Morven North Offshore Wind Array Project

Environmental Impact Assessment Report

Volume 2, Chapter 13: Shipping and Navigation

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13.1 Introduction

13.1.1.1 This chapter of the Morven North Offshore Wind Array Project (hereafter "Morven North") Environmental Impact Assessment (EIA) Report (hereafter, the EIA Report) presents the assessment of the likely significant effects (as per the EIA Regulations as defined in Volume 1, Chapter 2: Policy and Legislation) on shipping and navigation. Specifically, this chapter considers the potential impacts of Morven North seaward of Mean High Water Springs (MHWS) during the construction, operations and maintenance (O&M) and decommissioning phases.

13.1.1.2 The assessment presented in this chapter has relied upon, or informed the following technical reports:

- Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment;
- Volume 3, Annex 13.2: East Region Developers Group Cumulative Baseline for Shipping and Navigation.

13.1.1.3 Shipping and navigation was reported on in the Scoping Report for the Morven Option Lease Agreement Site (hereafter "the Morven Site Scoping Report") (Morven Offshore Wind Limited (MvOWL), 2023). As described in Volume 1, Chapter 4 of the EIA Report: Site Selection and Consideration of Alternatives, the Morven Option Lease Agreement Site has since been divided into two smaller projects, Morven North and the Morven South Offshore Wind Array Project (hereafter "Morven South").

13.1.1.4 The potential impacts to shipping and navigation are considered to generally be the same (or less) for Morven North as identified in the Morven Site Scoping Report. Consequently, there has been no change in the methodology or impacts that were scoped in or out in the Morven Site Scoping Report for shipping and navigation. The advice provided by the Marine Directorate - Licensing Operations Team (MD-LOT) in the Morven Site Scoping Opinion (MD-LOT, 2023) relevant to Morven North, has therefore been considered for the development of this chapter.

13.1.1.5 This chapter presents and assesses up-to-date parameters for Morven North and explains if and how any assessment aspects differ from the information set out in the Morven Site Scoping Report. Inter-related effects of Morven North are discussed further in Section 13.15.

13.2 Study area

13.2.1.1 Two study areas have been defined for shipping and navigation:

- The Morven North Shipping and Navigation Study Area;
- The Morven North and Morven South Regional Shipping and Navigation Study Area (hereafter the 'Regional Shipping and Navigation Study Area').

13.2.1.2 The study areas defined for shipping and navigation are defined as follows:

- The Morven North Shipping and Navigation Study Area includes the Morven North Boundary, plus a buffer extending 10 nautical miles (nm) from the Morven North Boundary. It is shown in Figure 13.1. This buffer has been defined to provide local context to the analysis of effects by obtaining the vessel traffic movements within and in proximity to the Morven North Boundary. This buffer has been agreed with shipping and navigation stakeholders during consultation (see Section 13.4) and is considered standard for sufficiently capturing vessel traffic activity relevant to offshore wind farm (OWF) projects.
- The Regional Shipping and Navigation Study Area includes the combined Morven North Boundary and Morven South Boundary (hereafter the 'Morven Site') plus a buffer extending 10nm from the Morven Site. It is shown in Figure 13.2. This buffer has been defined to provide further context to the analysis of effects by obtaining the vessel traffic movements within the wider

area, and is considered relevant to this chapter both as it encompasses Morven North, as well as is used within the baseline environment overview for analysis of the Morven Site (see Section 13.13.2).

13.2.1.3 The study areas for shipping and navigation for the Morven Site were presented and agreed during the scoping process for the Morven Site. The underlying principles used to define the study area for Morven North have not changed, other than the limits have been applied relative to the Morven North boundary, rather than the Morven Site boundary. The study area for the Morven Site for shipping and navigation was presented to and confirmed by the Maritime and Coastguard Agency (MCA), Northern Lighthouse Board (NLB), and United Kingdom (UK) Chamber of Shipping via a dedicated meeting undertaken in December 2022 and as detailed in Table 13.3.

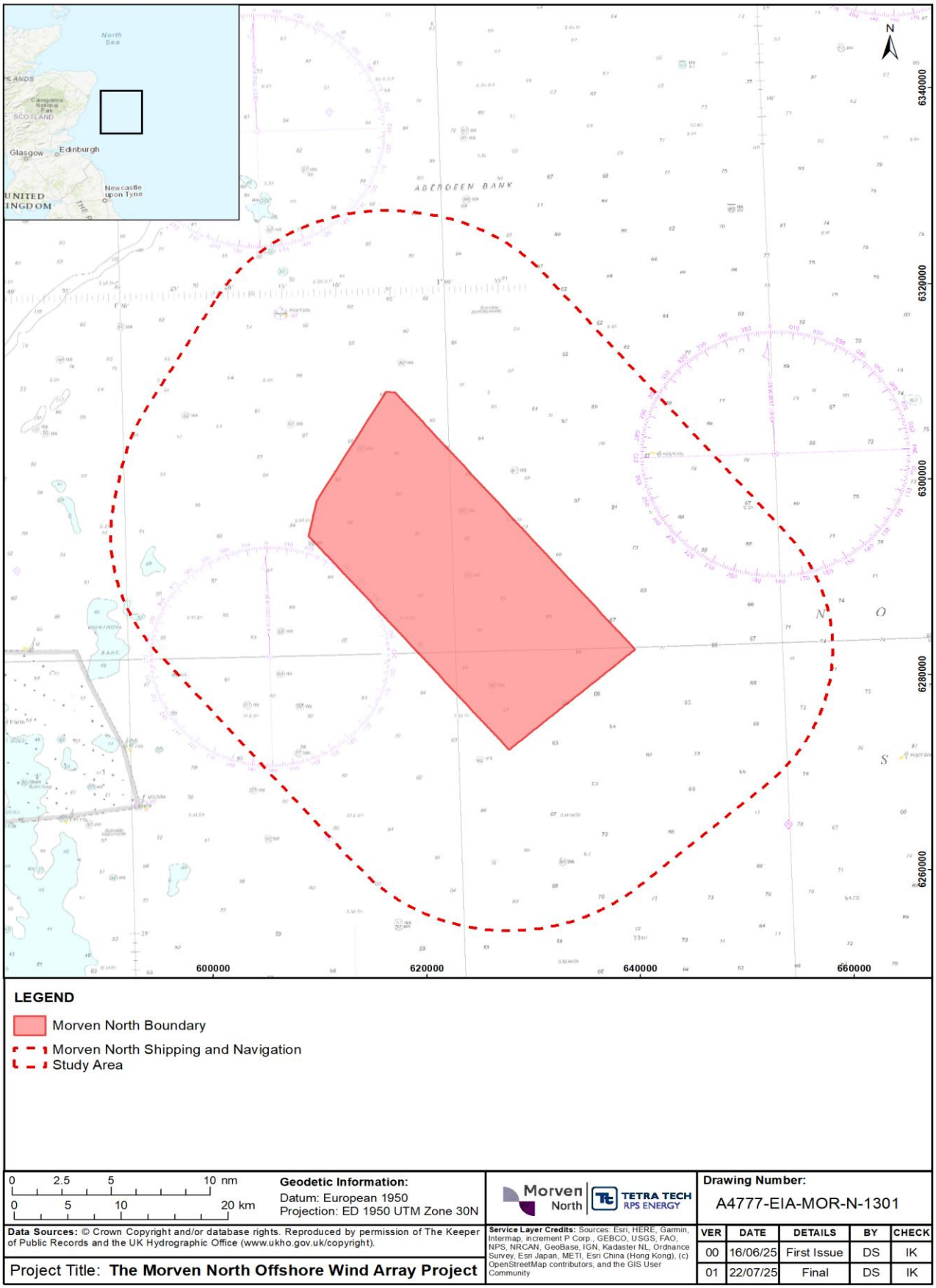

Figure 13.1: Morven North Shipping and Navigation Study Area

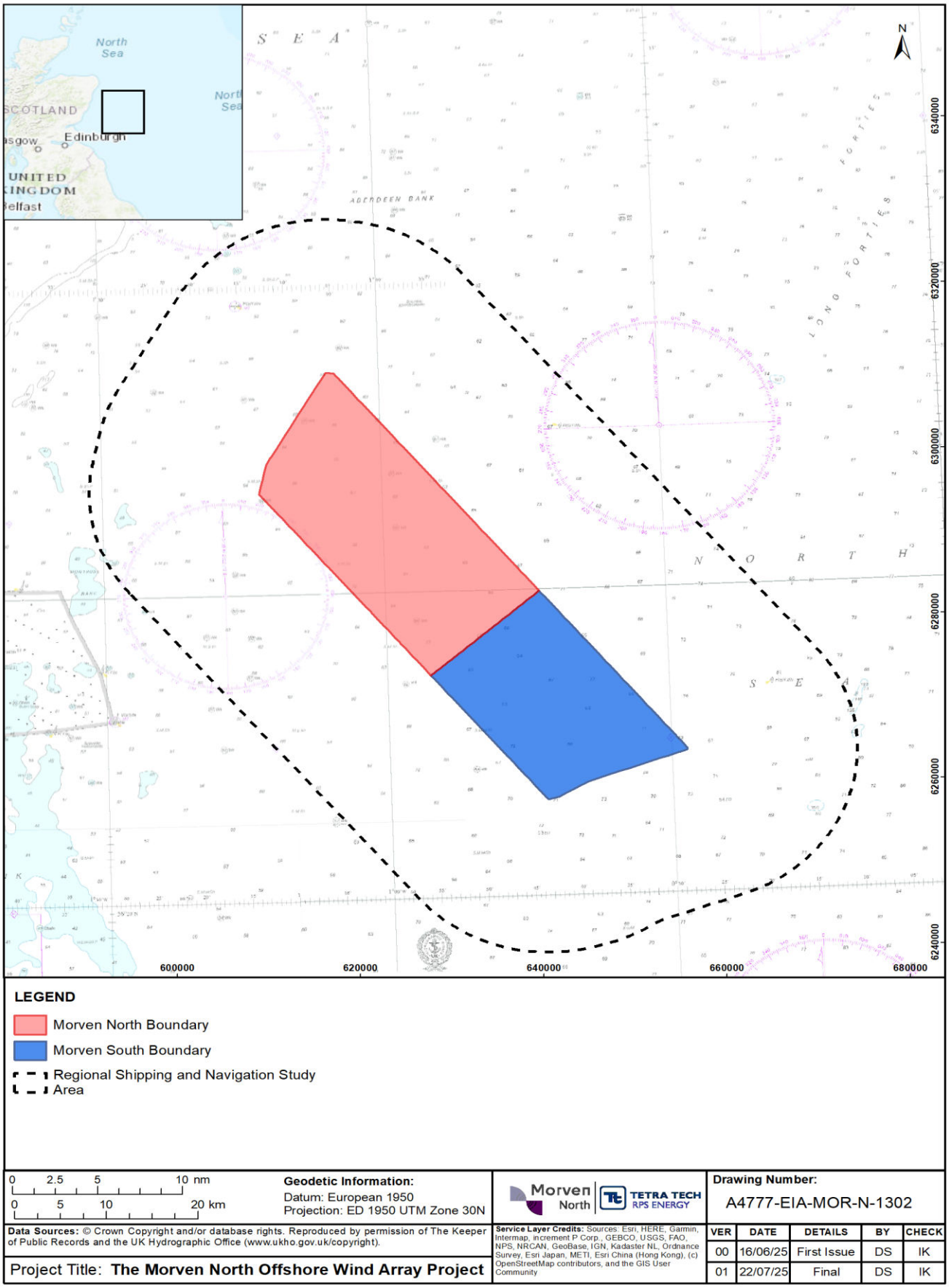

Figure 13.2: Morven North and Morven South Regional Shipping and Navigation Study Area

13.3 Legislative and policy context

13.3.1.1 Policy and legislation on renewable energy infrastructure is presented in Volume 1, Chapter 2: Policy and Legislation. Policy and legislation in relation to shipping and navigation is contained in:

- United Nations (UN) Convention on the Law of the Sea (UNCLOS) (UN, 1982);
- Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) (International Maritime Organization (IMO), 1972/77);
- International Convention for the Safety of Life at Sea (SOLAS) Chapter V (IMO, 1974);
- UK Marine Policy Statement (MPS) (His Majesty's (HM) Government, 2011);
- Scotland's National Marine Plan (NMP) (Scottish Government, 2015);
- Scotland's Sectoral Marine Plan (SMP) for Offshore Wind Energy (Scottish Government, 2020, 2025 (update in draft)).

13.3.1.2 A summary of the legislative provisions relevant to shipping and navigation are provided in Table 13.1 below, with other relevant policy provisions set out in Table 13.2. These are summarised here with further detail presented in Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.

Table 13.1: Summary of legislative provisions of relevance to shipping and navigation

Summary of relevant legislation	How and where considered in the 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 Morven North as detailed in Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment. Baseline routeing has also been identified (see Section 13.7.1) and considered in the impact assessment (see Section 13.11).
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 this chapter and Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment. In particular, collision avoidance provisions have been considered in the relevant impact assessment (see Sections 13.11 and 13.13).
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 this chapter and Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment. 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 (see Sections 13.11 and 13.13).
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 provisions of relevance to shipping and navigation

Summary of relevant policy	How and where considered in the 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 impact assessment (see Sections 13.11 and 13.13). Socio-economic impacts with regard to changes to shipping and marine recreation are considered within Volume 2, Chapter 17: Socio-Economics.
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 impact assessment (see Sections 13.11 and 13.13). Embedded mitigation 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 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. (Section 4.5)	Navigational safety impacts including on a cumulative basis have been assessed in Sections 13.11 and 13.13. Socio-economic impacts are considered in Volume 2, Chapter 17: Socio-Economics.
A key step recognised as "likely to form part of the development process" was "consultation with the Maritime and Coastguard Agency". (Section 4.5.4)	The MCA have been consulted throughout the assessment process (see Section 13.4).
Draft SMP for Offshore Wind Energy (Scottish Government, 2025)	
Busy shipping routes exist within the East region and are concentrated around the Firth of Forth, Firth of Tay and Aberdeen, with high amounts of vessel traffic supporting the oil gas industry as well as lifeline ferry routes from Aberdeen to the Orkney Islands and Shetland.	Key shipping routes have been identified, including those featuring oil and gas traffic (see Section 13.7.1). No lifeline routes have been identified within the vessel traffic dataset.

13.4 Consultation

13.4.1.1 The approach to consultation for Morven North is set out in Volume 1, Chapter 5: Consultation. A summary of the issues raised during consultation activities undertaken to date specific to shipping and navigation is presented in Table 13.3, together with how these issues have been considered in the production of this shipping and navigation EIA Report chapter. Further detail is presented within Volume 3, Annex 5.1: Consultation.

Table 13.3: Summary of key consultation issues raised during consultation activities undertaken for Morven North of relevance to shipping and navigation

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
16 December 2022	MCA: Consultation Meeting	The MCA confirmed it is content with the proposed 10nm Regional Shipping and Navigation Study Area.	Acknowledged in Section 13.2.
		The MCA flagged that it is important that fishing vessel traffic is analysed closely, as well as oil and gas/wind farm vessel transits to relevant North Sea infrastructure.	Fishing, oil and gas and wind farm vessel activity have been analysed in Section 13.7 for Morven North, with further detail provided in Section 10 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.
		The MCA noted that the cumulative picture is the most important aspect of shipping and navigation analysis.	Cumulative effects of Morven North have been assessed within Section 13.13 of the chapter. Additionally, a cumulative baseline assessment, in collaboration with other offshore wind developments, has been produced (see Volume 3, Annex 13.2: East Region Developers Group Cumulative Baseline for Shipping and Navigation).
		The MCA flagged concerns around navigational squeeze if future sites (beyond ScotWind) are developed.	Future case has been considered within paragraph 13.7.2 of this chapter and includes consideration of Innovation and Targeted Oil and Gas (INTOG) sites. Further detail is provided in Section 15 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.
16 December 2022	NLB: Consultation Meeting	The NLB confirmed it was content with the proposed 10nm Regional Shipping and Navigation Study Area.	Acknowledged in Section 13.2.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
16 December 2022	UK Chamber of Shipping: Consultation Meeting	The UK Chamber of Shipping raised that non-local stakeholders should also be considered in consultation.	Stakeholders that could experience transboundary effects have been consulted and are listed in Section 4 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.
		The UK Chamber of Shipping confirmed it is content with the proposed 10nm Regional Shipping and Navigation Study Area.	Acknowledged in Section 13.2.
		The UK Chamber of Shipping stated that although the INTOG sites are of low data confidence they should be included to some degree in the cumulative scope.	The INTOG sites have been included in the cumulative assessment in Section 13.13.
		The UK Chamber of Shipping noted that the movement of rigs in and around Dundee will be important to pick up on as these can be large and difficult to manoeuvre.	Vessel traffic data, including the identification of rig moves, has been assessed within Section 13.7 of this chapter and Section 10 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment, with secondary data provided in Appendix E to Appendix H.
		The UK Chamber of Shipping raised that Project vessels will add to constraints and their routeing to/from Morven North and Morven South should be considered.	The impact of project vessel activities has been assessed within Section 13.11. A combined Navigational Safety Plan (NSP) and Vessel Management Plan (VMP) (NSPVMP) are included as embedded mitigation as per Section 13.10 of this chapter and are presented in Volume 4, Annex 5: Outline Navigation Safety Plan and Vessel Management Plan.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
		The UK Chamber of Shipping noted concerns around navigational squeeze if future sites (beyond ScotWind) are developed.	Future case has been assessed within Section 13.7.2 and includes consideration of INTOG sites. Further detail is provided in Section 15 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.
13 March 2023	Rem Offshore: Regular Operator feedback	Rem Offshore stated that upon detailed review, no major impacts on operations have been identified. As long as the construction and development area is announced through the Navigational Warnings system, it will be possible to passage plan accordingly. Vessel Masters would prefer to navigate outside of the planned construction area, based on the required exclusion zone.	Acknowledged by the Applicant within the assessment of effects in Section 13.11. As noted, passage planning is able to assist with reducing effects; from regular operator outreach this was considered feasible with appropriate promulgation.
18 April 2023	MCA: Scoping Workshop	The MCA noted that in relation to the Morven/Ossian gap, they would not necessarily recommend the use of such a long, narrow shipping route.	Referenced within the assessment of effects in Section 13.11.
18 April 2023	Royal Yachting Association (RYA) Scotland: Scoping Workshop	RYA Scotland advised individual consultation with the Cruising Association (CA).	CA were represented by the RYA Scotland representative during the Hazard Workshop, and have been contacted regarding Morven North as per Section 4.1 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
		RYA Scotland raised that passage planning could be considered in the Navigational Risk Assessment (NRA) and that passage between Scandinavia and Scotland should be considered, although it may be that the OWF Scoping Boundary will just be avoided.	Acknowledged by the Applicant. Recreational vessel baseline has been assessed within Section 13.7 of this chapter with further detail in Section 10 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.
		RYA Scotland noted that recreational craft may end up spending more time within the OWF Scoping Boundary due to the lack of commercial vessels present there and that this should be analysed.	Recreational vessel activity has been assessed within Section 13.11.
18 April 2023	UK Chamber of Shipping: Scoping Workshop	The UK Chamber of Shipping queried the consideration of other developments in the area outside the 10nm Study Area and whether operators will be deviated toward the OWF Scoping Boundary. Specifically, due to the proposed Berwick Bank OWF which is not within the 10nm Study Area.	Cumulative effects of Morven North have been assessed within Section 13.13 of this chapter and Berwick Bank has been screened into the Cumulative Effects Assessment (CEA) as per Section 14 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.
		The UK Chamber of Shipping requested analysis on rig movements to be undertaken as reactivation work may become more prevalent in the area.	Vessel traffic data, including the identification of rig moves, has been assessed within Section 13.7 of this chapter and Section 10 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment, with secondary data provided in Appendix E to Appendix H.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
27 July 2023	NLB: Scoping Response	The NLB raised that embedded mitigation measures should specifically reference the development of a Lighting and Marking Plan (LMP), alongside an NSPVMP.	A combined LMP and Aids to Navigation Management Plan (AtoNMP) and NSPVMP are specifically referred to within the embedded mitigation measures in Section 13.10 of this chapter and included within the application (see Volume 4, Annex 4: Outline Lighting and Marking Plan and Volume 4, Annex 5: Outline Navigation Safety Plan and Vessel Management Plan).
09 August 2023	Forth Ports: Scoping Response	Forth Ports requested to be part of the consultation for the City of Edinburgh and City of Dundee from a ports point of view.	Forth Ports have been included as a consultee as per Section 4 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.
18 August 2023	MCA: Scoping Response	The MCA noted that 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 relevant effects on the raised impacts have been assessed in Section 13.11 as per the requirements of Marine Guidance Note (MGN) 654. The effect on small craft navigational and communication equipment is discussed in Section 13 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment, with risk to drifting recreational craft in adverse weather or tidal conditions discussed in Section 12 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
		The MCA raised that the development area carries a moderate amount of traffic with several important commercial shipping routes. Attention needs to be paid to routing, particularly in heavy weather so that vessels can continue to make safe passage without large-scale deviations. Cumulative and in combination effects on shipping routes should therefore be considered, including proximity to other developments and infrastructure, and the impact on safe navigable sea room.	Adverse weather routeing has been considered within Section 12 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment. A CEA has been undertaken in Section 13.13, with consideration to screened in developments.
		The MCA stated that an NRA will need to be submitted in accordance with MGN 654. This NRA should be accompanied by a detailed MGN 654 Checklist.	An NRA has been submitted (Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment), with associated MGN 654 checklist included in Appendix A.
		The MCA noted that the traffic surveys need to be within 24 months of the consent application.	MGN 654 compliant vessel traffic surveys have been undertaken as per Section 0, within 24 months of the consent application. Since Scoping, additional vessel traffic surveys have been carried out to ensure compliance with MGN 654.
		The MCA raised that the Development Specification and Layout Plan (DSLP) will require MCA approval prior to construction. Any additional navigation safety and/or Search and Rescue (SAR) requirements, as per MGN 654 Annex 5, will be agreed at the approval stage.	The DSLP and compliance with MGN 654 are included as embedded mitigation, with the creation of an Emergency Response Co-operation Plan (ERCoP) also referenced (as per Section 13.10).

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
		The MCA stated that attention should be paid to cabling routes and where appropriate a Burial Protection Index study and 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 (CD). This will be particularly relevant where depths are decreasing towards shore and potential impacts on navigable water increase, such as at the Horizontal Directional Drilling (HDD) location.	As per Section 6.4 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment and Section 13.10, any export cable protection will be compliant with MGN 654.
		The MCA noted that particular consideration will need to be given to the implications of the site size and location on SAR resources and ERCoPs. This report must recognise the level of radar surveillance, AIS and shore-based Very High Frequency (VHF) radio coverage and give due consideration for appropriate mitigation. Due consideration should be given to the use of appropriate mitigation as outlined in MGN 654 Annex 5 and a SAR checklist will also need to be completed.	A SAR checklist is required under MGN 654, which will be adhered to as per Section 13.10.
		The MCA raised that MGN 654 Annex 4 requires that hydrographic surveys should fulfil the requirements of the International Hydrographic Organization (IHO) Order 1a standard.	As per Section 13.10, there will be full MGN 654 compliance including in relation to hydrographic surveys.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
		The MCA stated that in the case of any High Voltage Direct Current (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. A desk based compass deviation study based on the specifications of the cable lay proposed will be required and a deviation survey post the cable being laid may be required.	As per Section 6.4 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment there is potential only for the cable between the bridge-linked Offshore Substation Platforms (OSP) to be HVDC (with High Voltage Alternating Current (HVAC) also a possibility here), with all other cables to be HVAC. Impacts of Electromagnetic Fields (EMF) are discussed further within Section 13.6 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.
18 August 2023	RYA Scotland: Scoping Response	RYA Scotland noted that shipping and navigation should be scoped in, and that they wish to be involved with the NRA.	RYA Scotland have been included as a consultee as per Section 4.3 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.
25 August 2023	UK Chamber of Shipping: Scoping Response	The UK Chamber of Shipping raised that additional sources should be used to assess Cruise traffic.	Since Scoping, and as per Section 0, a total of five MGN 654-compliant vessel traffic surveys have been undertaken in addition to long-term Automatic Identification System (AIS) only data as per Appendix E of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment, to provide additional vessel traffic data, including in relation to cruise liners.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
		The UK Chamber of Shipping stated that offshore construction traffic should be considered within the baseline.	Temporary traffic is excluded from the analysis given it will distort longer-term traffic patterns (noting that this is a standard industry approach). Details of temporary traffic are included in Section 5.3 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment. Operational wind farm traffic is included as baseline as per Section 5.3 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment (with potential construction traffic accounted for in Section 15.4 of the NRA) and in Section 13.7 of this chapter.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
02 May 2024	MCA: Consultation meeting (wording agreed by email 20 June 2024)	• Cumulative routeing options were discussed with the MCA at a meeting on the 02 May 2024, 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.	Considered in the analysis of future case routeing in Section 15 and the cumulative risk assessment in Section 13.12 as well as Section 21 to 23 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.
04 September 2024	MCA: Hazard Workshop	The MCA noted that due to viable options for diversion to the east and west of the two developments, it is not necessary to request a safety case to expand the gap between Morven and Ossian.	Acknowledged, and included within the CEA in Section 13.13.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
04 September 2024	NLB: Hazard Workshop	The NLB stated preference of using construction buoys only where necessary, to avoid cordoning off large sea areas and improve safety.	Use of construction buoys for each scenario have been considered within the assessment of effects in Section 13.11. The specific marking scheme will be determined in consultation with NLB post consent.
		The NLB raised that the Eastern Green Link 3 cable project between Morven and Ossian may be impactful, as if the developments are constructed at same time as a cable-layer is present then this may affect navigational safety.	Eastern Green Link 3 has been scoped into the cumulative assessment in Section 13.13.
04 September 2024	RYA Scotland: Hazard Workshop	RYA Scotland noted concern on the buoyage to be deployed, with potential for meteorological and oceanic (MetOcean) buoyage to drift off-station. It can be difficult for sea users to know that the buoyage is there due to the volume of added items to electronic charts and Notices to Mariners, especially if they are on the water at that time.	As will be included within the LMP and AtoNMP, buoyage to be deployed will be placed after consultation with NLB. Buoys which will be in place will use tracking devices, with recovery plans to be implemented within the LMP and AtoNMP.
		RYA Scotland stated that there is uncertainty on recreational vessel traffic in the future. If recreational vessels are transiting long distances it may result in passage planning earlier in the course, resulting in sufficient time to pass around Morven. Although inshore transits will likely be of shorter distances and so result in less time to make these decisions. These transits will likely be much closer to the coast and further from Morven. However, recreational users are finding that weather conditions are becoming increasingly more uncertain, with forecasts becoming more unreliable.	Acknowledged, with raised points included within the future case discussion for recreational vessel traffic in Section 13.7.2.
		RYA Scotland raised that the distance offshore may make fatigue a factor, with the number of single-handers exacerbating the issue as there is less relief available for these.	Impacts of Morven North on recreational craft have been assessed within Section 13.11.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
04 September 2024	Scottish Fishermen's Federation (SFF): Hazard Workshop	SFF noted that commissioning of the planned OWFs in the area will lead to vessel traffic increases.	Such increases in vessel traffic have been captured within the future case analysis in Section 15.3 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment. Additional embedded mitigation measures (i.e., the NSPVMP) both for Morven and the other projects will ensure that vessel activity interference with other sea user activities will be reduced. Additional traffic has been assessed and mitigated within Section 13.11 of the chapter.
12 December 2024	MCA: Email correspondence	The MCA stated that the proposed shipping and navigation methodology (completion of one NRA encompassing all three scenarios and two EIA chapters - one assessing Morven North in isolation and both sites concurrently and the other assessing Morven South in isolation and both sites concurrently) is suitable, noting that cumulative assessments will discuss all reasonable site build-out scenarios.	Acknowledged, with the approach to cumulative assessment laid out in Section 13.12.
30 January 2025	Forth Ports: Consultation meeting	Forth Ports raised no concerns with Morven for vessels routeing to and from Forth ports, with Berwick Bank being the most influential development for this vessel traffic.	Acknowledged, with routeing to/from Forth ports presented in Section 15.5 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment, including for a scenario with Berwick Bank present.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
30 January 2025	MCA: Consultation meeting	The MCA noted that if the SAR lanes will be in a northwest / southeast bearing, additional navigation corridors would be required due to the overall length of the arrays.	As per the embedded mitigation measures presented in Section 13.10, it will be ensured post-consent that the layout options will comply with MGN 654, including the potential for multiple lines of orientation and further consultation to take place prior to final layout signoff. Initial SAR access lanes based on the indicative MDS layouts within Section 6.3.1 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment, have been produced including the incorporation of Helicopter Refuge Areas.
30 January 2025	NLB: Consultation meeting	The NLB stated that it is feasible to have flexibility with the lighting and marking scheme for the arrays depending on build out scenarios.	Acknowledged within the embedded mitigation measures detailed in Section 13.10.
30 January 2025	RYA Scotland: Consultation meeting	RYA Scotland noted that maximum buildout of both arrays would be worst-case for recreational vessels in the vicinity.	Maximum buildout has been used for internal allision modelling.
11 February 2025	UK Chamber of Shipping: Consultation meeting	The UK Chamber of Shipping stated that the developments presented within the cumulative Study Area are representative of current and future influences on nearby routeing.	Acknowledged, with these developments used within the CEA in Section 13.13.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
		The UK Chamber of Shipping raised that vessels towing rigs or floating turbines for future sites should be considered within the assessment.	Relevant embedded mitigation measures to futureproof Morven North for navigational safety have been included within Section 13.10, such as vessels complying with the COLREGs (IMO, 1972/77) and marine coordination for project vessels. Potential increased incidence of towing vessel traffic has been discussed in Section 13.7.2.

13.5 Scope of the assessment

13.5.1 Impacts scoped into the assessment

13.5.1.1 The scope of this EIA Report has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 13.3. The scope of the shipping and navigation assessment covers the entire lifetime of Morven North, including construction, O&M, and decommissioning phases. Taking into account the scoping and consultation process, Table 13.4 summarises the potential impacts which have been scoped into this assessment. Where an impact is likely to occur within a specific development phase of the project, this is indicated within each relevant topic chapter (a '✓' is used to denote the phase the potential impact can occur, conversely a '✗' outlines there is no impact within this project phase), where relevant.

Table 13.4: Potential impacts scoped into the shipping and navigation assessment

C= Construction, O= Operations and Maintenance, D= Decommissioning phases

"✓" is used to denote the phase the potential impact can occur, "X" outlines there is no impact within this project phase

Potential impact	Phase			Activity
	C	O	D	
Increased vessel to vessel collision risk resulting from displacement (third-party to third party)	✓	✓	✓	Presence of the buoyed construction/ decommissioning area, surface structures, and vessels that are Restricted in Ability to Manoeuvre (RAM) associated with Morven North will displace third-party vessels and increase vessel density in the surrounding area which will result in increased collision risk.
Increased vessel to vessel collision risk resulting from displacement (third-party to project vessel)	✓	✓	✓	Presence of project vessels and activities associated with the construction, O&M, and decommissioning phases of Morven North will result in displacement of third-party vessels and an increase in collision risk between third-party vessels and project vessels.
Vessel to structure allision risk	✓	✓	✓	Presence of surface structures during construction, O&M, and decommissioning of Morven North will create new allision risk for vessels.
Reduced access to local ports and harbours	✓	✓	✓	Presence of project vessels and activities associated with the construction, O&M, and decommissioning phases of Morven North may impact access to local ports and harbours.
Reduction of under-keel clearance as a result of subsea infrastructure	x	✓	x	Presence of subsea infrastructure such as cable protection may increase under-keel interaction risk during the O&M phase of Morven North.
Anchor and fishing gear interactions with subsea cables	x	✓	x	Presence of subsea cables may increase the risk of anchor and fishing gear interaction during O&M phase of Morven North.

Potential impact	Phase			Activity
	C	O	D	
Reduction of SAR capability	x	✓	x	The layout and presence of surface structures as well as increased vessel traffic may result in an increased incident rate associated with Morven North and could reduce SAR capabilities.

13.5.2 Impacts scoped out of the assessment

13.5.2.1 On the basis of the baseline environment and the description of Morven North outlined in Volume 1, Chapter 3: Project Description, no impacts are proposed to be scoped out of the assessment for shipping and navigation undertaken in this chapter. Impacts to vessel communication and position fixing equipment have been assessed in Section 13 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment, as **broadly acceptable** and As Low As Reasonably Practicable (ALARP) (as defined within Section 13.8.2), and are thus screened out of the assessment of effects undertaken in Sections 13.11 and 13.13.

13.6 Approach to baseline characterisation

13.6.1.1 The shipping and navigation baseline environment has been characterised through site specific data and a literature review of key data sources. Details of the desktop studies undertaken are provided in Section 13.6.3, with the vessel traffic surveys described in Section 0.

13.6.2 Relevant guidance

13.6.2.1 To appropriately characterise the baseline for shipping and navigation, data collection from the site specific vessel traffic surveys carried out (see Section 0) has followed the principles of, and is compliant with, MGN 654 (MCA, 2021). Navigational features relevant to the MGN 654 checklist have been characterised using Admiralty charts 273, 278, 1407 and 1409 (United Kingdom Hydrographic Office (UKHO), 2025), as well as the Admiralty Sailing Directions North Sea (West) Pilot NP54 (UKHO, 2021).

13.6.3 Desktop study

13.6.3.1 Information on shipping and navigation within the Morven North Shipping and Navigation Study Area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 13.5 below.

Table 13.5: Summary of key desktop reports used to characterise the shipping and navigation baseline

Title	Source	Year	Author
ShipRoutes database	Anatec ShipRoutes database	2025	Anatec
Tidal data	Admiralty Charts 273, 278, 1407, and 1409	2025	UKHO

Title	Source	Year	Author
Wind direction data	Morven OWF Operational MetOcean Criteria	2024	European Centre for Medium-Range Weather Forecasts (ECMWF), MetOceanWorks
Significant wave height data	Morven Metocean Measurement report	2024	JERA Nex bp/EnBW
Navigational Features	Admiralty Charts 273, 278, 1407, and 1409	2025	UKHO
Maritime incident data	Royal National Lifeboat Institution (RNLI) incident data	2014 - 2023	RNLI
Long-term AIS data	Anatec's in-house data	2021 - 2022	Anatec
Maritime incident data	Department for Transport (DfT) UK civilian SAR helicopter taskings	2015 - 2024	DfT
Maritime incident data	Marine Accident Investigation Branch (MAIB) marine accidents database	2004 - 2023	MAIB
Navigational features	Admiralty Sailing Directions North Sea (West) Pilot NP54	2021	UKHO
Visibility data	Admiralty Sailing Directions North Sea (West) Pilot NP54	2021	UKHO

13.6.4 Site specific surveys

13.6.4.1 A summary of the surveys undertaken to inform the shipping and navigation assessment of effects is outlined in Table 13.6 and further detail of the survey methodologies and results is included within Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.

13.6.4.2 Site specific surveys undertaken to inform the shipping and navigation assessment were conducted on the Regional Shipping and Navigation Study Area presented within the Morven Site Scoping Report (MvOWL, 2023) and therefore encapsulated the Morven North Shipping and Navigation Study Area. The two 14-day vessel traffic surveys undertaken during summer 2024 and winter 2024 (hereafter the 'summer survey period' and 'winter survey period', respectively) are MGN 654-compliant and thus have been used as the primary data source for characterising the vessel traffic baseline. Additional surveys have been undertaken in winter 2022, summer 2023 and winter 2023, and have been used as validation of the primary data sources. These traffic surveys are provided in Appendices F to H in Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.

Table 13.6: Summary of site specific surveys

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
Winter Vessel Traffic Survey	Full extent of the Morven North Shipping and Navigation Study Area	Characterising vessel traffic movements within and in proximity to Morven North in line with MGN 654 (MCA, 2021) requirements.	Anatec Ltd	26 November - 06 December 2024 09 December - 13 December 2024[1]	Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment
Summer Vessel Traffic Survey	Full extent of the Morven North Shipping and Navigation Study Area	Characterising vessel traffic movements within and in proximity to Morven North in line with MGN 654 (MCA, 2021) requirements.	Anatec Ltd	20 June - 04 July 2024	Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment
Winter Vessel Traffic Survey	Full extent of the Morven North Shipping and Navigation Study Area	Secondary source for characterising vessel traffic movements within and in proximity to Morven North.	Anatec Ltd	15 November - 02 December 2023	Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment
Summer Vessel Traffic Survey	Full extent of the Morven North Shipping and Navigation Study Area	Secondary source for characterising vessel traffic movements within and in proximity to Morven North.	Anatec Ltd	01 June - 16 June 2023	Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment
Winter Vessel Traffic Survey	Full extent of the Morven North Shipping and Navigation Study Area	Secondary source for characterising vessel traffic movements within and in proximity to Morven North.	Anatec Ltd	21 November - 05 December 2022	Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment

[1] Due to adverse weather a number of days were not able to be surveyed for a full 24 hours, with the omitted period of time appended to the end of the survey period to allow for a full 14 days of data to be collected.

13.7 Baseline environment

13.7.1 Overview of baseline environment

Navigational features

13.7.1.1 The navigational features noted in proximity to Morven North are presented in Figure 13.3.

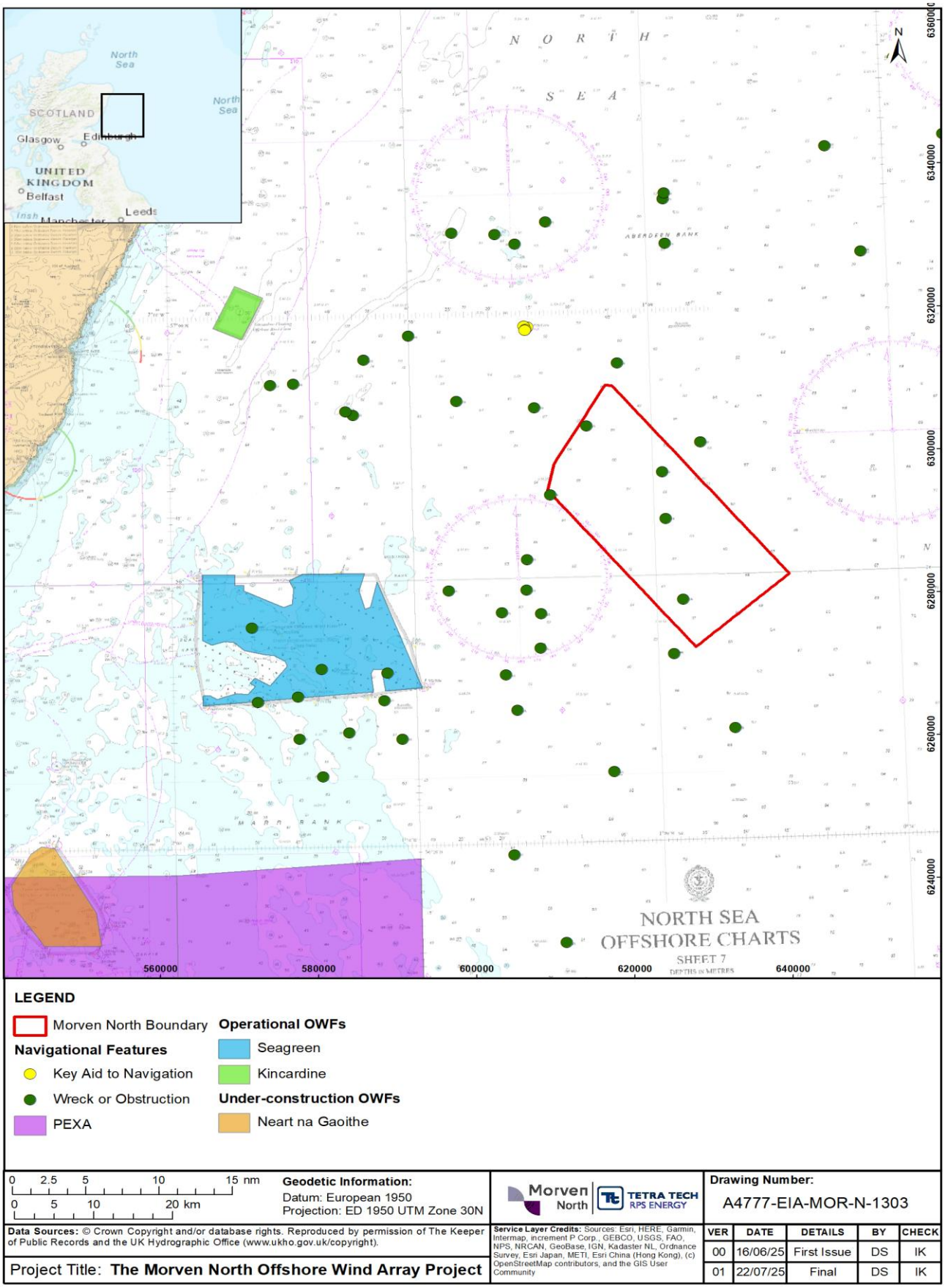

Figure 13.3: Navigational features in proximity to Morven North

13.7.1.2 There are no key AtoN located within the Morven North Boundary. A cluster of four buoys are located approximately 6.8nm northwest of the Morven North boundary and within the Bowdun array area (see Section 13.12.1 for further details relating to Bowdun), deployed to measure MetOcean conditions.

13.7.1.3 Seagreen was commissioned in late 2023 with the associated construction buoyage removed in March 2025 and is located approximately 15nm west of Morven North. Kincardine and Aberdeen OWF (European Offshore Wind Deployment Centre (EOWDC)) are the only other operational OWFs in proximity. It should be noted that future OWFs in the region are considered as part of the cumulative screening in Section 13.13.

13.7.1.4 The closest port or harbour is Aberdeen, located approximately 34nm to the northwest of Morven North. Military Practice and Exercise Areas (PEXA) are located in the vicinity, with submarine exercise area X5641 and area X5641 are located approximately 24nm and 29nm southwest of the Morven North Boundary respectively.

13.7.1.5 Other navigational features include numerous charted wrecks within the Morven North Shipping and Navigation Study Area, with four charted wrecks within the Morven North Boundary itself. There are no identified IMO routeing measures in proximity to the Morven North Boundary.

Vessel traffic data

13.7.1.6 Figure 13.4 and Figure 13.5 present the vessel traffic data recorded during the summer survey period and winter survey period, respectively, colour-coded by vessel type. Temporary traffic has been excluded from the figures below and subsequent analysis in order to focus on routine vessel activities.

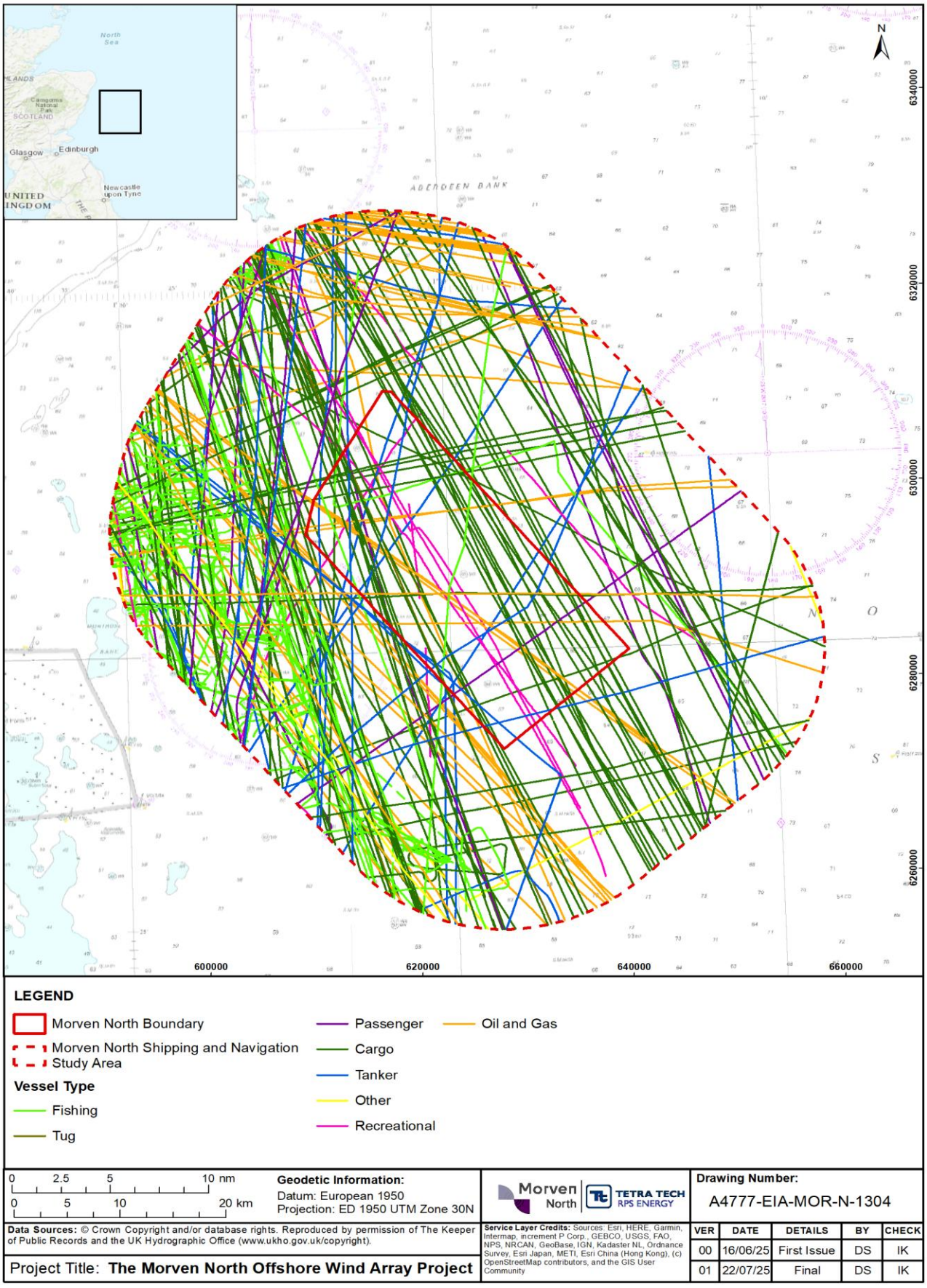

Figure 13.4: 14 days vessel traffic data by vessel type (summer 2024)

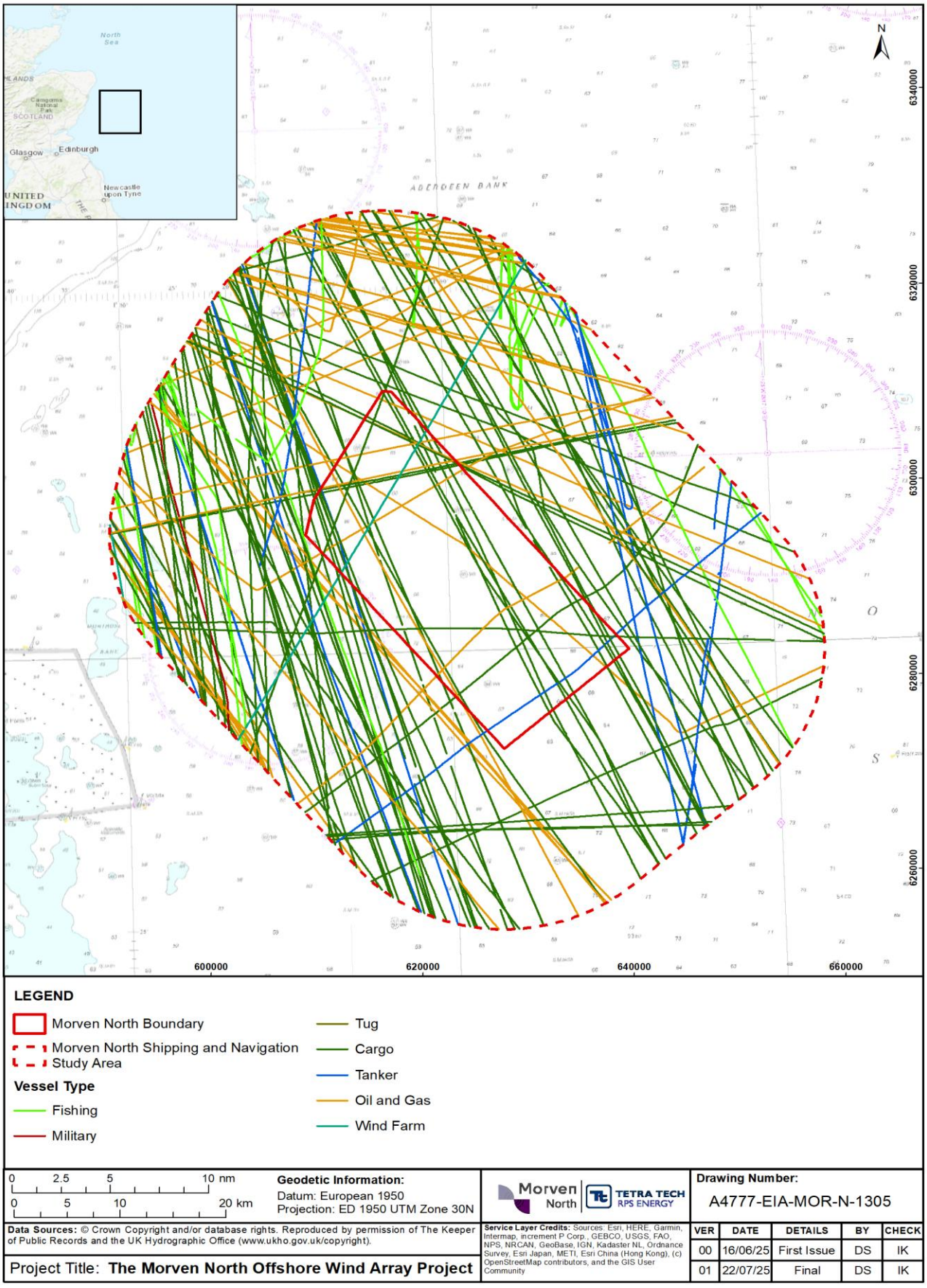

Figure 13.5: 14 days vessel traffic data by vessel type (winter 2024)

13.7.1.7 During the summer survey period there was an average of 18 unique vessels recorded within the Morven North Shipping and Navigation Study Area, with an average of five unique vessels per day recorded to intersect the Morven North Boundary itself. The busiest day recorded within the Morven North Shipping and Navigation Study Area, during the summer survey period, was 22 June 2024, on which 29 unique vessels were recorded. The busiest day recorded within the Morven North Boundary itself during the summer survey period was also 22 June 2024, on which ten unique vessels were recorded.

13.7.1.8 During the winter survey period there was an average of 12 unique vessels recorded within the Morven North Shipping and Navigation Study Area, with an average of two to three unique vessels per day recorded to intersect the Morven North Boundary itself. The busiest day recorded within the Morven North Shipping and Navigation Study Area during the winter survey period was 01 December 2024, on which 19 unique vessels were recorded. The busiest days recorded within the Morven North Boundary itself during the winter survey period were 01 and 10 December 2024, on which five unique vessels were recorded each.

13.7.1.9 During the summer survey period, the main vessel types within the Morven North Shipping and Navigation Study Area were cargo vessels (37%), oil and gas vessels (29%) and fishing vessels (10%). During the winter survey period, the main vessel types within the Morven North Shipping and Navigation Study Area were cargo vessels (47%), oil and gas vessels (30%) and fishing vessels (12%).

13.7.1.10 A Roll-on/Roll-off cargo (RoRo) vessel operated by Smyril Line was recorded undergoing regular transits within the Morven North Shipping and Navigation Study Area, operating between Þorlákshöfn in Iceland and Rotterdam in the Netherlands once every two days in the summer period only. No Roll-on/Roll-off passenger (RoPax) vessels were recorded within the Morven North Shipping and Navigation Study Area.

13.7.1.11 The majority of recreational vessels were recorded transiting northwest-southeast following the coast but activity was generally sparse given the distance offshore. No recreational vessels were recorded within the Morven North Shipping and Navigation Study Area during the winter survey period.

13.7.1.12 There were no instances of towing activity or rig movements within the dedicated vessel traffic surveys, although a solitary instance of a jackup platform being towed to Dundee approximately 3nm north of Morven North was recorded within the long-term vessel traffic data (see Appendix E of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment).

13.7.1.13 The average length of vessels within the Morven North Shipping and Navigation Study Area was 102 metres (m). Over the survey periods, vessel length ranged from 4m for a recreational vessel to 319m for a cruise liner.

13.7.1.14 Excluding the proportion of vessels for which draught was not available, the average draught of vessels within the Morven North Shipping and Navigation Study Area was 4.9m. Over the survey periods, vessel draught ranged from 2.2m for a tug to 13.8m for a bulk carrier.

13.7.1.15 Main commercial routes have been identified using the principles set out in MGN 654 (MCA, 2021). Vessel traffic data is assessed and vessels transiting at similar headings and locations are identified as a main route. To help identify main routes, vessel traffic data is also interrogated to show vessels (by name and/or operator) that frequently transit those routes. The route width is then calculated using the 90th percentile rule from the mean position of the potential shipping route.

13.7.1.16 A total of 16 main commercial routes within the Morven North Shipping and Navigation Study Area were identified from the vessel traffic survey data, in combination with Anatec's ShipRoutes database. These main commercial routes and corresponding 90th percentiles within the Morven North Shipping and Navigation Study Area are shown relative to Morven North in Figure 13.6. Following this, a description of each route is provided in Table 13.7, including the average number of

vessels per day, start and end locations, main vessel types and details of commercial ferry routeing (where applicable). It is noted that the start and end locations are based on the most common destinations transmitted via AIS by vessels on these routes.

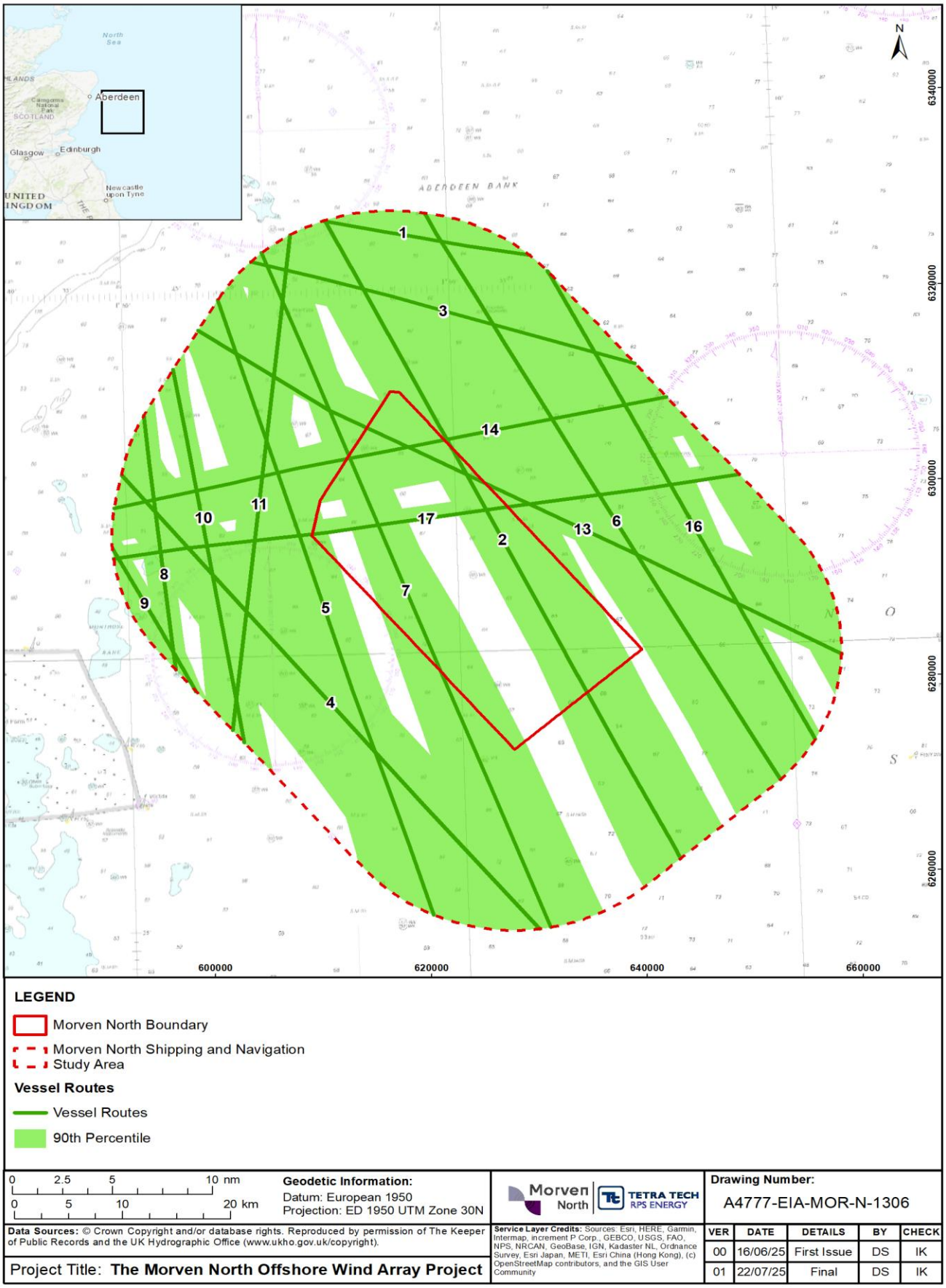

Figure 13.6: Base case main commercial routes within the Morven North Shipping and Navigation Study Area

Table 13.7: Description of base case main commercial routes within the Morven North Shipping and Navigation Study Area

Route Number	Average Vessels per Day	Average Vessels per Week	Description
1	2-3	16	Aberdeen – Catcher field. Comprised almost entirely of oil and gas vessels (96%).
2	1-2	10	Icelandic ports – Rotterdam. Comprised mainly of cargo vessels (90%). Includes the RoRo route operated by Smyril Line between Þorlákshöfn and Rotterdam.
3	1	7	Aberdeen – Fulmar field. Comprised mainly of oil and gas vessels (86%).
4	1	5-6	Aberdeen – Cygnus field. Comprised mainly of oil and gas vessels (76%) and cargo vessels (20%).
5	1	5-6	Reykjavik – Immingham. Comprised mainly of cargo vessels (86%) and tankers (12%).
6	1	5-6	Icelandic ports – Rotterdam. Comprised mainly of cargo vessels (77%), tankers (11%) and oil and gas vessels (10%).
7	0-1	4	Moray Firth – Rotterdam. Comprised mainly of cargo vessels (78%) and oil and gas vessels (16%).
8	0-1	2-3	Reykjavik – Rotterdam. Comprised mainly of cargo vessels (86%).
9	0-1	2-3	Aberdeen – Breagh field. Comprised of cargo vessels (45%), oil and gas vessels (39%) and tankers (17%).
10	0-1	2	Glensanda – Redcar. Comprised mainly of cargo vessels (70%), tankers (13%) and oil and gas vessels (12%).
11	0-1	2	Marcus Hook – Grangemouth. Comprised mainly of tankers (73%) and passenger vessels (20%).
13	0-1	1-2	Aberdeen – Bremen. Comprised mainly of cargo vessels (65%) and tankers (17%).
14	0-1	1-2	Montrose – Swedish ports. Comprised of cargo vessels (75%) and oil and gas vessels (25%).

Route Number	Average Vessels per Day	Average Vessels per Week	Description
16	0-1	1	Glensanda – Amsterdam. Comprised mainly of cargo vessels (81%) and tankers (12%).
17	0-1	1	Montrose – Elgin field. Comprised of oil and gas vessels (85%) and cargo vessels (15%).

Historical maritime incidents

Department for Transport SAR helicopters

13.7.1.17 There was a single SAR helicopter tasking recorded in the nine-year period from April 2015 to March 2024 within the Morven North Shipping and Navigation Study Area. This involved a search operation south of the Morven North Boundary.

Royal National Lifeboat Institution

13.7.1.18 There was a total of seven recorded RNLI responses to five unique incidents within the Morven North Shipping and Navigation Study Area from 2014 to 2023, corresponding to an average of one incident every two years. The majority of incidents were inshore of the Morven North Boundary. The most frequent incident type was machinery failure (two instances), with an instance each of flooding/foundering, sail failure and 'vessel may be in trouble'. Of the casualty types, three were recreational vessels with the remaining two being fishing vessels. One incident was recorded within the Morven North Boundary itself – a recreational vessel undergoing sail failure which was responded to by the Montrose station.

Marine Accident Investigation Branch

13.7.1.19 There was a total of three unique incidents recorded by the MAIB within the Morven North Shipping and Navigation Study Area from 2014 to 2023, corresponding to an average of one incident every three years. The most frequent incident type was 'accident to person' (two instances), with a single instance of flooding/foundering. Of the casualty types involved, two were fishing vessels with one recorded instance of a service vessel. No incidents were recorded within the Morven North Boundary itself.

13.7.1.20 A review of older MAIB incident data within the Morven North Shipping and Navigation Study Area between 2004 and 2013 indicates that the number of incidents has decreased in proximity to Morven North, with a total of four incidents within the Morven North Shipping and Navigation Study Area recorded. No incidents occurred within the Morven North Boundary.

13.7.2 Future baseline scenario

13.7.2.1 The EIA Regulations require the following to be included within the EIA Report: "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 development 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."

13.7.2.2 In the event that Morven North does not come forward, an assessment of the future baseline conditions has been carried out and is described within this section.

13.7.2.3 There is uncertainty associated with long-term predictions of vessel traffic growth including the potential for any other new developments in the UK or transboundary ports. Therefore, two independent scenarios of possible growth in commercial vessel movements of 10% and 20% have been estimated throughout the lifetime of Morven North. This is in line with the approach presented at the Hazard Workshop and typical industry standards, having been implemented within various previous NRAs. These scenarios have been included in the quantitative modelling undertaken within Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment. It is likely that commercial vessels will deviate to avoid any other future OWF developments that are under construction or in operations. This is in line with vessel behaviours observed at other UK OWFs.

13.7.2.4 It should also be considered that there may be an increase in vessels associated with OWF construction and operation as further future OWF 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.

13.7.2.5 There is also uncertainty associated with long-term predictions for commercial fishing vessel and recreational vessel transits given the limited reliable information on future trends upon which any firm assumption could be made. There are no know major developments which would increase commercial fishing or recreational vessel activity in the region.

13.7.2.6 Therefore, a conservative potential growth in commercial fishing vessel and recreational vessel movements of 10% and 20% has been estimated throughout the lifetime of Morven North. Changes in commercial fishing activity are considered further in Volume 2, Chapter 12: Commercial Fisheries.

13.7.3 Data limitations and assumptions

13.7.3.1 This section discusses key data gaps and limitations associated with the data sources used to inform the assessment within this chapter. These data limitations do not compromise the integrity of the assessment undertaken in this chapter due to the variety of sources that have been consulted and considered.

Vessel traffic data

13.7.3.2 It has been assumed that vessels under an obligation to broadcast information via AIS have done so, both in the vessel traffic surveys and long-term vessel traffic data. 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 during Anatec's thorough quality assurance of the data. As per Section 0, due to adverse weather conditions the survey vessel was not on-site for a full 24 hours on several days.

Maritime incidents

13.7.3.3 Although all UK commercial vessels are required to report accidents to the MAIB, this is not mandatory for non-UK vessels unless they are in a UK port, within 12nm territorial waters or carrying passengers to a UK port. There are also no requirements for non-commercial recreational craft to report accidents to the MAIB. Therefore, it is possible that not every incident that occurred within the Morven North Shipping and Navigation Study Area will be recorded within the MAIB dataset.

13.7.3.4 The RNLI incident data cannot be considered comprehensive of all incidents in the Morven North Shipping and Navigation Study Area. Any incident to which a RNLI resource was not mobilised has not been accounted for in this dataset.

United Kingdom Hydrographic Office

13.7.3.5 The UKHO Admiralty Charts are updated periodically, and therefore the information shown may not reflect the real-time features within the region with total accuracy. For AtoNs, only those charted and considered key to establishing the shipping and navigation baseline are shown.

13.7.3.6 During consultation, input has been sought from relevant stakeholders regarding the navigational features baseline. Navigational features are based upon the most recently available UKHO Admiralty Charts and Sailing Directions at the time of writing, alongside feedback from stakeholders.

13.8 Methodology for assessment of effects

13.8.1 Overview

13.8.1.1 The general approach for assessment of effects is set out in Volume 1, Chapter 6: EIA Methodology. The following sections provide an overview of the assessment methodology to assess the potential impacts on shipping and navigation only. The assessment methodology for shipping and navigation within this chapter is consistent with that provided in the Morven Site Scoping Report (MvOWL, 2023) and was agreed with stakeholders during the Hazard Workshop (see Section 13.4). The full methodology for assessing impacts on shipping and navigation receptors is set out within Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.

13.8.1.2 Specific to the shipping and navigation assessment of effects, 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, 2021);
- MGN 372 Amendment 1 (Merchant and Fishing) Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2022);
- International Organization for Marine Aids to Navigation (IALA) O-139 on The Marking of Man-Made Offshore Structures (IALA, 2021);
- IALA G1162 The Marking of Offshore Man-Made Structures (IALA, 2022);
- The RYA Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy (RYA, 2019);
- Revised Guidelines for Formal Safety Assessment (FSA) for Use in the Rule-Making Process (IMO, 2018).

13.8.2 Assessment criteria

13.8.2.1 As required under the MCA Methodology (Annex 1 to MGN 654) (MCA, 2021), and in line with international marine risk assessment standards, the IMO FSA (IMO, 2018) approach has been applied for impact assessment. The FSA methodology is centred on risk control, and assesses each impact in terms of its predicted frequency of occurrence and severity of consequence in order that its significance can be determined as '**broadly acceptable**', '**tolerable with mitigation**', or '**unacceptable**' via a risk matrix as shown in Table 13.10. The criteria for defining frequency of occurrence in this chapter are outlined in Table 13.8 below.

Table 13.8: Frequency of occurrence ranking definitions

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

13.8.2.2 The criteria for defining severity of consequence in this chapter are outlined in Table 13.9 below.

Table 13.9: Definition of terms relating to the severity of consequence

Rank	Description	Definition			
		People	Property	Environment	Business
1	Negligible	No perceptible risk	No perceptible risk	No perceptible risk	No perceptible risk
2	Minor	Slight injury(ies)	Minor damage to property, (i.e. superficial damage)	Tier 1 local assistance required	Minor reputational risks – limited to users
3	Moderate	Multiple minor or single serious injury	Damage not critical to operations	Tier 2 limited external assistance required	Local reputational risks
4	Serious	Multiple serious injuries or single fatality	Damage resulting in critical risk to operations	Tier 2 regional assistance required	National reputational risks
5	Major	More than one fatality	Total loss of property	Tier 3 national assistance required	International reputational risks

Table 13.10: International Maritime Organization Formal Safety Assessment risk matrix for shipping and navigation

Consequence	**Major**	Tolerable with Mitigation	Tolerable with Mitigation	Unacceptable	Unacceptable	Unacceptable
	Serious	Broadly Acceptable	Tolerable with Mitigation	Tolerable with Mitigation	Unacceptable	Unacceptable
	Moderate	Broadly Acceptable	Broadly Acceptable	Tolerable with Mitigation	Tolerable with Mitigation	Unacceptable
	Minor	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable with Mitigation	Tolerable with Mitigation
	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable with Mitigation
		Negligible	**Extremely Unlikely**	**Remote**	**Reasonably Probable**	**Frequent**
		Frequency				

13.8.2.3 For the purposes of the shipping and navigation impact assessment a level of effect determined as being of **unacceptable** significance is considered a 'significant' effect in EIA terms and not ALARP, requiring additional mitigation measures (secondary mitigation) implemented beyond those considered embedded to reduce the residual effect to within tolerable with mitigation or broadly acceptable parameters. Effects determined to be **tolerable with mitigation** or **broadly acceptable** are not significant in EIA terms and are ALARP. In the case of **tolerable with mitigation**, this acknowledges that the embedded mitigation (and secondary mitigation if identified) is sufficient to achieve ALARP status.

13.8.2.4 It is noted that the assessment in Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment, uses FSA terminology as required under MGN 654 (MCA, 2021). Differences in terminology are detailed in Table 13.11. This chapter uses the EIA terminology.

Table 13.11: Summary of terminology differences between Environmental Impact Assessment and Navigational Risk Assessment for shipping and navigation

EIA Term	NRA Term	Definition
Impact	Hazard	A potential to threaten human life, health, property or the environment.
Secondary mitigation	Additional mitigation measures	A means of controlling a single element of an impact which is additional to the risk with the embedded mitigation in place (required to reduce the risk 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	Sufferer of the effect.

13.8.2.5 Although EIA terminology has been adopted throughout the assessment of effects, the assessment is undertaken within the framework of FSA methodology as described above.

13.9 Parameters for assessment

13.9.1 Maximum Design Scenario

13.9.1.1 The Maximum Design Scenarios (MDS) identified in Table 13.12 have been selected as those design scenarios having 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: Project Description. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different infrastructure layout), to that assessed here, be taken forward in the final design scheme.

Table 13.12: Maximum Design Scenario considered for the assessment of potential impacts on shipping and navigation

C= construction, O= O&M, D= decommissioning phases

Potential impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
Increased vessel to vessel collision risk resulting from displacement (third-party to third-party)	✓	✓	✓	• Maximum extent of buoyed construction and decommissioning area assuming full build out of Morven North; • 96 wind turbines and five OSPs within the Morven North Boundary; • Construction phase of up to five years; • O&M phase of up to 35 years; • 500m safety zones around active construction, 50m safety zones during pre-commissioning; • 500m safety zones around major maintenance; • Up to 1,149 return trips per year from project vessels, with up to 41 project vessels on site at any one time during the construction and decommissioning phases; • Up to 293 return trips per year from project vessels, with up to 15 on site simultaneously during the O&M phase.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel displacement and subsequent collision risk involving third-party vessels.

Potential impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
Increased vessel to vessel collision risk resulting from displacement (third-party to project vessel)	✓	✓	✓	• Maximum extent of buoyed construction and decommissioning area assuming full build out of Morven North; • 500m safety zones around active construction, 50m safety zones during pre-commissioning and 500m safety zones around major maintenance. • 96 wind turbines and five OSPs within the Morven North Boundary; • Construction phase of up to five years; • O&M phase of up to 35 years; • Up to 1,149 return trips per year from project vessels, with up to 41 project vessels on site at any one time during the construction and decommissioning phases. This may include the use of vessels which are RAM; • Up to 293 return trips per year from project vessels, with up to 15 on site simultaneously during the O&M phase.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel to vessel collision risk involving a third-party vessel and a project vessel.

Potential impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
Vessel to structure allision risk	✓	✓	✓	• Maximum extent of buoyed construction and decommissioning area assuming full build out of Morven North; • 96 wind turbines and five OSPs within the Morven North Boundary; • Construction phase of up to five years; • O&M phase of up to 35 years; • 500m safety zones around active construction, 50m safety zones during pre-commissioning; • 500m safety zones around major maintenance; • Wind turbine jacket leg diameter of 3.2m and jacket leg spacing of 40m; • OSP jacket leg diameter of 4.6m for HVAC / 5m for HVDC and jacket leg spacing of 50m for HVAC / 135m for HVDC; • Bridge-linked HVDC OSP with combined 580m x 180m topside; • Maximum bridge link length of 100m and height of 14m above Highest Astronomical Tide (HAT); • Minimum structure spacing of 1,000m.	Largest possible extent of surface infrastructure, greatest number of surface structures and greatest duration resulting in the maximum spatial and temporal effect on vessel to structure allision risk.
Reduced access to local ports and harbours	✓	✓	✓	• Up to 1,149 return trips per year from project vessels, with up to 41 project vessels on site at any one time during construction and decommissioning; • Up to 293 return trips per year from project vessels, with up to 15 total project vessels during the O&M phase.	Greatest number of simultaneous vessel activities resulting in the maximum spatial and temporal effect on access to local ports and harbours.

Potential impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
Reduction of under keel clearance as a result of subsea infrastructure	×	✓	×	• Maximum extent of Morven North Boundary; • 96 wind turbines and five OSPs within the Morven North Boundary; • O&M phase of up to 35 years. • 500m safety zones around major maintenance; • Up to 229nm (424 kilometres (km)) of inter-array cables; • Maximum inter-array cable protection height of 3m, with 10% of the inter-array cables requiring protection; • Five inter-array crossings, with maximum crossing height of 4m; • Up to 261nm (484km) of interconnector cables; • Maximum interconnector cable protection height of 3m, with 10% of the interconnector cables requiring protection; • Five interconnector crossings, with maximum crossing height of 4m.	Maximum length of subsea cable and maximum extent of protection leading to greatest under keel interaction risk.

Potential impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
Anchor and fishing gear interaction with subsea cables	×	✓	×	• Maximum extent of Morven North Boundary; • 96 wind turbines and five OSPs within the Morven North Boundary. • O&M phase of up to 35 years; • 500m safety zones around major maintenance; • Up to 229nm (424km) of inter-array cables; • Maximum inter-array cable protection height of 3m, with 10% of the inter-array cables requiring protection; • Five inter-array crossings, with maximum crossing height of 4m; • Up to 261nm (484km) of interconnector cables; • Maximum interconnector cable protection height of 3m, with 10% of the interconnector cables requiring protection; • Five interconnector crossings, with maximum crossing height of 4m; • Minimum target burial depth for all cables of 0.5m.	Largest possible extent of subsea infrastructure and greatest duration resulting in the maximum spatial and temporal effect on anchor or fishing gear interaction with subsea cables.
Reduction of SAR capability	×	✓	×	• Maximum extent of Morven North Boundary; • 96 wind turbines and five OSPs within the Morven North Boundary; • O&M phase of up to 35 years; • Up to 229nm (424km) of inter-array cables; • Up to 26nm (484km) of interconnector cables; • Minimum structure spacing of 1,000m; • Up to 293 return trips per year from project vessels, with up to 15 total project vessels.	Largest possible extent, greatest number of surface structures, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on emergency response capability.

13.10 Embedded mitigation measures

13.10.1.1 As part of the project design process, a number of measures (primary and tertiary) have been adopted to reduce the potential for impacts on shipping and navigation (see Table 13.13). For the purposes of the shipping and navigation assessment the term 'embedded mitigation measure' is used to include the following measures (adapted from Institute of Environmental Management and Assessment (IEMA), 2016 and IEMA, 2024):

- Measures included as part of the design of Morven North. These include modifications to the location or design of Morven North, which are integrated into the application for consent. These measures are considered standard industry practice for this type of development and are referred to as primary mitigation in IEMA, 2016 and IEMA, 2024.
- Measures required to meet legislative requirements, or actions that are generally standard practice used to manage commonly occurring environmental effects. These measures are secured through the conditions of the marine licences and referred to as tertiary mitigation in IEMA, 2016 and IEMA, 2024.

13.10.1.2 As there is a commitment to implementing these measures, they are considered inherently part of the design of Morven North and have therefore been considered in the assessment presented in Sections 13.11 and 13.13 (i.e. the determination of frequency of occurrence, severity of consequence and therefore significance of effect assumes implementation of these measures).

13.10.1.3 The requirement for any additional mitigation measures is dependent on the significance of the effects on shipping and navigation. Where likely significant effects have been identified, further mitigation measures (referred to as secondary mitigation in IEMA, 2016 and IEMA, 2024) have been identified to reduce the significance of effect to acceptable levels following the initial assessment. These are measures that could further prevent, reduce and, where possible, offset any adverse effects on the environment. These measures are set out, where relevant, in Sections 13.11 and 13.13.

13.10.1.4 All designed-in measures and mitigation for Morven North are detailed in Volume 3, Annex 6.3: EIA Commitments Register.

Table 13.13: Embedded mitigation measures (primary and tertiary) adopted as part of Morven North

Reference number	Embedded mitigation measures adopted as part of Morven North	Justification	Primary or tertiary
MM-2	Development of and adherence to a Cable Plan which will include a cable burial risk assessment (CBRA) and cable burial and protection monitoring throughout the operational phase.	A Cable Plan will set out the approach to protection of cables during the project lifecyle. It will reduce the risks of vessel underwater allision with cable protection, anchor or fishing gear interaction with subsea cables and interference with magnetic position fixing equipment. The Cable plan will implement management and monitoring of cable protection (via burial or external protection where adequate burial depth, as identified via risk assessment, is not feasible) with any damage, destruction or decay of cables notified to Maritime and Coastguard Agency, Northern Lighthouse Board, Kingfisher and UK Hydrographic Office no later than 24 hours after discovered. This will reduce the probability of cables becoming unburied and impacting other sea users and marine ecology receptors. Cable burial and protection monitoring will be undertaken throughout the operational phase to assess the status of cable burial and any deployed protection. It will include the requirement of minimum burial depths of 0.5m or the use of cable protection around inter-array and interconnector cables and will include a CBRA. Cable protection may be necessary in some locations where sufficient cable burial depth cannot be achieved or where cables become exposed during the lifetime of Morven North. 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 Morven North, to minimise the risk of	Primary

Reference number	Embedded mitigation measures adopted as part of Morven North	Justification	Primary or tertiary
		interaction with other sea users or cable exposure.	
MM-6	Development and adherence to a Marine Pollution Contingency Plan.	To reduce the potential for release of pollutants from construction, operation and maintenance and decommissioning, a MPCP will be developed. The Marine Pollution Contingency Plan will include planning for accidental spills, addressing all potential contaminant releases and include key emergency details, and will be in line with appropriate regulations and guidelines.	Primary
MM-7	Development of and adherence to a Navigation Safety Plan and Vessel Management Plan (NSPVMP).	A NSPVMP will be developed to reduce the risk introduced due to the presence of project vessels. The Navigation Safety and Vessel Management Plan will describe the measures related to navigational safety, including information on Safety Zones, charting, construction buoyage, temporary lighting and marking and means of notification of Morven North activity to other sea users (e.g. via Notices to Mariners). It will confirm the types and numbers of vessels engaged in Morven North and consider vessel coordination, including indicative transit route planning. To ensure Morven North project vessels are suitably managed to minimise the likelihood of involvement in incidents and maximise the ability to assist in the event of a third-party incident. The NSPVMP will include the requirement for Morven Northvessels to comply with international marine regulations as adopted by the Flag State, including the International Regulations for Preventing Collisions at Sea (COLREGs) (International Maritime Organization (IMO), 1972/77) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974) through the NSP and VMP.	Primary
MM-11	Timely and efficient distribution of information via Notice to Mariners, Kingfisher notifications	To ensure other sea users and marine infrastructure receptors are aware of Morven North, to allow relevant	Tertiary

Reference number	Embedded mitigation measures adopted as part of Morven North	Justification	Primary or tertiary
	and other navigational warnings of the position and nature of works.	vessels to plan passage and thereby reduce potential for allision.	
MM-14	Compliance with Marine Guidance Note 654 and its annexes, where applicable.	Ensures the final Morven North layout complies with required guidance, including SAR operations and underkeel clearance in line with Marine Guidance Note 654.	Tertiary
MM-15	Development of and adherence to a Development Specification and Layout Plan.	The DSLP will confirm final layout and design of Morven North. This will be agreed in consultation with the MCA and NLM and will ensure the final layout of Morven North is suitable for both surface and air based (for SAR purposes) navigation and to ensure accurate mapping for navigation, and to ensure compliance with MGN654.	Primary
MM-24	Development of, and adherence to, an Emergency Response Cooperation Plan.	To formulate robust emergency response plans and site safety, and in compliance with Marine Guidance Note 654 including Annex 5 SAR requirements.	Primary
MM-33	An application for the use of safety zones of up to 500m during construction, periods of major maintenance, decommissioning and up to 50m for installed structures pre commissioning.	To protect third-party vessels from project vessels involved in construction and major maintenance activities, which may be Restricted in their Ability to Manoeuvre.	Tertiary
MM-34	Development of and adherence to a Lighting and Marking Plan	To reduce impacts on aviation, shipping and offshore ornithology. The LMP will detail compliance with legal requirements including IALA G1162 (IALA, 2021), and will assist with SAR operations and will ensure that appropriate lighting and marking of wind turbines and offshore substation platforms will be established in accordance with Civil Aviation Authority (CAA) regulations and guidance (CAP 393 and the Air Navigation Order (ANO)) and in accordance with the Civil Aviation Authority CAA and the Defence Infrastructure Organisation (DIO), which is responsible for the safeguarding of Ministry of Defence (MOD) assets. Secured through the LMP. The approach to Aids to Navigation will be outlined in the LMP.	Primary

Reference number	Embedded mitigation measures adopted as part of Morven North	Justification	Primary or tertiary
		Adopting the LMP and therefore reducing lighting to be compliant with MM-34, will provide the minimum amount and intensity of lighting that Morven North can legally have whilst remaining compliant with mandatory Health and Safety lighting requirements.	
MM-37	Appropriate marking on UKHO Admiralty charts.	To maximise awareness of Morven North, allowing other vessels, sea users and marine infrastructure receptors to plan their activities in advance.	Tertiary
MM-38	The construction and decommissioning area is marked by buoyage in agreement with the Northern Lighthouse Board.	Protects third-party vessels from project vessels involved in construction and major maintenance activities which may be Restricted in their Ability to Manoeuvre (RAM).	Tertiary
MM-39	Use of guard vessels as required.	To reduce potential conflict between Morven North and fishing activities by maximising awareness of temporary hazards.	Tertiary
MM-43	A minimum blade tip clearance of 34m above Lowest Astronomical Tide.	Increasing the clearance between blade tip and sea surface reduces potential for allision.	Primary

13.11 Assessment of significant effects

13.11.1.1 The potential impacts arising from the construction, O&M and decommissioning phases of Morven North are listed in Table 13.12, along with the MDS against which each impact has been assessed.

13.11.1.2 An assessment of the likely significance of the effects of Morven North on shipping and navigation receptors caused by each identified impact is given below.

13.11.2 Increased vessel to vessel collision risk resulting from displacement (third-party to third-party)

Construction phase

13.11.2.1 Construction activities associated with Morven North may displace existing vessel routes or activity, which may increase the risk of a collision between third-party vessels.

13.11.2.2 These two related elements are each considered in the subsequent assessment in terms of frequency of occurrence and severity of consequence.

Vessel displacement

13.11.2.3 Vessel traffic data collected during the summer and winter 2024 surveys has been used to establish the vessel traffic baseline, alongside 12 months of AIS collected via terrestrial receivers between October 2021 and September 2022 and three supplementary seasonal vessel traffic surveys. These

vessel traffic datasets have been validated by Anatec's ShipRoutes database and analysed to identify the volume of traffic passing within or in proximity to Morven North. Additionally, main routes were recognised from these datasets using the principles set out in MGN 654 (MCA, 2021) (see Section 13.7.1).

13.11.2.4 Although there will be no restrictions on entry into the buoyed construction area, other than through active safety zones, based on consultation feedback and experience at previously under construction OWFs it is anticipated that the majority of commercial vessels will choose not to navigate within the buoyed construction area; therefore, some main route deviations will be required.

13.11.2.5 The full methodology for classifying main route deviations is provided in Section 13.7.1, noting it is in line with MGN 654 (MCA, 2021). A deviation will be required for six of the 16 main routes identified within the Morven North Shipping and Navigation Study Area, with details provided in Table 13.7. The deviations identified are shown in Section 15.5.2 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.

13.11.2.6 The deviations are of relatively low magnitude, with five of the six increasing the total route length by less than 0.5%. The deviation of route 17 is anticipated to increase distance by 5.5nm, equating to a 3.9% increase in total route length. This is the lowest volume main commercial route within the Morven North Shipping and Navigation Study Area, with an average of one vessel per week. Although the deviation is greater, it is anticipated that the extent of the deviation could be reduced with passage planning for the departure from, or arrival to, Montrose, with a more direct approach to the northern extent of the Morven North Boundary than has been conservatively assumed in the quantitative assessment.

13.11.2.7 There is one RoRo route (Route 2) undergoing regular transit once every two days in summer only based on the vessel traffic data. Although this route may be displaced, and would be more sensitive given the timetabled nature of the service provided, the deviation involved is minor especially when compared with the total route length (increase of 0.2%) and was not raised as an issue during consultation, noting that the primary user – Smyril Line – was included in the regular operator outreach.

13.11.2.8 Based on experience at previously under construction OWFs, it is anticipated that fishing vessels and recreational vessels may also choose not to routinely navigate within the buoyed construction area, noting there would be no restriction on transit other than through active safety zones. However, they may be more likely to do so than commercial vessels, in particular in any areas of the Morven North Boundary where active construction is not ongoing, or structures are not yet present. As referenced by RYA Scotland within Section 13.4, recreational vessels engaged on long-distance transits will likely passage plan earlier in the course, providing adequate time to deviate around Morven North. Vessels on shorter routes will likely be undergoing coastal passage and so will pass further from Morven North.

13.11.2.9 For any smaller vessels that do choose to deviate, there is considered to be sufficient sea room outside of the Morven North Boundary for transits from such vessels to be accommodated.

13.11.2.10 The main consequences of vessel displacement will be increased journey times and distances for affected third party vessels, under the assumption that the buoyed construction area will be deployed around the maximum extent of Morven North. Any notable safety impacts are considered unlikely given the available sea room. Vessels are expected to comply with international and flag state regulations (including COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974)) and will be able to passage plan in advance given the promulgation of information relating to the Morven North Boundary and relevant nautical charts.

13.11.2.11 Relevant embedded mitigation measures include a buoyed construction area, adherence to an LMP and AtoNMP, marking on nautical charts and promulgation of information. These will ensure an increased awareness from third-party vessels and will also assist in passage planning to limit the extent of deviations.

Collision risk

13.11.2.12 From historical incident data, no collision incidents between third-party vessels have occurred directly as a result of a UK OWF.

13.11.2.13 In poor visibility, third-party vessels may experience limitations regarding visual identification of other third-party vessels, when passing on another side of the buoyed construction/decommissioning areas. This limitation may increase the potential for an encounter. However, this would be mitigated by the application of the COLREGs (including reduced speeds) in adverse weather conditions. Moreover, the minimum spacing between structures (1,000m) will be sufficient to ensure any visual hindrance is very short-term in nature.

13.11.2.14 Based on the pre-wind farm modelling (see Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment), the baseline collision risk levels within the Morven North Shipping and Navigation Study Area are low, with an estimated vessel to vessel collision risk of one every 2,344 years. This rises to an estimate of a return period of one every 1,625 years for a future case growth of 20% in vessel traffic. This is due to the volume of traffic in the area relative to available sea space.

13.11.2.15 Post-wind farm, the collision frequency was estimated at one in 1,421 years, representing an additional collision incident every 3,606 years. This rises to an estimate of a return period of one every 984 years for a future case growth of 20% in vessel traffic. This remains a low level of collision risk, which is also reflected when considering future case traffic levels.

13.11.2.16 It is also acknowledged that a number of the higher-use routes, such as Routes 1, 3, 4 and 6, are comprised mainly of oil and gas vessels accessing nearby fields. As such, these vessels will have good familiarity and experience operating in proximity to surface structures.

13.11.2.17 Due to the necessity for deviation of routes west of the Morven North Boundary, it is possible that commercial vessels will be displaced closer to areas of the sea in which fishing vessels were recorded to actively fish. This may then lead to an increase in encounters between commercial vessels and fishing vessels. However, there is sufficient sea room to allow both activities to safely occur and with application of the COLREGs in relation to the exhibiting of appropriate lights and shapes for fishing vessels engaged in fishing, the risk is considered manageable.

13.11.2.18 The most likely consequences in the event of an encounter between two or more third-party vessels is the implementation of avoidance action in line with the COLREGs, with the vessels involved able to resume their respective passages with no long-term consequences.

13.11.2.19 Based on historic incident data, should an encounter develop into a collision incident, it is most likely to involve minor contact resulting in minor damage to the vessels with no harm to people and no substantial reputational risks. As a worst case with very low frequency of occurrence one of the vessels could receive substantial damage or founder with Potential Loss of Life (PLL) and pollution, with this outcome more likely where one of the vessels is a small craft (e.g. fishing vessel, recreational vessel or Crew Transfer Vessel (CTV). From the vessel traffic survey data (which incorporates Radar and visual observations in addition to AIS) regular transits by commercial fishing vessels and recreational vessels through the Morven North Boundary are infrequent.

13.11.2.20 Relevant embedded mitigation measures include marking on nautical charts, promulgation of information, a buoyed construction area, adherence to an LMP and AtoNMP, adherence to an MPCP and adherence to an ERCoP. These will ensure an increased awareness from third-party vessels and will also assist in passage planning to limit the extent of deviations.

Frequency of occurrence

13.11.2.21 The frequency of occurrence in relation to displacement of vessel traffic resulting in increased third-party collision risk during the construction phase is considered Extremely Unlikely.

Severity of consequence

13.11.2.22 The severity of consequence in relation to displacement of vessel traffic resulting in increased third-party collision risk during the construction phase is considered Moderate.

Significance of effect

13.11.2.23 Taking the frequency of occurrence as extremely unlikely and the severity of consequence as moderate, the overall effect of vessel displacement and increased third-party vessel to vessel collision risk during construction of Morven North is considered to be **broadly acceptable**.

13.11.2.24 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Broadly Acceptable and Not Significant** in EIA terms.

13.11.2.25 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

Operations and maintenance phase

13.11.2.26 The presence of structures in Morven North, as well as maintenance activities associated with Morven North may displace existing vessel routes or activity, which may increase the risk of a collision between third-party vessels.

13.11.2.27 These two related elements are each considered in the subsequent assessment in terms of frequency of occurrence and severity of consequence.

Vessel displacement

13.11.2.28 Based on experience at existing operational OWFs and input during consultation, it is anticipated that the majority of commercial vessels will choose not to navigate within the Morven North Boundary and therefore some main route deviations will be required as per the respective construction phase hazard.

13.11.2.29 The nature of the deviations is expected to be similar to that discussed for the equivalent construction phase hazard, with the deviations in general relatively low magnitude and effective passage planning likely reducing the extent. One RoRo route (Route 2) is affected but was not raised as an issue during consultation, noting that the primary user – Smyril Line – was included in the regular operator outreach.

13.11.2.30 The minimum spacing of 1,000m between wind farm structures within the Morven North Boundary is considered sufficient to accommodate transits of smaller vessels, noting there will be no restrictions on entry into the Morven North Boundary with the exception of any active 500m major maintenance safety zones.

13.11.2.31 Based on experience at existing operational OWFs, it is anticipated that fishing vessels and recreational vessels may also choose not to routinely navigate internally within the Morven North Boundary. However, they may be more likely to do so than commercial vessels, particularly in the case of recreational vessels given the absence of commercial traffic (as raised by RYA Scotland in Section 13.4). In such instances this may reduce the level of displacement for these vessels during the O&M phase. As referenced by RYA Scotland within Section 13.4, recreational vessels engaged on long-distance transits will likely passage plan earlier in the course, providing adequate time to deviate around Morven North. Vessels on shorter routes will likely be undergoing coastal passage and so will pass further from Morven North.

13.11.2.32 It is noted that displacement of active commercial fishing is assessed separately in Volume 2, Chapter 12: Commercial Fisheries of the Morven North EIA Report.

13.11.2.33 Regarding displacement as a result of project vessel activity in the vicinity, given that any maintenance activities associated with Morven North will be less frequent than during the construction phase and localised, the likelihood of vessel displacement due to these activities is considered to be low. Additionally, such activities will likely be limited to within the Morven North Boundary and therefore not impact upon commercial vessel routeing.

13.11.2.34 The main consequences of vessel displacement will be increased journey times and distances for affected third party vessels, under the assumption that the wind turbines will be built to the full extent of Morven North. Any notable safety impacts are considered unlikely given the available sea room. Vessels are expected to comply with international and flag state regulations (including COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974)) and will be able to passage plan in advance given the promulgation of information relating to Morven North and relevant nautical charts.

13.11.2.35 Relevant embedded mitigation measures include DSLP approval, adherence to an LMP and AtoNMP, adherence to an NSPVMP, marking on nautical charts and promulgation of information.

Collision risk

13.11.2.36 As noted for the equivalent construction phase hazard, six of the 16 main routes will likely deviate as a result of the presence of Morven North. Post wind farm collision frequency was estimated at one every 1,421 years.

13.11.2.37 Any displacement of commercial vessels due to maintenance activities is not anticipated to affect available sea room to such an extent that the risk of a collision between third party vessels is materially increased. This is due to the lesser frequency of maintenance activities compared to during construction, spatially limited extent of the operation at any given time and the likelihood that maintenance activities are located internally with the array.

13.11.2.38 An additional factor is the potential for structures to obscure vessels from one another, thus hindering ability to comply with COLREGs (IMO, 1972/77). The minimum spacing of 1,000m between wind farm structures will likely provide sufficient sea room for visual observations, with full obstruction likely only to occur when vessels are at opposite ends of a row. Collision risk is likely to be low in such cases due to the distance between vessels.

13.11.2.39 In the event of an encounter between third party vessels, it is likely to be localised and short in duration, with collision avoidance action implemented by the vessels involved, as per compliance with COLREGs (IMO, 1972/77), to ensure that a collision incident does not develop.

13.11.2.40 As per the respective construction phase hazard, historical collision incident data indicates that the most likely consequences will be low should a collision occur, with minor contact between the vessels resulting in minor damage and no injuries to persons, with the vessels involved able to resume their respective passages and undertake a full inspection at the next port.

13.11.2.41 As with the equivalent construction phase hazard, the displacement of commercial vessels west of the Morven North Boundary may result in closer proximity to fishing vessels actively fishing. This may then lead to an increase in encounters between commercial vessels and fishing vessels but there is sufficient sea room to allow both activities to safely occur with application of the COLREGs.

13.11.2.42 As an unlikely worst-case scenario, a high impact collision event could occur. This may result in vessel foundering and subsequent PLL, as well as pollution. In such a circumstance, vessels associated with Morven North may attend the incident under SOLAS obligations and in liaison with the MCA and the procedures within the ERCoP and MPCP would be implemented.

13.11.2.43 Relevant embedded mitigation measures includes marking on nautical charts, promulgation of information, DSLP approval, adherence to an LMP and AtoNMP, adherence to an MPCP and adherence to an ERCoP.

Frequency of occurrence

13.11.2.44 The frequency of occurrence in relation to displacement of vessel traffic resulting in increased third-party collision risk during the O&M phase is considered Extremely Unlikely.

Severity of consequence

13.11.2.45 The severity of consequence in relation to displacement of vessel traffic resulting in increased third-party collision risk during the O&M phase is considered Moderate.

Significance of effect

13.11.2.46 Taking the frequency of occurrence as extremely unlikely and the severity of consequence as moderate, the overall effect of vessel displacement and increased third-party vessel to vessel collision risk during O&M of Morven North is considered to be **broadly acceptable**.

13.11.2.47 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Broadly Acceptable and Not Significant** in EIA terms.

13.11.2.48 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

Decommissioning phase

13.11.2.49 Since the methods used to remove structures and subsea cables are expected to be similar to those used to install them, this hazard is expected to be similar in nature to the equivalent construction stage hazard. It is noted that in the case of subsea cables sections may be left in situ to avoid unnecessarily disturbing the seabed. This would be confirmed through consultation and assessment to ensure the most suitable approach was taken. But for the purposes of this assessment (as a worst-case) it has been assumed that all subsea cables will be removed during decommissioning with only cable protection left in situ.

13.11.2.50 The use of a buoyed decommissioning area analogous to the buoyed construction area is assumed and will result in similar main route deviations to those established for the equivalent construction stage hazard. By the time of decommissioning, deviations will be well established, with vessels likely to continue on their typical routeing around the buoyed decommissioning area.

13.11.2.51 Relevant embedded mitigation measures would be as per the respective construction phase.

Frequency of occurrence

13.11.2.52 The frequency of occurrence in relation to displacement of vessel traffic resulting in increased third-party collision risk during the decommissioning phase is considered Extremely Unlikely.

Severity of consequence

13.11.2.53 The severity of consequence in relation to displacement of vessel traffic resulting in increased third-party collision risk during the decommissioning phase is considered Moderate.

Significance of effect

13.11.2.54 Taking the frequency of occurrence as extremely unlikely and the severity of consequence as moderate, the overall effect of vessel displacement and increased third-party vessel to vessel collision risk during decommissioning of Morven North is considered to be **broadly acceptable**.

13.11.2.55 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Broadly Acceptable and Not Significant** in EIA terms.

13.11.2.56 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

13.11.3 Increased vessel to vessel collision risk resulting from displacement (third-party to project vessel)

Construction phase

13.11.3.1 The presence of vessels associated with construction activities of Morven North may increase encounters and thus collision risk for vessels already operating in the area.

13.11.3.2 During the construction phase of Morven North there may be up to 1,149 vessel movements made by up to 41 project vessels on-site simultaneously. This will include vessels which are RAM. It is assumed that construction vessels will be on-site throughout the entire duration of the construction phase.

13.11.3.3 Encounters and collision risk involving project vessels will be managed through the implementation of marine coordination with full details of this to be provided in the NSPVMP. Project vessels will also be expected to carry AIS and comply with flag state regulations including the COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974). COLREGs will remain the navigational priority for project vessels at all times.

13.11.3.4 Applications for safety zones of 500m around on-going construction activities will be sought during the construction phase and will protect deployed project vessels, especially if they are RAM. Minimum advisory passing distances and guard vessels, as defined by risk assessment may also be implemented where safety zones do not apply, for example around cable installation vessels. Details of safety zones, minimum safe passing distances and guard vessels will be promulgated including via Notifications to Mariners and Kingfisher Bulletins.

13.11.3.5 Appropriate marine lighting and marking during construction including the buoyed construction area will be agreed with the NLB and set out in the LMP and AtoNMP. These navigational aids will further maximise mariner awareness when in proximity to ongoing construction works in the Morven North Boundary.

13.11.3.6 Third-party vessels may experience decreased capability to visually identify project vessels entering and exiting the Morven North Boundary during reduced visibility; however, this hazard will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions and the mandatory carriage of AIS by project vessels regardless of size. It is noted that the likelihood of a collision is likely to be greater in reduced visibility when the identification of project vessels entering and exiting the Morven North Boundary may be impeded.

13.11.3.7 Based on historical incident data, there has been one instance of a third-party vessel colliding with a project vessel in the UK (see Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment for further details). In this case, moderate vessel damage was reported with no harm to persons. It is noted that the incident occurred in 2011 and awareness of offshore wind developments and application of the measures outlined above has improved and been refined considerably in the interim, with no further collision incidents reported since.

13.11.3.8 If an encounter between a project vessel and third-party vessel occurs, it is likely to be localised and short in duration. Assuming the implementation of collision avoidance action as required by the COLREGs, the most likely outcome will be any vessels involved being able to resume their respective passages or activities with no long-term consequences.

13.11.3.9 In the event of a collision, the likely consequences will be minor contact between the vessels resulting in minor damage and no injuries to persons. As an unlikely worst-case scenario, foundering

could occur resulting in PLL and pollution. Other project vessels may be able to assist in the event of a collision under SOLAS obligation and the adherence to the ERCoP, noting this would be done in liaison with the MCA. If pollution were to occur in proximity to the Morven North Boundary or involving a project vessel, the MPCP will be implemented to reduce the risks.

13.11.3.10 As noted during consultation (see Section 13.4), there is the potential for a construction buoy to drift off-station. However, the LMP and AtoNMP will provide mechanisms for the location and recovery in any event; and due to the requirement for buoyage to be of IALA Position Category 2 (availability of not less than 99%), loss of any buoyage will be of low likelihood.

13.11.3.11 Relevant embedded mitigation measures include application for safety zones, a buoyed construction area, guard vessels as required by risk assessment adherence to an LMP and AtoNMP, NSPVMP, MPCP, ERCoP, promulgation of information, marine coordination and marking on nautical charts.

Frequency of occurrence

13.11.3.12 The frequency of occurrence in relation to encounters and collision risk between project vessels and third-party vessels during the construction phase is considered to be Extremely Unlikely.

Severity of consequence

13.11.3.13 The severity of consequence in relation to encounters and collision risk between project vessels and third-party vessels during the construction phase is considered to be Serious.

Significance of effect

13.11.3.14 Taking the frequency of occurrence as extremely unlikely and the severity of consequence as serious, the overall effect of encounters and collision risk between project vessels and third-party vessels during construction of Morven North is considered to be **tolerable with mitigation**.

13.11.3.15 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Tolerable with Mitigation and Not Significant** in EIA terms.

13.11.3.16 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

Operations and maintenance phase

13.11.3.17 The presence of vessels associated with maintenance activities of Morven North may increase encounters and thus collision risk for vessels already operating in the area.

13.11.3.18 During the O&M phase of Morven North there may be up to 293 vessel movements annually and up to 15 project vessels on-site simultaneously (during major maintenance; (i.e. likely less during normal operations)). This will include vessels which are RAM.

13.11.3.19 Encounter and collision risk involving project vessels will be managed through the implementation of marine coordination as will be set out in the NSPVMP. Project vessels will also be expected to carry AIS and comply with flag state regulations including the COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974). COLREGs will remain the navigational priority for project vessels at all times.

13.11.3.20 Applications for safety zones of 500m around major maintenance activities during O&M will be sought and will protect deployed project vessels, especially if they are RAM. Minimum advisory passing distances and guard vessels, as defined by risk assessment may also be implemented

where safety zones do not apply. Details of safety zones, minimum safe passing distances and guard vessels will be promulgated including via Notifications to Mariners and Kingfisher Bulletins.

13.11.3.21 Appropriate operational marine lighting and marking will be agreed with the NLB and set out in an LMP and AtoNMP. These navigational aids will further maximise mariner awareness when in proximity to the Morven North Boundary.

13.11.3.22 Third-party vessels may experience decreased capability to visually identify project vessels during reduced visibility, especially if visual observations are obscured by wind turbines; however, this hazard will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions and the mandatory carriage of AIS by project vessels regardless of size.

13.11.3.23 As discussed in the equivalent construction phase hazard, there has been one instance of a third-party vessel colliding with a project vessel in the UK. Moderate vessel damage was reported with no harm to persons. It is noted that the incident occurred in 2011 and awareness of offshore wind developments and application of the measures outlined above has improved and been refined considerably in the interim, with no further collision incidents reported since.

13.11.3.24 As per the respective construction phase hazard, if an encounter between a project vessel and third party vessel occurs, it is likely to be localised and short in duration. Assuming the implementation of collision avoidance action as required by the COLREGs, the most likely outcome will be any vessels involved being able to resume their respective passages or activities with no long-term consequences.

13.11.3.25 In the event of a collision, the likely consequences will be minor contact between the vessels resulting in minor damage and no injuries to persons. As an unlikely worst-case scenario, foundering could occur resulting in PLL and pollution. Other project vessels may be able to assist in the event of a collision under SOLAS obligation and the adherence to the ERCoP, noting this would be done in liaison with the MCA. If pollution were to occur in proximity to Morven North or involving a project vessel, the MPCP will be implemented to reduce the risks.

13.11.3.26 Relevant embedded mitigation measures include application for safety zones, guard vessels as required by risk assessment DSLP approval, adherence to an LMP and AtoNMP, NSPVMP, MPCP, ERCoP, promulgation of information, marine coordination and marking on nautical charts.

Frequency of occurrence

13.11.3.27 The frequency of occurrence in relation to encounters and collision risk between project vessels and third party vessels during the O&M phase is considered to be Extremely Unlikely.

Severity of consequence

13.11.3.28 The severity of consequence in relation to encounters and collision risk between project vessels and third party vessels during the O&M phase is considered to be Serious.

Significance of effect

13.11.3.29 Taking the frequency of occurrence as extremely unlikely and the severity of consequence as serious, the overall effect of encounters and collision risk between project vessels and third party vessels during O&M of Morven North is considered to be **tolerable with mitigation**.

13.11.3.30 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Tolerable with Mitigation and Not Significant** in EIA terms.

13.11.3.31 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

Decommissioning phase

13.11.3.32 The presence of vessels associated with decommissioning activities of Morven North may increase encounters and thus collision risk for vessels already operating in the area.

13.11.3.33 Since the methods used to remove structures and subsea cables are expected to be similar to those used to install them, including the vessels involved, this hazard is expected to be similar in nature to the equivalent construction phase, including the number of vessel movements by decommissioning vessels. It is noted that in the case of subsea cables it is expected that they will be left in situ but for the purposes of this assessment (as a worst-case) it has been assumed that all cables will be removed during decommissioning, with only cable protection left in situ.

13.11.3.34 On this basis the same assumptions made for the equivalent construction phase hazard in terms of frequency and consequence apply.

Frequency of occurrence

13.11.3.35 The frequency of occurrence in relation to encounters and collision risk between project vessels and third party vessels during the decommissioning phase is considered to be Extremely Unlikely.

Severity of consequence

13.11.3.36 The severity of consequence in relation to encounters and collision risk between project vessels and third party vessels during the decommissioning phase is considered to be Serious.

Significance of effect

13.11.3.37 Taking the frequency of occurrence as extremely unlikely and the severity of consequence as serious, the overall effect of encounters and collision risk between project vessels and third party vessels during decommissioning of Morven North is considered to be **tolerable with mitigation**.

13.11.3.38 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Tolerable with Mitigation and Not Significant** in EIA terms.

13.11.3.39 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

13.11.4 Vessel to structure allision risk

Construction phase

13.11.4.1 Presence of structures (including partially constructed) within the buoyed construction area will lead to creation of powered, drifting and internal allision risk for vessels.

13.11.4.2 The spatial extent of the hazard is small given that a vessel must be in close proximity to a structure for an allision incident to occur. Each allision element is considered in turn in terms of frequency of occurrence and severity of consequence, with the resulting significance of the residual risk across the various elements summarised at the end of the assessment. The forms of allision considered include:

- Powered allision risk;
- Drifting allision risk.

13.11.4.3 Unlike the O&M phase, although there is potential for a vessel to enter into the Morven North Boundary during construction, due to the presence of construction/decommissioning buoys and pre-constructed structures, it is not expected that internal navigation will take place.

13.11.4.4 In addition to a vessel entering the buoyed construction/decommissioning area and alliding with a structure under its own power, there is considered to be potential for a vessel to be adrift in proximity to Morven North; this is reflected in the RNLI incident data reviewed in proximity to the Morven North Boundary which indicates that machinery failure is the most common incident type. A vessel adrift may only develop into an allision situation if in proximity to a structure. This is only the case where the adrift vessel is located in close proximity to Morven North and the direction of the wind and/or tide directs the vessel towards a structure.

13.11.4.5 In circumstances where a vessel drifts towards a structure in the Morven North Boundary, there are actions which the vessel may take to prevent the drift incident developing into an allision situation. Powered vessels may be able to regain power prior to reaching a structure (i.e. by rectifying any fault). Given that vessels are expected to pass a safe distance off the buoyed construction area there is a greater duration over which regaining power may be achievable. Failing this, the vessel's emergency response procedures would be implemented which may include an emergency anchoring event following a check of the relevant nautical charts to ensure the deployment of the anchor will not lead to other risks (such as anchor snagging on a subsea cable), or the use of thrusters (depending on availability and power supply).

13.11.4.6 Where the deployment of the anchor is not possible (e.g. for small craft), any project vessels on-site may be able to render assistance in liaison with the MCA and in line with SOLAS obligations (IMO, 1974). This response will be managed via HM Coastguard (HMCG) and marine coordination and depends on the type and capability of vessels on site. This would be particularly relevant for sailing vessels relying on metocean conditions for propulsion, noting if the vessel becomes adrift in proximity to a structure there may be limited time to render assistance.

13.11.4.7 Temporary marine lighting and marking will be implemented including the buoyed construction area in agreement with the NLB. Promulgation of information and marking on charts will ensure vessels can passage plan in advance to reduce risk by passing clear of the buoyed construction area. Safety zones of 50m in radius around structures will also be applied for during the construction phase up until the point of commissioning of Morven North (rising to 500m where active construction is ongoing).

13.11.4.8 Should an allision occur, the consequences will depend on multiple factors including the energy of the impact, structural integrity of the vessel and sea state at the time of the impact. Fishing vessels and recreational vessels are considered most vulnerable to the hazard given the potential for a non-steel construction. In such cases, the most likely consequences will be minor damage with the vessel able to resume passage and undertake a full inspection at the next port. As an unlikely worst case, the vessel could founder resulting in PLL and pollution. Project vessels may assist in the event of an allision under SOLAS obligation and the adherence to the ERCoP, in line with the MCA. If pollution were to occur, then the MPCP will be implemented to reduce the environmental risk.

13.11.4.9 Relevant embedded mitigation measures include DSLP approval, adherence to a MPCP, adherence to an LMP and AtoNMP, adherence to an NSPVMP, promulgation of information, application for safety zones, adherence to an ERCoP, guard vessels where required by risk assessment and appropriate marking via construction buoyage as well as on nautical charts.

Frequency of occurrence

13.11.4.10 The frequency of occurrence in relation to vessel to structure allision risk during the construction phase is considered to be Extremely Unlikely.

Severity of consequence

13.11.4.11 The severity of consequence in relation to vessel to structure allision risk during the construction phase is considered to be Moderate.

Significance of effect

13.11.4.12 Taking the frequency of occurrence as extremely unlikely and the severity of consequence as moderate, the overall effect of vessel to structure allision risk during construction of Morven North is considered to be **broadly acceptable**.

13.11.4.13 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Broadly Acceptable and Not Significant** in EIA terms.

13.11.4.14 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

Operations and maintenance phase

Powered allision risk

13.11.4.15 Presence of structures within the Morven North Boundary will lead to creation of powered, drifting and internal allision risk for vessels during the O&M phase.

13.11.4.16 The spatial extent of the hazard is small given that a vessel must be in close proximity to an OWF structure for an allision incident to occur. Each allision element is considered in turn in terms of frequency of occurrence and severity of consequence, with the resulting significance of the residual risk across the various elements summarised at the end of the assessment. The forms of allision considered include:

- Powered allision risk;
- Drifting allision risk;
- Internal allision risk.

13.11.4.17 The base case annual powered vessel to structure allision frequency (see Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment) was estimated to be 1.69×10^{-3}, corresponding to a return period of one every 591 years. This rises to an estimate of 2.03×10^{-3} for a future case growth of 20% in vessel traffic, corresponding to a return period of one every 492 years. This is reflective of the volume of traffic passing at the minimum mean distance of 1nm from the Morven North Boundary. It is also considered a conservative result given the bridge-linked OSP (modelled as a singular structure) was modelled on the northeast perimeter of the Morven North Boundary and subsequently provided the highest allision risk of all structures.

13.11.4.18 Based on historical incident data, there have been two reported instances of a third-party vessel alliding with an operational OWF structure in the UK (in the Irish Sea and Southern North Sea). Both of these incidents involved a fishing vessel. These allisions resulted in minor to moderate damage to the vessels with minor injury to crew members.

13.11.4.19 Marine lighting and marking will be implemented in agreement with the NLB and defined within the LMP and AtoNMP. Promulgation of information and marking on charts will ensure vessels can passage plan in advance to reduce risk.

13.11.4.20 Should an allision occur, the consequences will depend on multiple factors as discussed in relation to the equivalent construction phase hazard. Fishing vessels and recreational vessels are considered most vulnerable to the hazard and in such cases, the most likely consequences will be minor damage with the vessel able to resume passage and undertake a full inspection at the next port. As an unlikely worst case, the vessel could founder resulting in PLL and pollution. Project vessels may assist in the event of an allision under SOLAS obligations and the adherence to the ERCoP, in liaison with the MCA. If pollution were to occur, then the MPCP will be implemented to reduce the environmental risk.

13.11.4.21 Relevant embedded mitigation measures include DSLP approval, adherence to a MPCP, adherence to an LMP and AtoNMP, adherence to an NSPVMP, promulgation of information, application for safety zones, adherence to an ERCoP and marking on nautical charts.

Frequency of occurrence

13.11.4.22 The frequency of occurrence in relation to powered vessel to structure allision risk during the O&M phase is considered to be Remote.

Severity of consequence

13.11.4.23 The severity of consequence in relation to powered vessel to structure allision risk during the O&M phase is considered to be Moderate.

Significance of effect

13.11.4.24 Taking the frequency of occurrence as remote and the severity of consequence as moderate, the overall effect of powered vessel to structure allision risk during O&M of Morven North is considered to be **tolerable with mitigation**.

13.11.4.25 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Tolerable with Mitigation and Not Significant** in EIA terms.

13.11.4.26 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

Drifting allision risk

13.11.4.27 The base case annual drifting vessel to structure allision frequency (see Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment) was estimated to be 1.53×10^{-4}, corresponding to a return period of one every 6,526 years. This rises to an estimate of 1.84×10^{-4} for a future case growth of 20% in vessel traffic, corresponding to a return period of one every 5,428 years. This is reflective of the volume of traffic passing at the minimum mean distance of 1nm from the Morven North Boundary and the need for a vessel to become adrift prior to a drifting allision event occurring.

13.11.4.28 Based on historical incident data, there have been no instances of a third-party vessel alliding with an operational OWF structure whilst Not Under Command (NUC). However, there is considered to be potential for a vessel to be adrift; this is reflected in the RNLI incident data reviewed in proximity to the Morven North Boundary which indicates that machinery failure is the most common incident type.

13.11.4.29 In circumstances where a vessel drifts towards a structure in the Morven North Boundary, powered vessels may be able to regain power prior to reaching Morven North (by rectifying any fault). Failing this, the vessel's emergency response procedures would be implemented which may include an emergency anchoring event or the use of thrusters (depending on availability and power supply).

13.11.4.30 Where the deployment of the anchor is not possible (e.g. for small craft), any project vessels on-site may be able to render assistance in liaison with the MCA and in line with SOLAS obligations (IMO, 1974). This response will be managed via HMCG and marine coordination and depends on the type and capability of vessels on site. This would be particularly relevant for sailing vessels relying on metocean conditions for propulsion, noting if the vessel becomes adrift in proximity to a structure there may be limited time to render assistance.

13.11.4.31 Should an allision occur, the consequences will be similar to those noted for the equivalent construction phase hazard including the unlikely worst-case of foundering, PLL 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. Project vessels may assist in the event of an allision under SOLAS (IMO, 19742) obligation and the adherence to the ERCoP, in line with the MCA. Additionally, a drifting vessel is likely to transit at a reduced speed compared to a powered vessel, thus reducing the energy of the impact, including in the case of a recreational vessel under sail.

13.11.4.32 Relevant embedded mitigation measures include adherence to an ERCoP, adherence to an MPCP and project vessel compliance with SOLAS (IMO, 1974).

Frequency of occurrence

13.11.4.33 The frequency of occurrence in relation to drifting vessel to structure allision risk during the O&M phase is considered to be Extremely Unlikely.

Severity of consequence

13.11.4.34 The severity of consequence in relation to drifting vessel to structure allision risk during the O&M phase is considered to be Moderate.

Significance of effect

13.11.4.35 Taking the frequency of occurrence as extremely unlikely and the severity of consequence as moderate, the overall effect of drifting vessel to structure allision risk during O&M of Morven North is considered to be **broadly acceptable**.

13.11.4.36 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Broadly Acceptable and Not Significant** in EIA terms.

13.11.4.37 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

Internal allision risk

13.11.4.38 Based on experience at existing operational OWFs, it is anticipated that commercial vessels will be unlikely to navigate internally within the Morven North Boundary. Fishing and recreational vessels may be more likely to transit through the array area noting they may choose not to depending on various conditions. Additionally, the RYA Scotland indicated that the absence of commercial traffic may increase the likelihood of internal navigation (see Section 13.4).

13.11.4.39 The base case fishing vessel to structure allision frequency (see Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment) is estimated to be 3.60×10^{-3}, corresponding to a return period of approximately one in 277 years. This rises to an estimate of 4.32×10^{-3} for a future case growth of 20% in vessel traffic, corresponding to a return period of one every 231 years. This return period is reflective of the volume of fishing vessel traffic in the Morven North Shipping and Navigation Study Area, both in transit and engaged in active fishing. Conservative modelling has been undertaken with the assumption that fishing levels in proximity to the wind farm structures will not change. In reality, as discussed within the equivalent construction phase hazard, fishing vessels will account for the presence of the structures and may choose to transit or fish elsewhere (noting this aligns with consultation input from Table 13.3).

13.11.4.40 The worst-case consequences reported for vessels involved in an allision incident involving a UK OWF has been flooding, with no life-threatening injuries to persons reported. If an allision incident were to occur, project vessels may assist under obligation of SOLAS (IMO, 1974) and adherence to

the ERCoP in liaison with the MCA. Additionally, if pollution occurs as a result of an allision incident, the MPCP would be implemented where appropriate.

13.11.4.41 If a vessel chooses to transit within the Morven North Boundary, the minimum spacing of 1,000m between wind farm structures is considered sufficient for safe internal navigation. Furthermore, operational lighting and marking and marking on nautical charts provide mitigation against internal allision risk. Any vessel planning to transit through the Morven North Boundary is expected to passage plan in advance in accordance with SOLAS Chapter V (IMO, 1974) and promulgation of information will ensure that vessels have good awareness of Morven North.

13.11.4.42 Should bridge links be used between OSPs then there is an additional allision risk should a vessel choose to navigate under the bridge link and between OSPs. A height of 14m above HAT would pose a danger for such vessels. However, given the maximum separation of 100m between OSPs joined by a bridge link it is considered highly unlikely that a vessel would choose to navigate under a bridge link, particularly given the spacing of structures across the Morven North Boundary which allow for alternative passages. Additionally, the specific lighting and marking requirements for bridge links will be agreed with NLB to ensure that allision risk for vessels (including project vessels and recreational vessels) is reduced.

13.11.4.43 Should a recreational vessel under sail enter the proximity of a wind turbine, there is also potential for effects such as wind shear, masking and turbulence to occur. As noted in the equivalent construction phase hazard, from previous studies of offshore wind developments, it has been concluded that wind turbines do reduce wind velocity downwind of a wind turbine (MCA, 2022) but that no negative effects on recreational craft have been reported on the basis of the limited spatial extent of the effect and its similarity to that experienced when passing a large vessel or close to other large structures or the coastline. In addition, no practical issues have been raised by recreational users to date when operating in proximity to existing offshore wind developments.

13.11.4.44 As noted within the Hazard Workshop, due to the distance offshore of the Morven North Boundary there may be an effect of fatigue for recreational users. The operational lighting and marking will be particularly important in such circumstances to ensure recreational users are aware of the presence of Morven North. It is also expected that recreational users on long sailings will ensure there is sufficient manning to avoid the effects of fatigue influencing safe navigation.

13.11.4.45 Relevant embedded mitigation measures include application for safety zones, DSLP approval, adherence to an LMP and AtoNMP, marking on nautical charts, promulgation of information, adherence to an ERCoP and adherence to an MPCP.

Frequency of occurrence

13.11.4.46 The frequency of occurrence of internal vessel to structure allision risk during the O&M phase is considered to be Extremely Unlikely.

Severity of consequence

13.11.4.47 The severity of consequence of internal vessel to structure allision risk during the O&M phase is considered to be Moderate.

Significance of effect

13.11.4.48 Taking the frequency of occurrence as extremely unlikely and the severity of consequence as moderate, the overall effect of internal vessel to structure allision risk during O&M of Morven North is considered to be **broadly acceptable**.

13.11.4.49 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Broadly Acceptable and Not Significant** in EIA terms.

13.11.4.50 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

Decommissioning phase

13.11.4.51 It is likely that allision risk during decommissioning will be similar to that observed for the construction phase, noting similar scenarios on-site, including partially removed structures within a buoyed decommissioning area. On this basis the same assumptions made for the equivalent construction phase hazard in terms of frequency and consequence apply.

Frequency of occurrence

13.11.4.52 The frequency of occurrence in relation to vessel to structure allision risk during the decommissioning phase is considered to be Extremely Unlikely.

Severity of consequence

13.11.4.53 The severity of consequence in relation to vessel to structure allision risk during the decommissioning phase is considered to be Moderate.

Significance of effect

13.11.4.54 Taking the frequency of occurrence as extremely unlikely and the severity of consequence as moderate, the overall effect of vessel to structure allision risk during decommissioning of Morven North is considered to be **broadly acceptable**.

13.11.4.55 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Broadly Acceptable and Not Significant** in EIA terms.

13.11.4.56 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

13.11.5 Reduced access to local ports and harbours

Construction phase

13.11.5.1 Up to 1,149 vessel movements made by construction vessels (excluding site preparation activities) 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 and designated routes to and from construction ports. Project vessels will also carry AIS and be compliant with flag state regulations including the COLREGs (IMO 1972/77).

13.11.5.2 The closest port or harbour to Morven North is Aberdeen, located approximately 34nm to the northwest. Given the relative distance to ports in the area and the anticipated deviations for the main commercial routes, it is not anticipated that there will be any substantial effect on vessel approaches to and from the local ports beyond the deviations already outlined for impacts on vessel displacement.

13.11.5.3 No concerns were raised during consultation over access to ports during the construction phase in relation to Morven North. However, it is acknowledged that future towage activities relating to rigs and/or floating turbines related to nearby offshore wind farm projects could be affected by the presence of the Morven North Boundary and project vessels for Morven North. It is anticipated that where such activities occur concurrently that marine coordination between the activities will be implemented to ensure the towage activity is not adversely impacted by the activities for Morven North.

13.11.5.4 The most likely consequences are increased journey times and distances, as per the vessel displacement hazard. As there are no pilot boarding stations in the vicinity of Morven North, no effect is anticipated on port related services such as pilotage.

13.11.5.5 Relevant embedded mitigation measures include clear buoyage of the construction area, adherence to an LMP and AtoNMP, adherence to an NSPVMP, marine coordination of project vessels, marking on nautical charts and promulgation of information. These mitigation measures will be particularly relevant for coordination between project vessel activities and third-party towage operations.

Frequency of occurrence

13.11.5.6 The frequency of the risk of reduced access to local ports and harbours during the construction phase is considered to be Remote.

Severity of consequence

13.11.5.7 The severity of consequence of the risk of reduced access to local ports and harbours during the construction phase is considered to be Minor.

Significance of effect

13.11.5.8 Taking the frequency of occurrence as remote and the severity of consequence as minor, the overall effect of reduced port access during construction of Morven North is considered to be **broadly acceptable**.

13.11.5.9 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Broadly Acceptable and Not Significant** in EIA terms.

13.11.5.10 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

Operations and maintenance phase

13.11.5.11 The presence of structures as well as increased vessel activity and personnel numbers may reduce emergency response capabilities during the O&M phase of Morven South by increasing the number of incidents, increasing consequences or reducing access for the responders.

13.11.5.12 The spatial extent of this hazard is large given the area covered by Morven North (149nm^2), as well as the distance covered by air-based SAR support (the SAR helicopter base is located at Inverness, 104nm northwest of the Morven North Boundary). It is unlikely that a SAR operation will require the entirety of the Morven North Boundary to be searched and it is probable that a search will be restricted to a smaller area in which a casualty is known to be located (accounting for assumptions on any potential drift of the casualty).

13.11.5.13 Up to 293 vessel movements annually by O&M vessels may be made throughout the O&M phase, which 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 Morven North Boundary and designated routes to and from the base port. Project vessels will also carry AIS and be compliant with flag state regulations including the COLREGs (IMO 1972/77).

13.11.5.14 As discussed in the baseline description and equivalent construction phase hazard, the closest port or harbour is Aberdeen, located approximately 34nm to the northwest. Given the relative distance to ports in the area and the anticipated deviations for the main commercial routes, it is not anticipated that there will be any substantial effect on vessel approaches to and from the local ports beyond the deviations already outlined for impacts on vessel displacement. However, it is acknowledged that future towage activities relating to rigs and/or floating turbines related to nearby

offshore wind farm projects could be affected by the presence of the Morven North Boundary and project vessels for Morven North. It is anticipated that where such activities occur concurrently that marine coordination between the activities will be implemented to ensure the towage activity is not adversely impacted by the activities for Morven North.

13.11.5.15 The most likely consequences are increased journey times and distances, as per the vessel displacement hazard. As there are no pilot boarding stations in the vicinity of Morven North, no effect is anticipated on port related services such as pilotage.

13.11.5.16 Relevant embedded mitigation measures include adherence to an LMP and AtoNMP, adherence to an NSPVMP, marine coordination of project vessels, marking on nautical charts and promulgation of information. These mitigation measures will be particularly relevant for coordination between project vessel activities and third-party towage operations.

Frequency of occurrence

13.11.5.17 The frequency of the risk of reduced access to local ports and harbours during the O&M phase is considered to be Remote.

Severity of consequence

13.11.5.18 The severity of consequence of the risk of reduced access to local ports and harbours during the O&M phase is considered to be Minor.

Significance of effect

13.11.5.19 Taking the frequency of occurrence as remote and the severity of consequence as minor, the overall effect of reduced port access during O&M of Morven North is considered to be **broadly acceptable**.

13.11.5.20 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Broadly Acceptable and Not Significant** in EIA terms.

13.11.5.21 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

Decommissioning phase

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

13.11.5.23 Since the methods used to remove structures and subsea cables are expected to be similar to those used to install them, this hazard is expected to be similar in nature to the equivalent construction phase, including the number of vessel movements by decommissioning vessels. It is noted that in the case of subsea cables it is expected that they will be left in situ but for the purposes of this assessment (as a worst-case) it has been assumed that all cables will be removed during decommissioning, with only cable protection left in situ.

13.11.5.24 As with the construction stage, it is not yet known from which port(s) decommissioning activity will be based for Morven North.

13.11.5.25 On this basis the same assumptions made for the equivalent construction phase hazard in terms of frequency and consequence apply.

Frequency of occurrence

13.11.5.26 The frequency of the risk of reduced access to local ports and harbours during the decommissioning phase is considered to be Remote.

Severity of consequence

13.11.5.27 The severity of consequence of the risk of reduced access to local ports and harbours during the decommissioning phase is considered to be Minor.

Significance of effect

13.11.5.28 Taking the frequency of occurrence as remote and the severity of consequence as minor, the overall effect of reduced port access during decommissioning of Morven North is considered to be **broadly acceptable**.

13.11.5.29 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Broadly Acceptable and Not Significant** in EIA terms.

13.11.5.30 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

13.11.6 Reduction of under keel clearance as a result of subsea infrastructure

Operations and maintenance phase

13.11.6.1 The presence of subsea cables and associated protection may reduce under keel clearance during the O&M phase of Morven North.

13.11.6.2 The target minimum burial depth for all subsea cables is 0.5m, noting actual burial depth will be determined via the CBRA process which will be undertaken post consent.

13.11.6.3 Where burial is not feasible, cable protection may be used instead, which again will be determined by the CBRA. In line with MGN 654, any reduction in water depth which exceeds 5% will be discussed with the MCA to determine if additional mitigation is necessary. This aligns with the RYA's recommendation that the "minimum safe under keel clearance over submerged structures and associated infrastructure should be determined in accordance with the methodology set out in MGN 543 [since superseded by MGN 654]" (RYA, 2019).

13.11.6.4 Given that depths within the Morven North Boundary range between 62m to 75m below LAT and that the maximum draught recorded within the vessel traffic surveys was 13.8m (see Section 10.2.4 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment), it is not anticipated that subsea cable protection will reduce water depths over the 5% threshold. No specific concerns from stakeholders were raised during consultation including the Hazard Workshop, with MGN 654 compliance considered suitable to manage the impact, noting that only small craft are expected to navigate internally within the Morven North Boundary.

13.11.6.5 Based on expert opinion, in the event of an underwater allision, the most likely consequence is minor damage. The unlikely worst-case consequence may be vessel foundering resulting in PLL and pollution, although this is considered highly improbable. Implementation of the MPCP will mitigate against pollution, whilst adherence to an ERCoP as well as operating under the obligations of SOLAS (IMO, 1974) will mitigate against the risk of PLL.

Frequency of occurrence

13.11.6.6 The frequency of occurrence of the risk of reduced under keel clearance due to the presence of subsea cables during O&M is considered Negligible.

Severity of consequence

13.11.6.7 The severity of consequence of the risk of reduced under keel clearance due to the presence of subsea cables during O&M is considered to be Minor.

Significance of effect

13.11.6.8 Taking the frequency of occurrence as negligible and the severity of consequence as minor, the overall effect of reduced under keel clearance due to subsea cables during O&M of Morven North is considered to be **broadly acceptable**.

13.11.6.9 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Broadly Acceptable and Not Significant** in EIA terms.

13.11.6.10 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

13.11.7 Anchor and fishing gear interaction with subsea cables

Operations and maintenance phase

13.11.7.1 The presence of subsea cables within the Morven North Boundary may increase the risk of anchor and fishing gear interaction.

13.11.7.2 The spatial extent of the hazard is small given that a vessel must be in close proximity to an inter-array cable for an interaction to occur.

13.11.7.3 There are three anchoring scenarios which are considered for this hazard:

- Planned anchoring – most likely as a vessel awaits a berth to enter port but may also result from adverse weather conditions, machinery failure or subsea operations;
- Unplanned anchoring – generally resulting from an emergency situation where the vessel has experienced steering failure;
- Anchor dragging – caused by anchor failure.

13.11.7.4 Although the second of these scenarios may involve limited decision-making time if drifting towards a hazard, in all three scenarios it is anticipated that the charting of infrastructure including the subsea cables will inform the decision to anchor, as per Regulation 34 of SOLAS (IMO, 1974).

13.11.7.5 No anchored vessels were observed within the Morven North Shipping and Navigation Study Area during the survey periods. Risk of interaction with an inter-array cable on a planned anchoring or dragged anchoring basis is therefore anticipated to be extremely low. In terms of emergency anchoring, any areas of high traffic volume are likely to represent the areas of highest risk, particularly where there are hazards nearby (for example, structures, rocks, shallows). However, given the relatively few hazards in proximity to the Morven North Boundary, as well as the water depths, the likelihood of this scenario arising is very low.

13.11.7.6 The likelihood of anchor interaction with a subsea cable is further reduced by the burial of the cables and use of external cable protection where required, which will be informed by the CBRA process, noting this will account for traffic volumes and vessel sizes. Moreover, with all subsea cables located within the Morven North Boundary, there is a limited pathway through which commercial vessels may be subject to this hazard.

13.11.7.7 Should an anchor interaction occur, the most likely consequence is no damage to the cable or anchor, based on previous anchor interaction incidents. As an unlikely worst-case consequence, a snagging incident could occur and the vessel's anchor as well as the cable could be damaged, resulting in a loss of stability noting this would only occur for a smaller vessel which would be less likely to penetrate deeper into the seabed than a larger vessel.

13.11.7.8 There is also a risk that fishing gear may interact with subsea cables. It is the responsibility of the fishermen to dynamically risk assess whether it is safe to undertake fishing activities within the

Morven North Boundary 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 subsea cables. From vessel traffic data, the majority of fishing vessels (including those likely actively fishing but outside the Morven North Boundary) were potters, which are of limited concern to subsea cables. In addition, the presence of subsea cables and the wind farm structures may mean that trawling is less likely within the Morven North Boundary. In the event of a fishing gear interaction, the consequences would likely consist of loss of gear, or as an unlikely worst-case could include loss of stability.

13.11.7.9 Relevant embedded mitigation measures include promulgation of information, marking on nautical charts, adherence to a CBRA and vessel compliance with MGN 654 (MCA, 2021).

Frequency of occurrence

13.11.7.10 The frequency of occurrence relating to the risk of anchor and fishing gear interaction with subsea cables during O&M is considered to be Extremely Unlikely.

Severity of consequence

13.11.7.11 The severity of consequence relating to the risk of anchor and fishing gear interaction with subsea cables during O&M is considered to be Moderate.

Significance of effect

13.11.7.12 Taking the frequency of occurrence as extremely unlikely and the severity of consequence as moderate, the overall effect of anchor and fishing gear interaction with subsea cables during O&M of Morven North is considered to be **broadly acceptable**.

13.11.7.13 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Broadly Acceptable and Not Significant** in EIA terms.

13.11.7.14 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

13.11.8 Reduction of Search and Rescue capability

Operations and maintenance phase

13.11.8.1 The presence of structures as well as increased vessel activity and personnel numbers may reduce emergency response capabilities during the O&M phase of Morven North by increasing the number of incidents, increasing consequences or reducing access for the responders.

13.11.8.2 The spatial extent of this hazard is large given the area covered by Morven North (149nm^2), as well as the distance covered by air-based SAR support (the SAR helicopter base is located at Inverness, 104nm northwest of the Morven North Boundary). It is unlikely that a SAR operation will require the entirety of the Morven North Boundary to be searched and it is probable that a search will be restricted to a smaller area in which a casualty is known to be located (accounting for assumptions on any potential drift of the casualty).

13.11.8.3 Up to 293 vessel movements may be made annually by maintenance vessels during the O&M phase of Morven North. It is assumed that maintenance vessels will be on-site throughout the majority of the O&M phase, although severe weather may lead to vessels being withdrawn. The presence of these vessels increase the likelihood of an incident and subsequently increase the likelihood of multiple incidents occurring simultaneously, diminishing emergency response capability. However, they may also be able to provide additional response resource in the event of an incident in liaison with the MCA.

13.11.8.4 The most likely consequence to occur would be a delay to any emergency response request. As an unlikely worst-case, this could result in a failure of emergency response to an incident resulting in PLL and pollution. However, project vessels will be managed via marine coordination and comply with flag state regulations which will reduce this risk. Additionally, the presence of project vessels themselves may mitigate this risk as they may assist at incidents involving other project vessels under the obligation of SOLAS (IMO, 1974) and adherence to an ERCoP, noting this would be undertaken with liaison with the MCA. The MPCP will also be implemented should pollution occur.

13.11.8.5 From recent SAR data, there was a single SAR tasking recorded throughout the nine-year period from April 2015 to March 2024 within the Morven North Shipping and Navigation Study Area, at its southern perimeter. The frequency of incidents in proximity to Morven North is not anticipated to increase significantly from the current level given the measures noted above which will be in place.

13.11.8.6 The layout will be agreed with the MCA and in line with MGN 654 requirements to ensure any SAR operations that do occur within the Morven North Boundary are facilitated. The Morven North indicative worst-case layout includes a ringroad Helicopter Refuge Area between the dense perimeter and internal grid to assist with SAR access, noting that the specific (final) layout taken forward will be agreed post consent. A SAR checklist will also be completed and agreed with the MCA as required under MGN 654.

13.11.8.7 Relevant embedded mitigation measures include DSLP approval, promulgation of information, adherence to an LMP and AtoNMP, marking on appropriate charts, marine coordination of project vessels, adherence to an ERCoP, adherence to an MPCP, adherence to an NSPVMP and compliance with MGN 654 and international marine regulations.

Frequency of occurrence

13.11.8.8 The frequency of occurrence relating to the risk of reduced emergency response capabilities during the O&M phase is considered to be Extremely Unlikely.

Severity of consequence

13.11.8.9 The severity of consequence relating to the risk of reduced emergency response capabilities during the O&M phase is considered to be Serious.

Significance of effect

13.11.8.10 Taking the frequency of occurrence as extremely unlikely and the severity of consequence as serious, the overall effect of reduced emergency response capability during O&M of Morven North is considered to be **tolerable with mitigation**.

13.11.8.11 The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore **Tolerable with Mitigation and Not Significant** in EIA terms.

13.11.8.12 No additional mitigation measures for shipping and navigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.13), is not significant in EIA terms.

13.11.9 Proposed monitoring

13.11.9.1 No shipping and navigation monitoring to test the predictions made within the assessment of likely significant effects on shipping and navigation is considered necessary.

13.12 Whole project and cumulative effects assessment methodology

13.12.1 Methodology

13.12.1.1 The Morven Programme comprises four distinct projects: Morven North, Morven South, Morven Hawthorn Pit Grid Connection Project (hereafter 'MHPGC Project'), and Morven Branxton Area Grid Connection Project (hereafter 'MBAGC Project'). As there is no clear impact pathway for the MHPGC Project and MBAGC Project, these are screened out of the CEA. Therefore, a whole project assessment covering Morven North together with each grid connection project in turn is not considered necessary. The CEA will therefore cover Scenarios 2, 3a, 3c and 4 (as defined below).

13.12.1.2 The following assessment scenarios have been considered to identify the likely significant effects of Morven North in combination with other plans and projects on the same receptor, as follows (and summarised in Table 13.14):

- Scenario 2: to identify the likely significant effects associated with Morven North and Morven South (the Morven Site);
- Scenario 3a: to identify the likely significant effects associated with Morven North and Tier 1 developments;
- Scenario 3c: to identify the likely significant effects associated with Morven North, Morven South and Tier 1 developments;
- Scenario 4: to identify the likely significant effects associated with Morven North, Morven South, Tier 1 developments and Tier 2 developments.

13.12.1.3 In contrast with the above, Scenario 1a assesses the likely significant effects associated with Morven North in isolation and is included in Section 13.11. Scenario 1b assesses the likely significant effects associated with Morven South in isolation with Scenario 3b assessing those associated with Morven South and Tier 1 developments. Both Scenarios 1b and 3b are included in Volume 2, Chapter 13: Shipping and Navigation, of the Morven South EIA Report.

13.12.1.4 The CEA has been undertaken in accordance with the methodology described in Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment, noting that this differs from the standard EIA approach. The maximum distance within which developments are considered for the CEA is 50nm from the Morven Site (the 'Cumulative Shipping and Navigation Study Area') on the basis that there is not considered to be a direct pathway between Morven North and any development beyond 50nm from the Morven Site. This distance is standard within shipping and navigation CEAs and provides a good overview of cumulative traffic patterns.

Table 13.14: Scenarios to be considered in the Morven North Cumulative Effects Assessment for shipping and navigation

Cumulative effects assessment			
Scenario 2	**Scenario 3a**	**Scenario 3c**	**Scenario 4**
Morven North + Morven South	Morven North + Tier 1 cumulative developments	Morven North + Morven South + Tier 1 cumulative developments	Morven North + Morven South + Tier 1 cumulative developments + Tier 2 cumulative developments

13.12.1.5 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, Annex 13.1: Shipping and Navigation Shared Navigational Risk 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.

13.12.1.6 In undertaking the CEA for Morven North, 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 likelihood of ultimately contributing to a cumulative effect alongside Morven North. Therefore, a tiered approach has been adopted, whereby all third-party projects and plans considered have been allocated into 'tiers' reflecting their current stage within the planning and development process. This provides a framework for placing relative weight upon the potential for each project/plan included in the CEA to ultimately be realised, based upon the project/plan's current stage of maturity and certainty in the project/plan's parameters. The tiered approach utilised within the Morven North CEA employs the following tiers as summarised in Table 13.15 below:

Table 13.15: Cumulative development screening summary[2]

Tier	Minimum Development Status[3]	Criterion	Data Confidence Level	Level of Cumulative Risk Assessment
Baseline	Under construction or operational	• Existing development	High	Incorporated in the quantitative review of commercial vessel routeing for all scenarios (starting from Scenario 1). These developments are considered as part of the baseline characterisation in Section 13.7.1

[2] Note that development status is the minimum to be considered for each Tier, with the primary factor for consideration being the criterion descriptors.

[3] Pre-scoping' indicates that a development has not yet produced a Scoping report detailing an initial outlook at all relevant receptors;

- 'Scoped' indicates that a development has produced a Scoping report;
- 'Under determination' indicates that the application for a development has been submitted, with the outcome pending;
- 'Consented' indicates that a development has been consented but does not have a Contract for Difference (CfD) secured;
- 'Under construction' indicates that offshore construction was ongoing at the time of the baseline being established and a buoyed construction area is present;
- 'Operational' indicates that a buoyed construction area has been removed, and that the development has begun exporting electricity.

Tier	Minimum Development Status[3]	Criterion	Data Confidence Level	Level of Cumulative Risk Assessment
Tier 1	Consented or under determination	• May impact a main commercial route passing within 1nm of the Morven Site. • Raised as having possible cumulative effect during consultation. *OWFs:* • Up to 50nm from the Morven Site. *Sub-sea cables:* • Up to 2nm from the Morven Site.	High or medium	Incorporated in the qualitative review of commercial traffic routeing at the first cumulative level (Scenario 3).
Tier 2	Scoped	• May impact a main commercial route passing within 1nm of the Morven Site. *OWFs:* • Up to 50nm from the Morven Site. *Sub-sea cables:* • Up to 2nm from the Morven Site.	High or medium	Incorporated in the qualitative review of commercial traffic routeing at the second cumulative level (Scenario 4).

Tier	Minimum Development Status[3]	Criterion	Data Confidence Level	Level of Cumulative Risk Assessment
Tier 3	Pre-scoping	• Does not impact a main commercial route passing within 1nm of the Morven Site. *OWFs:* • Further than 50nm from the Morven Site. *Sub-sea cables:* • Further than 2nm from the Morven Site.	Low	Screened out

13.12.1.7 Development status provided is the minimum to be considered for each Tier, with the criterion descriptors the primary factor (see Table 13.15). Therefore, even in instances where a development is at the minimum threshold for being in a specific tier based on development status, due to other factors (such as distance from Morven North or influence on routes in the area) there is the possibility that they are not considered within that tier.

13.12.1.8 The specific projects and plans scoped into the CEA for shipping and navigation are outlined in Table 13.16.

13.12.1.9 The potential impacts that have been considered in the CEA (listed in Table 13.17) are a subset of those considered for the Morven North alone assessment. This is because some of the potential impacts identified and assessed for the Morven North alone assessment are localised and temporary in nature or have been assessed to have negligible effect significance. In combination with consultation feedback, it is therefore considered that these potential impacts have limited or no potential to interact with similar changes associated with other plans or projects that are not immediately adjacent. These have therefore been scoped out of the relevant CEA scenarios. These impacts are:

- Reduction of under-keel clearance;
- Anchor and fishing gear interactions with subsea cables.

13.12.1.10 Similarly, some of the potential impacts considered within the Morven North alone assessment are specific to a particular phase of development (e.g. construction, O&M or decommissioning). Where cumulative effects with other plans or projects only have potential to occur where there is spatial or temporal overlap with Morven North during certain phases of development, these phases only have been considered.

13.12.1.11 It is noted that Seagreen 1A has been screened out despite being located within 50nm of Morven North. This is due to its location relative to Morven North – being part of the wider Seagreen project and located on the far side of Seagreen relative to Morven North reduces any additional effect anticipated for shipping and navigation users already affected. No concerns were raised during the Hazard Workshop on cumulative impacts from Seagreen 1A.

Table 13.16: List of other projects and plans considered within the Cumulative Effects Assessment for shipping and navigation

Project/plan	Status	Distance from Morven North (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Temporal construction overlap with Morven North
Tier 1						
Morven South	Application submitted/awaiting decision	0	Proposed for up to 95 turbines with a capacity of up to 1,500 Megawatt (MW).	2033-2042[4]	2043-	Yes
Ossian	Consent application submitted	9[5]	Proposed for up to 3,610MW capacity.	2029-2038	2039-	Yes
Bowdun	Scoped	10	Proposed for up to 60 turbines at a capacity of 1,008MW.	2029-2033	2034-	Yes
INTOG: Salamander	Consent application submitted	75	Proposed for up to 100MW.	2028	2029-	No
Tier 2						
Eastern Green Link 2	Consented	0	Transmission infrastructure	2025-2029	2030-	No

[4] Construction dates of Morven South are not currently known, but this will last for a total of five years. However, for the purposes of the assessment it has been assumed that construction for Morven South will commence in 2033 and have a duration of ten years, noting that due to the flexibility in construction order between Morven North and Morven South, Morven South will be built between 2033 and 2042 (as per the high-level indicative construction programme described in Volume 1, Chapter 3: Project Description).

[5] Despite proximity between Ossian and Morven North, feedback from the MCA (see Section 13.4) noted that use of sea space between Morven and Ossian is 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.

Project/plan	Status	Distance from Morven North (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Temporal construction overlap with Morven North
Eastern Green Link 3	In planning	5	Transmission infrastructure	2028-2033	2034-	Yes
Berwick Bank	Consented	32	Proposed for up to 307 turbines with a capacity of up to 4,100MW.	2025-2029	2030-	No
Bellrock	Scoped	37	Proposed for a capacity of 1,200MW.	2027-2030	2031-	No
Muir Mhòr OWF	Consent application submitted	58	Proposed for a capacity of 798MW.	2030-2033	2034-	Yes
Inch Cape OWF	Consented	61	Consented for up to 72 turbines at a capacity of 1,100MW.	2025-2026	2027-	No
INTOG: Flora	In planning	63	Proposed for up to 50MW.	TBD	TBD	TBD
INTOG: Cedar	In planning	89	Proposed for up to 1,008MW	2027	2028-	No

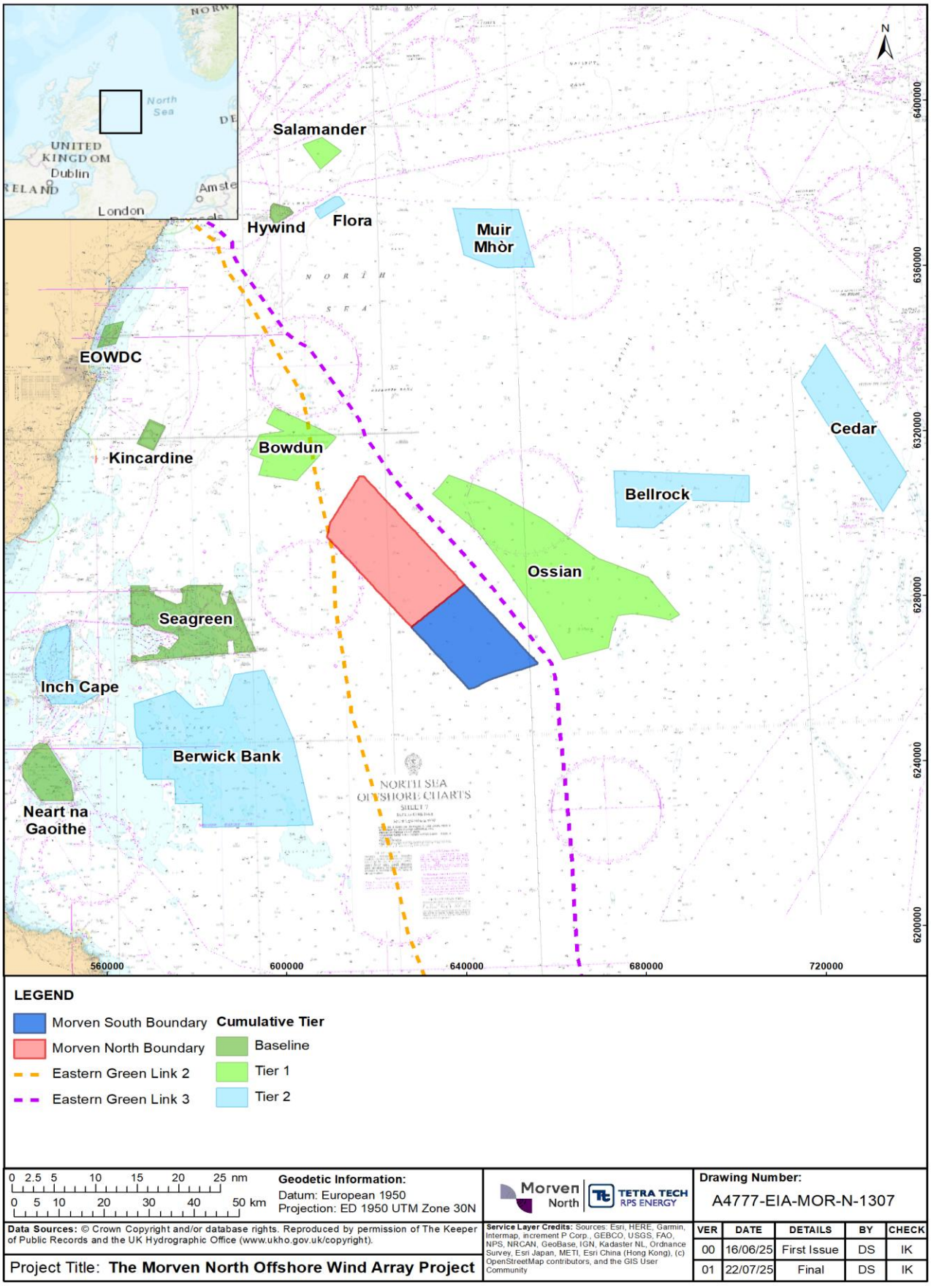

Figure 13.7: Other projects/plans screened into the Cumulative Effects Assessment for shipping and navigation

13.12.2 Maximum Design Scenario

13.12.2.1 The cumulative MDSs identified in Table 13.17 have been selected as those design scenarios having the potential to result in the greatest cumulative effect on an identified receptor or receptor group. The cumulative MDSs have been based on the Morven North alone assessment MDS (Table 13.12) and the Morven South alone assessment MDS, as well as publicly available information on other projects and plans that have been screened into the CEA (Table 13.16).

Table 13.17: Maximum Design Scenario considered for the assessment of likely significant cumulative effects on shipping and navigation

C= Construction, O= Operations and maintenance, D= Decommissioning phases

"✓" is used to denote the phase the potential impact can occur, "X" outlines there is no impact within this project phase

Potential Impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
Increased vessel to vessel collision risk resulting from displacement (third party to third party)	✓	✓	✓	**Scenario 2** MDS as described for Morven North (Table 13.12), with full build out of Morven South. Morven South MDS as follows: • Maximum extent of Morven South/buoyed construction area assuming full build out of Morven South Boundary; • 95 wind turbines and five OSPs within the Morven South Boundary; • Construction phase of up to five years; • Operational phase of up to 35 years; • 500m safety zones around active construction/major maintenance, 50m safety zones during pre-commissioning; • Up to 1,149 return trips per year from project vessels during construction/decommissioning, with up to 41 project vessels on site at any one time; • Up to 293 return trips per year from project vessel during O&M, with up to 15 total project vessels. **Scenario 3a** MDS as described for Morven North (Table 13.12), with full build out of all Tier 1 developments. **Scenario 3c**	The potential for and extent of likely significant cumulative effects will be greatest when, in addition to the MDS for Morven North, full build out of each development within the respective scenarios is actualised.

Potential Impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
				MDS as described for Morven North (Table 13.12), with full build out of Morven South (MDS as per Scenario 2) and all Tier 1 developments. **Scenario 4** MDS as described for Morven North (Table 13.12), with full build out of Morven South (MDS as per Scenario 2), all Tier 1 developments and all Tier 2 developments.	
Increased vessel to vessel collision risk resulting from displacement (third-party to project vessel)	✓	✓	✓	**Scenario 2** MDS as described for Morven North (Table 13.12), with full build out of Morven South. Morven South MDS as follows: • Maximum extent of Morven South/buoyed construction area assuming full build out of Morven South Boundary; • 95 wind turbines and five OSPs within the Morven South Boundary; • Construction phase of up to five years; • Operational phase of up to 35 years; • 500m safety zones around active construction/major maintenance, 50m safety zones during pre-commissioning; • Up to 1,149 return trips per year from project vessels during construction/decommissioning, with up to 41 project vessels on site at any one time; • Up to 293 return trips per year from project vessel during O&M, with up to 15 total project vessels. **Scenario 3a**	The potential for and extent of likely significant cumulative effects will be greatest when, in addition to the MDS for Morven North, full build out of each development within the respective scenarios is actualised.

Potential Impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
				MDS as described for Morven North (Table 13.12), with full build out of all Tier 1 developments. **Scenario 3c** MDS as described for Morven North (Table 13.12), with full build out of Morven South (MDS as per Scenario 2) and all Tier 1 developments. **Scenario 4** MDS as described for Morven North (Table 13.12), with full build out of Morven South (MDS as per Scenario 2), all Tier 1 developments and all Tier 2 developments.	
Vessel to structure allision risk	✓	✓	✓	**Scenario 2** MDS as described for Morven North (Table 13.12), with full build out of Morven South. Morven South MDS as follows: • Maximum extent of Morven South/buoyed construction area assuming full build out of Morven South; • 95 wind turbines and five OSPs within the Morven South Boundary; • Construction phase of up to five years; • Operational phase of up to 35 years; • 500m safety zones around active construction/major maintenance, 50m safety zones during pre-commissioning; • Wind turbine jacket leg diameter of 3.2m and jacket leg spacing of 40m; • OSP jacket leg diameter of 4.6m for HVAC / 5m for HVDC and jacket leg spacing of 50m for HVAC / 135m for HVDC;	The potential for and extent of likely significant cumulative effects will be greatest when, in addition to the MDS for Morven North, full build out of each development within the respective scenarios is actualised.

Potential Impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
				• Bridge-linked HVDC OSP with combined 580m x 180m topside; • Maximum bridge link length of 100m and height of 14m above HAT; • Minimum structure spacing of 1,000m. **Scenario 3a** MDS as described for Morven North (Table 13.12), with full build out of all Tier 1 developments. **Scenario 3c** MDS as described for Morven North (Table 13.12), with full build out of Morven South (MDS as per Scenario 2) and all Tier 1 developments. **Scenario 4** MDS as described for Morven North (Table 13.12), with full build out of Morven South (MDS as per Scenario 2), all Tier 1 developments and all Tier 2 developments.	
Reduced access to local ports and harbours	✓	✓	✓	**Scenario 2** MDS as described for Morven North (Table 13.12), with full build out of Morven South. Morven South MDS as follows: • Up to 1,149 return trips per year from project vessels during construction/decommissioning, with up to 41 project vessels on site at any one time; • Up to 293 return trips per year from project vessel during O&M, with up to 15 total project vessels. **Scenario 3a**	The potential for and extent of likely significant cumulative effects will be greatest when, in addition to the MDS for Morven North, full build out of each development within the respective scenarios is actualised.

Potential Impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
				MDS as described for Morven North (Table 13.12), with full build out of all Tier 1 developments. **Scenario 3c** MDS as described for Morven North (Table 13.12), with full build out of Morven South (MDS as per Scenario 2) and all Tier 1 developments. **Scenario 4** MDS as described for Morven North (Table 13.12), with full build out of Morven South (MDS as per Scenario 2), all Tier 1 developments and all Tier 2 developments.	
Reduction of under keel clearance as a result of subsea infrastructure	×	✓	×	**Scenario 2** MDS as described for Morven North (Table 13.12), with full build out of Morven South. Morven South MDS as follows: • Maximum extent of Morven South (i.e. full build out of Morven South); • 95 wind turbines and five OSPs within the Morven South Boundary; • Operational phase of up to 35 years; • 500m safety zones around active construction, 50m safety zones otherwise; • Up to 227nm (420km) of inter-array cables; • Maximum inter-array cable protection height of 3m, with 10% of the inter-array cables requiring protection; • Five inter-array crossings, with maximum crossing height of 4m;	The potential for and extent of likely significant cumulative effects will be greatest when, in addition to the MDS for Morven North, full build out of Morven South is actualised.

Potential Impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
				• Up to 143nm (264km) of interconnector cables; • Maximum interconnector cable protection height of 3m, with 10% of the interconnector cables requiring protection; • Five interconnector crossings, with maximum crossing height of 4m; • Minimum target burial depth for all cables of 0.5m.	
Anchor and fishing gear interaction with subsea cables	×	✓	×	**Scenario 2** MDS as described for Morven North (Table 13.12), with full build out of Morven South. Morven South MDS as follows: • Maximum extent of Morven South (i.e. full build out of Morven South); • 95 wind turbines and five OSPs within the Morven South Boundary; • Operational phase of up to 35 years; • 500m safety zones around active construction, 50m safety zones otherwise; • Up to 227nm (420km) of inter-array cables; • Maximum inter-array cable protection height of 3m, with 10% of the inter-array cables requiring protection; • Five inter-array crossings, with maximum crossing height of 4m; • Up to 143nm (264km) of interconnector cables;	The potential for and extent of likely significant cumulative effects will be greatest when, in addition to the MDS for Morven North, full build out of Morven South is actualised.

Potential Impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
				• Maximum interconnector cable protection height of 3m, with 10% of the interconnector cables requiring protection; • Five interconnector crossings, with maximum crossing height of 4m. • Minimum target burial depth for all cables of 0.5m.	
Reduction of SAR capability	×	✓	×	**Scenario 2** MDS as described for Morven North (Table 13.12), with full build out of Morven South. Morven South MDS as follows: • Maximum extent of Morven South (i.e. full build out of Morven South); • 95 wind turbines and five OSPs within the Morven South Boundary; • Minimum structure spacing of 1,000m; • Operational phase of up to 35 years; • Up to 227nm (420km) of inter-array cables; • Up to 143nm (264km) of interconnector cables; • Up to 293 return trips per year from project vessels during O&M, with up to 15 total project vessels. **Scenario 3a** MDS as described for Morven North (Table 13.12), with full build out of all Tier 1 developments. **Scenario 3c**	The potential for and extent of likely significant cumulative effects will be greatest when, in addition to the MDS for Morven North, full build out of each development within the respective scenarios is actualised.

Potential Impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
				MDS as described for Morven North (Table 13.12), with full build out of Morven South (MDS as per Scenario 2) and all Tier 1 developments. **Scenario 4** MDS as described for Morven North (Table 13.12), with full build out of Morven South (MDS as per Scenario 2), all Tier 1 developments and all Tier 2 developments.	

13.13 Cumulative effects assessment

13.13.1 Overview

13.13.1.1 A description of the significance of cumulative effects upon shipping and navigation receptors arising from each identified impact is given below. The Scenario 2 assessment for Morven North is presented in Table 13.18 to Table 13.24 (one for each impact), while the Scenario 3 and 4 assessment for Morven North is presented in Table 13.25 to Table 13.29 (one for each impact).

Vessel displacement and increased third-party vessel to vessel collision risk

13.13.1.2 There is potential for increased vessel displacement and increased third-party vessel to vessel collision risk as a result of Morven North's construction, O&M and decommissioning activities alongside other OWFs (including Morven South, Ossian, Bowdun, Bellrock, Berwick Bank, Cedar and Salamander) and subsea cables (including Eastern Green Link 2 and Eastern Green Link 3) within the Cumulative Shipping and Navigation Study Area. These activities include the presence of buoyed construction/decommissioning areas for Morven North and cumulative developments; presence of complete or partially complete surface structures for Morven North and cumulative developments; and project vessels involved with Morven North and cumulative developments which are RAM.

Third-party to project vessel collision risk

13.13.1.3 There is potential for increased third-party to project vessel collision risk as a result of Morven North's construction, O&M and decommissioning activities alongside other OWFs (e.g. Morven South, Ossian, Bowdun, Bellrock, Berwick Bank, Cedar and Salamander) and subsea cables (including Eastern Green Link 2 and Eastern Green Link 3) within the Cumulative Shipping and Navigation Study Area. These activities include project vessels involved with Morven North and cumulative developments in transit.

Vessel to structure allision risk

13.13.1.4 There is potential for increased vessel to structure allision risk as a result of Morven North's construction, O&M and decommissioning activities alongside other OWFs (including Morven South, Ossian and Bowdun) within the Cumulative Shipping and Navigation Study Area. These activities include the presence of complete or partially complete surface structures for Morven North and cumulative developments.

Reduced access to local ports and harbours

13.13.1.5 There is potential for reduced access to local ports and harbours as a result of Morven North's construction, O&M and decommissioning activities alongside other OWFs (including Morven South, Ossian, Bowdun, Bellrock, Berwick Bank, Cedar and Salamander) and subsea cables (including Eastern Green Link 2 and Eastern Green Link 3) within the Cumulative Shipping and Navigation Study Area. These activities include project vessels involved with Morven North and cumulative developments in close proximity to local ports and harbours; and shared construction/operations/decommissioning ports for Morven North and cumulative developments.

Reduction of under keel clearance as a result of subsea infrastructure

13.13.1.6 There is potential for reduction of under keel clearance as a result of Morven North's O&M activities alongside Morven South. These activities involve reduced depth due to cable protection associated with inter-array cables. Due to the localised nature of this impact it is applicable only for Scenario 2, with cumulative developments not expected to impact upon the reduction of under keel clearance past that which is assessed within Section 13.11.6. No concerns were raised on this matter during the Hazard Workshop process.

Anchor and fishing gear interaction with subsea cables

13.13.1.7 There is potential for anchor and fishing gear interaction with subsea cables as a result of Morven North's O&M activities alongside Morven South. These activities involve the presence of subsea cables associated with Morven North and Morven South. Due to the localised nature of this impact it is applicable only for Scenario 2, with cumulative developments not expected to impact upon anchor and fishing gear interaction with subsea cables past that which is assessed within Section 13.11.7. No concerns were raised on this matter during the Hazard Workshop process.

Reduced Search and Rescue capabilities

13.13.1.8 There is potential for reduced SAR capabilities as a result of Morven North's construction, O&M and decommissioning activities alongside other OWFs (including Morven South, Ossian and Bowdun) and subsea cables (including Eastern Green Link 2 and Eastern Green Link 3) within the Cumulative Shipping and Navigation Study Area. These activities involve the presence of complete or partially complete surface structures for Morven North and cumulative developments.

13.13.2 Scenario 2 assessment

Morven Site baseline environment

13.13.2.1 This section provides a brief summary of the baseline environment relating to Scenario 2, (i.e. the Morven Site). A complete review of the baseline environment for Scenario 2 is provided in Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.

Navigational features

13.13.2.2 The navigational features noted in proximity to the Morven Site are presented in Figure 13.8.

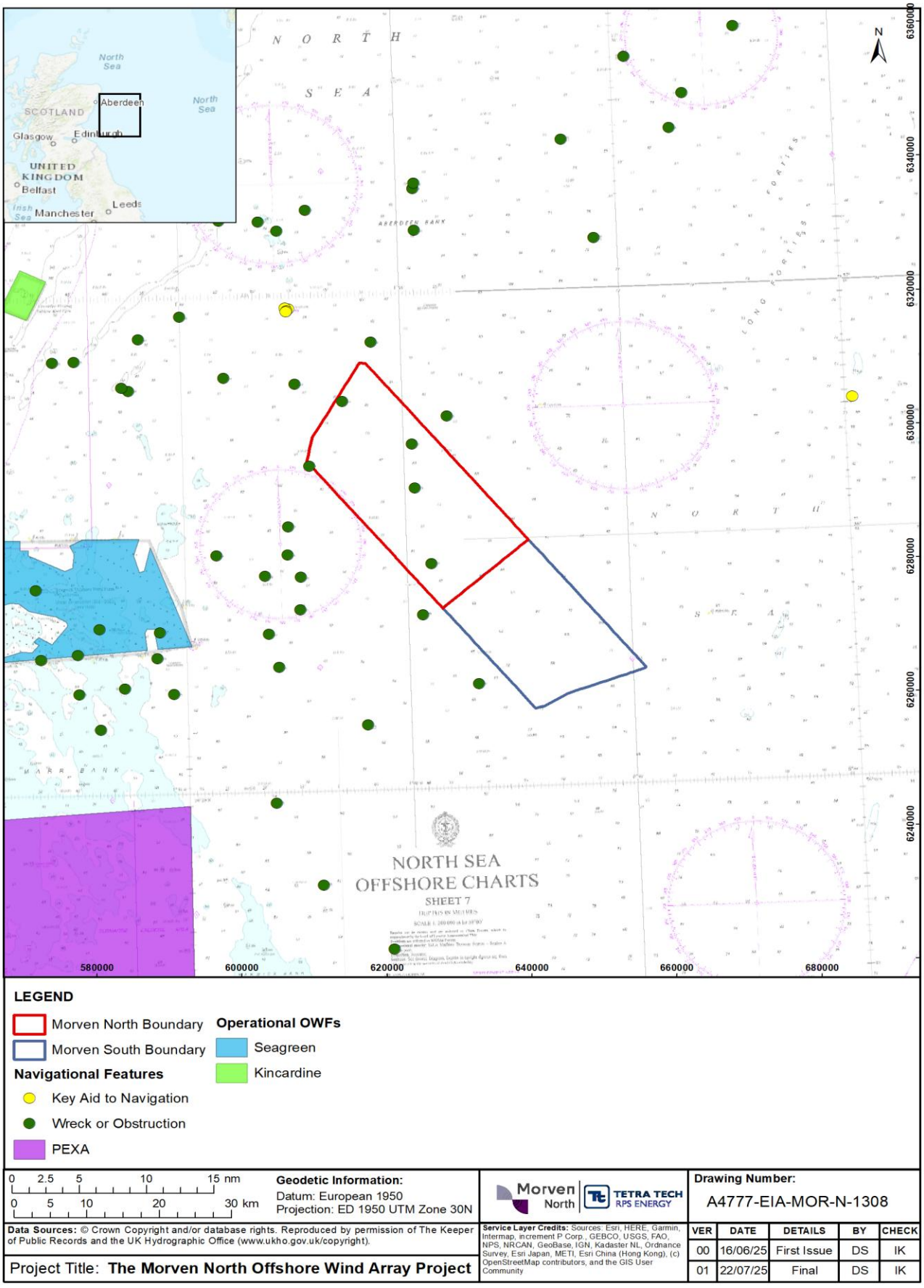

Figure 13.8: Navigational features in proximity to the Morven Site

13.13.2.3 A cluster of four buoys are located approximately 6.8nm northwest of the Morven Site and within the Bowdun array area, deployed to measure MetOcean conditions.

13.13.2.4 The operational Seagreen OWF is approximately 13nm to the west of the Morven Site, with Kincardine 23nm to the northwest. The closest port or harbour is Aberdeen, located approximately 34nm to the northwest of the Morven Site. Submarine exercise area X5641 and area X5641 are located approximately 24nm and 29nm southwest of the Morven Site respectively.

13.13.2.5 Other navigational features include numerous charted wrecks within the Regional Shipping and Navigation Study Area, with four charted wrecks within the Morven Site.

Vessel traffic data

13.13.2.6 Figure 13.9 and Figure 13.10 present the vessel traffic data recorded during the summer survey period and winter survey period, respectively, colour-coded by vessel type. Temporary traffic has been excluded from the figures below and subsequent analysis in order to focus on routine vessel activities, as is industry standard.

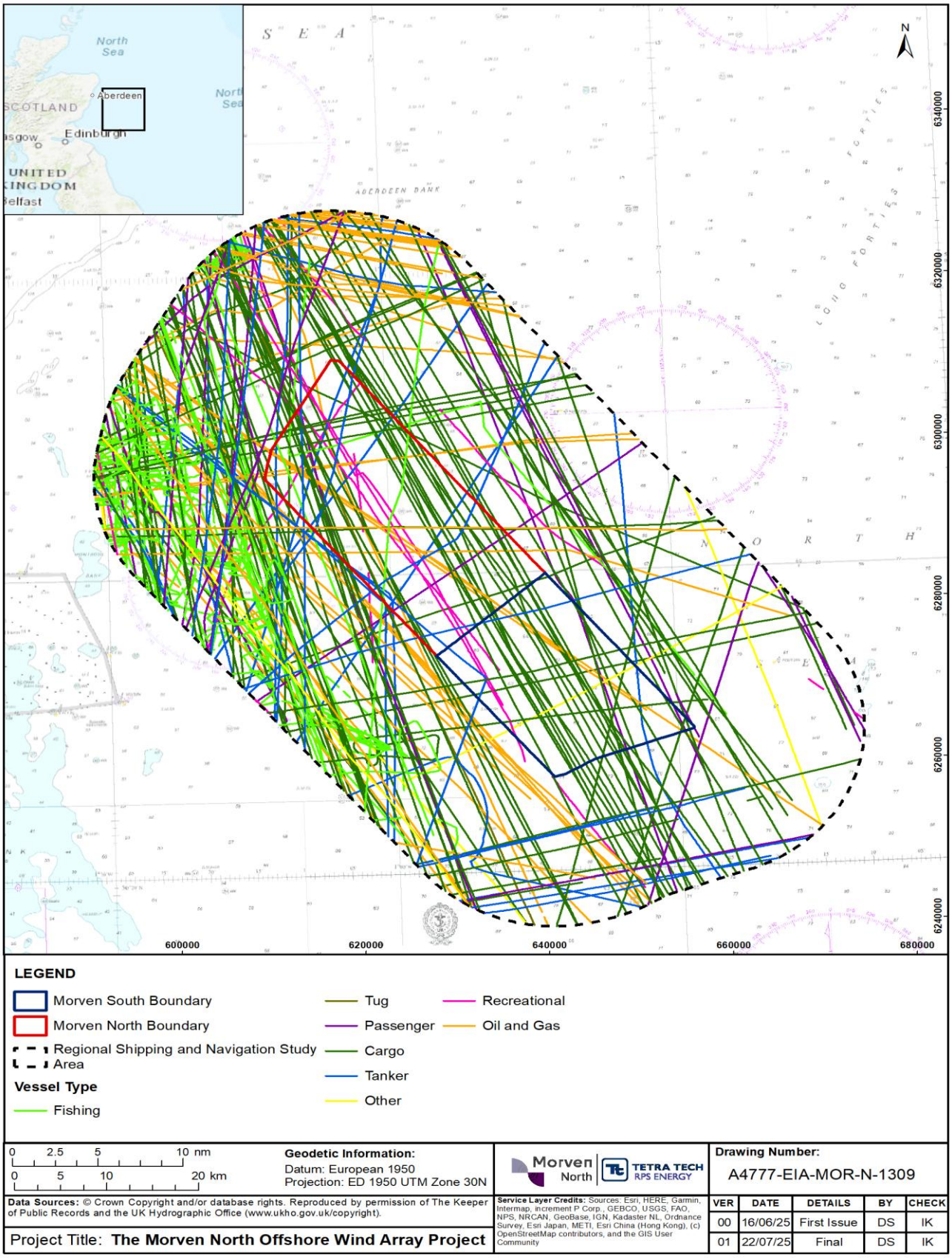

Figure 13.9: 14 days vessel traffic data by vessel type in the Regional Shipping and Navigation Study Area (summer 2024)

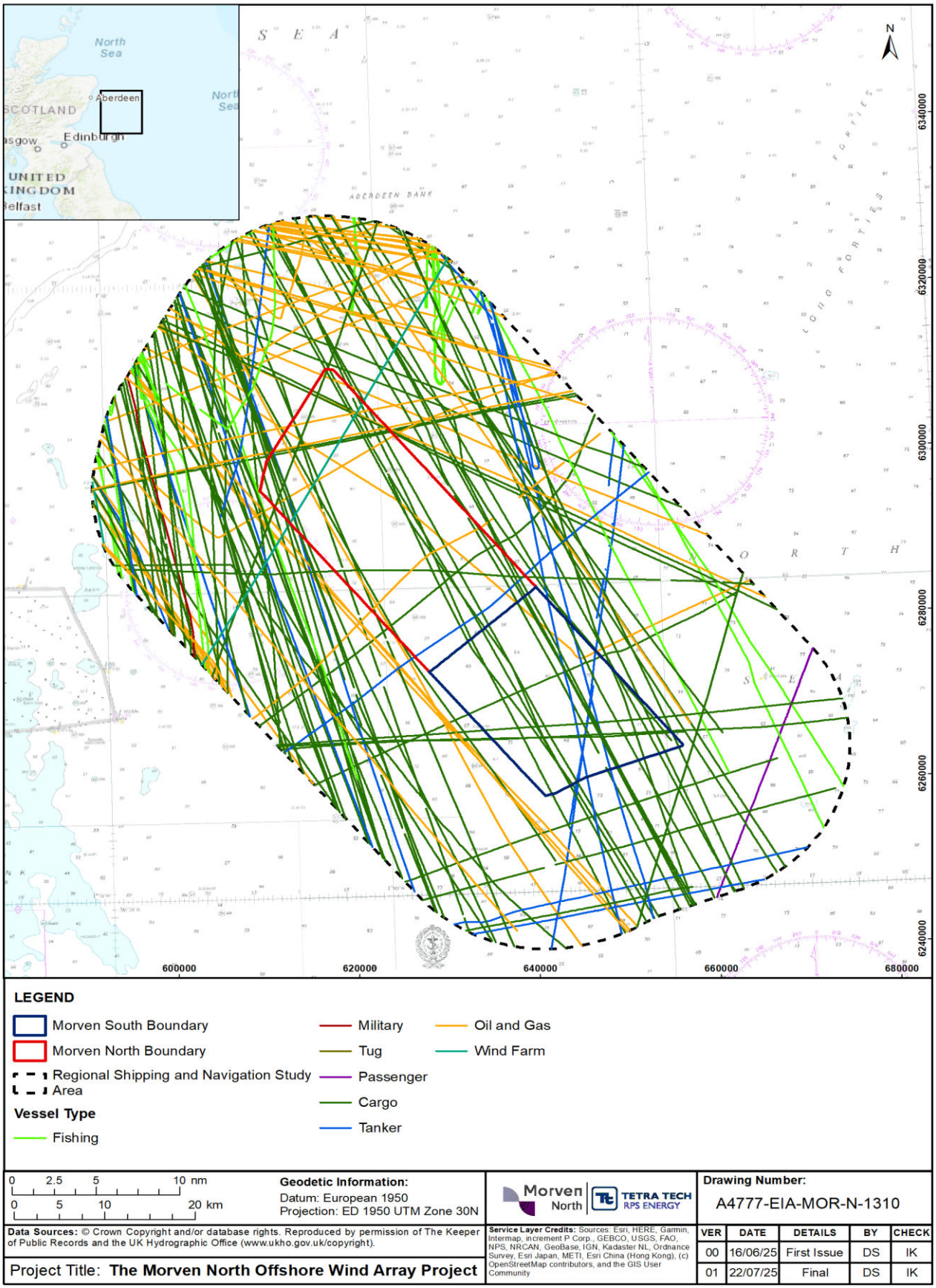

Figure 13.10: 14 days vessel traffic data by vessel type in the Regional Shipping and Navigation Study Area (winter 2024)

13.13.2.7 During the summer survey period there was an average of 20 unique vessels recorded within the Regional Shipping and Navigation Study Area, with an average of six unique vessels per day recorded to intersect the Morven Site itself. The busiest day recorded within the Regional Shipping and Navigation Study Area during the summer survey period was 22 June 2024, on which 30 unique vessels were recorded. The busiest day recorded within the Morven Site itself during the summer survey period was also 22 June 2024, on which 12 unique vessels were recorded.

13.13.2.8 During the winter survey period there was an average of 13 unique vessels recorded within the Regional Shipping and Navigation Study Area, with an average of three to four unique vessels per day recorded to intersect the Morven Site itself. The busiest day recorded within the Regional Shipping and Navigation Study Area during the winter survey period was 01 December 2024, on which 19 unique vessels were recorded. The busiest days recorded within the Morven Site itself during the winter survey period was also 01 December 2024, on which eight unique vessels were recorded.

13.13.2.9 During the summer survey period, the main vessel types within the Regional Shipping and Navigation Study Area were cargo vessels (37%), oil and gas vessels (27%), tankers (10%) and fishing vessels (10%). During the winter survey period, the main vessel types within the Regional Shipping and Navigation Study Area were cargo vessels (48%), oil and gas vessels (29%) and fishing vessels (12%).

13.13.2.10 A RoRo vessel operated by Smyril Line was recorded undergoing regular transits within the Regional Shipping and Navigation Study Area, operating between Þorlákshöfn and Rotterdam once every two days in the summer period only. No RoPax vessels were recorded.

13.13.2.11 The average length of vessels within the Regional Shipping and Navigation Study Area was 104m. Over the survey periods, vessel length ranged from 4m for a recreational vessel to 319m for a cruise liner.

13.13.2.12 Excluding the proportion of vessels for which draught was not available, the average draught of vessels within the Regional Shipping and Navigation Study Area was 5.0m. Over the survey periods, vessel draught ranged from 2.2m for a tug to 13.8m for a bulk carrier.

13.13.2.13 Main commercial routes have been identified using the principles set out in MGN 654 (MCA, 2021). Vessel traffic data is assessed and vessels transiting at similar headings and locations are identified as a main route. To help identify main routes, vessel traffic data is also interrogated to show vessels (by name and/or operator) that frequently transit those routes. The route width is then calculated using the 90th percentile rule from the mean position of the potential shipping route.

13.13.2.14 A total of 17 main commercial routes within the Regional Shipping and Navigation Study Area were identified from the vessel traffic survey data, in combination with Anatec's ShipRoutes database. These main commercial routes and corresponding 90th percentiles within the Regional Shipping and Navigation Study Area are shown relative to the Morven Site in Figure 13.11. A description of each route is presented in Section 11 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.

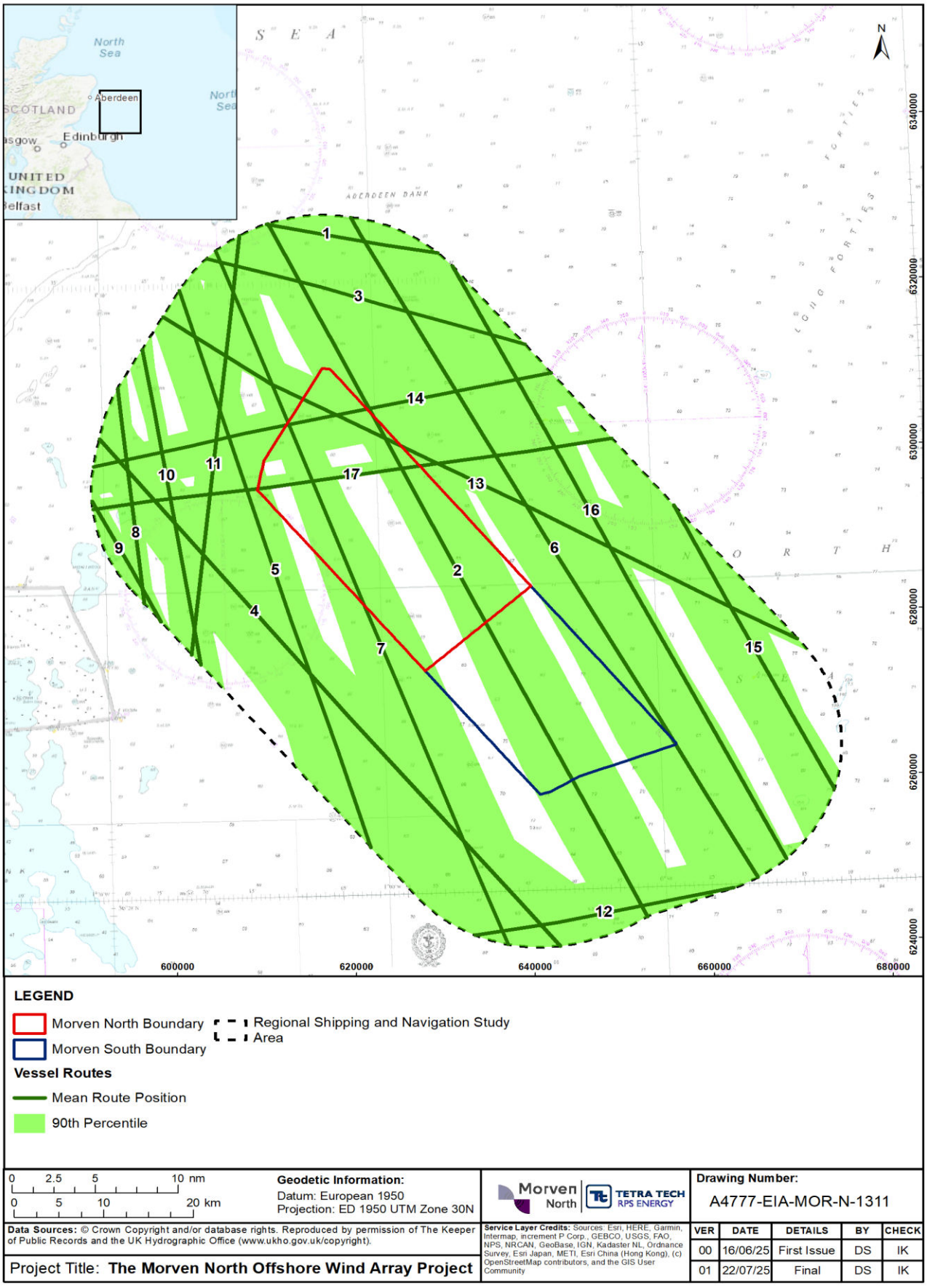

Figure 13.11: Base case main commercial routes within the Regional Shipping and Navigation Study Area

Historical maritime incidents

Department for Transport Search and Rescue helicopters

13.13.2.15 There was a single SAR helicopter tasking recorded in the nine-year period within the Regional Shipping and Navigation Study Area. This involved a search operation at the southeastern extent of the Morven Site.

Royal National Lifeboat Institution

13.13.2.16 There were a total of seven recorded RNLI responses to five unique incidents within the Regional Shipping and Navigation Study Area from 2014 to 2023, corresponding to an average of one incident every two years. The most frequent incident type was machinery failure (two instances), with the majority of incidents involving recreational vessels (three instances). The Montrose RNLI station was used for four of the seven callouts. One incident was recorded within the Morven Site – a recreational vessel within the Morven North Boundary undergoing sail failure and responded to by the Montrose station.

Marine Accident Investigation Branch

13.13.2.17 There were a total of three unique incidents recorded by the MAIB within the Regional Shipping and Navigation Study Area from 2014 to 2023, corresponding to an average of one incident every three years. The most frequent incident type was accident to person with two counts, with the majority of incidents involving recreational vessels (two instances). No incidents were recorded within the Morven Site.

13.13.2.18 A review of older MAIB incident data within the Regional Shipping and Navigation Study Area between 2004 and 2013 indicates that the number of incidents has decreased in proximity to the Morven Site, with a total of six incidents within the Regional Shipping and Navigation Study Area recorded. One incident occurred within the Morven South Boundary, involving a fishing vessel undergoing machinery failure.

Assessment

13.13.2.19 The Scenario 2 assessment for Morven North (i.e. featuring the Morven Site) is presented in Table 13.18 to Table 13.24.

Table 13.18: Morven North Scenario 2 assessment for vessel displacement and increased third-party vessel to vessel collision risk

Scenario 2: Morven North + Morven South	
Construction phase	
Overview	Construction activities associated with Morven North and Morven South may displace existing vessel routes or activity, which may increase the risk of a collision between third-party vessels. These two related elements are each considered in the subsequent assessment in terms of frequency of occurrence and severity of consequence. **Vessel displacement** Vessel traffic data collected during the summer and winter 2024 surveys has been used to establish the vessel traffic baseline, alongside 12 months of AIS collected via terrestrial receivers between October 2021 and September 2022 and three supplementary seasonal vessel traffic surveys. These vessel traffic datasets have been validated by Anatec's ShipRoutes database and analysed to identify the volume of traffic passing within or in proximity to Morven North and Morven South. Additionally, main routes were recognised from these datasets using the principles set out in MGN 654 (MCA, 2021) (see Section 13.7.1). Although there will be no restrictions on entry into the buoyed construction area, other than through active safety zones, based on experience at previously under construction OWFs and consultation it is anticipated that the majority of commercial vessels will choose not to navigate within the buoyed construction area; therefore, some main route deviations will be required. These deviations are highlighted in Section 15.5.4 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment. The full methodology for classifying main route deviations is provided in Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment noting it is in line with MGN 654 (MCA, 2021). A deviation will be required for seven of the 17 main routes identified within the Regional Shipping and Navigation Study Area, with details provided in Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment. The deviations are in general relatively low magnitude, with six of the seven increasing the total route length by less than 0.5%. Route 17 is anticipated to increase distance by 5.5nm, equating to a 3.9% increase in total route length. This is the lowest volume main commercial route within the Regional Shipping and Navigation Study Area, with an average of one vessel per week. Although the deviation is greater, it is anticipated that the extent of the deviation can be reduced with passage planning for the departure from or arrival to Montrose, with a more direct approach to the northern extent of the Morven Site than has been conservatively assumed in the quantitative assessment. There is one RoRo route (Route 2) undergoing regular transit once every two days in summer only based on the vessel traffic data. Although this route may be displaced and would be more sensitive given the timetabled nature of the service provided, the deviation involved is minor especially when compared with the total route length (increase of 0.3%) and was not raised as an issue during consultation, noting that the primary user – Smyril Line – was included in the regular operator outreach. Based on experience at previously under-construction OWFs, it is anticipated that fishing vessels and recreational vessels may also choose not to routinely navigate internally within the buoyed construction area, noting there would be no restriction on transit other than through

Scenario 2: Morven North + Morven South	
	active safety zones. However, they may be more likely to do so than commercial vessels, in particular in any areas of the Morven Site where active construction is not ongoing, or structures are not yet present. For any smaller vessels that do choose to deviate, there is considered to be sufficient sea room outside of the Morven Site for transits from such vessels to be accommodated. The main consequences of vessel displacement will be increased journey times and distances for affected third party vessels, under the assumption that the buoyed construction area will be deployed around the maximum extent of Morven North and Morven South. Any notable safety impacts are considered unlikely given the available sea room. Vessels are expected to comply with international and flag state regulations (including COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974)) and will be able to passage plan in advance given the promulgation of information relating to the Morven Site and relevant nautical charts. Relevant embedded mitigation measures include a buoyed construction area, adherence to an LMP and AtoNMP, marking on nautical charts and promulgation of information. These will ensure an increased awareness from third-party vessels, and will also assist in passage planning to limit the extent of deviations. **Collision risk** From historical incident data, no collision incidents between third-party vessels have occurred directly as a result of a UK OWF. In poor visibility, third-party vessels may experience limitations regarding visual identification of other third-party vessels, when passing on another side of the buoyed construction/decommissioning areas. This limitation may increase the potential for an encounter. However, this would be mitigated by the application of the COLREGs (including reduced speeds) in adverse weather conditions. Moreover, the minimum spacing between structures (1,000m) will be sufficient to ensure any visual hindrance is very short-term in nature. Based on the pre-wind farm modelling, the baseline collision risk levels within the Regional Shipping and Navigation Study Area are low, with an estimated vessel to vessel collision risk of one every 1,966 years. This rises to an estimate of a return period of one every 1,383 years for a future case growth of 20% in vessel traffic. This is due to the volume of traffic in the area relative to available sea space. Post-wind farm, the collision frequency was estimated at one in 971 years, representing an additional collision incident every 1,893 years. This rises to an estimate of a return period of one every 674 years for a future case growth of 20% in vessel traffic. This is a moderate level of collision risk, and is also reflected when considering future case traffic levels. However, with effective passage planning, the potential for hot spots of collision risk in proximity to the Morven Site is reduced and given the available sea room to the north and south it is anticipated that this would be manageable. It is also acknowledged that a number of the higher-use routes, such as Routes 1, 3, 4 and 6, are comprised mainly of oil and gas vessels accessing nearby fields. As such, these vessels will have good familiarity and experience operating in proximity to surface structures. Due to the necessity for deviation of routes west of the Morven Site, it is possible that commercial vessels will be displaced closer to areas of the sea in which fishing vessels were recorded to actively fish. This may then lead to an increase in encounters between commercial vessels and fishing vessels. However, there is sufficient sea room to allow both activities to safely occur and with application of the COLREGs in relation to the exhibiting of appropriate lights and shapes for fishing vessels engaged in fishing, the risk is considered manageable.

Scenario 2: Morven North + Morven South	
	The most likely consequences in the event of an encounter between two or more third-party vessels is the implementation of avoidance action in line with the COLREGs, with the vessels involved able to resume their respective passages with no long-term consequences. Should an encounter develop into a collision incident, it is most likely to involve minor contact resulting in minor damage to the vessels with no harm to people and no substantial reputational risks. As a worst case with very low frequency of occurrence one of the vessels could receive substantial damage or founder with PLL and pollution, with this outcome more likely where one of the vessels is a small craft (e.g., fishing vessel, recreational vessel or CTV). From the vessel traffic survey data (which incorporates Radar and visual observations in addition to AIS) regular transits by commercial fishing vessels and recreational vessels through the Morven Site are infrequent. Relevant embedded mitigation measures include marking on nautical charts, promulgation of information, a buoyed construction area, adherence to an LMP and AtoNMP, adherence to an MPCP and adherence to an ERCoP. These will ensure an increased awareness from third-party vessels and will also assist in passage planning to limit the extent of deviations.
Frequency of occurrence	The frequency of occurrence in relation to displacement of vessel traffic resulting in increased third-party collision risk during the construction phase is considered Remote.
Severity of consequence	The severity of consequence in relation to displacement of vessel traffic resulting in increased third-party collision risk during the construction phase is considered Moderate.
Significance of risk	Taking the frequency of occurrence as remote and the severity of consequence as moderate, the overall effect of vessel displacement and increased third-party vessel to vessel collision risk during construction of Morven North and Morven South is considered to be tolerable with mitigation. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Tolerable with Mitigation and Not Significant in EIA terms.
Operations and maintenance phase	
Overview	O&M activities associated with Morven North and Morven South may displace existing vessel routes or activity, which may increase the risk of a collision between third-party vessels. These two related elements are each considered in the subsequent assessment in terms of frequency of occurrence and severity of consequence. **Vessel displacement** Based on experience at existing operational OWFs and input during consultation, it is anticipated that the majority of commercial vessels will choose not to navigate within the Morven Site and therefore some main route deviations will be required as per the respective construction phase hazard.

Scenario 2: Morven North + Morven South	
	The nature of the deviations is expected to be similar to that discussed for the equivalent construction phase hazard, with the deviations in general relatively low magnitude and effective passage planning likely reducing the extent. One RoRo route (Route 2) is affected but was not raised as an issue during consultation, noting that the primary user – Smyril Line – was included in the regular operator outreach. The minimum spacing of 1,000m between structures within the Morven Site is considered sufficient to accommodate transits of smaller vessels, noting there will be no restrictions on entry into the Morven Site with the exception of any active 500m major maintenance safety zones. Based on experience at existing operational OWFs, it is anticipated that fishing vessels and recreational vessels may also choose not to routinely navigate internally within the Morven Site. However, they may be more likely to do so than commercial vessels. However, they may be more likely to do so than commercial vessels, particularly in the case of recreational vessels given the absence of commercial traffic (as raised by RYA Scotland in Section 13.4). In such instances this may reduce the level of displacement for these vessels during the O&M phase. It is noted that displacement of active commercial fishing is assessed separately in Volume 2, Chapter 12: Commercial Fisheries of the Morven North EIA Report and Volume 2, Chapter 12: Commercial Fisheries of the Morven South EIA Report. Given that any O&M activities associated with Morven North and Morven South will be less frequent than during the construction phase and localised, the likelihood of vessel displacement due to these activities is considered to be very low. Additionally, such activities will likely be limited to within the Morven Site and therefore not impact upon commercial vessel routeing. The main consequences of vessel displacement will be increased journey times and distances for affected third party vessels, under the assumption that the wind turbines will be built to the full extent of Morven North and Morven South. Any notable safety impacts are considered unlikely given the available sea room. Vessels are expected to comply with international and flag state regulations (including COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974)) and will be able to passage plan in advance given the promulgation of information relating to Morven North and Morven South and relevant nautical charts. Relevant embedded mitigation measures include DSLP approval, adherence to an LMP and AtoNMP, adherence to an NSPVMP, marking on nautical charts and promulgation of information. **Collision risk** As noted for the equivalent construction phase hazard, seven of the 17 main routes will likely deviate as a result of the presence of Morven North and Morven South. Post wind farm collision frequency was estimated at one every 971 years. Any displacement of commercial vessels due to O&M activities is not anticipated to affect available sea room to such an extent that the risk of a collision between third party vessels is materially increased. This is due to the lesser frequency of O&M activities compared to during construction, spatially limited extent of the operation at any given time and the likelihood that it is located internally with the array. An additional factor is the potential for structures to obscure vessels from one another, thus hindering ability to comply with COLREGs (IMO, 1972/77). The minimum spacing of 1,000m between structures will likely provide sufficient sea room for visual observations, with full

Scenario 2: Morven North + Morven South	
	obstruction likely only to occur when vessels are at opposite ends of a row. Collision risk is likely to be low in such cases due to the distance between vessels. In the event of an encounter between third party vessels, it is likely to be localised and short in duration, with collision avoidance action implemented by the vessels involved, as per compliance with COLREGs (IMO, 1972/77), to ensure that a collision incident does not develop. As per the respective construction phase hazard, historical collision incident data indicates that the most likely consequences will be low should a collision occur, with minor contact between the vessels resulting in minor damage and no injuries to persons, with the vessels involved able to resume their respective passages and undertake a full inspection at the next port. As with the equivalent construction phase hazard, the displacement of commercial vessels west of the Morven Site may result in closer proximity to fishing vessels actively fishing. This may then lead to an increase in encounters between commercial vessels and fishing vessels but there is sufficient sea room to allow both activities to safely occur with application of the COLREGs. As an unlikely worst-case scenario, a high impact collision event could occur. This may result in vessel foundering and subsequent PLL, as well as pollution. In such a circumstance, vessels associated with Morven North and Morven South may attend the incident under SOLAS obligations and in liaison with the MCA and the procedures within the ERCoP and MPCP would be implemented. Relevant embedded mitigation measures includes marking on nautical charts, promulgation of information, DSLP approval, adherence to an LMP and AtoNMP, adherence to an MPCP and adherence to an ERCoP.
Frequency of occurrence	The frequency of occurrence in relation to displacement of vessel traffic resulting in increased third-party collision risk during the O&M phase is considered Remote.
Severity of consequence	The severity of consequence in relation to displacement of vessel traffic resulting in increased third-party collision risk during the O&M phase is considered Moderate.
Significance of risk	Taking the frequency of occurrence as remote and the severity of consequence as moderate, the overall effect of vessel displacement and increased third-party vessel to vessel collision risk during O&M of Morven North and Morven South is considered to be tolerable with mitigation. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Tolerable with Mitigation and Not Significant in EIA terms.
Decommissioning phase	
Overview	Since the methods used to remove structures and subsea cables are expected to be similar to those used to install them, this hazard is expected to be similar in nature to the equivalent construction stage hazard. It is noted that in the case of subsea cables sections may be left in situ to avoid unnecessarily disturbing the seabed. This would be confirmed through consultation and assessment to ensure the most suitable approach was taken. But for the purposes of this assessment (as a worst-case) it has been assumed that all subsea cables will be removed during decommissioning with only cable protection left in situ.

Scenario 2: Morven North + Morven South	
	The use of a buoyed decommissioning area analogous to the buoyed construction area is assumed and will result in similar main route deviations to those established for the equivalent construction stage hazard. By the time of decommissioning, deviations will be well established, with vessels likely to continue on their typical routeing around the buoyed decommissioning area. Relevant embedded mitigation measures would be as per the respective construction phase.
Frequency of occurrence	The frequency of occurrence in relation to displacement of vessel traffic resulting in increased third-party collision risk during the construction phase is considered Remote.
Severity of consequence	The severity of consequence in relation to displacement of vessel traffic resulting in increased third-party collision risk during the construction phase is considered Moderate.
Significance of risk	Taking the frequency of occurrence as remote and the severity of consequence as moderate, the overall effect of vessel displacement and increased third-party vessel to vessel collision risk during decommissioning of Morven North and Morven South is considered to be tolerable with mitigation. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Tolerable with Mitigation and Not Significant in EIA terms.

Table 13.19: Morven North Scenario 2 assessment for increased third-party vessel to project vessel collision risk

Scenario 2: Morven North + Morven South	
Construction phase	
Overview	The presence of vessels associated with construction activities of Morven North and Morven South may increase encounters and thus collision risk for vessels already operating in the area. During the construction phase of Morven North and Morven South there may be up to 2,298 vessel movements made by up to 82 project vessels on-site simultaneously. This will include vessels which are RAM. It is assumed that construction vessels will be on-site throughout the entire duration of the construction phase. Encounters and collision risk involving project vessels will be managed through the implementation of marine coordination with full details of this to be provided in the NSPVMP. Project vessels will also be expected to carry AIS and comply with flag state regulations including the COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974). COLREGs will remain the navigational priority for project vessels at all times. Applications for safety zones of 500m around on-going construction activities will be sought during the construction phase and will protect deployed project vessels, especially if they are RAM. Minimum advisory passing distances and guard vessels, as defined by risk assessment

Scenario 2: Morven North + Morven South	
	may also be implemented where safety zones do not apply, for example around cable installation vessels. Details of safety zones, minimum safe passing distances and guard vessels will be promulgated including via Notifications to Mariners and Kingfisher Bulletins. Appropriate marine lighting and marking during construction including the buoyed construction area will be agreed with the NLB and set out in the LMP and AtoNMP. These navigational aids will further maximise mariner awareness when in proximity to ongoing construction works in the Morven Site. Third-party vessels may experience decreased capability to visually identify project vessels entering and exiting the Morven Site during reduced visibility; however, this hazard will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions and the mandatory carriage of AIS by project vessels regardless of size. It is noted that the likelihood of a collision is likely to be greater in reduced visibility when the identification of project vessels entering and exiting the Morven Site may be impeded. Based on historical incident data, there has been one instance of a third-party vessel colliding with a project vessel in the UK (see Section 9.6 for further details). In this case, moderate vessel damage was reported with no harm to persons. It is noted that the incident occurred in 2011 and awareness of offshore wind developments and application of the measures outlined above has improved and been refined considerably in the interim, with no further collision incidents reported since. If an encounter between a project vessel and third-party vessel occurs, it is likely to be localised and short in duration. Assuming the implementation of collision avoidance action as required by the COLREGs, the most likely outcome will be any vessels involved being able to resume their respective passages or activities with no long-term consequences. In the event of a collision, the likely consequences will be minor contact between the vessels resulting in minor damage and no injuries to persons. As an unlikely worst-case scenario, foundering could occur resulting in PLL and pollution. Other project vessels may be able to assist in the event of a collision under SOLAS obligation and the adherence to the ERCoP, noting this would be done in liaison with the MCA. If pollution were to occur in proximity to the Morven Site or involving a project vessel, the MPCP will be implemented to reduce the risks. As noted during consultation (see Section 13.4), there is the potential for a construction buoy to drift off-station. However, the LMP and AtoNMP will provide mechanisms for the location and recovery in any event; and due to the requirement for buoyage to be of IALA Position Category 2 (availability of not less than 99%), loss of any buoyage will be of low likelihood. Relevant embedded mitigation measures include application for safety zones, a buoyed construction area, guard vessels as required by risk assessment, adherence to an LMP and AtoNMP, NSPVMP, MPCP, ERCoP, promulgation of information, marine coordination and marking on nautical charts.
Frequency of occurrence	The frequency of occurrence in relation to encounters and collision risk between project vessels and third-party vessels during the construction phase is considered to be Extremely Unlikely.
Severity of consequence	The severity of consequence in relation to encounters and collision risk between project vessels and third-party vessels during the construction phase is considered to be Serious.

Scenario 2: Morven North + Morven South	
Significance of risk	Taking the frequency of occurrence as extremely unlikely and the severity of consequence as serious, the overall effect of encounters and collision risk between project vessels and third-party vessels during construction of Morven North and Morven South is considered to be tolerable with mitigation. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Tolerable with Mitigation and Not Significant in EIA terms.
Operations and maintenance phase	
Overview	The presence of vessels associated with O&M activities of Morven North and Morven South may increase encounters and thus collision risk for vessels already operating in the area. During the O&M phase of Morven North and Morven South there may be up to 586 vessel movements annually and up to 30 project vessels on-site simultaneously (during major maintenance; i.e., likely less during normal operations). This will include vessels which are RAM. Encounter and collision risk involving project vessels will be managed through the implementation of marine coordination as will be set out in the NSPVMP. Project vessels will also be expected to carry AIS and comply with flag state regulations including the COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974). COLREGs will remain the navigational priority for project vessels at all times. Applications for safety zones of 500m around major maintenance activities during O&M will be sought and will protect deployed project vessels, especially if they are RAM. Minimum advisory passing distances and guard vessels, as defined by risk assessment may also be implemented where safety zones do not apply. Details of safety zones, minimum safe passing distances and guard vessels will be promulgated including via Notifications to Mariners and Kingfisher Bulletins. Appropriate operational marine lighting and marking will be agreed with the NLB and set out in an LMP and AtoNMP. These navigational aids will further maximise mariner awareness when in proximity to the Morven Site. Third-party vessels may experience decreased capability to visually identify project vessels during reduced visibility, especially if visual observations are obscured by wind turbines; however, this hazard will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions and the mandatory carriage of AIS by project vessels regardless of size. As discussed in the equivalent construction phase hazard, there has been one instance of a third-party vessel colliding with a project vessel in the UK. Moderate vessel damage was reported with no harm to persons. It is noted that the incident occurred in 2011 and awareness of offshore wind developments and application of the measures outlined above has improved and been refined considerably in the interim, with no further collision incidents reported since. As per the respective construction phase hazard, if an encounter between a project vessel and third party vessel occurs, it is likely to be localised and short in duration. Assuming the implementation of collision avoidance action as required by the COLREGs, the most likely outcome will be any vessels involved being able to resume their respective passages or activities with no long-term consequences. In the event of a collision, the likely consequences will be minor contact between the vessels resulting in minor damage and no injuries to persons. As an unlikely worst-case scenario, foundering could occur resulting in PLL and pollution. Other project vessels may be able to

Scenario 2: Morven North + Morven South	
	assist in the event of a collision under SOLAS obligation and the adherence to the ERCoP, noting this would be done in liaison with the MCA. If pollution were to occur in proximity to Morven North and Morven South or involving a project vessel, the MPCP will be implemented to reduce the risks. Relevant embedded mitigation measures include application for safety zones, guard vessels as required by risk assessment, DSLP approval, adherence to an LMP and AtoNMP, NSPVMP, MPCP, ERCoP, promulgation of information, marine coordination and marking on nautical charts.
Frequency of occurrence	The frequency of occurrence in relation to encounters and collision risk between project vessels and third party vessels during the O&M phase is considered to be Extremely Unlikely.
Severity of consequence	The severity of consequence in relation to encounters and collision risk between project vessels and third party vessels during the O&M phase is considered to be Serious.
Significance of risk	Taking the frequency of occurrence as extremely unlikely and the severity of consequence as serious, the overall effect of encounters and collision risk between project vessels and third party vessels during O&M of Morven North and Morven South is considered to be tolerable with mitigation. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Tolerable with Mitigation and Not Significant in EIA terms.
Decommissioning phase	
Overview	The presence of vessels associated with decommissioning activities of Morven North and Morven South may increase encounters and thus collision risk for vessels already operating in the area. Since the methods used to remove structures and subsea cables are expected to be similar to those used to install them, including the vessels involved, this hazard is expected to be similar in nature to the equivalent construction phase, including the number of vessel movements by decommissioning vessels. It is noted that in the case of subsea cables it is expected that they will be left in situ but for the purposes of this assessment (as a worst-case) it has been assumed that all cables will be removed during decommissioning, with only cable protection left in situ. On this basis the same assumptions made for the equivalent construction phase hazard in terms of frequency and consequence apply.
Frequency of occurrence	The frequency of occurrence in relation to encounters and collision risk between project vessels and third party vessels during the construction phase is considered to be Extremely Unlikely.
Severity of consequence	The severity of consequence in relation to encounters and collision risk between project vessels and third party vessels during the construction phase is considered to be Serious.

Scenario 2: Morven North + Morven South	
Significance of risk	Taking the frequency of occurrence as extremely unlikely and the severity of consequence as serious, the overall effect of encounters and collision risk between project vessels and third party vessels during decommissioning of Morven North and Morven South is considered to be tolerable with mitigation. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Tolerable with Mitigation and Not Significant in EIA terms.

Table 13.20: Morven North Scenario 2 assessment for vessel to structure allision risk

Scenario 2: Morven North + Morven South	
Construction phase	
Overview	Presence of structures (including partially constructed) within the buoyed construction area will lead to creation of powered, drifting and internal allision risk for vessels. The spatial extent of the hazard is small given that a vessel must be in close proximity to a structure for an allision incident to occur. Each allision element is considered in turn in terms of frequency of occurrence and severity of consequence, with the resulting significance of the residual risk across the various elements summarised at the end of the assessment. The forms of allision considered for the construction phase are: • Powered allision risk; • Drifting allision risk. Unlike the O&M phase, due to the presence of construction/decommissioning buoys and pre-constructed structures, it is not expected that internal navigation will take place and therefore internal allision risk is not considered. In addition to a vessel entering the buoyed construction/decommissioning area and alliding with a structure under its own power, there is considered to be potential for a vessel to be adrift in proximity to Morven North and Morven South; this is reflected in the RNLI incident data reviewed in proximity to the Morven Site which indicates that machinery failure is the most common incident type. A vessel adrift may only develop into an allision situation if in proximity to a structure. This is only the case where the adrift vessel is located

Scenario 2: Morven North + Morven South	
	internally or in close proximity to Morven North and Morven South and the direction of the wind and/or tide directs the vessel towards a structure. In circumstances where a vessel drifts towards a structure in the Morven Site, there are actions which the vessel may take to prevent the drift incident developing into an allision situation. Powered vessels may be able to regain power prior to reaching the Morven Site (i.e., by rectifying any fault). Given that vessels are expected to pass a safe distance off the buoyed construction area there is a greater duration over which regaining power may be achievable. Failing this, the vessel's emergency response procedures would be implemented which may include an emergency anchoring event following a check of the relevant nautical charts to ensure the deployment of the anchor will not lead to other risks (such as anchor snagging on a subsea cable), or the use of thrusters (depending on availability and power supply). Where the deployment of the anchor is not possible (e.g. for small craft), any project vessels on-site may be able to render assistance in liaison with the MCA and in line with SOLAS obligations (IMO, 1974). This response will be managed via the coastguard and marine coordination and depends on the type and capability of vessels on site. This would be particularly relevant for sailing vessels relying on metocean conditions for propulsion, noting if the vessel becomes adrift in proximity to a structure there may be limited time to render assistance. Temporary marine lighting and marking will be implemented including the buoyed construction area in agreement with the NLB. Promulgation of information and marking on charts will ensure vessels can passage plan in advance to reduce risk. Safety zones of 50m in radius around structures will also be applied for during the construction phase up until the point of commissioning of Morven North and Morven South (rising to 500m where active construction is ongoing). Should an allision occur, the consequences will depend on multiple factors including the energy of the impact, structural integrity of the vessel and sea state at the time of the impact. Fishing vessels and recreational vessels are considered most vulnerable to the hazard given the potential for a non-steel construction. In such cases, the most likely consequences will be minor damage with the vessel able to resume passage and undertake a full

Scenario 2: Morven North + Morven South	
	inspection at the next port. As an unlikely worst case, the vessel could founder resulting in PLL and pollution. Project vessels may assist in the event of an allision under SOLAS obligation and the adherence to the ERCoP, in line with the MCA. If pollution were to occur, then the MPCP will be implemented to reduce the environmental risk. Relevant embedded mitigation measures include DSLP approval, adherence to a MPCP, adherence to an LMP and AtoNMP, adherence to an NSPVMP, promulgation of information, application for safety zones, adherence to an ERCoP, guard vessels where required by risk assessment and appropriate marking via construction buoyage as well as on nautical charts.
Frequency of occurrence	The frequency of occurrence in relation to vessel to structure allision risk during the construction phase is considered to be Remote.
Severity of consequence	The severity of consequence in relation to vessel to structure allision risk during the construction phase is considered to be Moderate.
Significance of risk	Taking the frequency of occurrence as remote and the severity of consequence as moderate, the overall effect of vessel to structure allision risk during construction of Morven North and Morven South is considered to be tolerable with mitigation. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Tolerable with Mitigation and Not Significant in EIA terms.
Operations and maintenance phase	
Overview	Presence of structures within the Morven Site will lead to creation of powered, drifting and internal allision risk for vessels during the O&M phase. The spatial extent of the hazard is small given that a vessel must be in close proximity to an OWF structure for an allision incident to occur. Each allision element is considered in turn in terms of frequency of occurrence and severity of consequence, with the resulting significance of the residual risk across the various elements summarised at the end of the assessment. The forms of allision considered for the O&M phase are: • Powered allision risk;

Scenario 2: Morven North + Morven South	
	• Drifting allision risk; • Internal allision risk. **Powered allision risk** The base case annual powered vessel to structure allision frequency was estimated to be 2.92×10^{-3}, corresponding to a return period of one every 343 years. This rises to an estimate of 3.50×10^{-3} for a future case growth of 20% in vessel traffic, corresponding to a return period of one every 285 years. This is reflective of the volume of traffic passing at the minimum mean distance of 1nm from the Morven Site. It is also considered a conservative result given the bridge-linked OSP (modelled as a singular structure) was modelled on the northeast perimeter of the Morven Site and subsequently provided the highest allision risk of all structures. Based on historical incident data, there have been two reported instances of a third-party vessel alliding with an operational OWF structure in the UK (in the Irish Sea and Southern North Sea). Both of these incidents involved a fishing vessel. These allisions resulted in minor to moderate damage to the vessels with minor injury to crew members. Marine lighting and marking will be implemented in agreement with the NLB and defined within the LMP and AtoNMP. Promulgation of information and marking on charts will ensure vessels can passage plan in advance to reduce risk. Should an allision occur, the consequences will depend on multiple factors as discussed in relation to the equivalent construction phase hazard. Fishing vessels and recreational vessels are considered most vulnerable to the hazard and in such cases, the most likely consequences will be minor damage with the vessel able to resume passage and undertake a full inspection at the next port. As an unlikely worst case, the vessel could founder resulting in PLL and pollution. Project vessels may assist in the event of an allision under SOLAS obligations and the adherence to the ERCoP, in liaison with the MCA. If pollution were to occur, then the MPCP will be implemented to reduce the environmental risk. Relevant embedded mitigation measures include DSLP approval, adherence to a MPCP, adherence to an LMP and AtoNMP, adherence to an NSPVMP,

Scenario 2: Morven North + Morven South	
	promulgation of information, application for safety zones, adherence to an ERCoP and marking on nautical charts. **Drifting allision risk** The base case annual drifting vessel to structure allision frequency was estimated to be 2.28×10^{-4}, corresponding to a return period of one every 4,386 years. This rises to an estimate of 2.74×10^{-4} for a future case growth of 20% in vessel traffic, corresponding to a return period of one every 3,652 years. This is reflective of the volume of traffic at the minimum mean distance of 1nm from the Morven Site and the need for a vessel to become adrift prior to a drifting allision event occurring. Based on historical incident data, there have been no instances of a third-party vessel alliding with an operational OWF structure whilst NUC. However, there is considered to be potential for a vessel to be adrift; this is reflected in the RNLI incident data reviewed in proximity to the Morven Site which indicates that machinery failure is the most common incident type. In circumstances where a vessel drifts towards a structure in the Morven Site, powered vessels may be able to regain power prior to reaching Morven North and Morven South (by rectifying any fault). Failing this, the vessel's emergency response procedures would be implemented which may include an emergency anchoring event or the use of thrusters (depending on availability and power supply). Where the deployment of the anchor is not possible (e.g., for small craft), any project vessels on-site may be able to render assistance in liaison with the MCA and in line with SOLAS obligations (IMO, 1974). This response will be managed via HMCG and marine coordination and depends on the type and capability of vessels on site. This would be particularly relevant for sailing vessels relying on metocean conditions for propulsion, noting if the vessel becomes adrift in proximity to a structure there may be limited time to render assistance. Should an allision occur, the consequences will be similar to those noted for the equivalent construction phase hazard including the unlikely worst-case of foundering, PLL and pollution. In the highly unlikely scenario of a drifting allision incident resulting in pollution, the implementation of the MPCP will

Scenario 2: Morven North + Morven South	
	reduce the environmental risk. Project vessels may assist in the event of an allision under SOLAS (IMO, 19742) obligation and the adherence to the ERCoP, in line with the MCA. Additionally, a drifting vessel is likely to transit at a reduced speed compared to a powered vessel, thus reducing the energy of the impact, including in the case of a recreational vessel under sail. Relevant embedded mitigation measures include adherence to an ERCoP, adherence to an MPCP and project vessel compliance with SOLAS (IMO, 1974). **Internal allision risk** Based on experience at existing operational OWFs, it is anticipated that commercial vessels will be unlikely to navigate internally within the Morven Site. Fishing and recreational vessels may be more likely to transit through noting they may choose not to depending on various conditions. Additionally, the RYA Scotland indicated that the absence of commercial traffic may increase the likelihood of internal navigation (see Section 4.2). The base case fishing vessel to structure allision frequency is estimated to be 3.60×10^{-3}, corresponding to a return period of approximately one in 277 years. This rises to an estimate of 4.32×10^{-3} for a future case growth of 20% in vessel traffic, corresponding to a return period of one every 231 years. This return period is reflective of the volume of fishing vessel traffic in the Regional Shipping and Navigation Study Area, both in transit and engaged in active fishing. Conservative modelling has been undertaken with the assumption that fishing levels in proximity to the wind turbines will not change. In reality, as discussed within the equivalent construction phase hazard, fishing vessels will account for the presence of the wind turbines and may choose to transit or fish elsewhere (noting this aligns with consultation input). The worst-case consequences reported for vessels involved in an allision incident involving a UK OWF has been flooding, with no life-threatening injuries to persons reported. If an allision incident were to occur, project vessels may assist under obligation of SOLAS (IMO, 1974) and adherence to the ERCoP in liaison with the MCA. Additionally, if pollution occurs as a result of an allision incident, the MPCP would be implemented where appropriate.

Scenario 2: Morven North + Morven South	
	If a vessel chooses to transit within the Morven Site, the minimum spacing of 1,000m between wind farm structures is considered sufficient for safe internal navigation. Furthermore, operational lighting and marking and marking on nautical charts provide mitigation against internal allision risk. Any vessel planning to transit through the Morven Site is expected to passage plan in advance in accordance with SOLAS Chapter V (IMO, 1974) and promulgation of information will ensure that vessels have good awareness of Morven North and Morven South. Should bridge links be used between OSPs then there is an additional allision risk should a vessel choose to navigate under the bridge link and between OSPs. A height of 14m above HAT would pose a danger for such vessels. However, given the maximum separation of 100m between OSPs joined by a bridge link it is considered highly unlikely that a vessel would choose to navigate under a bridge link, particularly given the spacing of structures across the Morven Site which allow for alternative passages. Additionally, the specific lighting and marking requirements for bridge links will be agreed with NLB to ensure that allision risk for vessels (including project vessels and recreational vessels) is reduced. Should a recreational vessel under sail enter the proximity of a wind turbine, there is also potential for effects such as wind shear, masking and turbulence to occur. As noted in the equivalent construction phase hazard, from previous studies of offshore wind developments, it has been concluded that wind turbines do reduce wind velocity downwind of a wind turbine (MCA, 2022) but that no negative effects on recreational craft have been reported on the basis of the limited spatial extent of the effect and its similarity to that experienced when passing a large vessel or close to other large structures or the coastline. In addition, no practical issues have been raised by recreational users to date when operating in proximity to existing offshore wind developments. As noted within the Hazard Workshop, due to the distance offshore of the Morven Site there may be an effect of fatigue for recreational users. The operational lighting and marking will be particularly important in such circumstances to ensure recreational users are aware of the presence of Morven North and Morven South. It is also expected that recreational users

Scenario 2: Morven North + Morven South	
	on long sailings will ensure there is sufficient manning to avoid the effects of fatigue influencing safe navigation. Relevant embedded mitigation measures include application for safety zones, DSLP approval, adherence to an LMP and AtoNMP, marking on nautical charts, promulgation of information, adherence to an ERCoP and adherence to an MPCP.
Frequency of occurrence	**Powered allision risk** The frequency of occurrence in relation to powered vessel to structure allision risk during the O&M phase is considered to be Remote. **Drifting allision risk** The frequency of occurrence in relation to drifting vessel to structure allision risk during the O&M phase is considered to be Extremely Unlikely. **Internal allision risk** The frequency of occurrence of internal vessel to structure allision risk during the O&M phase is considered to be Extremely Unlikely.
Severity of consequence	**Powered allision risk** The severity of consequence in relation to powered vessel to structure allision risk during the O&M phase is considered to be Moderate. **Drifting allision risk** The severity of consequence in relation to drifting vessel to structure allision risk during the O&M phase is considered to be Moderate. **Internal allision risk** The severity of consequence of internal vessel to structure allision risk during the O&M phase is considered to be Moderate.
Significance of risk	**Powered allision risk** Taking the frequency of occurrence as remote and the severity of consequence as moderate, the overall effect of powered vessel to structure allision risk during O&M of Morven North and Morven South is considered to be tolerable with mitigation.

Scenario 2: Morven North + Morven South	
	The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Tolerable with Mitigation and Not Significant in EIA terms. **Drifting allision risk** Taking the frequency of occurrence as extremely unlikely and the severity of consequence as moderate, the overall effect of drifting vessel to structure allision risk during O&M of Morven North and Morven South is considered to be broadly acceptable. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Broadly Acceptable and Not Significant in EIA terms. **Internal allision risk** Taking the frequency of occurrence as extremely unlikely and the severity of consequence as moderate, the overall effect of internal vessel to structure allision risk during O&M of Morven North and Morven South is considered to be broadly acceptable. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Broadly Acceptable and Not Significant in EIA terms.
Decommissioning phase	
Overview	It is likely that allision risk during decommissioning will be similar to that observed for the construction phase, noting similar scenarios on-site, including partially removed structures within a buoyed decommissioning area. On this basis the same assumptions made for the equivalent construction phase hazard in terms of frequency and consequence apply.
Frequency of occurrence	The frequency of occurrence in relation to vessel to structure allision risk during the construction phase is considered to be Remote.
Severity of consequence	The severity of consequence in relation to vessel to structure allision risk during the construction phase is considered to be Moderate.
Significance of risk	Taking the frequency of occurrence as remote and the severity of consequence as moderate, the overall effect of vessel to structure allision

Scenario 2: Morven North + Morven South	
	risk during decommissioning of Morven North and Morven South is considered to be tolerable with mitigation. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Tolerable with Mitigation and Not Significant in EIA terms.

Table 13.21: Morven North Scenario 2 assessment for reduced access to local ports and harbours

Scenario 2: Morven North + Morven South	
Construction phase	
Overview	Up to 2,298 vessel movements made by construction vessels (excluding site preparation activities) 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 and designated routes to and from construction ports. Project vessels will also carry AIS and be compliant with flag state regulations including the COLREGs (IMO 1972/77). The closest port or harbour to Morven North and Morven South is Aberdeen, located approximately 34nm to the northwest. Given the relative distance to ports in the area and the anticipated deviations for the main commercial routes, it is not anticipated that there will be any substantial effect on vessel approaches to and from the local ports beyond the deviations already outlined for impacts on vessel displacement. No concerns were raised during consultation over access to ports during the construction phase in relation to Morven North and Morven South. However, it is acknowledged that future towage activities relating to rigs and/or floating turbines could be affected by the presence of the Morven Site and project vessels for Morven North and Morven South. It is anticipated that where such activities occur concurrently that marine coordination between the activities will be implemented to ensure the towage activity is not adversely impacted by the activities for Morven North and Morven South. The most likely consequences are increased journey times and distances, as per the vessel displacement hazard. As there are no pilot boarding stations in the vicinity of Morven North and Morven South, no effect is anticipated on port related services such as pilotage. Relevant embedded mitigation measures include clear buoyage of the construction area, adherence to an LMP and AtoNMP, adherence to an NSPVMP, marine coordination of project vessels, marking on nautical charts and promulgation of information. These mitigation measures will be particularly relevant for coordination between project vessel activities and third-party towage operations.

Scenario 2: Morven North + Morven South	
Frequency of occurrence	The frequency of the risk of reduced access to local ports and harbours during the construction phase is considered to be Remote.
Severity of consequence	The severity of consequence of the risk of reduced access to local ports and harbours during the construction phase is considered to be Minor.
Significance of risk	Taking the frequency of occurrence as remote and the severity of consequence as minor, the overall effect of reduced port access during construction of Morven North and Morven South is considered to be broadly acceptable. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Broadly Acceptable and Not Significant in EIA terms.
Operations and maintenance phase	
Overview	Up to 586 vessel movements annually by O&M vessels may be made throughout the O&M phase, which 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 Morven Site and designated routes to and from the base port. Project vessels will also carry AIS and be compliant with flag state regulations including the COLREGs (IMO 1972/77). As discussed in the baseline description and equivalent construction phase hazard, the closest port or harbour is Aberdeen, located approximately 34nm to the northwest. Given the relative distance to ports in the area and the anticipated deviations for the main commercial routes, it is not anticipated that there will be any substantial effect on vessel approaches to and from the local ports beyond the deviations already outlined for impacts on vessel displacement. However, it is acknowledged that future towage activities relating to rigs and/or floating turbines could be affected by the presence of the Morven Site and project vessels for Morven North and Morven South. It is anticipated that where such activities occur concurrently that marine coordination between the activities will be implemented to ensure the towage activity is not adversely impacted by the activities for Morven North and Morven South. The most likely consequences are increased journey times and distances, as per the vessel displacement hazard. As there are no pilot boarding stations in the vicinity of Morven North and Morven South, no effect is anticipated on port related services such as pilotage. Relevant embedded mitigation measures include adherence to an LMP and AtoNMP, adherence to an NSPVMP, marine coordination of project vessels, marking on nautical charts and promulgation of information. These mitigation measures will be particularly relevant for coordination between project vessel activities and third-party towage operations.
Frequency of occurrence	The frequency of the risk of reduced access to local ports and harbours during the O&M phase is considered to be Remote.
Severity of consequence	The severity of consequence of the risk of reduced access to local ports and harbours during the O&M phase is considered to be Minor.

Scenario 2: Morven North + Morven South	
Significance of risk	Taking the frequency of occurrence as remote and the severity of consequence as minor, the overall effect of reduced port access during O&M of Morven North and Morven South is considered to be broadly acceptable. The hazard is considered ALARP with embedded miti gation in place and therefore no additional mitigation is required. The hazard is therefore Broadly Acceptable and Not Significant in EIA terms.
Decommissioning phase	
Overview	Decommissioning activities associated with the removal of structures and cables may displace existing routes/activity restricting access to ports/harbours. Since the methods used to remove structures and subsea cables are expected to be similar to those used to install them, this hazard is expected to be similar in nature to the equivalent construction phase, including the number of vessel movements by decommissioning vessels. It is noted that in the case of subsea cables it is expected that they will be left in situ but for the purposes of this assessment (as a worst-case) it has been assumed that all cables will be removed during decommissioning, with only cable protection will be left in situ. As with the construction stage, it is not yet known from which port(s) decommissioning activity will be based for Morven North and Morven South. On this basis the same assumptions made for the equivalent construction phase hazard in terms of frequency and consequence apply.
Frequency of occurrence	The frequency of the risk of reduced access to local ports and harbours during the construction phase is considered to be Remote.
Severity of consequence	The severity of consequence of the risk of reduced access to local ports and harbours during the construction phase is considered to be Minor.
Significance of risk	Taking the frequency of occurrence as remote and the severity of consequence as minor, the overall effect of reduced port access during decommissioning of Morven North and Morven South is considered to be broadly acceptable. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Broadly Acceptable and Not Significant in EIA terms.

Table 13.22: Morven North Scenario 2 assessment for reduction of under keel clearance

Scenario 2: Morven North + Morven South	
Operations and maintenance phase	
Overview	The presence of subsea cables and associated protection may reduce under keel clearance during the O&M phase of Morven North and Morven South. The target minimum burial depth for all subsea cables is 0.5m, noting actual burial depth will be determined via the CBRA process which will be undertaken post consent. Where burial is not feasible, cable protection may be used instead, which again will be determined by the CBRA. In line with MGN 654, any reduction in water depth which exceeds 5% will be discussed with the MCA to determine if additional mitigation is necessary. This aligns with the RYA's recommendation that the "minimum safe under keel clearance over submerged structures and associated infrastructure should be determined in accordance with the methodology set out in MGN 543 [since superseded by MGN 654]" (RYA, 2019). Given that depths within the Morven Site range between 62m to 76m below LAT and that the maximum draught recorded within the vessel traffic surveys was 13.8m (see Section 10.2.4 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment), it is not anticipated that subsea cable protection will reduce water depths over the 5% threshold. No specific concerns from stakeholders were raised during consultation including the Hazard Workshop, with MGN 654 compliance considered suitable to manage the impact, noting that only small craft are expected to navigate internally within the Morven Site. Based on expert opinion, in the event of an underwater allision, the most likely consequence is minor damage. The unlikely worst-case consequence may be vessel foundering resulting in PLL and pollution, although this is considered highly improbable. Implementation of the MPCP will mitigate against pollution, whilst adherence to an ERCoP as well as operating under the obligations of SOLAS (IMO, 1974) will mitigate against the risk of PLL.
Frequency of occurrence	The frequency of occurrence of the risk of reduced under keel clearance due to the presence of subsea cables during O&M is considered Negligible.

Scenario 2: Morven North + Morven South	
Severity of consequence	The severity of consequence of the risk of reduced under keel clearance due to the presence of subsea cables during O&M is considered to be Minor.
Significance of risk	Taking the frequency of occurrence as negligible and the severity of consequence as minor, the overall effect of reduced under keel clearance due to subsea cables during O&M of Morven North and Morven South is considered to be broadly acceptable. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Broadly Acceptable and Not Significant in EIA terms.

Table 13.23: Morven North Scenario 2 assessment for anchor and fishing gear interactions with subsea cables

Scenario 2: Morven North + Morven South	
Operations and maintenance phase	
Overview	The presence of subsea cables within the Morven Site may increase the risk of anchor and fishing gear interaction. The spatial extent of the hazard is small given that a vessel must be in close proximity to an inter-array cable for an interaction to occur. There are three anchoring scenarios which are considered for this hazard: • Planned anchoring – most likely as a vessel awaits a berth to enter port but may also result from adverse weather conditions, machinery failure or subsea operations; • Unplanned anchoring – generally resulting from an emergency situation where the vessel has experienced steering failure; • Anchor dragging – caused by anchor failure. Although the second of these scenarios may involve limited decision-making time if drifting towards a hazard, in all three scenarios it is anticipated that the charting of infrastructure including the subsea cables will inform the decision to anchor, as per Regulation 34 of SOLAS (IMO, 1974). No anchored vessels were observed within the Regional Shipping and Navigation Study Area during the survey periods, with one vessel every 30 days recorded as likely to be at anchor within the long-term vessel traffic data. Risk of interaction with an inter-array cable on a planned anchoring or dragged anchoring basis is therefore anticipated to be extremely low. In terms of emergency anchoring, any areas of high traffic volume are likely to represent the areas of highest risk, particularly where there are hazards nearby (for example, structures, rocks, shallows). However, given the relatively few hazards in proximity to the Morven Site, as well as the water depths, the likelihood of this scenario arising is very low. The likelihood of anchor interaction with a subsea cable is further reduced by the burial of the cables and use of external cable protection where required, which will be informed by the CBRA process, noting this will account for traffic volumes and vessel sizes. Moreover, with all subsea cables located within the

Scenario 2: Morven North + Morven South	
	Morven Site, there is a limited pathway through which commercial vessels may be subject to this hazard. Should an anchor interaction occur, the most likely consequence is no damage to the cable or anchor, based on previous anchor interaction incidents. As an unlikely worst-case consequence, a snagging incident could occur and the vessel's anchor as well as the cable could be damaged, resulting in a loss of stability noting this would only occur for a smaller vessel which would be less likely to penetrate deeper into the seabed than a larger vessel. There is also a risk that fishing gear may interact with subsea cables. It is the responsibility of the fishermen to dynamically risk assess whether it is safe to undertake fishing activities within the Morven Site 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 subsea cables. From vessel traffic data, the majority of fishing vessels (including those likely actively fishing but outside the Morven Site) were potters, which are of limited concern to subsea cables. In addition, the presence of subsea cables and the wind farm structures may mean that trawling is less likely within the Morven Site. In the event of a fishing gear interaction, the consequences would likely consist of loss of gear, or as an unlikely worst-case could include loss of stability. Relevant embedded mitigation measures include promulgation of information, marking on nautical charts, adherence to a CBRA and vessel compliance with MGN 654 (MCA, 2021).
Frequency of occurrence	The frequency of occurrence relating to the risk of anchor and fishing gear interaction with subsea cables during O&M is considered to be Extremely Unlikely.
Severity of consequence	The severity of consequence relating to the risk of anchor and fishing gear interaction with subsea cables during O&M is considered to be Moderate.
Significance of risk	Taking the frequency of occurrence as extremely unlikely and the severity of consequence as moderate, the overall effect of anchor and fishing gear

Scenario 2: Morven North + Morven South	
	interaction with subsea cables during O&M of Morven North and Morven South is considered to be broadly acceptable. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Broadly Acceptable and Not Significant in EIA terms.

Table 13.24: Morven North Scenario 2 assessment for reduction of emergency response capability including Search and Rescue

Scenario 2: Morven North + Morven South	
Operations and maintenance phase	
Overview	The installation of structures as well as increased vessel activity and personnel numbers may reduce emergency response capabilities during the O&M phase of Morven North and Morven South by increasing the number of incidents, increasing consequences or reducing access for the responders. The spatial extent of this hazard is large given the area covered by Morven North and Morven South (250nm^2), as well as the distance covered by air-based SAR support (the SAR helicopter base is located at Inverness, 104nm northwest of the Morven Site). It is unlikely that a SAR operation will require the entirety of the Morven Site to be searched and it is probable that a search will be restricted to a smaller area in which a casualty is known to be located (accounting for assumptions on any potential drift of the casualty). Up to 586 vessel movements may be made annually by maintenance vessels during the O&M phase of Morven North and Morven South. It is assumed that maintenance vessels will be on-site throughout the majority of the O&M phase, although severe weather may lead to vessels being withdrawn. The presence of these vessels increase the likelihood of an incident and subsequently increase the likelihood of multiple incidents occurring simultaneously, diminishing emergency response capability. However, they may also be able to provide additional response resource in the event of an incident in liaison with the MCA. The most likely consequence to occur would be a delay to any emergency response request. As an unlikely worst-case, this could result in a failure of emergency response to an incident resulting in PLL and pollution. However,

Scenario 2: Morven North + Morven South	
	project vessels will be managed via marine coordination and comply with flag state regulations which will reduce this risk. Additionally, the presence of project vessels themselves may mitigate this risk as they may assist at incidents involving other project vessels under the obligation of SOLAS (IMO, 1974) and adherence to an ERCoP, noting this would be undertaken with liaison with the MCA. The MPCP will also be implemented should pollution occur. From recent SAR data, there was a single SAR tasking recorded throughout the nine-year period within the Regional Shipping and Navigation Study Area, at the southeastern extent of the Morven Site. The frequency of incidents in proximity to Morven North and Morven South is not anticipated to increase significantly from the current level given the measures noted above which will be in place. The layout will be agreed with the MCA and in line with MGN 654 requirements to ensure any SAR operations that do occur within the Morven Site are facilitated. The Morven Site indicative worst-case layout includes both a ringroad Helicopter Refuge Area between the dense perimeter and internal grid and a Helicopter Refuge Area between the sites, to assist with SAR access. This has been included to address a concern raised by the MCA in relation to the size of the Morven Site. A SAR checklist will also be completed and agreed with the MCA as required under MGN 654. Relevant embedded mitigation measures include DSLP approval, promulgation of information, adherence to an LMP and AtoNMP, marking on appropriate charts, marine coordination of project vessels, adherence to an ERCoP, adherence to an MPCP, adherence to an NSPVMP and compliance with MGN 654 and international marine regulations.
Frequency of occurrence	The frequency of occurrence relating to the risk of reduced emergency response capabilities during the O&M phase is considered to be Extremely Unlikely.
Severity of consequence	The severity of consequence relating to the risk of reduced emergency response capabilities during the O&M phase is considered to be Serious.
Significance of risk	Taking the frequency of occurrence as extremely unlikely and the severity of consequence as serious, the overall effect of reduced emergency response

Scenario 2: Morven North + Morven South	
	capability during O&M of Morven North and Morven South is considered to be tolerable with mitigation. The hazard is considered ALARP with embedded mitigation in place and therefore no additional mitigation is required. The hazard is therefore Tolerable with Mitigation and Not Significant in EIA terms.

13.13.3 Scenarios 3 and 4 assessment

13.13.3.1 The Scenarios 3 and 4 assessment for Morven North is presented in Table 13.25 to Table 13.29. Due to the nature of differing timescales for developments in the vicinity alongside Morven North, the assessment for Scenarios 3 and 4 considers worst-case scenarios as a whole across the Morven North phases.

Table 13.25: Morven North Cumulative Effects Assessment for vessel displacement and increased third-party vessel to vessel collision risk

	Cumulative effects assessment		
	Scenario 3a: Morven North + Tier 1 developments	**Scenario 3c: Morven North + Morven South + Tier 1 developments**	**Scenario 4: Morven North + Morven South + Tier 1 developments + Tier 2 developments**
Overview	The CEA for Scenario 3a considers Morven North together with the Tier 1 projects. Based on the cumulative assessment of vessel routeing undertaken, there would be 13 routes expected to deviate on a cumulative basis considering Scenario 3a (see Section 15.5.5 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment for these deviations). It is noted that Route 1 comprises a much greater number of vessels than any other route and is among the routes not affected in Scenario 3a. The affected routes have been grouped based on location and direction, and in each case there is either only a small deviation required (Aberdeen East routeing) or optionality for mariners (Firth of Forth, Montrose and north-south routeing). In all cases there are means by which vessels can continue to safely navigate within the region. For the north-south routeing there would likely be an increase in passage time and distance, although with adequate passage planning (particularly for the approach to/from the north) any increases can be reduced. For the Montrose routeing, there would be increased passage time and distance, although again effective passage planning	The CEA for Scenario 3c considers Morven North and Morven South together with the Tier 1 projects. Based on the cumulative assessment of vessel routeing undertaken, there would be 13 routes expected to deviate on a cumulative basis considering Scenario 3c (see Section 15.5.7 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment for these deviations). It is noted that Route 1 comprises a much greater number of vessels than any other route and is among the routes not affected in Scenario 3c. The affected routes have been grouped based on location and direction, and in each case there is either only a small deviation required (Aberdeen East routeing) or optionality for mariners (Firth of Forth, Montrose and north-south routeing). In all cases there are means by which vessels can continue to safely navigate within the region. For the north-south routeing there would likely be an increase in passage time and distance, although with adequate passage planning (particularly for the approach to/from the north) any increases can be reduced. For the Montrose routeing, there would be increased passage time and distance,	The CEA for Scenario 4 considers Morven North and Morven South together with the Tier 1 and Tier 2 projects. Based on the cumulative assessment of vessel routeing undertaken, there would be 15 routes expected to deviate on a cumulative basis considering Scenario 4 (see Section 15.5.8 of Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment for these deviations). Again, the affected routes have been grouped based on location and direction, and in each case there is optionality for mariners such that vessels can continue to safely navigate within the region. For the Aberdeen East routeing, there would be increased passage time and distance, although this largely attributable to the presence of Ossian and Bellrock rather than the Morven Site. For the north-south routeing there would likely be an increase in passage time and distance, particularly if choosing to pass east of Bellrock, although with adequate passage planning (particularly for the approach to/from the north) any increases can be reduced. For the Montrose routeing, there would be increased passage time and distance,

	Cumulative effects assessment		
	may mitigate this with changes to the way that affected vessels approach/depart Montrose. There is sufficient open sea room in the approaches to Montrose to allow this. Given the optionality available for routeing this may limit increases in collision risk resulting from the overall reduction in navigable sea room. However, it is recognised that collision risk will increase relative to Morven North in isolation, and may be particularly relevant for encounters between commercial vessels and fishing vessels where routeing passes west of the Morven North Boundary and Bowdun.	although again effective passage planning may mitigate this with changes to the way that affected vessels approach/depart Montrose. There is sufficient open sea room in the approaches to Montrose to allow this. Given the optionality available for routeing this may limit increases in collision risk resulting from the overall reduction in navigable sea room. However, it is recognised that collision risk will increase relative to Morven North in isolation, and may be particularly relevant for encounters between commercial vessels and fishing vessels where routeing passes west of the Morven North Boundary and Bowdun.	although again effective passage planning may mitigate this with changes to the way that affected vessels approach/depart Montrose. There is sufficient open sea room in the approaches to Montrose to allow this, while deviations further offshore are again largely attributable to the presence of Ossian and Bellrock rather than the Morven Site. For the Firth of Forth routeing, there would be increased passage time and distance associated with the option passing offshore of Berwick Bank, although this increase is largely attributable to Berwick Bank only. Overall, only Bellrock and Berwick Bank (of Tier 2 developments) are considered to further exacerbate passage time and distance, and these increases are again manageable through effective passage planning which will include the ability to choose from various routeing options. Given the optionality available for routeing this may limit increases in collision risk resulting from the overall reduction in navigable sea room. However, it is recognised that collision risk will increase relative to Morven North in isolation, and may be particularly relevant for encounters between commercial vessels and fishing vessels where routeing passes west of the Morven North Boundary and Bowdun. There may be an effect on routeing vessels from vessels involved in construction or maintenance of Eastern Green Link 2 and/or

	Cumulative effects assessment		
			Eastern Green Link 3. However, any associated displacement will be temporary in nature and spatially limited to the area immediately around the vessel position. Considering embedded mitigation measures such as promulgation of information, any displacement as a result of cable installation will be minor and manageable with appropriate passage planning.
Frequency of occurrence	The frequency of occurrence relating to vessel displacement and increased third-party vessel to vessel collision risk is considered to be Remote.		The frequency of occurrence relating to vessel displacement and increased third-party vessel to vessel collision risk is considered to be Reasonably Probable.
Severity of consequence	The severity of consequence relating to vessel displacement and increased third-party vessel to vessel collision risk is considered to be Moderate.		The severity of consequence relating to vessel displacement and increased third-party vessel to vessel collision risk is considered to be Moderate.
Significance of risk	Taking the frequency of occurrence as Remote and the severity of consequence as Moderate, the cumulative effect of third party vessel to vessel collision risk is considered to be Tolerable with Mitigation and Not Significant in EIA terms.		Taking the frequency of occurrence as Reasonably Probable and the severity of consequence as Moderate, the cumulative effect of third party vessel to vessel collision risk is considered to be Tolerable with Mitigation and Not Significant in EIA terms. No additional mitigation is therefore required.

Table 13.26: Morven North Cumulative Effects Assessment for increased third-party to project vessel collision risk

	Cumulative effects assessment		
	Scenario 3a: Morven North + Tier 1 developments	**Scenario 3c: Morven North + Morven South + Tier 1 developments**	**Scenario 4: Morven North + Morven South + Tier 1 developments + Tier 2 developments**
Overview	The CEA for Scenario 3a considers Morven North together with the Tier 1 projects. Ossian, Bowdun and (to a lesser extent) Salamander are also within a pre-consent phase and as such, as highlighted within the Hazard Workshop, there is the potential for an increase in numbers of project vessels from other developments. Noting that base ports are not known for developments pre-construction, and that vessel types and numbers have not been finalised, the movements of project vessels from other developments are considered qualitatively where relevant. In addition, there is the potential that the same or similarly located base ports could be used by cumulative developments for construction, maintenance and/or decommissioning vessels. On this basis, there may be an overall cumulative increase in project vessel presence within the Regional Shipping and Navigation Study Area, particularly where offshore construction periods overlap. As such there is a potential for increased encounters and collision risk with third party traffic. However, all developers – including the Applicant – are expected to establish appropriate vessel management systems	The CEA for Scenario 3c considers Morven North and Morven South together with the Tier 1 projects. There may be an overall cumulative increase in project vessel presence within the general area due to Ossian, Bowdun and (to a lesser extent) Salamander, particularly where offshore construction periods overlap. As such there is a potential for increased encounters and collision risk with third party traffic. However, all developers – including the Applicant – are expected to establish appropriate vessel management systems including through marine coordination and as such any encounters will be managed, including by COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974). This may include close liaison between the developers, particularly where sharing base ports (with liaison including with the relevant port authority(s)) and the use of specific entry/exit points for each array may be beneficial for minimising interactions with third party vessels, with this most relevant for Ossian and Bowdun as the close neighbours to the Morven Site. These will be considered as part of the NSPVMP for the respective developments, as required. In addition, promulgation of information from	The CEA for Scenario 4 considers Morven North and Morven South together with the Tier 1 and Tier 2 projects. As with Scenario 3c, although an increase in project vessel numbers from other developments will lead to increased encounter and collision risk, the establishment of vessel management systems will ensure that any encounters are managed appropriately. Additionally, Tier 2 developments are located a sufficient distance from the Morven Site such that increased interactions are likely to be limited to where there are shared base ports, potentially putting further emphasis on liaison with the relevant port authority(s).

	Cumulative effects assessment		
	including through marine coordination and as such any encounters will be managed, including by COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974). This may include close liaison between the developers, particularly where sharing base ports (with liaison including with the relevant port authority(s)) and the use of specific entry/exit points for each array may be beneficial for minimising interactions with third party vessels, with this most relevant for Ossian and Bowdun as the close neighbours to the Morven North Boundary. These will be considered as part of the NSPVMP for the respective developments, as required. In addition, promulgation of information from each respective project will inform mariners of project operations.	each respective project will inform mariners of project operations.	
Frequency of occurrence	The frequency of occurrence relating to increased third-party to project vessel collision risk is considered to be Remote.		
Severity of consequence	The severity of consequence relating to increased third-party to project vessel collision risk is considered to be Serious.		
Significance of risk	Taking the frequency of occurrence as Remote and the severity of consequence as Serious, the cumulative effect of third-party vessel to project vessel collision risk is considered to be Tolerable with Mitigation and Not Significant in EIA terms. No additional mitigation is therefore required.		

Table 13.27: Morven North Cumulative Effects Assessment for vessel to structure allision risk

	Cumulative effects assessment		
	Scenario 3a: Morven North + Tier 1 developments	**Scenario 3c: Morven North + Morven South + Tier 1 developments**	**Scenario 4: Morven North + Morven South + Tier 1 developments + Tier 2 developments**
Overview	The CEA for Scenario 3a considers Morven North together with the Tier 1 projects. The nearest screened in cumulative development is Ossian, located 4.8nm east of the Morven North Boundary. As discussed in relation to collision risk, input from the Hazard Workshop indicated there was no concern over the sea room available for deviation within a cumulative context, given that it is not expected that vessels would regularly transit through the gap between the sites. Feedback from the MCA (see Section 13.4) also indicated agreement that use of sea space between Morven and Ossian is 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. It is unlikely that vessels will experience increased allision risk beyond the localised risk when passing any given development. Bowdun is located 5.4nm north-west of the Morven North Boundary. Based on the Shipping Route Template in MGN 654, this distance is generally considered sufficient to allow vessels to safely navigate between the sites with very low allision risk, noting that as per the assessment of vessel displacement there is optionality for mariners to choose whether such a passage is preferable.	The CEA for Scenario 3c considers Morven North and Morven South together with the Tier 1 projects. The nearest screened in cumulative development is Ossian OWF, located 2.9nm east of the Morven Site. As discussed in relation to collision risk, input from the Hazard Workshop indicated there was no concern over the sea room available for deviation within a cumulative context, given that it is not expected that vessels would attempt to transit through the gap between the sites. Feedback from the MCA (see Section 13.4) also indicated agreement that use of sea space between Morven and Ossian is 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. It is unlikely that vessels will experience increased allision risk beyond the localised risk when passing any given development. Bowdun is located 5.4nm north-west of the Morven North Boundary. Based on the Shipping Route Template in MGN 654, this distance is generally considered sufficient to allow vessels to safely navigate between the sites with very low allision risk, noting that as per the assessment of vessel displacement	The CEA for Scenario 4 considers Morven North and Morven South together with the Tier 1 and Tier 2 projects. The nearest screened in cumulative development is Ossian OWF, located 2.9nm east of the Morven Site. As discussed in relation to collision risk, input from the Hazard Workshop indicated there was no concern over the sea room available for deviation within a cumulative context, given that it is not expected that vessels would attempt to transit through the gap between the sites. Feedback from the MCA (see Section 13.4) also indicated agreement that use of sea space between Morven and Ossian is 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. It is unlikely that vessels will experience increased allision risk beyond the localised risk when passing any given development. Bowdun is located 5.4nm north-west of the Morven North Boundary. Based on the Shipping Route Template in MGN 654, this distance is generally considered sufficient to allow vessels to safely navigate between the sites with very low allision risk, noting that as per the assessment of vessel displacement

	Cumulative effects assessment		
	No perceptible risk is identified in relation to Salamander given the distance from the Morven North Boundary. All developments will be required to implement marine lighting and marking in agreement with NLB and in compliance with IALA G1162 (IALA, 2022). The LMP and AtoNMP for each development will include cumulative considerations as deemed appropriate by NLB. Further, all layouts will need to be agreed with the MCA and NLB, with these discussions including consideration of allision risk.	there is optionality for mariners to choose whether such a passage is preferable. No perceptible risk is identified in relation to any Tier 1 developments given the distance from the Morven Site. It is acknowledged that allision risk will be increased as a result of the additional presence of these developments, but is largely attributable to those developments alone, (i.e. the presence of the Morven Site does not materially influence the additional allision risk across the region as a whole). All developments will be required to implement marine lighting and marking in agreement with NLB and in compliance with IALA G1162 (IALA, 2022). The LMP and AtoNMP for each development will include cumulative considerations as deemed appropriate by NLB. Further, all layouts will need to be agreed with the MCA and NLB, with these discussions including consideration of allision risk.	there is optionality for mariners to choose whether such a passage is preferable. No perceptible risk is identified in relation to any Tier 1 or Tier 2 developments given the distance from the Morven Site. It is acknowledged that allision risk will be increased as a result of the additional presence of these developments, but is largely attributable to those developments alone, (i.e. the presence of the Morven Site does not materially influence the additional allision risk across the region as a whole). All developments will be required to implement marine lighting and marking in agreement with NLB and in compliance with IALA G1162 (IALA, 2022). The LMP and AtoNMP for each development will include cumulative considerations as deemed appropriate by NLB. Further, all layouts will need to be agreed with the MCA and NLB, with these discussions including consideration of allision risk.
Frequency of occurrence	The frequency of occurrence relating to vessel to structure allision risk is considered to be Remote.		
Severity of consequence	The severity of consequence relating to vessel to structure allision risk is considered to be Moderate.		
Significance of risk	Taking the frequency of occurrence as Remote and the severity of consequence as Moderate, the cumulative effect of vessel to structure allision risk is considered to be Tolerable with Mitigation and Not Significant in EIA terms. No additional mitigation is therefore required.		

Table 13.28: Morven North Cumulative Effects Assessment for reduced access to local ports and harbours

	Cumulative effects assessment		
	Scenario 3a: Morven North + Tier 1 developments	**Scenario 3c: Morven North + Morven South + Tier 1 developments**	**Scenario 4: Morven North + Morven South + Tier 1 developments + Tier 2 developments**
Overview	The CEA for Scenario 3a considers Morven North together with the Tier 1 projects. As discussed in relation to collision risk, there is the potential that the same or similarly located base ports could be used by cumulative developments for construction, maintenance and/or decommissioning vessels. This increases the number of vessels which may be RAM at any given time as well as generally increasing the number of vessels within an area. Given the relative distance to ports in the area and the anticipated cumulative deviations for the main commercial routes, it is not anticipated that there will be any substantial effect on vessel approaches to and from local ports beyond the deviations already outlined for the vessel displacement hazard. This assumes that the duration and nature of project activities are analogous to that considered for Morven North in isolation. In the event of temporal overlap in construction of cumulative developments, it is anticipated that the developments would coordinate activities in liaison with local ports so as to ensure that access constraints are reduced. As is the case for the assessment of Morven North in isolation, promulgation of	The CEA for Scenario 3c considers Morven North and Morven South together with the Tier 1 projects. Given the relative distance to ports in the area and the anticipated cumulative deviations for the main commercial routes, it is not anticipated that there will be any substantial effect due to activities associated with cumulative developments beyond the deviations already outlined for hazards relating to vessel displacement. This assumes that the duration and nature of such activities are analogous to that considered for Morven North and Morven South. In the event of temporal overlap in construction of cumulative developments, it is anticipated that the developments would coordinate activities in liaison with local ports so as to ensure that access constraints are reduced. As is the case for the assessment of Morven North and Morven South in isolation, promulgation of information to allow mariners to passage plan accordingly is key.	The CEA for Scenario 4 considers Morven North and Morven South together with the Tier 1 and Tier 2 projects. As with the equivalent Scenario 3c hazard, the relative distance to potential similar ports used for other developments will not lead to substantial effects beyond those addressed with vessel displacement, and in the event of any overlap, activities will be coordinated.

	Cumulative effects assessment		
	information to allow mariners to passage plan accordingly is key.		
Frequency of occurrence	The frequency of occurrence relating to reduced access to local ports and harbours is considered to be Reasonably Probable.		
Severity of consequence	The severity of consequence relating to reduced access to local ports and harbours is considered to be Minor.		
Significance of risk	Taking the frequency of occurrence as Reasonably Probable and the severity of consequence as Minor, the cumulative effect of reduced access to ports is considered to be Tolerable with Mitigation and Not Significant in EIA terms. No additional mitigation is therefore required.		

Table 13.29: Morven North Cumulative Effects Assessment for reduced Search and Rescue capabilities

	Cumulative effects assessment		
	Scenario 3a: Morven North + Tier 1 developments	**Scenario 3c: Morven North + Morven South + Tier 1 developments**	**Scenario 4: Morven North + Morven South + Tier 1 developments + Tier 2 developments**
Overview	The CEA for Scenario 3a considers Morven North together with the Tier 1 projects. The presence of Tier 1 developments and associated project vessels would increase the likelihood of an incident requiring emergency response. However, as with Morven North in isolation, each development will have an ERCoP in place in liaison with the MCA. Additionally, project vessels across all the developments may be able to assist in the event of an incident across the region under the obligation of SOLAS (IMO, 1974). Therefore, any strain on emergency response resources may be somewhat balanced by the additional third party resources on site. Given the distances between the Morven North Boundary and Ossian and Bowdun, no material impact on SAR access is anticipated, (i.e., there is sufficient distance to allow a SAR asset to transition a search between two sites). Nevertheless, for all developments the layout will need to be agreed with the MCA, with these discussions including consideration of SAR access.	The CEA for Scenario 3c considers Morven North and Morven South together with the Tier 1 projects. The presence of Tier 1 developments and associated project vessels would increase the likelihood of an incident requiring emergency response. However, as with Morven North and Morven South in isolation, each development will have an ERCoP in place in liaison with the MCA. Additionally, project vessels across all the developments may be able to assist in the event of an incident across the region under the obligation of SOLAS (IMO, 1974). Therefore, any strain on emergency response resources may be somewhat balanced by the additional third party resources on site. Given the distances between the Morven Site and Ossian and Bowdun, no material impact on SAR access is anticipated, (i.e., there is sufficient distance to allow a SAR asset to transition a search between two sites). Nevertheless, for all developments the layout will need to be agreed with the MCA, with these discussions including consideration of SAR access.	The CEA for Scenario 4 considers Morven North and Morven South together with the Tier 1 and Tier 2 projects. The presence of Tier 2 developments and associated project vessels would further increase the likelihood of an incident requiring emergency response. However, as per Scenario 3c, each development will have an ERCoP in place in liaison with the MCA and project vessels across all the developments may be able to assist in the event of an incident across the region under the obligation of SOLAS (IMO, 1974). Therefore, any strain on emergency response resources may again be somewhat balanced by the additional third party resources on site. No further issues relating to SAR access are identified for Scenario 4 given the distances between the Morven Site and Tier 2 developments.
Frequency of occurrence	The frequency of occurrence relating to reduced SAR capabilities is considered to be Remote.		

	Cumulative effects assessment
Severity of consequence	The severity of consequence relating to reduced SAR capabilities is considered to be Serious.
Significance of risk	Taking the frequency of occurrence as Remote and the severity of consequence as Serious, the cumulative effect of reduced emergency response capability is considered to be Tolerable with Mitigation and Not Significant in EIA terms. No additional mitigation is therefore required.

13.13.4 Proposed monitoring

13.13.4.1 Site-specific monitoring is not proposed because the assessment concluded that Morven North would not give rise to significant effects for shipping and navigation, either alone or when considered cumulatively with other plans, projects, or activities. The Applicant will, however, continue to liaise with MD-LOT, and other key stakeholders to help identify opportunities for proportionate, evidence-led regional or strategic monitoring that can improve the understanding of the environmental implications of offshore wind, particularly where recognized evidence gaps exist. This may include contributing to, or participating in, relevant ongoing initiatives under the ScotMER programme (Scottish Government, 2026).

13.14 Transboundary effects

13.14.1.1 A screening of transboundary effects has been carried out (see Volume 3, Annex 6.2: Transboundary Effects Screening). The potential for significant transboundary effects with regard to shipping and navigation to result from Morven North upon the interests of other EEA states has been assessed as part of the EIA, with transboundary effects of Morven North described in Section 13.11 and cumulative transboundary effects described in Section 13.13. Given the international nature of vessel routeing (including to international ports), all impacts assessed within Section 13.11 are relevant.

13.14.1.2 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, with further detail provided in Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment. In particular, AIS is an internationally recognised and implemented means of broadcasting vessel information. As such, no transboundary impacts other than those already assessed in Section 13.11 are anticipated.

13.15 Inter-related effects

13.15.1.1 Inter-relationships are considered to be the impacts and associated effects of different aspects of Morven North on the same receptor. Inter-related effects are considered to be either:

- Lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of Morven North (construction, O&M and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three project stages (e.g. subsea noise effects from piling, operational turbines, vessels and decommissioning);
- Receptor-led effects: Assessment of the scope for multiple effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, multiple effects on shipping and navigation, such as increased vessel to vessel collision risk, vessel to structure allision risk, and reduced access to local ports and harbours, may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects may be short-term, temporary or transient effects, or incorporate longer-term effects.

13.15.1.2 A description of the likely inter-related effects arising from Morven North on shipping and navigation is provided in Volume 2, Chapter 21: Inter-related and Ecosystem Effects.

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

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

13.15.1.4 Table 13.30 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, O&M and decommissioning of Morven North and the inter-related effects (receptor-led effects) that are predicted to arise for shipping and navigation receptors.

13.15.1.5 As noted above, effects on shipping and navigation 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;
  - Displacement from fishing grounds for commercial fishing vessels due to maintenance activities or the presence of structures during the O&M phase.

Table 13.30: Summary of likely significant inter-related effects on the environment from individual effects occurring across the construction, Operation and Maintenance and decommissioning phases of Morven North (lifetime effects) and from multiple effects interacting across all phases (receptor-led effects)

C= Construction, O= O&M, D= Decommissioning phases

Description of impact	Phase			Likely significant inter-related effect	Significance
	C	O	D		
Morven North lifetime effects					
Increased vessel to vessel collision risk resulting from displacement (third-party to third-party)	✓	✓	✓	When displacement and increased collision risk between third-party vessels is considered across all phases, the additive effect is not larger than when considered across an individual phase. Increasing familiarity with Morven North may reduce the potential in later phases for late routeing decisions that can lead to an increased likelihood of an encounter between third-party vessels.	Across the lifetime of Morven North, 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.

Description of impact	Phase			Likely significant inter-related effect	Significance
	C	O	D		
Increased vessel to vessel collision risk resulting from displacement (third-party to project vessel)	✓	✓	✓	When displacement and increased collision risk between third-party vessels and project vessels is considered across all phases, the additive effect is not larger than when considered across construction or decommissioning phases (noting the effect is of a lesser extent during the O&M phase). Increasing familiarity with Morven North may reduce the potential in later phases for late routeing decisions that can lead to an increased likelihood of an encounter between a third-party and project vessel.	Across the lifetime of Morven North, 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.
Vessel to structure allision risk.	✓	✓	✓	When allision risk is considered across all phases, the additive effect is not larger than when considered across an individual phase, given that during the construction and decommissioning phases, the risk will be mitigated by the presence of the buoyed construction or decommissioning area, and during the O&M phase third-party vessels will be well familiar with the structures following on from the construction phase.	Across the lifetime of Morven North, 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.

Description of impact	Phase			Likely significant inter-related effect	Significance
	C	O	D		
Reduced access to local ports and harbours.	✓	✓	✓	When reduced access to local ports and harbours is considered across all phases, the additive effect is not larger than when considered across an individual phase. Increasing familiarity with Morven North may reduce the potential in later phases for late routeing decisions that can lead to less efficient port access.	Across the lifetime of Morven North, 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					
Loss of access or exclusion from fishing grounds during construction, O&M and decommissioning phases may lead to displacement of commercial fishing vessels from fishing grounds, which may lead to a reduction in available sea room and increase the risk of vessel-to-vessel collision between third-party vessels. 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.					

13.16 Summary of impacts, mitigation, likely significant effects and monitoring

13.16.1.1 Information on shipping and navigation within the Regional Shipping and Navigation Study Area was collected through a variety of data sources including dedicated stakeholder consultation, assessment of the baseline environment (including vessel traffic, navigational features and incident rates) and quantitative modelling.

13.16.1.2 Table 13.31 presents a summary of the potential impacts, designed in mitigation measures and the conclusions on likely significant effects on shipping and navigation in EIA terms. The impacts assessed are:

- increased vessel to vessel to vessel collision risk resulting from displacement (third-party to third-party);
- increased vessel to vessel collision risk resulting from displacement (third-party to project vessel);
- vessel to structure allision risk;
- reduced access to local ports and harbours;
- reduction of under keel clearance as a result of subsea infrastructure;
- anchor and fishing gear interaction with subsea cables;
- reduction of SAR capability.

13.16.1.3 Overall, it is concluded that there will be no likely significant effects arising on shipping and navigation receptors from Morven North during the construction, O&M or decommissioning phases.

13.16.1.4 Table 13.32 presents a summary of the potential Scenario 2 (Morven Site) impacts, designed in mitigation measures and the conclusions on likely significant effects on shipping and navigation in EIA terms. The impacts assessed are:

- increased vessel to vessel to vessel collision risk resulting from displacement (third-party to third-party);
- increased vessel to vessel collision risk resulting from displacement (third-party to project vessel);
- vessel to structure allision risk;
- reduced access to local ports and harbours;
- reduction of under keel clearance as a result of subsea infrastructure;
- anchor and fishing gear interaction with subsea cables;
- reduction of SAR capability.

13.16.1.5 Overall, it is concluded that there will be no likely significant effects arising on shipping and navigation receptors from Morven North and Morven South during the construction, O&M or decommissioning phases (Scenario 2).

13.16.1.6 Table 13.33 presents a summary of the potential cumulative impacts, designed in mitigation measures and the conclusions on likely significant effects on shipping and navigation in EIA terms, inclusive of Scenarios 3a (Morven North and Tier 1 developments), 3c (Morven Site and Tier 1 developments), and 4 (Morven Site, Tier 1 and Tier 2 developments). The cumulative effects assessed are:

- increased vessel to vessel to vessel collision risk resulting from displacement (third-party to third-party);
- increased vessel to vessel collision risk resulting from displacement (third-party to project vessel);
- vessel to structure allision risk;
- reduced access to local ports and harbours;
- reduction of SAR capability.

13.16.1.7 Overall, it is concluded that there will be no likely significant cumulative effects on shipping and navigation receptors from Morven North cumulatively with other projects/plans.

13.16.1.8 No likely significant transboundary effects have been identified in regard to effects of Morven North.

Table 13.31: Summary of likely significant effects, mitigation and monitoring (Scenario 1)

C= Construction, O= Operations and Maintenance, D= Decommissioning phases

Description of impact	Phase	Designed-in measures	Frequency of occurrence	Severity of consequence	Significance of effect	Additional mitigation measures	Significance of residual effect	Proposed monitoring
Vessel displacement and increased third-party vessel to vessel collision risk	C	DSLP approval, adherence to LMP and AtoNMP and NSPVMP, marking on nautical charts, promulgation of information	Extremely unlikely	Moderate	Broadly acceptable	None	Broadly acceptable, not significant (ALARP)	None
	O		Extremely unlikely	Moderate	Broadly acceptable	None	Broadly acceptable, not significant (ALARP)	
	D		Extremely unlikely	Moderate	Broadly acceptable	None	Broadly acceptable, not significant (ALARP)	
Increased third-party vessel to project vessel collision risk	C	Application for safety zones, buoyed construction/decommissioning areas, guard vessels, DSLP approval, promulgation of information, marine coordination, marking on nautical charts, adherence to LMP and AtoNMP, NSPVMP, MPCP and ERCoP.	Extremely unlikely	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	None
	O		Extremely unlikely	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
	D		Extremely unlikely	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
Vessel to structure allision risk	C	Application for safety zones, buoyed construction/decommissioning area, DSLP approval, marking on nautical charts, promulgation of	Extremely unlikely	Moderate	Broadly acceptable	None	Broadly acceptable, not significant (ALARP)	None
	O (Powered)		Remote	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	

Description of impact	Phase	Designed-in measures	Frequency of occurrence	Severity of consequence	Significance of effect	Additional mitigation measures	Significance of residual effect	Proposed monitoring
	O (Drifting)	information and adherence to LMP and AtoNMP, ERCoP and MPCP.	Extremely unlikely	Moderate	Broadly acceptable	None	Broadly acceptable, not significant (ALARP)	
	O (Internal)		Extremely unlikely	Moderate	Broadly acceptable	None	Broadly acceptable, not significant (ALARP)	
	D		Extremely unlikely	Moderate	Broadly acceptable	None	Broadly acceptable, not significant (ALARP)	
Reduced access to local ports and harbours	C	Clear buoyage of construction/decommissioning area, marine coordination of project vessels, marking on nautical charts, promulgation of information, adherence to LMP and AtoNMP and adherence to NSPVMP.	Remote	Minor	Broadly acceptable	None	Broadly acceptable, not significant (ALARP)	None
	O		Remote	Minor	Broadly acceptable	None	Broadly acceptable, not significant (ALARP)	
	D		Remote	Minor	Broadly acceptable	None	Broadly acceptable, not significant (ALARP)	
Reduction of under keel clearance	O	Promulgation of information, marking of locations on nautical charts, adherence to MPCP and ERCoP.	Negligible	Minor	Broadly acceptable	None	Broadly acceptable, not significant (ALARP)	None
Anchor and fishing gear interaction with subsea cables	O	Promulgation of information, marking on nautical charts, vessel compliance with MGN 654, adherence to a CBRA.	Extremely unlikely	Moderate	Broadly acceptable	None	Broadly acceptable, not significant (ALARP)	None

Description of impact	Phase	Designed-in measures	Frequency of occurrence	Severity of consequence	Significance of effect	Additional mitigation measures	Significance of residual effect	Proposed monitoring
Reduction of SAR capabilities	O	SAR checklist, DSLP approval, promulgation of information, marking on appropriate charts, marine coordination of project vessels, compliance with MGN 654 and international marine regulations, adherence to LMP and AtoNMP, ERCoP, MPCP, NSPVMP.	Extremely unlikely	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	None

Table 13.32: Summary of likely significant effects, mitigation and monitoring (Scenario 2)

C= Construction, O= Operations and Maintenance, D= Decommissioning phases

Description of impact	Phase	Designed in measures	Frequency of occurrence	Severity of consequence	Significance of effect	Additional mitigation measures	Significance of residual effect	Proposed monitoring
Vessel displacement and increased third-party vessel to vessel collision risk	C	DSLP approval, adherence to LMP and AtoNMP and NSPVMP, marking on nautical charts, promulgation of information.	Remote	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	None
	O		Remote	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
	D		Remote	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
Increased third-party vessel to project vessel collision risk	C	Application for safety zones, buoyed construction/decommissioning areas, guard vessels, DSLP approval, promulgation of information, marine coordination, marking on nautical charts, adherence to LMP and AtoNMP, NSPVMP, MPCP and ERCoP.	Extremely unlikely	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	None
	O		Extremely unlikely	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
	D		Extremely unlikely	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and ALARP (not significant) (ALARP)	
Vessel to structure allision risk	C	Application for safety zones, buoyed construction/decommiss	Remote	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	None

Description of impact	Phase	Designed in measures	Frequency of occurrence	Severity of consequence	Significance of effect	Additional mitigation measures	Significance of residual effect	Proposed monitoring
	O (Powered)	ioning area, DSLP approval, marking on nautical charts, promulgation of information and adherence to LMP and AtoNMP, ERCoP and MPCP.	Remote	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
	O (Drifting)		Extremely unlikely	Moderate	Broadly acceptable	None	Broadly acceptable and not significant (ALARP)	
	O (Internal)		Extremely unlikely	Moderate	Broadly acceptable	None	Broadly acceptable and not significant (ALARP)	
	D		Remote	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
Reduced access to local ports and harbours	C	Clear buoyage of construction/decommissioning area, marine coordination of project vessels, marking on nautical charts, promulgation of information, adherence to LMP and AtoNMP and adherence to NSPVMP.	Remote	Minor	Broadly acceptable	None	Broadly acceptable and not significant (ALARP)	None
	O		Remote	Minor	Broadly acceptable	None	Broadly acceptable and not significant (ALARP)	
	D		Remote	Minor	Broadly acceptable	None	Broadly acceptable and not significant (ALARP)	
Reduction of under keel clearance	O	Promulgation of information, marking of locations on nautical charts, adherence to MPCP and ERCoP.	Negligible	Minor	Broadly acceptable	None	Broadly acceptable and not significant (ALARP)	None

Description of impact	Phase	Designed in measures	Frequency of occurrence	Severity of consequence	Significance of effect	Additional mitigation measures	Significance of residual effect	Proposed monitoring
Anchor and fishing gear interaction with subsea cables	O	Promulgation of information, marking on nautical charts, vessel compliance with MGN 654, adherence to a CBRA.	Extremely unlikely	Moderate	Broadly acceptable	None	Broadly acceptable and not significant (ALARP)	None
Reduction of SAR capabilities	O	SAR checklist, DSLP approval, promulgation of information, marking on appropriate charts, marine coordination of project vessels, compliance with MGN 654 and international marine regulations, adherence to LMP and AtoNMP, ERCoP, MPCP, NSPVMP.	Extremely unlikely	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	None

Table 13.33: Summary of likely significant cumulative environment effects, mitigation and monitoring

C= Construction, O= Operations and Maintenance, D= Decommissioning phases

Description of impact	Scenario	Designed in measures	Frequency of occurrence	Severity of consequence	Significance of effect	Additional mitigation measures	Significance of residual effect	Proposed monitoring
Vessel displacement and increased third-party vessel to vessel collision risk	3a	DSLP approval, adherence to LMP and AtoNMP and NSPVMP, marking on nautical charts, promulgation of information.	Remote	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	None
	3c		Remote	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
	4		Reasonably probable	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
Increased third-party vessel to project vessel collision risk	3a	Application for safety zones, buoyed construction/decommissioning areas, guard vessels, DSLP approval, promulgation of information, marine coordination, marking on nautical charts, adherence to LMP and AtoNMP, NSPVMP, MPCP and ERCoP.	Remote	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	None
	3c		Remote	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
	4		Remote	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	

Description of impact	Scenario	Designed in measures	Frequency of occurrence	Severity of consequence	Significance of effect	Additional mitigation measures	Significance of residual effect	Proposed monitoring
Vessel to structure allision risk	3a	Application for safety zones, buoyed construction/decommissioning area, DSLP approval, marking on nautical charts, promulgation of information and adherence to LMP and AtoNMP, ERCoP and MPCP.	Remote	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	None
	3c		Remote	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
	4		Remote	Moderate	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
Reduced access to local ports and harbours	3a	Clear buoyage of construction/decommissioning area, marine coordination of project vessels, marking on nautical charts, promulgation of information, adherence to LMP and AtoNMP and adherence to NSPVMP.	Reasonably probable	Minor	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	None
	3c		Reasonably probable	Minor	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
	4		Reasonably probable	Minor	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	
Reduction of SAR capabilities	3a	SAR checklist, DSLP approval, promulgation of information, marking on appropriate charts, marine coordination of project vessels,	Remote	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	None
	3c		Remote	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	

Description of impact	Scenario	Designed in measures	Frequency of occurrence	Severity of consequence	Significance of effect	Additional mitigation measures	Significance of residual effect	Proposed monitoring
	4	compliance with MGN 654 and international marine regulations, adherence to LMP and AtoNMP, ERCoP, MPCP, NSPVMP.	Remote	Serious	Tolerable with Mitigation	None	Tolerable with Mitigation and not significant (ALARP)	

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