and damage to property and minor reputational effects on business, but no perceptible effect on people. Although considered less likely, collision between third party vessels could involve one of the vessels foundering resulting in PLL and the environmental consequence of pollution. Such a scenario would be more likely if one of the third-party vessels involved was a small craft and the other a commercial vessel since the small craft may have a weaker structural integrity than the commercial vessel. The Array's MPCP will be implemented to minimise the environmental effects should pollution occur.

Frequency of occurrence

73. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, the outputs of the modelling, and consideration of historical incident data.

Severity of consequence

74. The severity of consequence is considered to be serious.

Significance of the effect

75. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

76. No secondary shipping and navigation mitigation is considered necessary because the likely effect, in the absence of mitigation beyond the designed in measures outlined in Table 13.11, is of tolerable significance and ALARP which is not significant in EIA terms.

Decommissioning phase

77. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place resulting in the anticipated deviations for the main commercial routes defined for the construction phase being directly applicable for the decommissioning phase. On this basis, the risk of third-party to third-party vessel collision for commercial vessels is considered the same during the decommissioning phase as during the construction phase. However, it is noted that the deviations will be well established by the decommissioning phase, and that vessels will likely be more familiar with the Array than during the construction phase.

78. The impact will be present throughout the decommissioning phase which is expected to be of similar duration to the construction phase (i.e. maximum of eight years). Given that third-party vessels are expected to be compliant with Flag State regulations including the COLREGs, the likes of collision avoidance action seek to ensure that the likelihood of an encounter developing into a collision incident is low. This is furthered by the promulgation of information and charting of the buoyed decommissioning area which will maximise awareness of ongoing decommissioning activities, thus allowing third-party vessels to passage plan in advance.

79. The most likely consequences associated with the MDS are as per the equivalent construction phase and operation and maintenance phase impacts.

Frequency of occurrence

80. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, the outputs of the modelling, and consideration of historical incident data.

Severity of consequence

81. The severity of consequence is considered to be serious.

Significance of the effect

82. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

83. No secondary shipping and navigation mitigation is considered necessary because the likely effect, in the absence of mitigation beyond the designed in measures outlined in Table 13.11, is of tolerable significance and ALARP which is not significant in EIA terms.

DISPLACEMENT FROM ADVERSE WEATHER ROUTEING

84. Some vessels and vessel operators may wish to transit alternative routes during periods of adverse weather. Adverse weather includes wind, wave and tidal conditions as well as reduced visibility due to fog.

Construction phase

85. No specific adverse weather routeing was observed within the baseline vessel traffic data studied, however the long term 12 month AIS analysis within the NRA (volume 3, appendix 13.1) showed a minor weighting towards summer months for cargo vessels, tankers, and oil and gas vessels in terms of traffic volumes. This may indicate that such vessels prefer to pass further inshore of the shipping and navigation study area in adverse conditions (which may be more likely during winter months).

86. Adverse weather can hinder a vessel's standard route, its speed of navigation, and/or its 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 and equipment, and/or discomfort and danger to persons on board. The sensitivity of a vessel to these phenomena will depend on the actual stability parameters, hull geometry, vessel type, vessel size and speed.

87. The following key points of relevance to adverse weather were raised during consultation (see section 13.5):

- Smyril Line stated that vessels would likely not transit through offshore wind farms in adverse weather conditions.
- It was suggested at the Hazard Workshop that vessels would likely seek to make the most direct safe transit possible during adverse weather.
- Wilson Ship Management indicated transit choice through the area would depend on weather conditions, and stated preference for passing inshore.

88. There is open sea area inshore of the site boundary (the closest baseline wind farm is Seagreen 1 Offshore Wind Farm, located 27 nm inshore) and therefore the buoyed construction area is not considered as hindering any preference for inshore routeing.

89. Details would be promulgated to facilitate advanced passage planning including in adverse conditions. Under COLREGS (IMO, 1972/77), vessels are also required to take appropriate measures with regards to determining a safe speed, taking into account various factors including the state of visibility, the state of the wind, sea, and current as well as the proximity of navigational hazards. In particular, vessels would be able to account for forecast for adverse conditions within their passage planning.

90. Most likely consequences are minor alterations to existing adverse weather routeing noting the data indicates a preference for inshore routeing in such conditions. As a worst case vessels may be required to pass further offshore than preferred leading to large deviations in adverse conditions and safety concerns.

Frequency of occurrence

91. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, the outputs of the modelling, and consideration of historical incident data.

Severity of consequence

92. The severity of consequence is considered to be serious.

Significance of the effect

93. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

94. No secondary shipping and navigation mitigation is considered necessary because the likely effect, in the absence of mitigation beyond the designed in measures outlined in Table 13.11, is of tolerable significance and ALARP which is not significant in EIA terms.

Operation and maintenance phase

95. As noted in the equivalent construction phase discussion, no specific adverse weather routeing was observed within the baseline vessel traffic data studied, however the long term 12 month AIS analysis within the NRA showed a minor weighting towards summer months for cargo vessels, tankers, and oil and gas vessels in terms of volume.

96. There is open sea area inshore of the site boundary (the closest operational wind farm is Seagreen 1 Offshore Wind Farm, located 27 nm inshore) and therefore the Array is not considered as hindering any preference for inshore routeing. During the operation and maintenance phase, vessels may be more likely to pass through the Array than during the construction phase, however based on consultation input (see section 13.5) it is unlikely that vessels would choose to transit through the Array during adverse weather conditions.

97. All infrastructure will be shown on appropriate Admiralty Charts ensuring vessels can passage plan to account for the Array. In particular, vessels would be able to account for forecast for adverse conditions within their passage planning. Under COLREGS (IMO, 1972/77), vessels are also required to take appropriate measures with regards to determining a safe speed, taking into account various factors including the state of visibility, the state of the wind, sea, and current as well as the proximity of navigational hazards.

98. Most likely consequences are minor alterations to existing adverse weather routeing noting the data indicates a preference for inshore routeing in such conditions. As a worst case vessels may be required to pass further offshore than preferred leading to large deviations in adverse conditions and safety concerns.

Frequency of occurrence

99. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, the outputs of the modelling, and consideration of historical incident data.

Severity of consequence

100. The severity of consequence is therefore considered to be serious.

Significance of the effect

101. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

102. No secondary shipping and navigation mitigation is considered necessary because the likely effect, in the absence of mitigation beyond the designed in measures outlined in Table 13.11, is of tolerable significance and ALARP which is not significant in EIA terms.

Decommissioning phase

103. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place. However, it is noted that the deviations will be well established by the decommissioning phase, and that vessels will likely be more familiar with the Array than during the construction phase.

104. Details would be promulgated to facilitate advanced passage planning including in adverse conditions. In particular, vessels would be able to account for forecast for adverse conditions within their passage planning. Under COLREGS (IMO, 1972/77), vessels are also required to take appropriate measures with regards to determining a safe speed, taking into account various factors including the state of visibility, the state of the wind, sea, and current as well as the proximity of navigational hazards.

105. Most likely consequences are minor alterations to existing adverse weather routeing noting the data indicates a preference for inshore routeing in such conditions. As a worst case vessels may be required to pass further offshore than preferred leading to large deviations in adverse conditions and safety concerns.

Frequency of occurrence

106. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, the outputs of the modelling, and consideration of historical incident data.

Severity of consequence

107. The severity of consequence is considered to be serious.

Significance of the effect

108. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

109. No secondary shipping and navigation mitigation is considered necessary because the likely effect, in the absence of mitigation beyond the designed in measures outlined in Table 13.11, is of tolerable significance and ALARP which is not significant in EIA terms.

INCREASED VESSEL TO VESSEL COLLISION RISK (THIRD-PARTY TO PROJECT VESSELS)

Construction phase

110. Up to 7,902 return trips by construction vessels (and site preparation vessels) may be made throughout the construction phase and will include vessels which are RAM. Project vessels will be managed by marine coordination, including the use of traffic management procedures such as the designation of entry and exit points to and from the buoyed construction area. Project vessels will also carry AIS and be compliant with relevant Flag State regulations, including the COLREGs, and comply with the procedures set out in the NSVMP (which will be a condition of consent).

111. Safety zones will be applied for including up to 500 m around structures where vessels are undertaking construction work and 50 m around partially completed or completed surface piercing structures prior to commissioning of the wind farm. Such safety zones will protect project vessels involved in construction works which may be RAM. If on-site as deemed necessary via risk assessment, guard vessels will also assist with monitoring safety zones and alerting third-party traffic to their presence.

112. Details of construction activities, including the presence of safety zones and any use of advisory safe passing distances, as defined by risk assessment, will be suitably promulgated to maximise awareness of ongoing construction activities.

113. Additionally, the use of IALA G1162 (IALA, 2021b) compliant lighting and marking including lights, marks, sounds, signals and other aids to navigation as required by the NLB and the MCA will further maximise awareness, both in day and night conditions including in restricted visibility. An outline LMP is provided in volume 4, appendix 26. This will include details of the buoyed construction area which will be agreed with the NLB and within which project vessels undertaking construction activities will most likely be located during construction activities. As per the impact on vessel displacement, it is anticipated that third-party vessels are unlikely to frequently enter the buoyed construction area and therefore the level of exposure for project vessels located on-site will be very low.

114. In restricted visibility, there is an increased risk of visual impediment to third-party vessels in relation to identifying project vessels entering and exiting the buoyed construction area. However, the COLREGs regulate vessel movements in adverse weather conditions including the requirement for all vessels operating in reduced visibility to maintain a safe speed which will allow more time for reacting to encounters. COLREGs also covers the movement of project vessels and manages any encounters, and the carriage of AIS by such vessels will also assist with identifying their movements.

115. It is noted that there will be a need to tow floating substructures out of port during the construction phase. Feedback received at the Hazard Workshop (see section 13.5) was that good seamanship and watchkeeping in compliance with COLREGS were key mitigations. Procedures for vessels towing substructures will also be considered in the VMP. All vessels involved in towing procedures will be lit and marked as required under COLREGS. Precise plans for fabrication and wet storage locations are unknown at this stage. Where enabling works are required within port limits to facilitate fabrication and storage these will be subject to the relevant assessment and licensing for the port works. Wet storage within the site boundary will be limited.

116. The impact will be present throughout the construction phase which may last for up to eight years. With the designed in measures noted above implemented, it is considered unlikely that a close encounter between a third-party vessel and a project vessel will occur. In the event that such an encounter does occur, collision avoidance action would be implemented by the vessels as per the COLREGs, thus seeking to ensure that the likelihood of the encounter developing into a collision incident is very low.

117. From historical incident data, there has been only one collision incident involving a third-party vessel and project vessel in the UK, occurring in a harbour in 2011 and resulting in moderate vessel damage but no harm to any People On Board (POB). No collision incidents have occurred in the period since (in excess of ten years), reflecting the increasing awareness of offshore wind farm developments and improved application of the various measures outlined above.

118. The most likely consequences in the event of a collision incident between a project vessel and third-party vessel are minor contact between the vessels resulting in minor damage to property and minor reputational effects on business but no perceptible effect on people. Although considered less likely collision between third party vessels could involve one of the vessels foundering resulting in PLL and the environmental consequence of pollution. Such a scenario would be more likely if the third-party vessel involved was a small craft which may have weaker structural integrity than a commercial vessel. The Array's MPCP will be implemented to reduce the environmental effects should pollution occur.

Frequency of occurrence

119. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, consideration of historical incident data, and the designed in measures in place to manage project vessel movements and activities.

Severity of consequence

120. The severity of consequence is considered to be serious.

Significance of the effect

121. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

122. No secondary shipping and navigation mitigation is considered necessary because the likely effect, in the absence of mitigation beyond the designed in measures outlined in Table 13.11, is of tolerable significance and ALARP which is not significant in EIA terms.

Operation and maintenance phase

123. Up to 508 return trips annually from vessels may be made throughout the operation and maintenance phase and will include vessels which are RAM. As per the construction phase, project vessels will be managed by marine coordination, carry AIS and be compliant with relevant Flag State regulations.

124. Also, safety zones will be applied for including up to 500 m around structures where vessels are undertaking major maintenance work. Such safety zones will protect project vessels involved in major maintenance which may be RAM. If on-site (determined via risk assessment of major maintenance activities), guard vessels will assist with monitoring safety zones and alerting third-party traffic to their presence.

125. Similarly to the construction phase, details of major maintenance activities including the presence of safety zones and any advisory safe passing distances, as defined by risk assessment, will be suitably promulgated (e.g. via Notice to Mariners, Kingfisher) to maximise awareness of ongoing major maintenance activities.

126. Additionally, the use of lighting and marking (IALA G1162 compliant (IALA, 2021b)) as required by the NLB and the MCA will further increase awareness, both in day and night conditions including in restricted visibility. In restricted visibility there is an increased risk of visual obstruction to third-party vessels in relation to identifying project vessels entering and exiting the project. However, the COLREGs regulate vessel movements in adverse weather conditions, allowing more time to react to encounters. The carriage of AIS by project vessels will also assist with third-party vessels identifying their movements.

127. As per the equivalent construction phase impact, there has been only one collision incident involving a third-party vessel and project vessel in the UK, occurring in a harbour in 2011 and resulting in moderate vessel damage but no harm to any POB. No collision incidents have occurred in the period since (in excess of ten years), reflecting the increasing awareness of offshore wind farm developments and improved application of the various measures previously outlined.

128. It is noted that there may be a need to tow floating substructures to/from port during the operation and maintenance phase for maintenance purposes (noting this is only likely to be needed for major component replacement). Feedback received at the Hazard Workshop (see section 13.5) was that good seamanship and watchkeeping in compliance with COLREGS were key mitigations. Procedures for vessels towing substructures will also be considered in the VMP. All vessels involved in towing procedures will be lit and marked as required under COLREGS.

129. The impact will be present throughout the operation and maintenance phase which may last for up to 35 years. With the designed in measures noted above implemented, it is considered unlikely that an encounter between a third-party vessel and a project vessel will occur. In the event that such an encounter does occur, collision avoidance action would be implemented by the vessels as per COLREGs, thus ensuring that the likelihood of the encounter developing into a collision incident is very low.

130. The likelihood of an encounter is decreased compared to in the construction phase given that fewer project vessels will generally be on-site at any time.

131. The most likely consequences in the event of a collision incident between a project vessel and third-party vessel are as per the equivalent construction phase impact, namely minor contact and damage to property and minor reputational effects on business, but no perceptible effect on people. Although considered less likely allision could involve one of the vessels foundering resulting in PLL and the environmental consequence of pollution. Such a scenario would be more likely if the third-party vessel involved was a small craft which may have weaker structural integrity than a commercial vessel. The Array's MPCP will be implemented to minimise the environmental effects should pollution occur.

Frequency of occurrence

132. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, consideration of historical incident data, and the designed in measures in place to manage project vessel movements and activities.

Severity of consequence

133. The severity of consequence is therefore considered to be serious.

Significance of the effect

134. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

135. No secondary shipping and navigation mitigation is considered necessary because the likely effect, in the absence of mitigation beyond the designed in measures outlined in Table 13.11, is of tolerable significance and ALARP which is not significant in EIA terms.

Decommissioning phase

136. Since the numbers and types of vessel used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, project vessels will be managed by marine coordination, applications will be made for statutory safety zones, and decommissioning activities will generally be located within the buoyed decommissioning area.

137. The impact will be present throughout the decommissioning phase which is expected to be of similar duration to the construction phase (i.e. maximum of eight years). With the designed in measures previously noted implemented, it is considered unlikely that an encounter between a third-party vessel and a project vessel will occur. As per the equivalent construction phase impact, in the event that such an encounter does occur, collision avoidance action would be implemented by the vessels as per the COLREGs, thus ensuring that the likelihood of the encounter developing into a collision incident is very low.

Frequency of occurrence

138. The frequency of occurrence is considered to be extremely unlikely based on the available searoom, consideration of historical incident data, and the designed in measures in place to manage project vessel movements and activities.

Severity of consequence

139. The severity of consequence is considered to be serious.

Significance of the effect

140. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

141. No secondary shipping and navigation mitigation is considered necessary because the likely effect, in the absence of mitigation beyond the designed in measures outlined in Table 13.11, is of tolerable significance and ALARP which is not significant in EIA terms.

VESSEL TO STRUCTURE ALLISION RISK

142. The spatial extent of the impact is considered small given that a vessel must be in close proximity to a structure in the Array for an allision incident to occur. The forms of allision considered are:

- powered allision;
- drifting allision; and
- internal allision.

143. These are discussed separately for each phase, with a combined impact significance ranking provided.

Construction phase

Powered allision

144. Powered allision risk may be caused by human/navigational error, unfamiliarity with the Array and/or a failure of an aid to navigation.

145. Experience from previous under construction offshore wind farms indicates that Masters regularly choose to transit greater than 1 nm from construction works. In doing so, vessels are unlikely to navigate close enough to a structure to create an allision risk. There is a distance of 27 nm between the Array and Seagreen 1 Offshore Wind Farm, the closest baseline offshore wind farm, which provides notable sea room for safe navigation.

146. Based on the NRA (volume 3, appendix 13.1) modelling, with the main commercial route deviations in place and assuming all structures are installed, the base case annual powered vessel to structure allision frequency is estimated to be 6.91×10^{-3}, corresponding to a return period of approximately one in 145 years.

147. The impact will be present throughout the construction phase which may last for up to eight years and will cover a greater spatial extent as more structures are installed. Safety zones of up to 50 m around partially completed or completed but not yet fully commissioned surface piercing structures will be in place and assist with ensuring that vessels are aware of the presence of structures. Where identified as necessary via risk assessment (which will include consideration of the other mitigation measures in place), a guard vessel may also be used, which will alert passing vessels to the presence of the ongoing construction activities. Furthermore, the use of lighting and marking as required by the NLB and the MCA (including for partially completed structures), charting of the buoyed construction area and promulgation of information will allow vessels to passage plan a safe route in advance. It should also be noted that commercial vessels are expected to comply with international and Flag State regulations (including the COLREGs and SOLAS). Consultation with the NLB to establish agreement on lighting and marking will be undertaken post-consent. With these designed in measures in place, it is considered unlikely that a powered allision incident will occur.

148. From historical incident data, there have been no reported instances of a powered allision involving a third-party vessel with a pre-commissioned wind farm structure in the UK.

149. The most likely consequences in the event of a powered allision incident are minor damage to property with the vessel able to resume passage and undertake a full inspection at the next port. However, this will depend on multiple factors including the energy of the impact, structural integrity of the vessel and the sea state at the time. Given the potential for a non-steel construction, commercial fishing vessels and recreational vessels are considered more vulnerable. Although considered less likely an allision could involve the vessel foundering resulting in PLL and the environmental consequence of pollution. The Array's MPCP will be implemented to reduce the environmental effects should pollution occur.

Drifting allision

150. Drifting allision risk may be caused by mechanical or technical failure, adverse weather and/or a navigational system error. A vessel adrift may only develop into an allision situation if in proximity to a pre-commissioned structure. This is only the case where the adrift vessel is located in proximity to the buoyed construction area and the wind and/or tide directs the vessel towards a structure.

151. As discussed in relation to powered allision risk, it is likely that commercial vessels will deviate to avoid the buoyed construction area. As such, it is likely that associated allision risk would be highest to pre-commissioned structures on the periphery of the Array. Smaller vessels may still choose to transit through, and as such may come in proximity to internal structures.

152. Based on the NRA (volume 3, appendix 13.1) modelling, with the main commercial route deviations in place, the base case annual drifting vessel to structure allision frequency is estimated to be 2.16×10^{-4}, corresponding to a return period of approximately one in 4,619 years.

153. For drifting allision incidents, the adrift vessel would initiate its emergency response procedures to avoid a Closest Point of Approach (CPA) with a structure resulting in an allision. This may include emergency anchoring following a check of the relevant nautical charts (thus ensuring that the anchor deployment does not lead to other impacts such as anchor snagging on a subsea cable), noting this would depend on the vessel and water depths. These measures may also include the use of thrusters (depending on availability and power supply). Moreover, under SOLAS obligations (IMO, 1974), other nearby vessels including project vessels (via marine coordination) may be able to render assistance, depending on the type and size of vessel.

154. From historical incident data, there have been no reported instances of a drifting allision involving a third-party vessel with a pre-commissioned wind farm structure in the UK.

155. Should a drifting allision occur, the consequences will be similar to those noted for the case of a powered allision including the unlikely worst case of foundering and pollution. In the highly unlikely scenario of a drifting allision incident resulting in pollution, the implementation of the MPCP will reduce the environmental risk. Additionally, a drifting vessel is likely to be moving at a reduced speed compared to a powered vessel dependent on conditions, thus reducing the energy of the impact, including in the case of a recreational vessel under sail.

Internal allision

156. As noted in the discussion on third-party vessel to third-party vessel collision risk, it is likely that only smaller vessels (e.g. fishing, recreation) may choose to transit through the Array during construction. On this basis it is considered very unlikely that a commercial vessel would be involved in an internal allision.

157. Minimum spacing between structures of 1,000 m is considered sufficient for safe internal navigation, i.e. keeping clear of the structures in the Array. The final layout will be agreed with both NLB and MCA, noting these discussions will include consideration of ensuring safe internal navigation.

158. As with any passage, any vessel navigating in or near the Array is expected to passage plan in accordance with SOLAS Chapter V (IMO, 1974), and promulgation of information will ensure that such vessels have good awareness of the works being undertaken. Charting of the buoyed construction area will further increase mariner awareness.

159. The Applicant will apply for safety zones of radius 500 m around structures where construction is underway, with 50 m pre-commissioning safety zones applied for around structures where work is not underway during the construction phase. These safety zones would make clear to passing mariners the areas which should be avoided to minimise allision risk.

160. Should an internal allision occur, the consequences will be similar to those noted in the discussion for the case of a powered allision, including the unlikely worst case of foundering and pollution. In the highly unlikely scenario of an internal allision incident resulting in pollution, the implementation of the MPCP will minimise the environmental risk.

Frequency of occurrence

161. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, outputs of the modelling, and consideration of historical incident data.

Severity of consequence

162. The severity of consequence is considered to be serious.

Significance of the effect

163. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

164. No secondary shipping and navigation mitigation is considered necessary because the likely effect, in the absence of mitigation beyond the designed in measures outlined in Table 13.11, is of tolerable significance and ALARP which is not significant in EIA terms.

Operation and maintenance phase

Powered allision

165. Powered allision risk may be caused by human/navigational error, unfamiliarity with the Array and/or a failure of an aid to navigation.

166. Experience from previous operational offshore wind farms indicates that Masters regularly choose to transit greater than 1 nm from an array, with it being likely that the deviations established during construction will remain in place during the operation and maintenance phase. In doing so, vessels are unlikely to navigate close enough to a structure to create an allision risk. There is a distance of 27 nm between the Array and the Seagreen 1 Offshore Wind Farm, the closest baseline offshore wind farm, which provides notable sea room for safe navigation.

167. Based on the NRA (volume 3, appendix 13.1) modelling, with the main commercial route deviations in place, the base case annual powered vessel to structure allision frequency is estimated to be 6.91×10^{-3}, corresponding to a return period of approximately one in 145 years.

168. The structures will be lit and marked as directed by the MCA and NLB and in compliance with IALA G1162 (IALA, 2021b) to ensure passing mariner awareness (e.g. lights, sound signals, AIS Aids to Navigation (AtoN)). Additionally, commercial vessels are expected to comply with international and Flag State regulations (including the COLREGs and SOLAS) and will be able to passage plan in advance given the promulgation of information relating to the Array, including display of the structure locations on appropriate nautical charts.

169. NLB raised during consultation (section 13.5) that contingency of overall lighting and marking would need to be considered, in particular in a scenario where a wind turbine with a key AtoN was towed from the Array for maintenance. Appropriate measures for this scenario will be agreed as part of the LMP process.

170. RYA Scotland raised during consultation that outage of marine lights should be rectified in a timely manner (section 13.5). Associated measures and procedures will be detailed in the outline AtoN Management Plan, outline provided in volume 4, appendix 26, annex A, noting that IALA Availability targets will be set out in the LMP (outline LMP provided in volume 4, appendix 26).

171. Based on historical incident data as set out in the NRA (volume 3, appendix 13.1), there have been two reported instances of a third-party vessel alliding with an operational wind farm structure in the UK (one in the Irish Sea and one in the Southern North Sea). Both of these incidents involved a fishing vessel, with a RNLI lifeboat attending on both occasions and a helicopter deployed in one case.

172. The most likely consequences in the event of a powered allision incident are as per the equivalent construction phase impact, namely minor damage to property. Although considered less likely collision between third party vessels could involve the vessel foundering resulting in PLL and the environmental consequence of pollution. The Array's MPCP will be implemented to reduce the environmental effects should pollution occur.

Drifting allision

173. Drifting allision risk may be caused by mechanical or technical failure, adverse weather and/or a navigational system error. A vessel adrift may only develop into an allision situation if in proximity to a structure and this is only the case where the adrift vessel is located in proximity to the Array and the wind and/or tide directs the vessel towards a structure.

174. Based on the NRA (volume 3, appendix 13.1) modelling, with the main commercial route deviations in place, the base case annual drifting vessel to structure allision frequency is estimated to be 2.16×10^{-4}, corresponding to a return period of approximately one in 4,619 years.

175. For drifting allision incidents, the adrift vessel would initiate its emergency response procedures to avoid a CPA with a structure resulting in an allision. This may include emergency anchoring following a check of the relevant nautical charts (thus ensuring that the anchor deployment does not lead to other impacts such as anchor snagging on a subsea cable), noting this would depend on the vessel and water depths. These measures may also include the use of thrusters (depending on availability and power supply). Moreover, under SOLAS obligations (IMO, 1974), other nearby vessels including project vessels associated with operation and maintenance activities (via marine coordination) may be able to render assistance, depending on the type and size of vessel.

176. Based on historical incident data as set out in the NRA (volume 3, appendix 13.1), there have been no instances of a third-party vessel alliding with a UK operational wind farm structure whilst Not Under Command (drifting).

177. The most likely consequences in the event of a drifting allision incident are as per the equivalent construction phase impact, namely minor damage to property. Although considered less likely collision between third party vessels could involve the vessel foundering resulting in PLL and the environmental consequence of pollution. The Array's MPCP will be implemented to minimise the environmental effects should pollution occur. The consequences are less likely to be severe for a drifting allision incident given that the speed at which the impact occurs (and subsequent energy of the impact) will generally be dictated by the wind and/or tidal speeds.

Internal allision

178. As per the impact on vessel displacement, it is anticipated that commercial fishing vessels and recreational vessels may choose to navigate internally within the Array, particularly in favourable weather conditions. However, consultation input indicated this may be less likely than within a fixed foundation project. Therefore, an internal allision risk exists for such smaller craft. However, due to the distance offshore of the Array, fishing and recreational vessel traffic volume is expected to be low and this was reflected in the vessel traffic data (section 13.7.1) and input from consultees (section 13.5).

179. From historical incident data, there has been two reported instances of a third-party vessel alliding with an operational wind farm structure in the UK. Both of these incidents involved a fishing vessel, with a RNLI lifeboat attending on both occasions and a helicopter deployed in one case. Given that the size of the Array and the promulgation of information, there is likely to be a reasonable level of awareness of the Array meaning that such an incident is unlikely to occur at the Array.

180. The base case annual fishing vessel to structure allision frequency is estimated to be 4.08×10^{-2}, corresponding to a return period of approximately one in 24 years. This is high compared to that estimated for other UK offshore wind farm developments and is reflective of the conservatism of the model, which assumes that fishing vessel activity and volume will not change after installation of the structures. However, it was noted during consultation (see section 13.5) that fishing vessels may be more likely avoid the Array than a fixed foundation offshore wind farm.

181. Comfort with internal navigation will likely increase throughout the lifetime of the Array and appropriate lighting and marking (agreed with the NLB and MCA, in compliance with IALA G1162 (IALA, 2021b)) will be in place to maximise awareness of the structure locations including internally. The final Array layout will

be agreed through the DSLP via consultation with the MCA and NLB, and this will include agreement of a clear identification (ID) marking system on the structures, with each structure clearly displaying its ID visible in all directions, facilitating safe internal navigation. The structure locations will also be displayed on appropriate nautical charts.

182. The most likely consequences in the event of an allision incident are as per the equivalent construction phase impact, namely minor damage to property. Although considered less likely collision between third party vessels could involve the vessel foundering resulting in PLL and the environmental consequence of pollution. The Array's MPCP will be implemented to minimise the environmental effects should pollution occur. The consequences are less likely to be severe for an internal allision incident given that the vessel will be likely transiting at lower speeds whilst in the Array, reducing the severity of impact.

Frequency of occurrence

183. The frequency of occurrence is therefore considered to be extremely unlikely based on the available sea room, outputs of the modelling, and consideration of historical incident data.

Severity of consequence

184. The severity of consequence is therefore considered to be serious.

Significance of the effect

185. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

186. No secondary shipping and navigation mitigation is considered necessary because the likely effect, in the absence of mitigation beyond the designed in measures outlined in Table 13.11, is of tolerable significance and ALARP which is not significant in EIA terms.

Decommissioning phase

187. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place and it is anticipated that third-party vessels will be unlikely to enter. Pre-decommissioning or partially removed structures will be similar in nature to pre-commissioning or partially completed structures, and the movement of third-party vessels within and around the buoyed decommissioning area is anticipated to be similar to that within and around the buoyed construction area.

Frequency of occurrence

188. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, outputs of the modelling, and consideration of historical incident data.

Severity of consequence

189. The severity of consequence is considered to be serious.

Significance of the effect

190. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

191. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP which is not significant in EIA terms.

REDUCED ACCESS TO LOCAL PORTS AND HARBOURS

Construction phase

192. The closest port or harbour to the Array is the Port of Aberdeen, located approximately 44 nm to the north-west, on the east coast of Scotland. Given the distance offshore of the Array and the anticipated deviations for the main commercial routes, it is not anticipated that there will be any notable impact on vessel approaches to and from local ports above and beyond the deviations outlined for the vessel displacement impacts associated with the buoyed construction area or the construction activities therein. Regardless, details of construction activities including the presence of safety zones and any advisory safe passing distances, as defined by risk assessment, will be suitably promulgated to increase awareness of ongoing construction activities.

193. It should be noted that there are also no pilot boarding stations, port authority limits or Vessel Traffic Service (VTS) areas in proximity to the Array given its distance offshore and as such these services will not be impacted.

194. Up to 7,902 return trips by construction vessels (including site preparation activities) may be made throughout the construction phase and will include vessels which are RAM, noting this will include towing operations. It is not yet known which ports will be used for construction, however, regardless of ports used, all project vessels will be managed by marine coordination, including the use of traffic management procedures. Project vessels will also carry AIS and be compliant with Flag State regulations including the COLREGs. These measures will seek to ensure any impacts on access to ports used are reduced.

195. The most likely consequences of the impact are increased journey times and distances due to the presence of the buoyed construction area and project vessels, as per the vessel displacement impact. The MDS may include disruption to schedules, but this is considered highly unlikely given the international nature of routeing in the area and the ability to passage plan to reduce timing impacts. No effect is anticipated on port related services such as pilotage.

Frequency of occurrence

196. The frequency of occurrence is considered to be remote based on the designed in measures in place to manage project vessel movements.

Severity of consequence

197. The severity of consequence is considered to be minor.

Significance of the effect

198. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be remote. The effect will, therefore, be of **broadly acceptable** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

199. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance and ALARP which is not significant in EIA terms.

Operation and maintenance phase

200. As noted for the equivalent construction phase impact, the closest port or harbour to the Array is the Port of Aberdeen. Again, given the distance offshore of the Array and the anticipated deviations for the main commercial routes, it is not anticipated that there will be any notable impact on vessel approaches to and from local ports above and beyond the deviations outlined for the vessel displacement impact. Given the distance offshore, there are also no pilot boarding stations, port authority limits or VTS areas in proximity to the Array. Details of major maintenance activities including the presence of safety zones and any advisory safe passing distances, as defined by risk assessment, will be suitably promulgated to maximise awareness of ongoing operation and maintenance activities.

201. Up to 508 return trips annually from vessels may be made throughout the operation and maintenance phase and will include vessels which are RAM. It is not yet known which ports will be used; regardless as per the construction phase, project vessels will be managed by marine coordination, carry AIS and be compliant with relevant Flag State regulations. These measures will ensure any impacts on access to ports used are reduced as far as practicable.

202. The most likely consequences of the impact are as per the equivalent construction phase impact, namely increased journey times and distances. The MDS may include disruption to schedules, but this is considered highly unlikely given the international nature of routeing in the area and the ability to passage plan to reduce timing impacts. No effect is anticipated on port related services such as pilotage.

Frequency of occurrence

203. The frequency of occurrence is considered to be remote based on the designed in measures in place to manage project vessel movements.

Severity of consequence

204. The severity of consequence is considered to be minor.

Significance of the effect

205. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be remote. The effect will, therefore, be of **broadly acceptable** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

206. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance and ALARP which is and not significant in EIA terms.

Decommissioning phase

207. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, the number of return trips per year by decommissioning vessels will be similar and a buoyed decommissioning area analogous to the buoyed construction area will be in place.

208. The impact will be present throughout the decommissioning phase which is expected to be of similar duration to the construction phase (i.e. maximum of eight years). Since the anticipated deviations associated with the main commercial routes accessing a local port and the volumes of vessel traffic on such routes are the same as for the equivalent construction phase impact, similar impact is likely.

Frequency of occurrence

209. The frequency of occurrence is considered to be remote based on the designed in measures in place to manage project vessel movements.

Severity of consequence

210. The severity of consequence is considered to be minor.

Significance of the effect

211. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be remote. The effect will, therefore, be of **broadly acceptable** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

212. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance and ALARP which is not significant in EIA terms.

LOSS OF STATION

Construction phase

213. The MCA require under their Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA and HSE, 2017) that developers arrange TPV of the mooring systems by an independent and competent person/body. The Regulatory Expectations state that TPV is a “continuous activity”, and that if any modifications to a system occur or if new information becomes available with regard to its reliability, additional TPV would be required. This TPV will facilitate management of any risk of failure of the mooring lines.

214. On this basis, the potential for loss of station is considered unlikely, noting that for a total loss of station, all moorings would be required to fail (based on the MDS there may be up to six mooring lines per foundation). There have been no reports to date of loss of stations from floating UK offshore wind farms.

215. The Regulatory Expectations also require the provision of continuous monitoring either by Global Positioning System or other suitable means. The Applicant will put such a system in place, with each wind turbine continuously monitored, and with capability of being tracked in the event of a loss of station as detailed in MGN 654 (see designed in measures in Table 13.11).

216. The most likely consequences are failure of a single mooring line leading to a larger excursion zone than typical. As a worst case, total mooring line failure could lead to a drifting platform leading to a collision.

Frequency of occurrence

217. The frequency of occurrence is considered to be negligible based on the designed in measures in place in terms of TPV, monitoring and tracking.

Severity of consequence

218. The severity of consequence is considered to be serious.

Significance of the effect

219. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will, therefore, be of **broadly acceptable** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

220. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance and ALARP which is not significant in EIA terms.

Operation and maintenance phase

221. The same designed in measures in terms of TPV and monitoring details for the construction phase will apply during the operation and maintenance phase, based on the requirements of the Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA and HSE, 2017) and MGN 654 (MCA, 2021a).

222. On this basis, the potential for loss of station is considered unlikely, noting that for a total loss of station, all moorings would be required to fail (based on the MDS there may be up to six mooring lines per foundation), and in the event that mooring lines did fail, monitoring and tracking procedures will be in place.

223. The most likely consequences are failure of a single mooring line leading to a larger excursion zone than typical. As a worst case, total mooring line failure could lead to a drifting platform leading to a collision.

Frequency of occurrence

224. The frequency of occurrence is considered to be negligible based on the designed in measures in place such as TPV of project infrastructure, and implementation of a continuous discrete monitoring system.

Severity of consequence

225. The severity of consequence is considered to be serious.

Significance of the effect

226. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will, therefore, be of **broadly acceptable** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

227. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance and ALARP which is not significant in EIA terms.

Decommissioning phase

228. The decommissioning phase is considered to be generally analogous to the construction phase in reverse and therefore the likelihood of loss of station during the decommissioning phase is considered to be the same as for the construction phase.

Frequency of occurrence

229. The frequency of occurrence is considered to be negligible based on the designed in measures in place in terms of TPV, monitoring and tracking.

Severity of consequence

230. The severity of consequence is considered to be serious.

Significance of the effect

231. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will, therefore, be of **broadly acceptable** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

232. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance and ALARP which is not significant in EIA terms.

REDUCTION OF UNDERKEEL CLEARANCE AS A RESULT OF SUBSEA INFRASTRUCTURE

Construction phase

233. During the construction phase, there may be a need to wet store subsea components including the mooring lines and subsea cables within the Array. During this time, the components would be left on or tethered to the seabed. It is not expected that any components will be an underkeel risk during this period given it is likely that they will be close to the seabed. However, final plans will be confirmed via the CMS which will

be approved by MD-LOT in consultation with the MCA and NLB (i.e. it will be confirmed via the CMS that suitable underkeel clearance will be available during the construction phase).

234. It is noted that the buoyed construction area in place during the construction phase means it is anticipated that third-party vessels will be unlikely to enter on a regular basis based on consultation input and experience of other UK offshore wind farms. This includes the physical marking of the buoys themselves, and the display of the buoyed construction area on appropriate nautical charts.

235. Should an underwater allision occur, the most likely consequences are minor damage to property and minor reputational effects on business but no perceptible effect on people. Although considered less likely, a more serious interaction could involve the vessel foundering resulting in PLL and the environmental consequence of pollution. The Array's MPCP will be implemented to reduce the environmental impacts should pollution occur.

Frequency of occurrence

236. The frequency of occurrence is considered to be extremely unlikely based on deep water depths within the site boundary.

Severity of consequence

237. The severity of consequence is considered to be serious.

Significance of the effect

238. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will, therefore, be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

239. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.11) is of tolerable significance and ALARP which is not significant in EIA terms.

Operation and maintenance phase

240. During the operational phase, vessels navigating in proximity to the floating substructures associated with the Array may be at risk of interaction with either the mooring lines, or any underwater elements of the floating substructures not visible from the surface including the subsea cables. The level of risk will depend on the clearance available above the subsea elements of the substructures (in particular the mooring lines and buoyant sections of dynamic cables).

241. Up to 681 nm (1,261 km) of inter-array cables and 127 nm (236 km) of interconnector cables may be in place during the operation and maintenance phase. For both the static portion of the inter-array cables and the interconnector cables, with the minimum burial depth anticipated to be 0.4 m, subject to CBRA confirmation. Where cable burial is not possible, external cable protection methods may be deployed which will again be determined within the CBRA. Charted water depths within the site boundary range from 62 m to 84 m below CD and are therefore sufficiently deep that the reduction of underkeel clearance resulting from the presence of cables on the seabed is not of concern to vessel keels.

242. The inter-array cables may utilise buoyancy modules, which can be used to maintain the lazy-S configuration of the dynamic portion of the inter-array cable to allow extension of the cables in response to the floating foundation movements (see volume 1, chapter 3). The requirement for these buoyancy modules and their final design, including their depth below the waterline, are yet to be confirmed. Final design will be confirmed via the DSLP which will be approved by MD-LOT in consultation with the MCA and NLB (i.e. the DSLP will confirm that the final design of the dynamic cables will maintain suitable underkeel clearances).

243. Each foundation may utilise up to six mooring lines. There are two substructure types under consideration, namely semi-submersible and Tension Leg Platform (TLP). For semi-submersible substructures, there are three types of mooring configurations: taut, semi-taut and catenary. The NRA (volume 3, appendix 13.1) has considered an example mooring line arrangement based on worst case parameters. On the basis of the example considered, the vessel with the largest draught recorded within the vessel traffic datasets (16.3 m) would need to transit closer than 100 m to the floating wind turbines to risk interaction with the mooring lines. Based on consultation such a passing distance is very unlikely for any third party vessel, particularly for larger vessels. Final design of the mooring lines will be confirmed via the DSLP which will be approved by MD-LOT in consultation with the MCA and NLB (i.e. the DSLP will confirm that the final design of the mooring lines will maintain suitable underkeel clearances).

244. General consultation input has been that commercial vessels are likely to avoid the Array. This aligns with operational experience of other UK wind farms. Any commercial vessels that does access the Array would be unlikely to transit within close proximity to the floating foundations. Smaller vessels may be more comfortable transiting through the Array, however these will have smaller draughts. It was noted during the Hazard Workshop that fishing vessels up to 24 m would likely keep a clearance of around 250 m to 300 m from the floating foundations, and that larger fishing vessels, such as 70 m to 90 m pelagic vessels, would likely keep a minimum 500 m clearance and would be unlikely to transit through the Array. It was also noted that recreational vessels would likely keep a minimum of 50 m from wind turbines and that even this distance would be unusual, with larger clearance distances typically used.

245. Details of the infrastructure including the floating foundations, mooring lines and subsea cables will be promulgated to increase awareness of the Array and any potential underkeel interaction risk. The locations of the floating foundations would be clearly shown on appropriate nautical charts, and the locations of the anchors and mooring lines will also be provided to the UKHO for charting purposes.

246. Should an underwater allision occur, the most likely consequences are minor damage to property and minor reputational effects on business but no perceptible effect on people. Although considered less likely, a more serious interaction could involve the vessel foundering resulting in PLL and the environmental consequence of pollution. The Array's MPCP will be implemented to reduce the environmental effects should pollution occur.

Frequency of occurrence

247. The frequency of occurrence is considered to be extremely unlikely based on deep water depths within the site boundary and the consultation input indicating vessels will not pass in close proximity to the structures.

Severity of consequence

248. The severity of consequence is considered to be serious.

Significance of the effect

249. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will, therefore, be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

250. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.11) is of tolerable significance and ALARP which is not significant in EIA terms.

Decommissioning phase

251. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place and it is anticipated that third-party vessels are unlikely to enter on a regular basis.

Frequency of occurrence

252. The frequency of occurrence is considered to be extremely unlikely based on deep water depths within the site boundary and the consultation input indicating vessels will not pass in close proximity to the structures.

Severity of consequence

253. The severity of consequence is considered to be serious.

Significance of the effect

254. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will, therefore, be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

255. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.11) is of tolerable significance and ALARP which is not significant in EIA terms.

ANCHOR INTERACTION WITH SUBSEA CABLES (INCLUDING DYNAMIC CABLING)

Construction phase

256. As all cables associated with the Array will be located within the site boundary, anchor interaction with a subsea cables only applies to vessels within the site boundary. However, a buoyed construction area will be in place during the construction phase and it is anticipated that third-party vessels will be unlikely to enter on a regular basis.

257. It is also considered unlikely that a vessel would drop anchor in the Array unless it was an emergency (e.g. a drifting incident), given water depths are in excess of 60 m. This aligned with the vessel traffic assessment (see section 13.7.1), with no vessels identified as being at anchor over the 12 months assessed in proximity to the Array based on navigational status information broadcast via AIS. In addition, no designated anchorage areas or preferred anchorage locations in proximity to the Array were identified.

258. Should an anchor interaction incident occur with the cables, the most likely consequences will be low based on historical anchor interaction incidents, with no damage incurred to the cable or the vessel. As an unlikely worst case, a snagging incident could occur and/or the vessel's anchor and the cable could be damaged. However, with the designed in measures in place including charting and cable burial/protection, this risk will be managed For commercial fishing vessels or recreational vessels the consequences may also include compromised stability of the vessel, however, water depths are such that small vessels are very unlikely to attempt dropping anchor.

259. As for vessel anchors, there is a risk that fishing gear may interact with any cables. It is the responsibility of fishers to dynamically risk assess whether it is safe to undertake fishing activities within the Array and to make a decision as to whether or not to fish. This decision will be informed by a number of factors, which will include the charted locations of infrastructure within the Array. Further assessment of impacts associated with fishing gear is provided in volume 2, chapter 12.

Frequency of occurrence

260. The frequency of occurrence is considered to be extremely unlikely given very low frequency of baseline anchoring and the use of cable burial/external cable protection and charting.

Severity of consequence

261. The severity of consequence is considered to be moderate.

Significance of the effect

262. Overall, the severity of consequence is deemed to be moderate and the frequency of occurrence is considered to be extremely unlikely. The effect will, therefore, be of **broadly acceptable** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

263. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.11) is of broadly acceptable significance and ALARP which is not significant in EIA terms.

Operation and maintenance phase

264. During the operation and maintenance phase, vessels may be more likely to enter into the Array following removal of the buoyed construction area, however, consultation input indicated entry may be less frequent than at fixed foundation offshore wind farm developments (see section 13.5).

265. Scenarios which may lead to a vessel dropping anchor include the following (noting that water depths in the Array are in excess of 60 m, meaning the latter two scenarios are considered particularly unlikely):

- vessel anchoring in an emergency over subsea cable (e.g. to avoid drifting into a structure, or into an area of busy traffic);
- vessel dropping anchor inadvertently (e.g. mechanical failure);
- planned anchoring where vessel is unaware of presence of infrastructure; and
- vessel dragging anchor over subsea cable following anchor failure.

266. Due to the distance offshore of the Array and local water depths, anchoring activity is expected to be very limited. This aligned with the vessel traffic assessment (section 13.7.1), with no vessels identified as being at anchor over the 12 months assessed in proximity to the Array based on navigational status information broadcast via AIS. In addition, no designated anchorage areas or preferred anchorage locations in proximity to the Array were identified.

267. In line with Regulation 34 of SOLAS (IMO, 1974), the charted location of any hazards should be taken into consideration as part of the decision making process of where to anchor. The locations of subsea cables,

structure locations and mooring lines will be provided to the UKHO for charting purposes, and as such mariners will be able to include the infrastructure within their decision making processes.

268. Cable protection will primarily be by seabed burial where possible. The extent and method by which the static portion of the inter-array cables and the interconnector cables will be buried will depend on the results of a detailed seabed survey of the final inter-array and interconnector cable routes and associated CBRA. Where cable burial is not possible, external cable protection methods may be deployed which will again be determined within the CBRA.

269. It is noted that there will be sections of cables between the seabed and the floating substructures. Interaction with these sections is considered an unlikely event given water depths and the presence of infrastructure means anchoring is unlikely to be attempted in the vicinity of the foundations (outside of an emergency).

270. Should an anchor interaction incident occur with the cables, the most likely consequences will be low based on historical anchor interaction incidents, with no damage incurred to the cable or the vessel. As an unlikely worst case, a snagging incident could occur and the vessel's anchor and/or the cable could be damaged. However, with the designed in measures in place, this risk will be managed. For commercial fishing vessels or recreational vessels the consequences may also include compromised stability of the vessel, however, water depths are such that small vessels are very unlikely to attempt dropping anchor.

271. As for vessel anchors, there is a risk that fishing gear may interact with any cables. It is the responsibility of fishers to dynamically risk assess whether it is safe to undertake fishing activities within the Array and to make a decision as to whether or not to fish. This decision will be informed by a number of factors, which will include the charted locations of infrastructure within the Array (e.g. on UKHO charts, and other electronic charts as appropriate). Further assessment of impacts associated with fishing gear is provided in volume 2, chapter 12.

Frequency of occurrence

272. The frequency of occurrence is considered to be extremely unlikely given very low frequency of baseline anchoring and the use of cable burial/protection and charting.

Severity of consequence

273. The severity of consequence is considered to be moderate.

Significance of the effect

274. Overall, the severity of consequence is deemed to be moderate and the frequency of occurrence is considered to be extremely unlikely. The effect will, therefore, be of **broadly acceptable** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

275. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance and ALARP which is not significant in EIA terms.

Decommissioning phase

276. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place and it is anticipated that third-party vessels will be unlikely to enter on a regular basis.

277. Static cable sections may be left *in situ*, noting dynamic cable sections will be removed. Cables left *in situ* will remain charted and will be located in the site boundary where water depths mean that deliberate anchoring is unlikely.

Frequency of occurrence

278. The frequency of occurrence is considered to be negligible given very low frequency of baseline anchoring, the use of cable burial / protection and charting, and increased familiarity with the project post construction.

Severity of consequence

279. The severity of consequence is considered to be moderate.

Significance of the effect

280. Overall, the severity of consequence is deemed to be moderate and the frequency of occurrence is considered to be negligible. The effect will, therefore, be of **broadly acceptable** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

281. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance and ALARP which is and not significant in EIA terms.

ANCHOR INTERACTION WITH MOORING LINES

Construction phase

282. Noting water depths in the vicinity of the site boundary, the visible presence and display on charts of the buoyed construction area and promulgation of information, it is considered unlikely that vessels would attempt to anchor in the vicinity of the mooring lines (which may be wet stored during the construction phase). It is noted that this aligns with the baseline anchoring assessment undertaken on the 12 months of vessel traffic data which did not identify any anchoring activity based on the information broadcast via AIS (see volume 3, appendix 13.1).

283. As for vessel anchors, there is a risk that fishing gear may interact with any mooring lines. It is the responsibility of fishers to dynamically risk assess whether it is safe to undertake fishing activities within the Array and to make a decision as to whether or not to fish. This decision will be informed by a number of factors, which will include the charted locations of infrastructure within the Array (e.g., on UKHO charts, and other electronic charts as appropriate). Further assessment of impacts associated with fishing gear is provided in volume 2, chapter 12.

284. There is limited data available with regard to anchor and gear interaction with mooring lines and floating substructures due to lack of precedent of large scale floating wind farms, however, consequences are likely to be similar to that of the cables.

Frequency of occurrence

285. The frequency of occurrence is considered to be negligible given very low frequency of baseline anchoring and charting of infrastructure.

Severity of consequence

286. The severity of consequence is considered to be moderate.

Significance of the effect

287. Overall, the severity of consequence is deemed to be moderate and the frequency of occurrence is considered to be negligible. The effect will, therefore, be of **broadly acceptable** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

288. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance and ALARP which is not significant in EIA terms.

Operation and maintenance phase

289. During the operation and maintenance phase, vessels may be more likely to enter into the Array following removal of the buoyed construction area, however consultation input indicates entry may be less frequent than at fixed foundation offshore wind farm developments (see section 13.5).

290. Noting water depths in the vicinity of the Array, the visible presence of the surface aspects of the floating substructures and display on charts of the infrastructure, it is considered unlikely that vessels would attempt to anchor in the vicinity of the mooring lines.

291. As for vessel anchors, there is a risk that fishing gear may interact with any mooring lines. It is the responsibility of fishers to dynamically risk assess whether it is safe to undertake fishing activities within the Array and to make a decision as to whether or not to fish. This decision will be informed by a number of factors, which will include the charted locations of infrastructure within the Array (e.g., on UKHO charts, and other electronic charts as appropriate).

292. As noted during the equivalent construction phase impact, there are limited data available with regards to anchor interaction with mooring lines and floating substructures, however, consequences are likely to be similar to that of the cables.

Frequency of occurrence

293. The frequency of occurrence is considered to be negligible given very low frequency of baseline anchoring and charting of infrastructure.

Severity of consequence

294. The severity of consequence is considered to be moderate.

Significance of the effect

295. Overall, the severity of consequence is deemed to be moderate and the frequency of occurrence is considered to be negligible. The effect will, therefore, be of **broadly acceptable** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

296. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance and ALARP which is not significant in EIA terms.

Decommissioning phase

297. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place and it is anticipated that third-party vessels will not enter. It is also noted that it is intended that all mooring lines will be removed as part of the decommissioning process.

Frequency of occurrence

298. The frequency of occurrence is considered to be negligible given very low frequency of baseline anchoring and charting of infrastructure.

Severity of consequence

299. The severity of consequence is considered to be moderate.

Significance of the effect

300. Overall, the severity of consequence is deemed to be moderate and the frequency of occurrence is considered to be negligible. The effect will, therefore, be of **broadly acceptable** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

301. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance and ALARP which is not significant in EIA terms.

REDUCTION IN SEARCH AND RESCUE CAPABILITY

Construction phase

302. The construction phase will lead to an increased level of vessels and personnel in the area over baseline levels. On this basis there may be an increase in the number of incidents requiring emergency response over baseline rates.

303. Up to 7,902 return trips from construction vessels (including site preparation) may be made throughout the construction phase and will include vessels which are RAM. The presence of project vessels will increase the likelihood of an incident, with the potential to diminish emergency response capability.

304. Baseline incident rates are considered low in the area based on the data studied, with an average of less than one incident per year indicated within the MAIB, RNLI and helicopter taskings datasets. It is also noted that to date, there have only been 13 reported allision or collision incidents associated with offshore wind farms in the UK as detailed in the NRA (volume 3, appendix 13.1). While it should be considered that this only covers allisions and collisions, it is still not anticipated that the construction phase would notably increase the observed baseline incident rates.

305. Any on-site project vessels and resources associated with the construction phase will form additional resource to respond to any incidents in the area in liaison with the MCA, both in terms of incidents associated with construction activities (i.e. self-help resources), but also incidents occurring outside of the Array to third-party vessels.

306. As required under MGN 654, the Applicant will produce and submit an ERCoP to the MCA detailing how they would cooperate and assist in the event of an incident including consideration of additional project resources that will be available (e.g. project vessels associated with construction activities). The initial ERCoP will specifically cover the construction phase.

307. The most likely consequence is a delay caused emergency response request but without notable impact on the operation. As a worst case the delay could lead to PLL.

Frequency of occurrence

308. The frequency of occurrence is considered to be remote based on consideration of the historical incident data and the designed in measures in place including compliance with MGN 654.

Severity of consequence

309. The severity of consequence is considered to be serious.

Significance of the effect

310. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be remote. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

311. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP which is not significant in EIA terms.

Operation and maintenance phase

312. The operation and maintenance phase will lead to an increased level of vessels and personnel in the area over baseline levels, however, it is likely to be considerably less than during the construction phase (when more vessels will be present and more activity being undertaken). On this basis there may be an increase in the number of incidents requiring emergency response over baseline rates, albeit likely at lower rates than during the construction phase.

313. As per the equivalent construction phase discussion, baseline incident rates are considered low in the area, and it is considered unlikely that incident rates will rise notably based on the study of allision and collision incidents that have occurred at other UK offshore wind farms (further details provided in volume 3, appendix 13.1).

314. Any on-site project vessels and resources associated with the operation and maintenance phase will form additional resource to respond to any incidents in the area in liaison with the MCA, both in terms of incidents associated with the ongoing operation and maintenance activities (i.e. self-help resources), but also incidents occurring outside of the Array to third-party vessels.

315. As required under MGN 654 (MCA, 2021a), the Applicant will produce and submit an ERCoP to the MCA detailing how they would cooperate and assist in the event of an incident including consideration of additional project resources that will be available (e.g. project vessels associated with operation and maintenance activities). The ERCoP will be updated on a regular basis as required by the MCA, and this will include the transfer of the construction phase ERCoP into the operation and maintenance phase ERCoP in advance of the completion of construction. The Applicant will also agree a SAR checklist with the MCA post consent, which will set out the required mitigations of relevance to SAR that will be implemented.

316. To ensure suitable SAR access is maintained, the final layout of structures will be agreed with the MCA post consent. This will include application of the SAR layout requirements within MGN 654 (MCA, 2021a), noting that there may also be a need for use of Helicopter Refuge Areas given the size of the site boundary. The consideration of MGN 654 in addition to agreement of the layout positions with the MCA will ensure that suitable SAR access is maintained.

317. The most likely consequence is a delay caused emergency response request but without notable impact on the operation. As a worst case the delay could lead to PLL.

Frequency of occurrence

318. The frequency of occurrence is considered to be remote based on consideration of the historical incident data and the designed in measures in place including compliance with MGN 654.

Severity of consequence

319. The severity of consequence is considered to be serious.

Significance of the effect

320. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be remote. The effect will, therefore, be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

321. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP which is not significant in EIA terms.

Decommissioning phase

322. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place and it is anticipated that third-party vessels would be unlikely to enter on a regular basis.

323. This also includes the assumption that the vessels on site associated with decommissioning activities will form additional resource to respond to any incidents in the area in liaison with the MCA, both in terms of

incidents associated with the decommissioning activities (i.e. self-help resources), but also incidents occurring outside of the Array to third-party vessels.

324. As required under MGN 654 (MCA, 2021a), the Applicant will produce and submit an ERCoP to the MCA detailing how they would cooperate and assist in the event of an incident including consideration of additional project resources that will be available (e.g. project vessels associated with decommissioning). The ERCoP will be updated on a regular basis as required by the MCA, and this will include an update prior to decommissioning.

325. The most likely consequence is a delay caused emergency response request but without notable impact on the operation. As a worst case the delay could lead to PLL.

Frequency of occurrence

326. The frequency of occurrence is considered to be remote based on consideration of the historical incident data and the designed in measures in place including compliance with MGN 654.

Severity of consequence

327. The severity of consequence is considered to be serious.

Significance of the effect

328. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be remote. The effect will, therefore, be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Secondary mitigation and residual effect

329. No secondary shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP which is not significant in EIA terms.

13.12. CUMULATIVE EFFECTS ASSESSMENT

13.12.1. METHODOLOGY

330. The Cumulative Effects Assessment (CEA) assesses the impact associated with the Array together with other relevant plans, projects and activities. Cumulative effects are defined as the combined effect of the Array in combination with the effects from a number of different projects, on the same receptor or resource. Further details on CEA methodology are provided in volume 1, chapter 6.

331. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see volume 3, appendix 6.4 of the Array EIA Report). Volume 3, appendix 6.4 further provides information regarding how information pertaining to other plans and projects is gained and applied to the assessment. Each project or plan has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence, impact-receptor pathways and the spatial/temporal scales involved.

332. In undertaking the CEA for the Array, it should be noted that other projects and plans under consideration will have differing potential for proceeding to an operational stage and hence a differing potential to ultimately contribute to a cumulative impact alongside the Array. Therefore, a tiered approach has be adopted which provides a framework for placing relative weight upon the potential for each project/plan to be included in the CEA to ultimately be realised, based upon the project/plan's current stage of maturity and certainty in the projects' parameters. The tiered approach which will be utilised within the overarching Array CEA employs the following tiers:

- tier 1 assessment – Array and Proposed offshore export cable corridor(s) and Proposed onshore transmission infrastructure and all plans/projects which became operational since baseline characterisation, those under construction and those with consent and submitted but not yet determined;
- tier 2 assessment – All plans/projects assessed under Tier 1, plus those projects with a Scoping Report; and
- tier 3 assessment – All plans/projects assessed under Tier 2, which are reasonably foreseeable, plus those projects likely to come forward where an Agreement for Lease (AfL) has been granted.

333. It is noted that the cumulative routeing assessment in the NRA uses its own tiering system based on development status, distance from the Array, level of interaction with baseline traffic of relevance to the Array, level of concern raised during consultation, and data confidence. Full details are provided in the NRA (volume 3, appendix 13.1). This chapter considers the cumulative routeing outputs, but applies the tiering shown in Table 13.12. The NRA also considers a 50 nm buffer for cumulative routeing.

334. The specific projects scoped into the CEA for shipping and navigation for the purposes of the Array EIA Report chapter are outlined in Table 13.12.

335. The range of potential cumulative impacts that are identified and included in Table 13.13, is a subset of those considered for the Array alone CEA assessment. This is because some of the potential impacts identified and assessed for the Array alone, are localised and temporary in nature. It is considered therefore, that these potential impacts have limited or no potential to interact with similar changes associated with other plans or projects. These have therefore not been taken forward for detailed assessment. The scoped out impacts are:

- loss of station;
- reduction of under keel clearance as a result of subsea infrastructure;
- anchor interaction with subsea cables (including dynamic cabling); and
- anchor interaction with mooring lines.

336. Similarly, some of the potential impacts considered within the Array alone assessment are specific to a particular phase of development (e.g. construction, operation and maintenance or decommissioning). Where the potential for cumulative effects with other plans or projects only have potential to occur where there is spatial or temporal overlap with the Array during certain phases of development, impacts associated with a certain phase may be omitted from further consideration where no plans or projects have been identified that have the potential for cumulative effects during this period.

337. It should be noted that there are no impact pathways in respect of the Proposed onshore transmission infrastructure that could result in a cumulative impact on shipping and navigation receptors scoped into the CEA. Therefore, the Proposed onshore transmission infrastructure has not been considered further within this CEA.

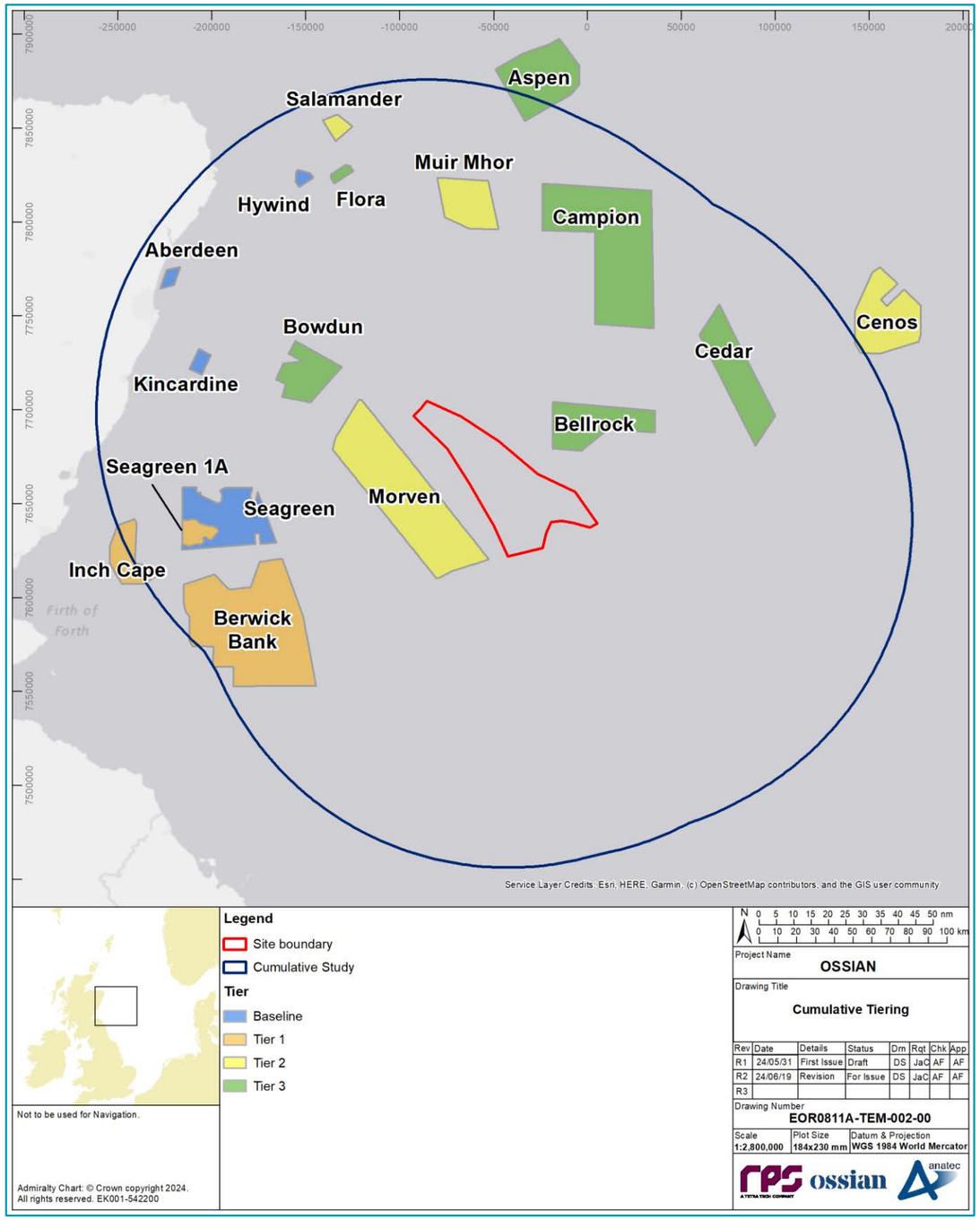

Figure 13.5: Other Projects/Plans Screened into the CEA for Shipping and Navigation

Table 13.12: List of Other Projects and Plans Considered within the CEA for Shipping and Navigation

Project/Plan	Status [i.e. Application, Consented, Under Construction, Operational]	Distance from Array Area (km)	Description of Project/Plan	Dates of Construction (If Applicable)	Dates of Operation (If Applicable)	Overlap with the Array [e.g. Project Construction Phase Overlaps with Array Construction Phase]
Tier 1						
Proposed offshore export cable corridor(s)	Planned	0	Export cables for the Ossian project.	2030 to 2038	2038 to 2072	Overlaps with Array phases
Offshore Wind Projects and Associated Cables						
Inch Cape Offshore Wind Farm	Consented	86.92 (46.8 nm)	Inch Cape Offshore Wind Farm is consented for up to 784 MW (up to 72 wind turbines)	2025 to 2026	2027 onwards	The project operation and maintenance phase overlaps with the Array construction and operation and maintenance phases.
Berwick Bank Offshore Wind Farm	Planning	56.84 (30.6 nm)	Berwick Bank Offshore Wind Farm is proposed for up to 307 wind turbines with a capacity of up to 4.1 GW	2025 to 2032	2033 onwards	The project construction and operation and maintenance phase overlaps with the Array construction and operation and maintenance phases.
Seagreen 1A Project	Consented	66.3 (35.8 nm)	Seagreen 1A Project is consented for up to 36 turbines with no maximum generating capacity.	2024 to 2025	2026 onwards	The project operation and maintenance phase overlaps with the Array construction and operation and maintenance phases.
Tier 2						
Offshore Wind Projects and Associated Cables						
Cenos Offshore Wind Farm	Scoping	91.7 (49.5 nm)	Cenos Offshore Wind Farm is proposed for up to 1,400MW.	Unknown	Unknown	The project construction and/or operation and maintenance phase may overlap with the Array construction and/or operation and maintenance phases.
Morven Offshore Wind Farm	Scoping	5.5 (3.1 nm)	Morven Offshore Wind Farm is proposed for up to 191 wind turbines at a capacity of 2,300 MW.	2031 to 2037	2038 onwards	The project construction and operation and maintenance phase overlaps with the Array construction and operation and maintenance phases.
Muir Mhor Offshore Wind Farm	Scoping	51.38 (27.7 nm)	Muir Mhor Offshore Wind Farm is proposed for up to 798 MW	2027 to2029	2030 onwards	The project operation and maintenance phase overlaps with the Array construction and operation and maintenance phases.
Salamander Offshore Wind Farm	Scoping	79.49 (42.8 nm)	Salamander Offshore Wind Farm is proposed for up to 100 MW	Unknown	Unknown	The project construction and/or operation and maintenance phase may overlap with the Array construction and/or operation and maintenance phases.
Tier 3						
Offshore Wind Projects and Associated Cables						
Bellrock Offshore Wind Farm	Pre-planning	8.67 (4.7 nm)	Bellrock Offshore Wind Farm is proposed for a capacity of 1,200 MW.	Unknown	Unknown	The project construction and/or operation and maintenance phase may overlap with the Array construction and/or operation and maintenance phases.
Bowdun Offshore Wind Farm	Pre-planning	25.36 (13.7 nm)	Bowdun Offshore Wind Farm is proposed for up to 60 wind turbines at a capacity of 1,000 MW.	Unknown	Unknown	The project construction and/or operation and maintenance phase may overlap with the Array construction and/or operation and maintenance phases.
Campion Offshore Wind Farm	Pre-planning	44.15 (23.8 nm)	Campion Offshore Wind Farm is proposed for up to 100 wind turbines at a capacity of 2,000 MW.	Unknown	Unknown	The project construction and/or operation and maintenance phase may overlap with the Array construction and/or operation and maintenance phases.

Project/Plan	Status [i.e. Application, Consented, Under Construction, Operational]	Distance from Array Area (km)	Description of Project/Plan	Dates of Construction (If Applicable)	Dates of Operation (If Applicable)	Overlap with the Array [e.g. Project Construction Phase Overlaps with Array Construction Phase]
Flora Floating Wind Farm	Pre-planning	68.41 (36.9 nm)	Flora Floating Wind Farm is proposed for up to 50 MW	Unknown	Unknown	The project construction and/or operation and maintenance phase may overlap with the Array construction and/or operation and maintenance phases.
Aspen Floating Wind Farm	Pre-planning	85.61 (49.3 nm)	Aspen Floating Wind Farm is proposed for up to 1,008 MW	Unknown	Unknown	The project construction and/or operation and maintenance phase may overlap with the Array construction and operation and maintenance phases.
Cedar Floating Wind Farm	Pre-planning	51.65 (27.8 nm)	Cedar Floating Wind Farm is proposed for up to 1,008 MW	Unknown	Unknown	The project construction and/or operation and maintenance phase may overlap with the Array construction and/or operation and maintenance phases.

13.12.2. MAXIMUM DESIGN SCENARIO

338. The MDSs identified in Table 13.13 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the details provided in volume 1, chapter 3 of the Array EIA Report as well as the information available on other projects and plans (see volume 3, appendix 6.4), to inform an MDS. Effects of greater significance are not predicted to arise should any other development scenario, based on details within the Project Description (volume 1, chapter 3) (e.g. different wind turbine layout), to that assessed here, be taken forward in the final design scheme.

Table 13.13: Maximum Design Scenario Considered for Each Impact as part of the Assessment of Likely Significant Cumulative Effects on Shipping and Navigation

Potential Cumulative Effect	Phase[2]			Tier	Maximum Design Scenario
	C	O	D		
Increased vessel to vessel collision risk resulting from displacement (third-party to third-party)	✓	✓	✓	1	**Construction Phase** • same parameters for the Array as considered for the MDS for the assessment of the equivalent impact for the Array alone case (Table 13.6); and • full build out of all CEA tier 1 projects. **Operation and Maintenance Phase** • same parameters for the Array as considered for the MDS for the assessment of the equivalent impact for the Array alone case (Table 13.6); and • full build out of all CEA tier 1 projects. **Decommissioning Phase** • the MDS for the decommissioning phase will be similar to but no greater than the construction phase given similar scenarios from a shipping and navigation perspective; and • full build out of all CEA tier 1 projects.
				2	**Construction Phase** • same parameters for the Array as considered for the MDS for the assessment of the equivalent impact for the Array alone case (Table 13.6); and • full build out of all CEA tier 2 projects. **Operation and Maintenance Phase** • same parameters for the Array as considered for the MDS for the assessment of the equivalent impact for the Array alone case (Table 13.6); and • full build out of all CEA tier 2 projects. **Decommissioning Phase** • the MDS for the decommissioning phase will be similar to but no greater than the construction phase given similar scenarios from a shipping and navigation perspective; and • full build out of all CEA tier 2 projects.
				3	**Construction Phase** • same parameters for the Array as considered for the MDS for the assessment of the equivalent impact for Array alone case (Table 13.6) ;and • full build out of all CEA tier 3 projects. **Operation and Maintenance Phase** • same parameters for the Array as considered for the MDS for the assessment of the equivalent impact for the Array alone case (Table 13.6); and • full build out of all CEA tier 3 projects. **Decommissioning Phase** • the MDS for the decommissioning phase will be similar to but no greater than the construction phase given similar scenarios from a shipping and navigation perspective; and • full build out of all CEA tier 3 projects.
Displacement from adverse weather routeing	✓	✓	✓	1	As for Increased vessel to vessel collision risk resulting from displacement (third-party to third-party) impact.
				2	
				3	
Increased vessel to vessel collision risk (third-party to project vessels)	✓	✓	✓	1	
				2	
				3	
Vessel to structure allision risk	✓	✓	✓	1	
				2	
				3	

[2] C = Construction, O = Operation and maintenance, D = Decommissioning

Potential Cumulative Effect	Phase[2]			Tier	Maximum Design Scenario
	C	O	D		
Reduced access to local ports and harbours	✓	✓	✓	1	
				2	
				3	
Reduction in SAR capability	✓	✓	✓	1	
				2	
				3	

13.12.3. CUMULATIVE EFFECTS ASSESSMENT

339. An assessment of the likely significance of the cumulative effects of the Array upon shipping and navigation receptors arising from each identified impact is given below.

INCREASED VESSEL TO VESSEL COLLISION RISK RESULTING FROM DISPLACEMENT (THIRD-PARTY TO THIRD-PARTY)

Tier 1

Construction phase

340. Any displacement associated with the installation of the offshore export cable(s) required for the Array will be spatially limited to the area immediately around the installation vessel activities and temporary in nature. Details of the installation would be promulgated in advance via the usual means including Notice to Mariners and Kingfisher bulletins ensuring awareness will be maximised and facilitating passage planning.

341. Based on the cumulative routeing assessment in the NRA (volume 3, appendix 13.1), it is not anticipated that Inch Cape Offshore Wind Farm, Berwick Bank Offshore Wind Farm, or the Seagreen 1A Project will impact main routes also interacting with the Array. As such, deviations on a cumulative basis are likely to be similar to the deviations assuming only the buoyed construction area is in place.

Frequency of occurrence

342. The frequency of occurrence is considered to be negligible based on the available sea room around Tier 1 developments and the temporary nature of the cable installation impact.

Severity of consequence

343. The severity of consequence is considered to be serious.

Significance of the effect

344. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

345. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Operation and maintenance phase

346. Any displacement associated with the offshore export cable(s) required for the Array during the operation and maintenance phase will be limited to any maintenance activity requiring the presence of a vessel. This displacement would be spatially limited to the area immediately around the vessel activities and temporary in nature. Details of the operation would be promulgated in advance via the usual means including Notices to Mariners and Kingfisher bulletins ensuring awareness will be maximised, and facilitating passage planning.

347. As for the construction phase, it is not anticipated that Inch Cape Offshore Wind Farm, Berwick Bank Offshore Wind Farm or the Seagreen 1A Project will impact main routes also interacting with the Array, as per the cumulative routeing assessment in the NRA (volume 3, appendix 13.1). As such, deviations on a cumulative basis are likely to be similar to the deviations assuming the Array alone case.

Frequency of occurrence

348. The frequency of occurrence is considered to be negligible based on the available sea room around Tier 1 developments.

Severity of consequence

349. The severity of consequence is considered to be serious.

Significance of the effect

350. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

351. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Decommissioning phase

352. Any displacement associated with the decommissioning of the offshore export cable(s) required for the Array will be spatially limited to the area immediately around the associated vessel activities and temporary in nature. Details of the decommissioning would be promulgated in advance via the usual means including Notice to Mariners and Kingfisher bulletins ensuring awareness will be maximised and facilitating passage planning.

353. As for the construction and operation and maintenance phases, it is not anticipated that Inch Cape Offshore Wind Farm, Berwick Bank Offshore Wind Farm or the Seagreen 1A Project will impact main routes also interacting with the Array, as per the cumulative routeing assessment in the NRA (volume 3, appendix 13.1).

Frequency of occurrence

354. The frequency of occurrence is considered to be negligible based on the available sea room around Tier 1 developments.

Severity of consequence

355. The severity of consequence is considered to be serious.

Significance of the effect

356. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

357. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Tier 2

All phases

358. Based on the cumulative routeing assessment in the NRA (volume 3, appendix 13.1), it is anticipated that the majority of vessels will choose to pass inshore of the Array, between Seagreen 1 Offshore Wind Farm (screened out as part of the baseline) and Morven Offshore Wind Farm on the basis that:

- Consultation input including at the Hazard Workshop indicates that commercial vessels are likely to prefer to pass in open sea room rather than between or in proximity to wind farm arrays.
- The open sea room means that vessels will be able to passage plan with minimal waypoints on their transits.
- Overall percentage increases in deviations associated with this routeing option are low are low when compared to the route lengths as a whole (the busiest route [Route 2] is approximately 700 nm in total length, with the inshore deviation leading to an estimated increase of less than 1%).

359. There is in excess of 10 nm of navigable sea area between Seagreen 1 Offshore Wind Farm and Morven Offshore Wind Farm, and therefore there is considered to be sufficient sea space to accommodate any additional transits form vessels choosing to deviate through this inshore area.

360. Some vessels may also choose to pass offshore of the Array, noting that the presence of Salamander Offshore Wind Farm and Muir Mhor Offshore Wind Farm to the north may mean this will lead to a larger deviation than passing inshore.

361. The Cenos Offshore Wind Farm is located approximately 50 nm from the Array, and is unlikely to contribute notably to cumulative deviations to the routes also interacting with the Array, other than for oil and gas vessels from Montrose. These vessels will be able to pass either north or south of the Cenos Offshore Wind Farm, or through at the master's discretion.

362. The proximity of the Morven Offshore Wind Farm means that lighting and marking and also charting will need to be considered cumulatively. This will ensure vessels are aware of the projects and are able to passage plan accordingly.

Frequency of occurrence

363. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, the outputs of the modelling, and consideration of historical incident data.

Severity of consequence

364. The severity of consequence is considered to be serious.

Significance of the effect

365. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will, therefore, be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

366. Assuming consultation with the MCA and NLB on the cumulative lighting and marking and charting of the Array and other Tier 2 developments, the effect is considered to be of tolerable significance and ALARP, which is not significant in EIA terms.

Tier 3

All phases

367. Based on the cumulative routeing assessment in the NRA (volume 3, appendix 13.1) which considers all Tier 3 developments, it is anticipated that the majority of vessels will choose to pass inshore of the Array, between Seagreen 1 Offshore Wind Farm (screened out as part of the baseline) and Morven Offshore Wind Farm (Tier 2) as described in the equivalent Tier 2 assessment. The inclusion of other Tier 3 developments is considered as making it more likely that vessels will choose to pass inshore of the Array given the generally offshore locations of the other proposed Tier 3 arrays, in particular the location of the Bowdun Offshore Wind Farm. The addition of Tier 3 developments does not reduce the available sea room between Seagreen 1 Offshore Wind Farm and Morven Offshore Wind Farm. Further north, the Flora Floating Offshore Wind Farm may mean that vessels are more likely to pass inshore of the Hywind Offshore Wind Farm (screened out as part of the baseline), however passing between the Flora Floating Offshore Wind Farm and the Muir Mhor Offshore Wind Farm will also be an option.

368. Vessels choosing to pass further offshore may use the sea area between the Array and Bellrock Offshore Wind Farm, noting that general consensus during consultation including the hazard workshop was that there was sufficient sea space to accommodate likely users. There is also the option to pass further offshore, between the Campion Offshore Wind Farm and Bellrock Offshore Wind Farm. Any vessels choosing such passage would need to pass either north or south of the Cedar array.

369. The location of the Aspen array is considered as being unlikely to significantly contribute to cumulative deviations, given that as discussed above most vessels on north/south are likely to pass inshore.

370. In addition to the Morven Offshore Wind Farm (Tier 2), the proximity of the Bellrock Offshore Wind Farm means that lighting and marking and also charting will need to be considered cumulatively. This will ensure vessels are aware of the projects and are able to passage plan accordingly.

Frequency of occurrence

371. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, the outputs of the modelling, and consideration of historical incident data.

Severity of consequence

372. The severity of consequence is considered to be serious.

Significance of the effect

373. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will, therefore, be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

374. Assuming consultation with the MCA and NLB on the cumulative lighting and marking and charting of the Array and other Tier 2 and Tier 3 developments, the effect is considered to be of tolerable significance and ALARP, which is not significant in EIA terms.

DISPLACEMENT FROM ADVERSE WEATHER ROUTEING

Tier 1

Construction phase

375. Any displacement associated with the installation of the offshore export cable(s) required for the Array will be spatially limited to the area immediately around the installation vessel activities and temporary in nature. Details of the installation would be promulgated in advance via the usual means including Notice to Mariners and Kingfisher bulletins ensuring awareness will be maximised and facilitating passage planning. As such no notable cumulative impact on adverse weather routeing is anticipated.

376. Based on the cumulative routeing assessment in the NRA (volume 3, appendix 13.1), it is not anticipated that the Inch Cape Offshore Wind Farm, Berwick Bank Offshore Wind Farm or the Seagreen 1A Project will impact main routes also interacting with the Array, and therefore only irregular transits are likely to be impacted. There is in excess of 30 nm between the Array and the Tier 1 projects, facilitating inshore routeing to the west of the buoyed construction area if this is vessel preference during adverse conditions.

Frequency of occurrence

377. The frequency of occurrence is considered to be negligible based on the available sea room and the temporary nature of cable installation.

Severity of consequence

378. The severity of consequence is considered to be serious.

Significance of the effect

379. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

380. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Operation and maintenance phase

381. Any displacement associated with the offshore export cable(s) required for the Array during the operation and maintenance phase will be limited to any maintenance activity requiring the presence of a vessel. This displacement would be spatially limited to the area immediately around the vessel activities and temporary in nature. Details of the operation would be promulgated in advance via the usual means including Notice to Mariners and Kingfisher bulletins ensuring awareness will be maximised and facilitating passage planning. As such no notable cumulative impact on adverse weather routeing is anticipated.

382. As noted for the construction phase, when accounting for the presence of the Inch Cape Offshore Wind Farm, the Berwick Bank Offshore Wind Farm and the Seagreen 1A Project there is sea room available inshore of the Array to accommodate inshore routeing if this is vessel preference during adverse weather conditions (there is in excess of 30 nm between the Array and the Tier 1).

Frequency of occurrence

383. The frequency of occurrence is considered to be negligible based on the available sea room around Tier 1 developments.

Severity of consequence

384. The severity of consequence is considered to be serious.

Significance of the effect

385. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

386. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Decommissioning phase

387. Any displacement associated with the decommissioning of the offshore export cable(s) required for the Array will be spatially limited to the area immediately around the associated vessel activities and temporary in nature. Details of the decommissioning would be promulgated in advance via the usual means including Notice to Mariners and Kingfisher bulletins ensuring awareness will be maximised and facilitating passage planning.

388. As for the construction and operation and maintenance phases, when accounting for the presence of the Inch Cape Offshore Wind Farm, Berwick Bank Offshore Wind Farm and the Seagreen 1A Project there is considered to be sea room available to allow for any inshore routeing preference during adverse weather (there is in excess of 30 nm between the Array and the closest Tier 1 project).

Frequency of occurrence

389. The frequency of occurrence is considered to be negligible based on the available sea room around Tier 1 developments.

Severity of consequence

390. The severity of consequence is considered to be serious.

Significance of the effect

391. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

392. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Tier 2

All phases

393. There is in excess of 10nm of navigable sea area between Seagreen 1 Offshore Wind Farm (screened out as part of the baseline) and Morven Offshore Wind Farm, and therefore there is considered to be sufficient sea room to accommodate any additional transits from vessels choosing an inshore passage as a result of adverse weather. It is considered likely based on the cumulative routeing assessment in the NRA (volume 3, appendix 13.1), that most vessels will choose this routeing option for deviation, passing inshore of both the Morven Offshore Wind Farm and the Salamander Offshore Wind Farm. There is open sea room to the east for any vessels choosing to pass further offshore, with other Tier 2 developments in excess of 25nm from the Array.

394. The proximity of the Morven Offshore Wind Farm means that lighting and marking and also charting will need to be considered cumulatively. This will ensure vessels are aware of the projects and are able to passage plan accordingly including during adverse weather.

Frequency of occurrence

395. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, the outputs of the modelling, and consideration of historical incident data.

Severity of consequence

396. The severity of consequence is considered to be serious.

Significance of the effect

397. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will, therefore, be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

398. Assuming consultation with the MCA and NLB on the cumulative lighting and marking and charting of the Array and other Tier 2 developments, the effect is considered to be of tolerable significance and ALARP, which is not significant in EIA terms.

Tier 3

All phases

399. The inclusion of Tier 3 developments is considered as increasing the likelihood that vessels will pass inshore (including during adverse weather), noting that no Tier 3 developments result in reduced sea room between Seagreen 1 Offshore Wind Farm (screened out as part of the baseline) and Morven Offshore Wind Farm (Tier 2). Any vessels choosing to pass further offshore will likely use either the sea space between the Array and Bellrock Offshore Wind Farm, or between Campion Offshore Wind Farm and Bellrock Offshore Wind Farm. Any vessels choosing such passage would need to pass either north or south of the Cedar array.

400. The location of the Aspen array is considered as being unlikely to significantly contribute to cumulative deviations, given that as discussed above most vessels on north/south are likely to pass inshore, including during adverse weather.

401. In addition to the Morven Offshore Wind Farm (Tier 2), the proximity of the Bellrock Offshore Wind Farm means that lighting and marking and also charting will need to be considered cumulatively. This will ensure vessels are aware of the projects and are able to passage plan accordingly including during adverse weather.

Frequency of occurrence

402. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, the outputs of the modelling, and consideration of historical incident data.

Severity of consequence

403. The severity of consequence is considered to be serious.

Significance of the effect

404. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will, therefore, be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

405. Assuming consultation with the MCA and NLB on the cumulative lighting and marking and charting of the Array and other Tier 2 and Tier 3 developments, the effect is considered to be of tolerable significance and ALARP, which is not significant in EIA terms.

INCREASED VESSEL TO VESSEL COLLISION RISK (THIRD-PARTY TO ARRAY VESSELS)

Tier 1

Construction phase

406. Any collision risk associated with the installation of the offshore export cable(s) required for the Array will be spatially limited to the area immediately around the installation vessel activities and temporary in nature. Details of the installation would be promulgated in advance via the usual means including Notice to Mariners and Kingfisher bulletins ensuring awareness will be increased and facilitating passage planning, thus reducing any collision risk associated with the installation. Any encounters that did occur between a third-party vessel and the cable installation vessel would be managed via COLREGS.

407. It is anticipated that Inch Cape Offshore Wind Farm and the Seagreen 1A Project will be operational prior to commencement of construction of the Array. Timelines are less certain for Berwick Bank Offshore Wind Farm, however based on current understanding of timelines there is unlikely to be a large overlap between the end of the Berwick Bank Offshore Wind Farm construction and construction of the Array. Therefore, it is likely that the only additional project vessels on a cumulative basis will be those associated with the operation and maintenance of Tier 1 projects (i.e. likely less than during the construction phases), up until decommissioning.

408. Inch Cape Offshore Wind Farm is likely to be utilising similar vessel management mitigations to those discussed in section 13.10, in particular marine coordination and use of safety zones. It is also noted that the production of a VMP and NSP are conditions of the Inch Cape Offshore Wind Farm consent, and that all vessels associated with Inch Cape Offshore Wind Farm will be required to comply with COLREGS and SOLAS. The same applies for the Seagreen 1A Project. It is likely that similar procedures will be implemented by Berwick Bank Offshore Wind Farm, noting that the implementation of a VMP and NSP is a standard condition of consent.

Frequency of occurrence

409. The frequency of occurrence is considered to be negligible based on the available sea room, consideration of historical incident data, and the designed in measures in place to manage project vessel movements and activities.

Severity of consequence

410. The severity of consequence is considered to be serious.

Significance of the effect

411. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

412. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Operation and maintenance phase

413. Any collision risk associated with the offshore export cable(s) required for the Array during the operation and maintenance phase will be limited to any maintenance activity requiring the presence of a surface vessel. This risk would be spatially limited to the area immediately around the vessel activities and temporary in nature. Details of the operation would be promulgated in advance via the usual means including Notice to Mariners and Kingfisher bulletins ensuring awareness will be increased and facilitating passage planning, and thus reduce collision risk.

414. As for the construction phase impact, the Inch Cape Offshore Wind, Seagreen 1A Project and the Berwick Bank Offshore Wind Farm are likely to be implementing similar vessel management procedures and mitigations as will be the case for the Array (e.g. VMP, NSP, safety zones).

Frequency of occurrence

415. The frequency of occurrence is considered to be negligible based on the available sea room, consideration of historical incident data, and the designed in measures in place to manage project vessel movements and activities.

Severity of consequence

416. The severity of consequence is considered to be serious.

Significance of the effect

417. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

418. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Decommissioning phase

419. Any collision risk associated with the decommissioning of the offshore export cable(s) required for the Array will be spatially limited to the area immediately around the associated vessel activities and temporary in nature. Details of the decommissioning would be promulgated in advance via the usual means including Notice to Mariners and Kingfisher bulletins ensuring awareness will be maximised and facilitating passage planning, thus minimising collision risk.

420. As for the construction phase and operation and maintenance phase impacts, the Inch Cape Offshore Wind, the Seagreen 1A Project and the Berwick Bank Offshore Wind Farm are likely to be implementing similar vessel management procedures and mitigations as will be the case for the Array (e.g. VMP, NSP, safety zones).

Frequency of occurrence

421. The frequency of occurrence is considered to be negligible based on the available sea room, consideration of historical incident data, and the designed in measures in place to manage project vessel movements and activities.

Severity of consequence

422. The severity of consequence is considered to be serious.

Significance of the effect

423. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

424. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Tier 2

Construction phase

425. All Tier 2 projects are anticipated to implement similar vessel management mitigations to those discussed in section 13.10, in particular marine coordination and use of safety zones. It is also noted that the production of a VMP and NSP are standard conditions of consent, and that all vessels associated with Tier 2 projects will be required to comply with COLREGS and SOLAS.

426. During the construction phase, there will be elevated levels of vessels on site and in the general area (noting ports are still to be decided). There may be overlap between the construction phase, and the construction phases of other Tier 2 developments. Ports to be used for other developments are also unknown, however, as above vessel movements will all be managed.

Frequency of occurrence

427. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, consideration of historical incident data, and the designed in measures in place to manage project vessel movements and activities.

Severity of consequence

428. The severity of consequence is considered to be serious.

Significance of the effect

429. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

430. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP, which is not significant in EIA terms.

Operation and maintenance phase

431. During the operation and maintenance phase, all Tier 2 projects are anticipated to implement similar vessel management mitigations to those discussed in section 13.10, in particular marine coordination and use of safety zones. It is also noted that the production of a VMP and NSP are standard conditions of consent, and that all vessels associated with Tier 2 projects will be required to comply with COLREGS and SOLAS.

432. During the operation and maintenance phase, there are likely to be lower levels of vessels on site and in the general area, noting ports are still to be decided. Ports to be used for other developments are also unknown, however, as above vessel movements will all be managed.

Frequency of occurrence

433. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, consideration of historical incident data, and the designed in measures in place to manage project vessel movements and activities.

Severity of consequence

434. The severity of consequence is considered to be serious.

Significance of the effect

435. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

436. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP, which is not significant in EIA terms.

Decommissioning phase

437. During the decommissioning phase, all Tier 2 projects are anticipated to implement similar vessel management mitigations to those discussed in section 13.10, in particular marine coordination and use of safety zones. It is also noted that the production of a VMP and NSP are standard conditions of consent

(outlines provided in volume 4, appendix 26), and that all vessels associated with Tier 2 projects will be required to comply with COLREGS and SOLAS.

Frequency of occurrence

438. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, consideration of historical incident data, and the designed in measures in place to manage project vessel movements and activities.

Severity of consequence

439. The severity of consequence is considered to be serious.

Significance of the effect

440. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

441. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP, which is not significant in EIA terms.

Tier 3

Construction phase

442. All Tier 3 projects are anticipated to implement similar vessel management mitigations to those discussed in section 13.10, in particular marine coordination and use of safety zones. It is also noted that the production of a VMP and NSP are standard conditions of consent, and that all vessels associated with Tier 3 projects will be required to comply with COLREGS and SOLAS.

443. During the construction phase, there will be elevated levels of vessels on site and in the general area (noting ports are still to be decided). There may be overlap between the construction phase, and the construction phases of other Tier 3 developments. Ports to be used for other developments are also unknown, however, as above vessel movements will all be managed.

Frequency of occurrence

444. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, consideration of historical incident data, and the designed in measures in place to manage project vessel movements and activities.

Severity of consequence

445. The severity of consequence is considered to be serious.

Significance of the effect

446. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

447. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP, which is not significant in EIA terms.

Operation and maintenance phase

448. During the operation and maintenance phase, all Tier 3 projects are anticipated to implement similar vessel management mitigations to those discussed in section 13.10, in particular marine coordination and use of safety zones. It is also noted that the production of a VMP and NSP are standard conditions of consent and that all vessels associated with Tier 3 projects will be required to comply with COLREGS and SOLAS.

449. During the operation and maintenance phase, there are likely to be lower levels of vessels on site and in the general area, noting ports are still to be decided. Ports to be used for other developments are also unknown, however, as above vessel movements will all be managed.

Frequency of occurrence

450. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, consideration of historical incident data, and the designed in measures in place to manage project vessel movements and activities.

Severity of consequence

451. The severity of consequence is considered to be serious.

Significance of the effect

452. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

453. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP, which is not significant in EIA terms.

Decommissioning phase

454. During the decommissioning phase, all Tier 3 projects are anticipated to implement similar vessel management mitigations to those discussed in section 13.10, in particular marine coordination and use of safety zones. It is also noted that the production of a VMP and NSP are standard conditions of consent, and that all vessels associated with Tier 3 projects will be required to comply with COLREGS and SOLAS.

Frequency of occurrence

455. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, consideration of historical incident data, and the designed in measures in place to manage project vessel movements and activities.

Severity of consequence

456. The severity of consequence is considered to be serious.

Significance of the effect

457. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

458. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP, which is not significant in EIA terms.

VESSEL TO STRUCTURE ALLISION RISK

Tier 1

459. There will be no allision impact associated with the offshore export cable(s) required for the Array during any phase.

Construction phase

460. It is anticipated that Inch Cape Offshore Wind Farm will be operational prior to commencement of construction of the Array, with this also likely being the case for Berwick Bank Offshore Wind Farm noting timelines are less certain. Both would therefore have operational mitigations active, in particular lighting and marking in agreement with NLB (a LMP is a condition of the Inch Cape Offshore Wind Farm consent and is a standard condition).

461. Other Tier 1 offshore wind developments are in excess of 30 nm from the Array, and therefore given the localised nature of allision risk, any notable additional cumulative risk is unlikely, noting that the NRA cumulative routeing assessment (volume 3, appendix 13.1) indicated likely limited interaction with Inch Cape Offshore Wind Farm and Berwick Bank Offshore Wind Farm to vessels also passing the Array.

Frequency of occurrence

462. The frequency of occurrence is considered to be negligible based on the distance to other Tier 1 offshore wind developments.

Severity of consequence

463. The severity of consequence is considered to be serious.

Significance of the effect

464. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

465. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Operation and maintenance phase

466. It is anticipated that Inch Cape Offshore Wind Farm will be operational prior to commencement of construction of the Array, with this also likely being the case for Berwick Bank Offshore Wind Farm noting timelines are less certain. During the operation and maintenance phase, both will therefore likely have operational mitigations active, in particular lighting and marking in agreement with NLB (a LMP is a condition of the Inch Cape Offshore Wind Farm consent and is a standard condition).

467. Other Tier 1 offshore wind developments are in excess of 30 nm from the Array, and therefore given the localised nature of allision risk, any notable additional cumulative risk is unlikely, noting that the NRA cumulative routeing assessment (volume 3, appendix 13.1) indicated likely limited interaction with Inch Cape Offshore Wind Farm and Berwick Bank Offshore Wind Farm to vessels also passing the Array.

Frequency of occurrence

468. The frequency of occurrence is considered to be negligible based on the distance to other Tier 1 offshore wind developments.

Severity of consequence

469. The severity of consequence is considered to be serious.

Significance of the effect

470. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

471. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Decommissioning phase

472. Decommissioning timelines of Inch Cape Offshore Wind Farm Seagreen 1A Project, and Berwick Bank Offshore Wind Farm are unknown, however given they are anticipated to be operational prior to commencement of construction of the Array, they may be decommissioned in advance of decommissioning

of the Array. These projects are likely to utilise industry standard mitigations during decommissioning, including use of a buoyed decommissioning area and temporary lighting where appropriate.

473. Other Tier 1 offshore wind developments are in excess of 30 nm from the Array, and therefore given the localised nature of allision risk, any notable additional cumulative risk is unlikely, noting that the NRA cumulative routeing assessment (volume 3, appendix 13.1) indicated likely limited interaction with Inch Cape Offshore Wind Farm and Berwick Bank Offshore Wind Farm to vessels also passing the Array.

Frequency of occurrence

474. The frequency of occurrence is considered to be negligible based on the distance to other Tier 1 offshore wind developments.

Severity of consequence

475. The severity of consequence is considered to be serious.

Significance of the effect

476. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

477. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Tier 2

All phases

478. As discussed within the cumulative displacement impact commentary, based on the cumulative routeing assessment in the NRA (volume 3, appendix 13.1) it is likely that most vessels currently transiting within or near the Array will choose to pass inshore between Seagreen 1 Offshore Wind Farm (screened out as part of the baseline) and Morven Offshore Wind Farm, where there is in excess of 10 nm of width of sea room available for transit (which is considered sufficient to safely accommodate additional vessel transits without unduly increasing allision risk given allision risk is localised to each development). Vessels choosing to pass further have open sea room to the east.

479. All Tier 2 developments will be required to agree lighting and marking with the NLB to ensure navigational safety including managing allision risk. Similarly, layouts must also be agreed with the MCA and NLB, with these discussions including consideration of internal allision risk. The proximity of the Morven Offshore Wind Farm means that lighting and marking and also charting will need to be considered cumulatively. This will ensure vessels are aware of the projects and are able to passage plan accordingly to manage cumulative allision risk.

Frequency of occurrence

480. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, outputs of the modelling, and consideration of historical incident data.

Severity of consequence

481. The severity of consequence is considered to be serious.

Significance of the effect

482. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will, therefore, be of **tolerable** significance and ALARP, which is not significant in EIA.

Further mitigation and residual effect

483. Assuming consultation with the MCA and NLB on the cumulative lighting and marking and charting of the Array and other Tier 2 developments, the effect is considered to be of tolerable significance and ALARP, which is not significant in EIA terms.

Tier 3

All phases

484. The inclusion of Tier 3 developments is considered as increasing the likelihood that vessels will pass inshore in particular the Bowdun Offshore Wind Farm and the Flora Floating Wind Farm, noting that no Tier 3 developments result in reduced sea room between Seagreen 1 Offshore Wind Farm (screened out as part of the baseline) and Morven Offshore Wind Farm (Tier 2). Tier 3 developments do not reduce this available sea space, where there is in excess of 10 nm of width of sea room available for transit which is considered sufficient to safely accommodate additional vessel transits without unduly increasing allision risk. This includes the Aspen and Cedar projects which are both located in excess of 25 nm from the Array.

485. Any vessels choosing to pass further offshore will likely use either the sea space between the Array and Bellrock Offshore Wind Farm, or between Campion Offshore Wind Farm and Bellrock Offshore Wind Farm. There is in excess of 10 nm of sea room between Campion Offshore Wind Farm and Bellrock Offshore Wind Farm, and consensus during consultation including at the Hazard Workshop was that the space available between Bellrock Offshore Wind Farm and the Array was also sufficient to manage any associated risk.

486. In addition to Tier 2 developments, all Tier 3 developments will be required to agree lighting and marking with the NLB to ensure navigational safety including managing allision risk. Similarly, layouts must also be agreed with the MCA and NLB, with these discussions including consideration of internal allision risk. In addition to the Morven Offshore Wind Farm (Tier 2), the proximity of the Bellrock Offshore Wind Farm means that lighting and marking and also charting will need to be considered cumulatively.

Frequency of occurrence

487. The frequency of occurrence is considered to be extremely unlikely based on the available sea room, outputs of the modelling, and consideration of historical incident data.

Severity of consequence

488. The severity of consequence is considered to be serious.

Significance of the effect

489. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be extremely unlikely. The effect will, therefore, be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

490. Assuming consultation with the MCA and NLB on the cumulative lighting and marking and charting of the Array and other Tier 2 and Tier 3 developments, the effect is considered to be of tolerable significance and ALARP, which is not significant in EIA terms.

REDUCED ACCESS TO LOCAL PORTS AND HARBOURS

Tier 1

Construction phase

491. Any displacement associated with the installation of the offshore export cable(s) required for the Array will be spatially limited to the area immediately around the installation vessel activities and temporary in nature. Details of the installation would be promulgated in advance via the usual means including Notice to Mariners and Kingfisher bulletins ensuring awareness will be increased and facilitating passage planning. Any cumulative impact on port access is therefore unlikely.

492. It is anticipated that Inch Cape Offshore Wind Farm and the Seagreen 1A Project will be operational prior to commencement of construction of the Array, with this also likely being the case for Berwick Bank Offshore Wind Farm noting timelines are less certain. Therefore, it is likely that the only additional project vessels on a cumulative basis will be those associated with the operation and maintenance of Tier 1 projects, meaning it is likely that traffic volumes will be lower than during their respective construction phases, up until decommissioning.

493. These projects are likely to be utilising similar vessel management mitigations to those discussed in section 13.10, in particular marine coordination. It is also noted that the production of a VMP and NSP are conditions of the Inch Cape Offshore Wind Farm consent and are standard conditions. These measures will seek to ensure vessel movements including in and out of port are managed.

494. Given the distance between the Tier 1 offshore wind developments and the Array (all in excess of 30 nm), there will be no direct impact on port access from the associated structures outside of the deviations which have already been assessed separately. Based on the cumulative routeing assessment in the NRA (volume 3, appendix 13.1), it is not anticipated that the Inch Cape Offshore Wind Farm, Seagreen 1A Project or Berwick Bank Offshore Wind Farm will impact main routes also interacting with the Array.

Frequency of occurrence

495. The frequency of occurrence is considered to be negligible considering the extent of the cumulative study area and based on the available sea room around Tier 1 developments and the temporary nature of the cable installation impact.

Severity of consequence

496. The severity of consequence is considered to be minor.

Significance of the effect

497. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

498. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Operation and maintenance phase

499. Any displacement associated with the offshore export cable(s) required for the Array during the operation and maintenance phase will be limited to any maintenance activity requiring the presence of a vessel. This displacement would be spatially limited to the area immediately around the vessel activities and temporary in nature. Details of the operation would be promulgated in advance via the usual means including Notice to Mariners and Kingfisher bulletins seeking to ensure awareness will be increased and facilitating passage planning. Any cumulative impact on port access is therefore unlikely.

500. As noted in the construction phase impact, it is anticipated that the Inch Cape Offshore Wind Farm and the Seagreen 1A Project will be operational prior to commencement of construction of the Array, with this also likely being the case for the Berwick Bank Offshore Wind Farm noting timelines are less certain. Therefore, during the operation and maintenance phase for the Array, it is likely that the only additional project vessels on a cumulative basis will be those associated with the operation and maintenance of the Tier 1 projects, meaning it is likely that traffic volumes associated with the Tier 1 projects will be lower than during the construction phases, up until decommissioning.

501. These projects are likely to be utilising similar vessel management mitigations to those discussed in section 13.10 during the operation and maintenance phase, in particular marine coordination. It is also noted that the production of a VMP and NSP are conditions of the Inch Cape Offshore Wind Farm consent and are standard conditions. These measures will ensure vessel movements including in and out of port are managed.

502. Given the distance between the Tier 1 offshore wind developments and the Array (in excess of 30 nm) there will be no direct impact on port access from the associated structures outside of the deviations which have already been assessed separately. Based on the cumulative routeing assessment in the NRA, it is not anticipated that the Inch Cape Offshore Wind Farm, Seagreen 1A Project or Berwick Bank Offshore Wind Farm will impact main routes also interacting with the Array.

Frequency of occurrence

503. The frequency of occurrence is considered to be negligible considering the extent of the cumulative study area and based on the available sea room around Tier 1 developments and the temporary nature of the cable installation impact.

Severity of consequence

504. The severity of consequence is considered to be minor.

Significance of the effect

505. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

506. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Decommissioning phase

507. Any displacement associated with the decommissioning of the offshore export cable(s) required for the Array will be spatially limited to the area immediately around the associated vessel activities and temporary in nature. Details of the decommissioning would be promulgated in advance via the usual means including Notice to Mariners and Kingfisher bulletins ensuring awareness will be maximised and facilitating passage planning.

508. Cumulative impacts on port access from the Inch Cape Offshore Wind Farm, Seagreen 1A Project and the Berwick Bank Offshore Wind Farm are considered equivalent to the corresponding construction phase impact.

Frequency of occurrence

509. The frequency of occurrence is considered to be negligible considering the extent of the cumulative study area and based on the available sea room around Tier 1 developments and the temporary nature of the cable installation impact.

Severity of consequence

510. The severity of consequence is considered to be minor.

Significance of the effect

511. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

512. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Tier 2

All phases

513. Given the distance offshore of Tier 2 developments, there is unlikely to be any direct impact on port access from the structures outside of the cumulative deviations that have already been assessed.

514. All Tier 2 developments are likely to be utilising similar vessel management mitigations to those deployed fort the Array, in particular marine coordination. It is also noted that the production of a VMP and NSP are standard conditions of consent. These measures will seek to ensure vessel movements including in and out of port are managed.

Frequency of occurrence

515. The frequency of occurrence is considered to be negligible considering the extent of the cumulative study area and based on the available sea room.

Severity of consequence

516. The severity of consequence is considered to be minor.

Significance of the effect

517. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

518. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

Tier 3

All phases

519. Given the distance offshore of Tier 3 developments, there is unlikely to be any direct impact on port access from the structures outside of the cumulative deviations that have already been assessed.

520. As for Tier 2, all Tier 3 developments are likely to be utilising similar vessel management mitigations to those deployed fort the Array, in particular marine coordination. It is also noted that the production of a VMP and NSP are standard conditions of consent. These measures will seek to ensure vessel movements including in and out of port are managed.

Frequency of occurrence

521. The frequency of occurrence is considered to be negligible considering the extent of the cumulative study area and based on the available sea room.

Severity of consequence

522. The severity of consequence is considered to be minor.

Significance of the effect

523. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be negligible. The effect will therefore be of **broadly acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual effect

524. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of broadly acceptable significance, which is not significant in EIA terms.

REDUCTION IN SAR CAPABILITY

Tier 1

All phases

525. Given the low baseline incident rates, there is not considered likely to be a notable effect on emergency response resources on a cumulative level. This takes account of historical data showing that allisions and collisions caused by offshore wind farms do not occur at a high frequency (as detailed in the NRA (volume 3, appendix 13.1)), in combination with there being unlikely to be a notable rise in incidents associated with the installation of the offshore export cable(s) required for the Array.

526. It is anticipated that the Inch Cape Offshore Wind Farm and the Seagreen 1A Project will be operational prior to commencement of construction of the Array with this also likely being the case for Berwick Bank Offshore Wind Farm noting timelines are less certain. Therefore, it is likely that the only additional project vessels on a cumulative basis will be those associated with the operation and maintenance of the Tier 1 projects, meaning it is likely that traffic volumes will be lower than during the construction phases, up until decommissioning. By extension, this is also likely to mean that risk of incident is lower.

527. All offshore wind farms, including Inch Cape Offshore Wind Farm, Seagreen 1A Project and Berwick Bank Offshore Wind Farm, will also be required to produce and agree an ERCoP and SAR checklist with the MCA.

528. Given the distance between Tier 1 offshore wind developments and the Array (in excess of 30 nm), there will be no direct cumulative impact on the ability to search the localised areas covered by the projects in a SAR operation.

Frequency of occurrence

529. The frequency of occurrence is considered to be remote based on consideration of the historical incident data and the designed in measures in place including compliance with MGN 654.

Severity of consequence

530. The severity of consequence is considered to be serious.

Significance of the effect

531. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be remote. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

532. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP, which is not significant in EIA terms.

Tier 2

All phases

533. All Tier 2 projects will be required to produce an ERCoP and agree a SAR checklist with the MCA, meaning that each individual project will have appropriate liaison measures with the MCA in place, and implement suitable SAR mitigations. The relevant MCA guidance (MCA, 2021b) also requires that individual ERCoPs consider SAR procedures and liaison on a cumulative basis.

534. MCA guidance in the form of MGN 654 (MCA, 2021a) also dictates SAR design requirements for offshore wind farms. All Tier 2 projects will need to discuss and agree their layouts with the MCA, and these discussions will include consideration of other local offshore wind farms in proximity. This will ensure SAR operations can continue within the area, with SAR assets being able to access and search individual offshore wind farm layouts.

Frequency of occurrence

535. The frequency of occurrence is considered to be remote based on consideration of the historical incident data and the designed in measures in place including compliance with MGN 654.

Severity of consequence

536. The severity of consequence is considered to be serious.

Significance of the effect

537. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be remote. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

538. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP which is not significant in EIA terms.

Tier 3

All phases

539. All Tier 3 projects will be required to produce an ERCoP and agree a SAR checklist with the MCA, meaning that each individual project will have appropriate liaison measures with the MCA in place, and implement suitable SAR mitigations. The relevant MCA guidance (MCA, 2021b) also requires that individual ERCoPs consider SAR procedures and liaison on a cumulative basis.

540. MCA guidance in the form of MGN 654 (MCA, 2021a) also dictates SAR design requirements for offshore wind farms. All Tier 3 projects will need to discuss and agree their layouts with the MCA, and these discussions will include consideration of other local offshore wind farms in proximity. This will ensure SAR operations can continue within the area, with SAR assets being able to access and search individual offshore wind farm layouts.

Frequency of occurrence

541. The frequency of occurrence is considered to be remote based on consideration of the historical incident data and the designed in measures in place including compliance with MGN 654.

Severity of consequence

542. The severity of consequence is considered to be serious.

Significance of the effect

543. Overall, the severity of consequence is deemed to be serious and the frequency of occurrence is considered to be remote. The effect will therefore be of **tolerable** significance and ALARP, which is not significant in EIA terms.

Further mitigation and residual effect

544. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 13.10) is of tolerable significance and ALARP, which is not significant in EIA terms.

13.13. PROPOSED MONITORING

545. No monitoring is proposed for shipping and navigation.

13.14. TRANSBOUNDARY EFFECTS

546. A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to shipping and navigation from the Array upon the interests of European Economic Area (EEA) states has been assessed as part of the EIA. Transboundary impacts in terms of vessel routeing (including to international ports) are considered to have been assessed within section 13.11 (for the Array alone) and section 13.12 (on a cumulative basis). Individual transits may have the potential to be associated with vessels that are internationally owned or located, however, any such transits have been captured within the baseline assessment of vessel traffic as per section 13.7.1 (noting further detail and assessment is provided in the NRA (volume 3, appendix 13.1)).

547. As such, no transboundary impacts other than those already assessed in section 13.11 and section 13.12 are anticipated.

13.15. INTER-RELATED EFFECTS

548. For shipping and navigation, the following potential impacts have been considered within the inter-related effects assessment:

- increased vessel to vessel collision risk resulting from displacement (third party to third party);
- increased vessel to vessel collision risk (third party to Array vessels);
- vessel to structure allision risk; and
- reduced access to local ports and harbours.

549. Table 13.14 lists the inter-related effects (receptor-led effects) that are predicted to arise for shipping and navigation receptors. No inter-related effects (Array lifetime effects) are predicted to arise during the construction, operation and maintenance and decommissioning phase of the Array since the potential impacts listed above in paragraph 548 will not be further exacerbated over the lifetime of the Array as there will be designed in measures in place and to accommodate any vessels that chose to avoid the Array without notably increasing vessel density around the site boundary.

550. Shipping and navigation receptors also have the potential to have secondary effects on other receptors and these effects are fully considered in the topic-specific chapters. These receptors and effects are:

- commercial fisheries
  - displacement from fishing grounds for commercial fishing vessels due to the presence of the buoyed construction and decommissioning areas during the construction and decommissioning phases, respectively; and
  - displacement from fishing grounds for commercial fishing vessels due to the floating wind turbines and anchor mooring lines during the operation and maintenance phase.

Table 13.14: Summary of Likely Significant Potential Inter-Related Effects for Shipping and Navigation from Individual Effects Occurring across the Construction, Operation and Maintenance and Decommissioning Phases of the Array (Array Lifetime Effects) and from Multiple Effects Interacting Across all Phases (Receptor-led Effects)

Description of Impact	Phase[3] Likely Significant Inter-Related Effects			
	C	O	D	
Array Lifetime Effects				
Increased vessel to vessel collision risk resulting from displacement (third party to third party)	✓	✓	✓	Across the lifetime of the Array, the effects on shipping and navigation receptors are not anticipated to interact in such a way as to result in inter-related effects of greater significance than the assessments presented for each individual phase. As a result, the inter-related effects are of minor adverse significance which is not significant in EIA terms.
Increased vessel to vessel collision risk (third party to Array vessels)	✓	✓	✓	Across the lifetime of the Array, the effects on shipping and navigation receptors are not anticipated to interact in such a way as to result in inter-related effects of greater significance than the assessments presented for each individual phase. As a result, the inter-related effects are of minor adverse significance which is not significant in EIA terms.

[3] C = Construction, O = Operation and maintenance, D = Decommissioning

Description of Impact	Phase[3] Likely Significant Inter-Related Effects			
	C	O	D	
Vessel to structure allision risk	✓	✓	✓	Across the lifetime of the Array, the effects on shipping and navigation receptors are not anticipated to interact in such a way as to result in inter-related effects of greater significance than the assessments presented for each individual phase. As a result, the inter-related effects are of minor adverse significance which is not significant in EIA terms.
Reduced access to local ports and harbours	✓	✓	✓	Across the lifetime of the Array, the effects on shipping and navigation receptors are not anticipated to interact in such a way as to result in inter-related effects of greater significance than the assessments presented for each individual phase. As a result, the inter-related effects are of minor adverse significance which is not significant in EIA terms.
Receptor-led Effects				
The presence of the buoyed construction and decommissioning areas during the construction and decommissioning phases, respectively, may result in the displacement from fishing grounds of commercial fishing vessels. This displacement and the associated reduction in available sea room will increase the vessel to vessel collision risk between third-party vessels. Due to the floating wind turbines and anchor mooring lines may also be an impact on fishing vessel displacement during the operation and maintenance phase. However, it is unlikely that effects will act together and that any interactions between effects will be of any greater significance than those already assessed in isolation. As a result, the receptor-led effects are of minor adverse significance which is not significant in EIA terms.				

13.16. SUMMARY OF IMPACTS, MITIGATION, LIKELY SIGNIFICANT EFFECTS AND MONITORING

Information on shipping and navigation within the shipping and navigation study area was collected through consultation, assessment of the baseline environment (including vessel traffic, navigational features and incident rates) and numerical modelling. This information is summarised in Table 13.15 which presents a summary of the potential impacts, designed in measures and the conclusion of LSE[1] in EIA terms in respect to shipping and navigation. The impacts assessed comprise:

- increased vessel to vessel collision risk resulting from displacement (third-party to third-party);
- displacement from adverse weather routeing;
- increased vessel to vessel collision risk (third-party to project vessels);
- vessel to structure allision risk;
- reduced access to local ports and harbours;
- loss of station;
- reduction of underkeel clearance as a result of subsea infrastructure;
- anchor interaction with subsea cables (including dynamic cabling);
- anchor interaction with mooring lines; and
- reduction in SAR capability.

551. Overall, it is concluded that there will be no LSE[1] arising from the Array during the construction, operation and maintenance or decommissioning phases.

552. Table 13.16 presents a summary of the potential impacts, designed in measures and the conclusion of LSE[1] on shipping and navigation in EIA terms. The cumulative effects assessed include:

- increased vessel to vessel collision risk resulting from displacement (third-party to third-party);
- displacement from adverse weather routeing;
- increased vessel to vessel collision risk (third-party to Array vessels);
- vessel to structure allision risk;
- reduced access to local ports and harbours; and
- reduction in SAR capability.

553. Overall, it is concluded that there will be no likely significant cumulative effects from the Array alongside other projects/plans.

554. No transboundary impacts other than those already assessed in section 13.11 and section 13.12 are anticipated. On this basis, no likely significant transboundary effects have been identified in regard to effects of the Array.

Table 13.15: Summary of Likely Significant Environmental Effects, Secondary Mitigation and Monitoring

Description of Impact	Phase	Severity of Consequence	Frequency of Occurrence	Significance of Effect	Additional Measures	Significance of Residual Effect
Increased vessel to vessel collision risk resulting from displacement (third-party to third-party)	Construction	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Operation and maintenance	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Decommissioning	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
Displacement from adverse weather routeing	Construction	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Operation and maintenance	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Decommissioning	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
Increased vessel to vessel collision risk (third-party to project)	Construction	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Operation and maintenance	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Decommissioning	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
Vessel to structure allision risk	Construction	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Operation and maintenance	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP
	Decommissioning	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
Reduced access to local ports and harbours	Construction	Minor	Remote	Broadly acceptable	None	Broadly acceptable
	Operation and maintenance	Minor	Remote	Broadly acceptable	None	Broadly acceptable
	Decommissioning	Minor	Remote	Broadly acceptable	None	Broadly acceptable
Loss of station	Construction	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
	Operation and maintenance	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
	Decommissioning	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
Reduction of underkeel clearance as a result of subsea infrastructure	Construction	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Operation and maintenance	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Decommissioning	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
Anchor interaction with subsea cables (including dynamic cabling)	Construction	Moderate	Extremely unlikely	Broadly acceptable	None	Broadly acceptable
	Operation and maintenance	Moderate	Extremely unlikely	Broadly acceptable	None	Broadly acceptable
	Decommissioning	Moderate	Negligible	Broadly acceptable	None	Broadly acceptable
Anchor interaction with mooring lines	Construction	Moderate	Negligible	Broadly acceptable	None	Broadly acceptable
	Operation and maintenance	Moderate	Negligible	Broadly acceptable	None	Broadly acceptable
	Decommissioning	Moderate	Negligible	Broadly acceptable	None	Broadly acceptable
Reduction in SAR capability	Construction	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP
	Operation and maintenance	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP
	Decommissioning	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP

Table 13.16: Summary of Likely Significant Cumulative Environment Effects, Mitigation and Monitoring

Description of Impact	Phase	Cumulative Effects Assessment Tier	Severity of Impact	Frequency of Occurrence	Significance of Effect	Additional Measures	Significance of Residual Effect
Increased vessel to vessel collision risk resulting from displacement (third-party to third-party)	Construction	1	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
	Operation and maintenance	1	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
	Decommissioning	1	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
Increased vessel to vessel collision risk resulting from displacement (third-party to third-party)	Construction	2	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
	Operation and maintenance	2	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
	Decommissioning	2	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
Increased vessel to vessel collision risk resulting from displacement (third-party to third-party)	Construction	3	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
	Operation and maintenance	3	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
	Decommissioning	3	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
Displacement from adverse weather routeing	Construction	1	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
	Operation and maintenance	1	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
	Decommissioning	1	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
Displacement from adverse weather routeing	Construction	2	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
	Operation and maintenance	2	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
	Decommissioning	2	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
Displacement from adverse weather routeing	Construction	3	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
	Operation and maintenance	3	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
	Decommissioning	3	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
Increased vessel to vessel collision risk (third-party to project)	Construction	1	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
	Operation and maintenance	1	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
	Decommissioning	1	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
Increased vessel to vessel collision risk (third-party to project)	Construction	2	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Operation and maintenance	2	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Decommissioning	2	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP

Description of Impact	Phase	Cumulative Effects Assessment Tier	Severity of Impact	Frequency of Occurrence	Significance of Effect	Additional Measures	Significance of Residual Effect
Increased vessel to vessel collision risk (third-party to project)	Construction	3	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Operation and maintenance	3	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
	Decommissioning	3	Serious	Extremely unlikely	Tolerable and ALARP	None	Tolerable and ALARP
Vessel to structure allision risk	Construction	1	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
	Operation and maintenance	1	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
	Decommissioning	1	Serious	Negligible	Broadly acceptable	None	Broadly acceptable
Vessel to structure allision risk	Construction	2	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
	Operation and maintenance	2	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
	Decommissioning	2	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
Vessel to structure allision risk	Construction	3	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
	Operation and maintenance	3	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
	Decommissioning	3	Serious	Extremely unlikely	Tolerable and ALARP	Consultation with MCA and NLB on cumulative lighting and marking and charting.	Tolerable and ALARP
Reduced access to local ports and harbours	Construction	1	Minor	Negligible	Broadly acceptable	None	Broadly acceptable
	Operation and maintenance	1	Minor	Negligible	Broadly acceptable	None	Broadly acceptable
	Decommissioning	1	Minor	Negligible	Broadly acceptable	None	Broadly acceptable
Reduced access to local ports and harbours	Construction	2	Minor	Negligible	Broadly acceptable	None	Broadly acceptable
	Operation and maintenance	2	Minor	Negligible	Broadly acceptable	None	Broadly acceptable
	Decommissioning	2	Minor	Negligible	Broadly acceptable	None	Broadly acceptable
Reduced access to local ports and harbours	Construction	3	Minor	Negligible	Broadly acceptable	None	Broadly acceptable
	Operation and maintenance	3	Minor	Negligible	Broadly acceptable	None	Broadly acceptable
	Decommissioning	3	Minor	Negligible	Broadly acceptable	None	Broadly acceptable
Reduction in SAR capability	Construction	1	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP
	Operation and maintenance	1	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP
	Decommissioning	1	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP
Reduction in SAR capability	Construction	2	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP
	Operation and maintenance	2	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP
	Decommissioning	2	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP
Reduction in SAR capability	Construction	3	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP
	Operation and maintenance	3	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP
	Decommissioning	3	Serious	Remote	Tolerable and ALARP	None	Tolerable and ALARP

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