# BERWICK BANK WIND FARM
# **ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

## Volume 2, Chapter 13: Shipping and Navigation

**EOR0766**
**EIA Report - Chapter 13**
**Final**

## Document Status

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## Approval for Issue

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# 13. SHIPPING AND NAVIGATION

## 13.1. INTRODUCTION

1. This chapter of the Offshore Environmental Impact Assessment Report (EIA) Report presents the assessment of the likely significant effects of the Berwick Bank Wind Farm offshore infrastructure which is the subject of this application (hereafter referred to as the "Proposed Development") on shipping and navigation. Specifically, this chapter considers the likely significant effects of the Proposed Development seaward of Mean High Water Springs (MHWS) during the construction, operation and maintenance, and decommissioning phases.

2. Likely significant effect is a term used in both the "EIA Regulations" and the Habitat Regulations. Reference to likely significant effect in this Offshore EIA Report refers to "likely significant effect" as used by the "EIA Regulations". This Offshore EIA Report is accompanied by a Report to Inform Appropriate Assessment (RIAA) which uses the term as defined by the Habitats Regulations Appraisal (HRA) Regulations.

3. The assessment presented is informed by the following technical chapters:

   - volume 1, chapter 3: Project Description;
   - volume 1, chapter 5: Stakeholder Engagement and Consultation;
   - volume 1, chapter 6: Environmental Impact Assessment Methodology;
   - volume 2, chapter 12: Commercial Fisheries;
   - volume 2, chapter 14: Aviation, Military and Communications; and
   - volume 2, chapter 17: Infrastructure and Other Users.

4. This chapter summarises information contained within the Navigational Risk Assessment (NRA) (see volume 3, appendix 13.1) which, as required by the Maritime and Coastguard Agency's (MCA), is informed by Marine Guidance Note (MGN) 654 (MCA, 2021) including the undertaking of a Formal Safety Assessment (FSA). The FSA has been translated into the methodology for assessment of effects outlined in section 13.9.

## 13.2. PURPOSE OF THIS CHAPTER

5. The primary purpose of the Offshore EIA Report is outlined in volume 1, chapter 1. It is intended that the Offshore EIA Report will provide the Scottish Ministers, statutory and non-statutory stakeholders with sufficient information to determine the likely significant effects of the Proposed Development on the receiving environment.

6. In particular, this Shipping and Navigation EIA Report chapter:

   - presents the existing environmental baseline established from desk studies, site-specific surveys and consultation with stakeholders;
   - identifies any assumptions and limitations encountered in compiling the environmental information;
   - presents the likely significant impacts on shipping and navigation arising from the Proposed Development and reaches a conclusion on the likely significant effects on shipping and navigation based on the information gathered and the analysis and assessments undertaken; and
   - highlights any necessary monitoring and/or mitigation measures which recommended to prevent, minimise, reduce or offset the likely significant adverse environmental effects of the Proposed Development on shipping and navigation.

## 13.3. STUDY AREAS

7. A 10 nm buffer has been applied around the Proposed Development array area (the 'Proposed Development array area shipping and navigation study area') as shown in Figure 13.1. This study area has been defined to provide local context to the analysis of risks by capturing the relevant routes and vessel traffic movements within, and in proximity to, the Proposed Development array area. A 10 nm study area has been used within the majority of United Kingdom (UK) offshore wind farm NRAs and is suitable for collection of Radio Detection and Ranging (radar) data.

8. A 2 nm buffer has been applied around the Proposed Development export cable corridor (the 'Proposed Development export cable corridor shipping and navigation study area') as shown in Figure 13.1. Again, this study area has been defined to capture relevant receptors and their movements within, and in proximity to, the Proposed Development export cable corridor. The Proposed Development export cable corridor shipping and navigation study area covers the Proposed Development export cable corridor area between Mean Low Water Springs (MLWS) at the shoreline and the boundary of the Proposed Development array area (i.e. offshore areas only).

9. Both shipping and navigation study areas have been agreed with key stakeholders, including the MCA, Northern Lighthouse Board (NLB) and Forth Ports, as part of discussions on survey methodology (see 08 July 2020, 10 June 2020 and 12 June 2020 entries in Table 13.5, respectively).

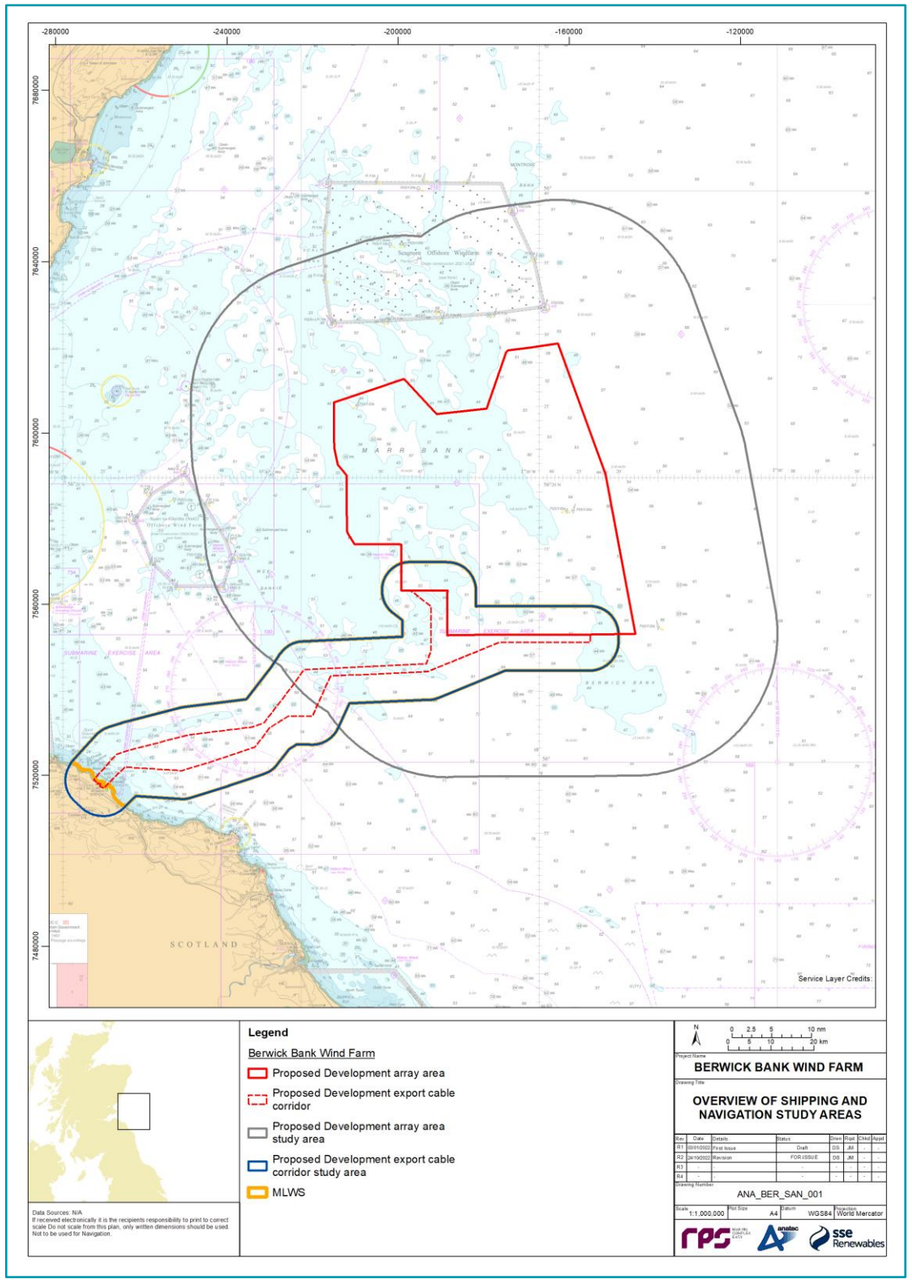


**Figure 13.1: Shipping and Navigation Study Areas**

## 13.4. POLICY AND LEGISLATIVE CONTEXT

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

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

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

**Table 13.1: Summary of Legislation Relevant to Shipping and Navigation**

| Summary of Relevant Legislation | How and Where Considered in the Offshore EIA Report |
|---|---|
| **UNCLOS (UN, 1982)** | |
| "*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.*" | UNCLOS is considered fully throughout this Offshore EIA Report chapter. Particular regard is given to internationally recognised sea lanes (main commercial routes) which are considered a key element of the shipping and navigation baseline (see section 13.7) and have been considered where relevant as part of the assessment of effects (see section 13.11). |
| **COLREGs (IMO, 1972/77)** | |
| Rule 8 Part (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.*" | The COLREGs is considered fully throughout this Offshore EIA Report chapter. Particular regard is given to collision avoidance (Rule 8) and conduct of vessels in restricted visibility (Rule 19) when considering collision risk in the assessment of effects (see section 13.11). |
| Rule 19 Part (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 Chapter V is considered fully throughout this Offshore EIA Report chapter. Particular regard is given to rendering assistance to persons in distress (Regulation 33) and passage planning (Regulation 34) when for various effects in the assessment of effects (see section 13.11). |
| Regulation 34 "*Prior to proceeding to sea, the master shall ensure that the intended voyage has been planned using the appropriate nautical charts and nautical publications for the area concerned.*" | |

**Table 13.2: Summary of UK Marine Policy Statement Relevant to Shipping and Navigation**

| Summary of Relevant Policy Framework | How and Where Considered in the Offshore EIA Report |
|---|---|
| **UK Marine Policy Statement (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.*" | The ports and shipping section of the UK Marine Policy Statement has been considered fully throughout this Offshore EIA Report chapter. Particular regard is given to the displacement of existing main commercial routes and subsequent increases in collision risk as part of the assessment of effects (see section 13.11). |
| **Scotland's National Marine Plan (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 UNCLOS. The following factors will be taken into account when reaching decisions regarding development and use:*<br>*The extent to which the locational decision interferes with existing or planned routes used by shipping, access to ports and harbour sand navigational safety. This includes commercial anchorages and defined approaches to ports.*<br>*Where interference is likely, whether reasonable alternatives can be identified.*<br>*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.*"<br>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 port sand harbours."*<br>Transport 3 "*Ferry routes and maritime transport to island and remote mainland areas provide essential connections and should be safeguarded from inappropriate marine development.*<br>*Developments will not be consented where they will unacceptably interfere with lifeline ferry services.*"<br>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).*" | All marine planning policies for shipping, ports, harbours and ferries have been considered fully throughout this Offshore EIA Report chapter. Particular regard is given to the displacement of main commercial routes and other marine activities such as anchoring activity (see section 13.7). Mitigation measures have been identified to reduce the effect of such impacts. |

## 13.5. CONSULTATION

11. The Project has facilitated early engagement with stakeholders and subsequent engagement throughout the pre-application phase of the Proposed Development. The consultation process ensured that the focus in the EIA submission documents is on likely significant environmental effects as defined by the EIA Regulations but that the NRA follows the MCAs required guidance and methodology.

12. A summary of the key 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 Offshore EIA Report chapter. Further detail is presented within Section 4 of the NRA.

13. The Shipping and Navigation Road Map (up to date at the point of Application) is presented as volume 3, appendix 13.2 and documents meetings and discussion points. At the request of MS-LOT an audit document (the Berwick Bank Wind Farm Audit Document for Post-Scoping Discussions (volume 3, appendix 5.1) has been produced and submitted alongside the application to summarise discussions on key issues, post-receipt of the Berwick Bank Wind Farm Scoping Opinion (MS-LOT, 2022).

**Table 13.3: Summary of Key Consultation of Relevance to Shipping and Navigation**

| Date | Consultee and Type of Consultation | Issue(s) Raised | Response to Issue Raised and/or Where Considered in this Chapter |
|---|---|---|---|
| **Relevant Consultation to Date** | | | |
| 9 June 2020 | Maritime and Coastguard Agency (MCA) – consultation meeting regarding 2020 Berwick Bank | If vessel traffic surveys are undertaken during COVID-19 pandemic restrictions then it is important to ensure the outputs remain representative of the true vessel traffic picture. | Consultation with local stakeholders and analysis of long-term vessel traffic data predating the COVID-19 pandemic has been undertaken to assist with establishing and validation of the baseline characterisation of vessel traffic movements (see section 13.7.1). |
| 10 June 2020 | NLB – consultation meeting on 2020 Berwick Bank | Content with the proposed approach to vessel traffic surveys provided the MCA are satisfied as the MCA take the lead on the survey methodology. | Noted in the methodology to inform the baseline (see section 13.6) and MCA confirmed they were content with the approach to vessel traffic surveys (see 8 July 2020 entry). |
| 12 June 2020 | Forth Ports – consultation meeting on 2020 Berwick Bank | The Port Vessel Traffic Service (VTS) system does not extend as far out as the Firth of Forth developments and Forth Ports do not advise traffic that far offshore. | Noted in the baseline characterisation of navigational features (see section 13.7.1). |
| | | Content with the vessel traffic survey options outlined. | Noted in the methodology to inform the baseline (see section 13.6). |
| | | There is some regular container traffic but there may be a cumulative effect on the Forth and Tay, especially for larger vessels which may have to enter from the south. | Vessel displacement has been considered in the assessment of effects (see section 13.11). |
| 8 July 2020 | MCA – email correspondence relating to 2020 Berwick Bank | Content with the intended approach to vessel traffic surveys with no concerns to raise. | Noted in methodology to inform the baseline (see section 13.6). |
| 9 March 2021 | MCA – Scoping Opinion for 2020 Berwick Bank | The likely cumulative and in combination effects on shipping routes should be considered, taking into account the proximity to other offshore wind farm developments including Inch Cape, Neart na Gaoithe (NnG) and Seagreen, and the impact on navigable sea room. | Vessel displacement has been considered in the Cumulative Effect Assessment (CEA) (see section 13.12.3). |

| Date | Consultee and Type of Consultation | Issue(s) Raised | Response to Issue Raised and/or Where Considered in this Chapter |
|---|---|---|---|
| | | Additionally, the proximity to other offshore wind farms in close proximity will need to be fully considered, with an appropriate assessment of the distances between boundaries and shipping routes as per MGN 543 [superseded by MGN 654]. | The proximity of the Proposed Development array area to Seagreen and Inch Cape has been considered as part of the assessment of effects (see section 13.11) and CEA (see section 13.12). |
| | | An NRA will need to be submitted in accordance with MGN 543 [now superseded by MGN 654] (and MGN 372) and the MCA Methodology and should be accompanied by a detailed MGN 543 [now superseded by MGN 654] Checklist. | An NRA has been undertaken and is provided in volume 3, appendix 13.1. The NRA is informed by the guidance stated and the MGN 654 Checklist has been completed. |
| 9 March 2021 | UK Chamber of Shipping – Scoping Opinion for 2020 Berwick Bank | Recognise and agree that summer 2020 data may not be representative of normal traffic levels due to the COVID-19 pandemic and suggest caution and supplementary data from 2019 or future years is necessary. | A new summer vessel traffic survey was undertaken in August 2022 and has been used alongside the winter 2021 vessel traffic data as the primary dataset for characterising vessel traffic movements (see section 13.7.1). |
| | | Some concerns over the potential deviation required by east-west commercial traffic. | Vessel displacement has been considered in the assessment of effects (see section 13.11). |
| 28 April 2021 | MCA – consultation meeting on 2020 Berwick Bank | Any navigation corridors will need to be in accordance with MGN 543 [now superseded by MGN 654]. Local consultation with regular users and ports is key and if future traffic will regularly use any gap, then it would need to be defined as a corridor and meet MGN requirements. | A navigation corridor safety case has been undertaken (see section 17 and 19.1 of the NRA) which includes compliance with MGN 654, consultation with local stakeholders including Regular Operators and consideration of the future case scenario. |
| 24 August 2021 | Forth Ports – consultation meeting | No specific considerations in relation to future case traffic volumes. | Noted in the establishment of the future case scenario (see section 13.7.2). |
| 27 September 2021 | Evergas – Regular Operator consultation response | The Proposed Development array area will have an impact on routeing, especially for vessels coming from the north with increases in passage distance of approximately 30 nm. | Vessel displacement has been considered in the assessment of effects (see section 13.11). |
| 28 September 2021 | Cruising Association (CA) – first Hazard Workshop | There are 22,000 fishing spots along the coast between Arbroath and Montrose and so up to 2 nm out to sea is a no-go zone for recreational vessels. The potential for potters to push recreational craft in the array to where commercial vessels are is a cause for concern. | Vessel displacement has been considered in the CEA (see section 13.12.3). |
| 28 September 2021 | Forth Ports – first Hazard Workshop | Smaller vessels could pass west of all the offshore wind farm developments if considered a less risky option but for tankers the water depth would be an additional consideration. If vessels are forced to pass west of all the offshore wind farm developments, then Forth Ports will have to contact vessels asking for intentions. | Vessel displacement has been considered in the CEA (see section 13.12.3). |
| | | There were approximately 120 cruise vessels into the Forth and Tay in 2019 compared with none in 2020 and few in 2021. There are currently 125 booked up for 2022 and therefore 2019 is the most accurate year for passenger vessel data. | The disparity in passenger vessel activity is reflected in the vessel traffic survey data collected in 2020. A new vessel traffic survey was undertaken in August 2022 and has been principally used to characterise passenger vessel movements (see section 13.7.1). |
| 28 September 2021 | MCA – first Hazard Workshop | Queried whether deviations due to the presence of Seagreen will be included in the baseline. | Seagreen is considered as part of the baseline with main commercial route deviations considering the Proposed Development (for the project in isolation assessment of effects, see section 13.11) and Inch Cape (for the CEA, see section 13.12.3) considered. |
| | | An adjustment to the north-west boundary of the Proposed Development array area should be considered to allow vessels more space in between the Proposed Development array area and Inch Cape. | The Proposed Development array area has been refined based on consultation feedback, including at the north-west to increase the width of the gap between the Proposed Development array area and Inch Cape. |
| 28 September 2021 | NLB – first Hazard Workshop | Large vessels would be more comfortable passing outside to the east of all the offshore wind farm developments, but smaller vessels could come inside between the Proposed Development array area and Inch Cape. | Vessel displacement has been considered in the CEA (see section 13.12.3). |
| 28 September 2021 | Royal National Lifeboat Institution (RNLI) – first Hazard Workshop | Changes relating to where incidents occur (due to the channelling of vessel traffic) may have a bearing on the future location of Search and Rescue (SAR) assets. | Current locations of SAR resources in the region are included in the baseline characterisation of navigational features (see section 13.7.1). Emergency response capability/access has been considered in the assessment of effects (see section 13.11). |
| 28 September 2021 | Royal Yachting Association (RYA) Scotland – first Hazard Workshop | The RYA Coastal Atlas is the highest quality dataset available for recreational vessel movements for which the COVID-19 pandemic (and possibly European Union (EU) Exit) has had a large effect. | The RYA Coastal Atlas of Recreational Boating (RYA, 2019) (see section 13.7.1) has informed the baseline characterisation of recreational vessel movements. |
| | | Weather is very impactful for recreational vessels and only 20% are currently transmitting via Automatic Identification System (AIS). | All recreational vessels recorded throughout the vessel traffic surveys (which included collection of AIS, radar and visual observations) were recorded on AIS rather than radar (see section 13.7.1). |

| Date | Consultee and Type of Consultation | Issue(s) Raised | Response to Issue Raised and/or Where Considered in this Chapter |
|---|---|---|---|
| | | A focus of commercial vessels through the gap between the Proposed Development array area and Inch Cape may discourage recreational vessels from navigating in proximity. | Vessel displacement has been considered in the CEA (see section 13.12.3). The Proposed Development array area has been refined based on consultation feedback, including at the north-west to increase the width of the gap between the Proposed Development array area and Inch Cape. |
| 5 October 2021 | Evergas – email correspondence | As a gas carrier, significant precaution is taken including allowing for unforeseen machinery failure. Therefore, keeping close to shore or utilising the navigation corridor between the Proposed Development array area and Inch Cape would result in a difficult situation in such an event. The longer alternative is considered safer and would be used. | Vessel displacement has been considered in the CEA (see section 13.12.3). The Proposed Development array area has been refined based on consultation feedback, including at the north-west to increase the width of the gap between the Proposed Development array area and Inch Cape. |
| 26 October 2021 | UK Chamber of Shipping – email correspondence | There is growing concern for the narrow channel between the Proposed Development array area and Inch Cape leading to vessel traffic either passing east or west of both developments. A change to the western boundary of the Proposed Development array area to create a wider and more meaningful channel for north-south traffic is suggested. | The Proposed Development array area has been refined based on consultation feedback, including at the north-west to increase the width of the gap between the Proposed Development array area and Inch Cape. |
| 15 December 2021 | Intrada Ship Management – Regular Operator consultation response | In good weather some vessels on voyage to/from Inverness will make passage across Seagreen and the Proposed Development array area; hence there will be some deviation (plus increased steaming time, more fuel, potentially a missed tide with resultant lost time). | Vessel displacement has been considered in the CEA (see section 13.12.3) including consideration of a MGN 654 compliant navigation corridor. |
| | | In adverse weather the vessels tend to be closer to the coast but Inch Cape and NnG have potential to limit the options to the Master for safe passage. | Vessel displacement has been considered in the CEA (see section 13.12.3) and includes consideration of exposure to adverse weather and a MGN 654 compliant navigation corridor. |
| | | There is a pinch point between Inch Cape and the Proposed Development array area forcing traffic to be closer than necessary and increasing the risk of close quarters navigation, or worse (collision along with environmental impacts than can create, let alone injury/life). | A navigation corridor safety case has been undertaken and vessel displacement has been considered in the CEA (see section 13.12.3) including consideration of a MGN 654 compliant navigation corridor. The Proposed Development array area has been refined based on consultation feedback, including at the north-west to increase the width of the gap between the Proposed Development array area and Inch Cape. |
| | | In adverse weather this pinch point will be even worse. Vessels are slow to respond in adverse weather needing more sea room to turn. | A navigation corridor safety case has been undertaken and vessel displacement has been considered in the CEA (see section 13.12.3) including consideration of a MGN 654 compliant navigation corridor. The Proposed Development array area has been refined based on consultation feedback, including at the north-west to increase the width of the gap between the Proposed Development array area and Inch Cape. |
| | | Vessels also carry deck cargoes, which is an added consideration for the Master in making safe passage and minimising rolling/pitching. | Vessel displacement has been considered in the CEA (see section 13.12.3) and includes consideration of exposure to adverse weather. |
| **Consultation on the Proposed Development** | | | |
| February 2022 | RYA Scotland – Scoping response | The RYA Scotland confirmed that the data sources described are sufficient, that the designed in measures are appropriate, the list of consultees is sufficient and cumulative effects of all offshore developments between the border with England and Duncansby Head should be considered as these would be encountered by vessels on passage from the south to the Caledonian Canal and the Northern Isles and vice versa (Hywind and Forthwind can be excluded). | The assessment has considered all projects of relevance within 50 nm (see section 13.12.3), and it is considered that vessels are not cumulatively impacted by two separate projects more than 50 nm apart given this allows sufficient time for vessels to return to historical transits. |
| February 2022 | NLB – Scoping response | Of particular interest is the 'funnelling' of vessel traffic between both existing and proposed offshore developments, and an assessment of these interactions, along with the increased allision and collision risk, is welcomed. | A navigation corridor safety case has been undertaken and vessel displacement has been considered in the CEA (see section 13.12.3) including consideration of a MGN 654 compliant navigation corridor. The Proposed Development array area has been refined based on consultation feedback, including at the north-west to increase the width of the gap between the Proposed Development array area and Inch Cape. |
| February 2022 | MCA – Scoping response | Vessel traffic surveys, 12 months of AIS data from 2019 and additional recreational data and consultation feedback is acceptable to the MCA. | Noted in the methodology to inform the baseline (see section 13.6). |
| | | Consideration of electromagnetic deviation on ships' compasses should be included within the assessment. The MCA would be willing to accept a three-degree deviation for 95% of the cable | Interference with magnetic position fixing equipment has been considered in the assessment of effects (see section 13.11). |

| Date | Consultee and Type of Consultation | Issue(s) Raised | Response to Issue Raised and/or Where Considered in this Chapter |
|---|---|---|---|
| | | route. For the remaining 5% of the cable route no more than five degrees will be attained. | |
| | | The array layout will require MCA approval prior to construction to minimise the risks to surface vessels, including rescue boats and SAR aircraft operating within the site. Any additional navigation safety and/or SAR requirements, as per MGN 654 annex 5, will be agreed at the approval stage. | The final layout will be agreed as part of the DSLP in consultation with the MCA and NLB (see section 13.10) and will include a MGN 654 compliant navigation corridor. |
| February 2022 | UK Chamber of Shipping – Scoping response | Given the scale of the Proposed Development and its proximity to three consented offshore wind farms, there are concerns that a 10 nm study area is insufficient and suggest that this needs extended, especially to the west and the north to take in the other wind farm areas. | The Proposed Development array area shipping and navigation study area has been defined to provide local context to the analysis of risks, is suitable for collection of radar data and is in line with MGN 654 requirements (see section 13.3). |
| | | The Proposed Development array area has the potential to amount to considerable navigational squeeze, between it and other developments as the gaps to Inch Cape and Seagreen are minimal. Traffic may route entirely west of the sites resulting in interaction with shallower waters, large amounts of fishing activity and the Forth Ports VTS. Or traffic may route entirely east of the sites with greater deviation and further from SAR resources. | A navigation corridor safety case has been undertaken and vessel displacement has been considered in the CEA (see section 13.12.3) including consideration of a MGN 654 compliant navigation corridor. The Proposed Development array area has been refined based on consultation feedback, including at the north and north-west to increase the width of the gaps between the Proposed Development array area and Seagreen and Inch Cape. |
| | | Since the vessel traffic data presented is not representative of those sites at full build out, detailed examination and scenario modelling for traffic behaviour is required. | Vessel displacement has been considered in the CEA (see section 13.12.3) including scenarios featuring those relevant projects not accounted for by the vessel traffic data (Inch Cape). This includes examination of the re-routeing options available in such scenarios with further details provided in section 15.6 of the NRA. |
| February 2022 | Ministry of Defence (MOD) – Scoping response | Defence maritime navigational interests should be considered, noting the Proposed Development overlaps two military danger areas and MOD Naval Practice and Exercise Areas (PEXA) X5641 and X5642. | Military features have been considered in the establishment of the baseline environment and military vessels have been considered within the assessment of effects (see section 13.11). |
| 27 July 2022 | Forth Ports – second Hazard Workshop | Offshore rig work is sporadic and could include periods of high activity which drops off for months at a time. Many of the rigs are towed into Dundee and then heavy lift vessels are used to transport them to the Firth of Forth. | |
| | | Given the proximity of the Proposed Development array area to the other three offshore wind farm developments in the region, there could be a crossroads formed for vessel traffic. | Collision risk has been considered in the CEA (see section 13.12.3) and a navigation corridor safety case for the gap between the Proposed Development array area and Inch Cape has been undertaken (see section 19.1 of the NRA). |
| | | The area is known to experience significant bad weather. | Noted as part of the assessment of vessel displacement in section 13.11. |
| 27 July 2022 | RYA Scotland – second Hazard Workshop | The change in the Proposed Development array area boundary will make the gap between other wind farms less problematic and some recreational vessels may also cut across the eastern extent of Inch Cape leaving more space. | Noted as part of the assessment of vessel displacement at the cumulative level in section 13.12.3. |
| | | The alignment of the western boundary of the Proposed Development array area and Seagreen is a positive change given that when passage planning it will be more obvious how vessels will transit through the area. | Noted as part of the assessment of vessel displacement at the cumulative level in section 13.12.3. |
| 27 July 2022 | Fishermen's Mutual Association (FMA) including representation of Scottish Fishermen's Federation (SFF) – second Hazard Workshop | Most of the larger tankers will navigate the inside route closer to shore and so the Marr Bank may prove to increase risk to these vessels, particularly in adverse weather. | Noted as part of the assessment of vessel displacement in section 13.11. |
| 27 July 2022 | Scottish Whitefish Producers Association – second Hazard Workshop | The 1,260m minimum spacing between wind turbines may be insufficient to allow safe navigation in any weather conditions. Fewer larger wind turbines are therefore preferable. | Noted as part of the assessment of vessel displacement in section 13.11. |

## 13.6. METHODOLOGY TO INFORM BASELINE

### 13.6.1. DESKTOP STUDY

14. Information on shipping and navigation within the shipping and navigation study areas was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 13.4, with the most up to date available datasets used wherever possible with some datasets restricted by the availability of information from the providing organisation (i.e. Marine Accident Investigation Branch (MAIB) data which is not released immediately due to ongoing accident investigations).

**Table 13.4: Summary of Key Desktop Reports**

| Title | Source | Year | Author |
|---|---|---|---|
| MAIB marine accidents database | MAIB | 2000 to 2019 | MAIB |
| Royal National Lifeboat Institution (RNLI) incident data | RNLI | 2010 to 2019 | RNLI |
| Fugro Metocean study | Fugro | 2010 to 2012 | Fugro |
| UK civilian SAR helicopter taskings | Department for Transport (DfT) | April 2015 to March 2021 | DfT |
| Vessel Traffic Monitoring (VMS) data for Proposed Development shipping and navigation study areas | Marine Scotland | 2018 to 2021 | Marine Scotland |
| Long-term vessel traffic data | Anatec | 2019 | Anatec |
| Case studies of past weather events | Met Office | 2019 | Met Office |
| UK Coastal Atlas of Recreational Boating | RYA | 2019 | RYA |
| Military exercise and danger areas | Marine Scotland | 2019 | Marine Scotland |
| Admiralty Charts 156, 160, 175, 190, 210, 213, 268, 273, 278, 734, 735, 1407, 1409 | United Kingdom Hydrographic Office (UKHO) | 2020/2022 | UKHO |
| Summer vessel traffic data for Proposed Development export cable corridor shipping and navigation study area | Anatec | 2022 | Anatec |
| Admiralty Sailing Directions North Sea (West) Pilot NP54 | UKHO | 2022 | UKHO |
| ShipRoutes database | Anatec | 2022 | Anatec |
| Winter vessel traffic data for Proposed Development export cable corridor shipping and navigation study area | Anatec | 2021 | Anatec |
| UK ports: ship arrivals | DfT | 2022 | DfT |
| Modelling of significant wave height data | Vortex | 2021 | Vortex |
| Modelling of significant wave height data | Vortex | 2021 | Vortex |

### 13.6.2. SITE-SPECIFIC SURVEYS

15. To inform the Shipping and Navigation Offshore EIA Report chapter, site-specific surveys were undertaken, as agreed with the MCA, NLB and Forth Ports (see 09 June 2020, 10 June 2020 and 12 June 2020 entries in Table 13.3, respectively). A summary of the surveys undertaken to inform the shipping and navigation assessment of effects are outlined in Table 13.5, noting that the winter 2021 and summer 2022 vessel traffic surveys are the primary sources used for characterising vessel traffic movements within and in proximity to the Proposed Development array area.

**Table 13.5: Summary of Site-Specific Survey Data**

| Title | Extent of Survey | Overview of Survey | Survey Contractor | Date | Reference to Further Information |
|---|---|---|---|---|---|
| Summer 2020 vessel traffic survey | Proposed Development array area shipping and navigation study area | AIS, radar and visual observation summer 2020 survey data to characterise vessel traffic movements within and in proximity to the Proposed Development array area. | N/A | July 2020 | Volume 3, appendix 13.1 |
| Winter 2021 vessel traffic survey | Proposed Development array area shipping and navigation study area | AIS, radar and visual observation winter 2021 survey data to characterise vessel traffic movements within and in proximity to the Proposed Development array area. | N/A | January 2021 | Volume 3, appendix 13.1 |
| Summer 2022 vessel traffic survey | Proposed Development array area shipping and navigation study area | AIS, radar and visual observation summer 2022 survey data to characterise vessel traffic movements within and in proximity to the Proposed Development array area. | N/A | August 2022 | Volume 3, appendix 13.1 |

## 13.7. BASELINE ENVIRONMENT

### 13.7.1. OVERVIEW OF BASELINE ENVIRONMENT

Navigational features

16. A plot of navigational features in proximity to the Proposed Development is presented in Figure 13.2. Details of the key navigational features are provided in Table 13.6.

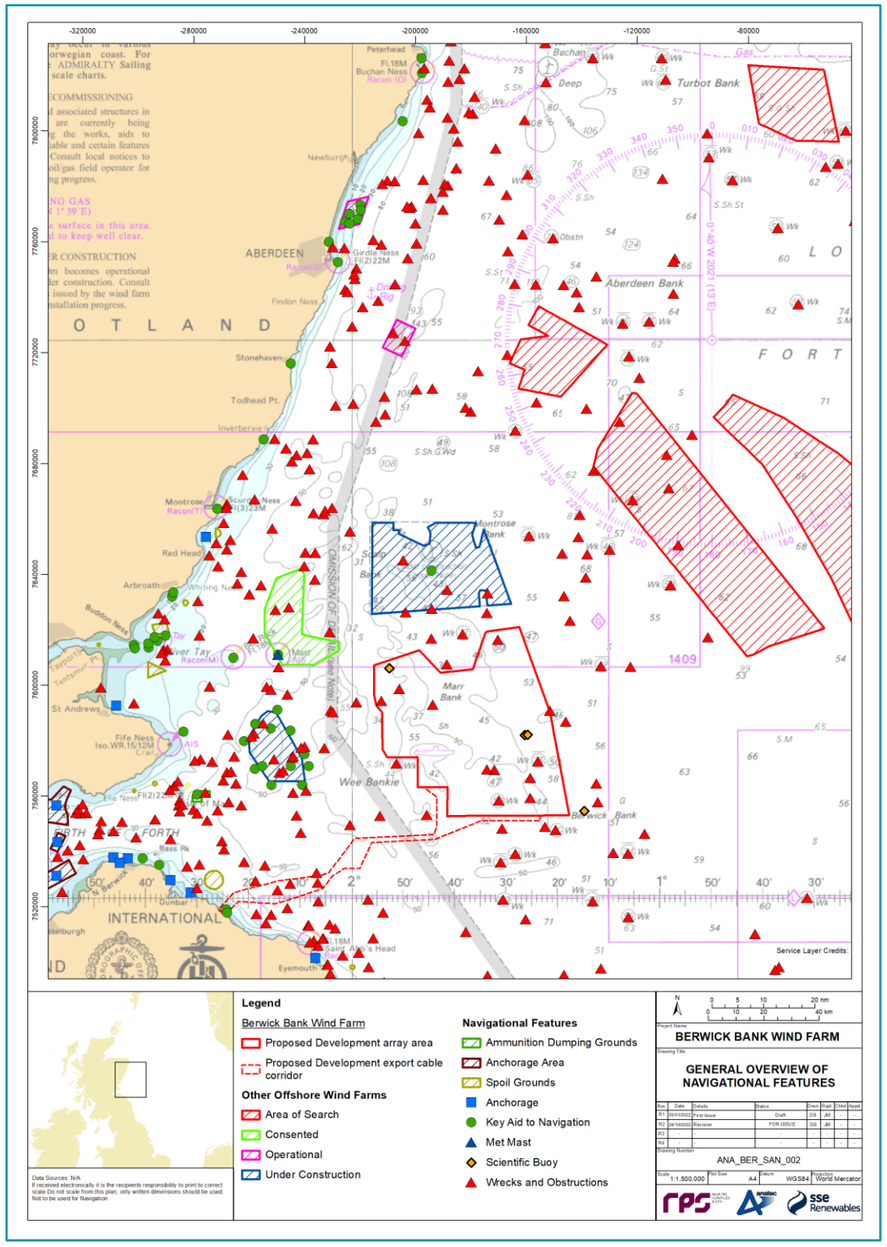


**Figure 13.2: Navigational Features in Proximity to the Proposed Development**

**Table 13.6: Details of Key Navigational Features**

| Navigational Feature | Details |
|---|---|
| Other offshore wind farms | The closest offshore wind farm developments to the Proposed Development array area are Seagreen (2.7 nm (5.0 km) to the north and under construction), Inch Cape (4.1 nm (7.6 km) to the west and consented) and NnG (8.8 nm (16 km) to the west and under construction). |
| Ports and related services | The closest ports or harbours to the Proposed Development array area are Arbroath Harbour (23 nm to the north-west) and Montrose Port (24 nm to the north-west). There are many ports and harbours located within the Firth of Forth including Grangemouth, Rosyth, Leith and Braefoot Bay.<br><br>A Vessel Traffic Service (VTS) – the Forth and Tay Navigation Service – is operated from Grangemouth with "all vessels of 50 Gross Tonnes (GT) and over required to report on passing the eastern limit and at all subsequent reporting points" (UKHO, 2021). |
| Military areas | There are two MOD naval PEXAs located within the Outer Firth of Forth (X5641 and X5642), with area X5642 overlapping the Proposed Development array area. There is a firing practice area off the Northumberland coast located approximately 19 nm to the south of the Proposed Development array area.<br><br>No restrictions are placed on the right to transit a military PEXA at any time, although mariners are advised to exercise caution. Exercises and firing only occur when the area is considered to be clear of all shipping. |
| Aids to navigation | There are no aids to navigation located within the Proposed Development array area. There is one aid to navigation located within the Proposed Development export cable corridor, a special mark situated in the approaches to Torness Power Station at the landfall location.<br><br>There is a group of nine aids to navigation located west of the Proposed Development array area forming the construction buoyage for NnG which is expected to be removed following commissioning of the development, anticipated in November 2022 (EDF, 2020). Similar aids to navigation are also in place for Seagreen but are not yet charted at the time of writing. |

### Vessel traffic movements

17. A plot of vessel traffic survey data from the winter 2021 survey recorded within the Proposed Development array area shipping and navigation study area, colour coded by vessel type, is presented in Figure 13.3. Following this, the vessel traffic survey data from the summer 2022 survey is presented in Figure 13.4. A number of the vessel tracks recorded were classified as temporary (non-routine), such as the tracks of the survey vessel, other non-routeing survey vessels and vessels associated with the construction of NnG. These have therefore been excluded to ensure the analysis is not skewed and gives a fair representation of standard vessel traffic movements in the area.

18. For the summer survey period (August 2022), there was an average of 14 unique vessels per day recorded within the Proposed Development array area shipping and navigation study area, and six unique vessels per day within the Proposed Development array area itself. The main vessel types were tankers (34% within the Proposed Development array area shipping and navigation study area), cargo vessels (30%) and commercial fishing vessels (18%).

19. For the winter survey period (January 2021), there was an average of 16 unique vessels per day recorded within the Proposed Development array area shipping and navigation study area, and six unique vessels per day within the Proposed Development array area itself. The main vessel types were cargo vessels (36% within the Proposed Development array area shipping and navigation study area), tankers (32%) and commercial fishing vessels (16%).

20. Passenger vessels were not present in the vessel traffic survey data. However, from an analysis of long-term vessel traffic data, an average of one unique passenger vessel every two days was recorded within

the Proposed Development array area shipping and navigation study area. This discrepancy is attributed to the COVID-19 pandemic has had a substantial effect on shipping movements globally and was confirmed by Forth Ports during consultation.

21. Main commercial routes have been identified using the principles set out in MGN 654 (MCA, 2021) and based on the vessel traffic survey data, long-term vessel traffic data and consultation feedback. A total of 15 main commercial routes were identified within the Proposed Development array area shipping and navigation study area. A plot of the main commercial routes and corresponding 90$^{th}$ percentiles within the Proposed Development array area shipping and navigation study area is presented in Figure 13.5. A description of each route is provided in Table 13.7. It is noted that the start and end locations stated are based on the most common destinations transmitted via AIS by vessels on those routes.

**Table 13.7: Description of Main Commercial Routes**

| Route Number | Average Vessels per Day | Description |
|---|---|---|
| 1 | 1 | Aberdeen–Humber ports. Generally used by tankers (88%). |
| 2 | 1 | Forth ports–Antwerp. Generally used by tankers (82%). |
| 3 | 1 | Aberdeen–Great Yarmouth. Generally used by oil and gas vessels (46%) and cargo vessels (38%). |
| 4 | 0 to 1 | Aberdeen–Humber ports. Generally used by cargo vessels (50%) and tankers (36%). |
| 5 | 0 to 1 | Forth ports–Baltic ports. Generally used by tankers (48%) and cargo vessels (43%). |
| 6 | 0 to 1 | Montrose–Rotterdam. Generally used by cargo vessels (72%). |
| 7 | 0 to 1 | Invergordon–Humber ports. Generally used by cargo vessels (75%). |
| 8 | 0 to 1 | Forth ports–Hamburg. Generally used by tankers (64%). |
| 9 | 0 to 1 | Aberdeen–Humber ports. Generally used by passenger vessels (57%) and cargo vessels (28%). |
| 10 | 0 to 1 | Forth ports–north Norway ports. Generally used by cargo vessels (42%) and tankers (32%). |
| 11 | 0 to 1 | Dundee–Baltic ports. Generally used by cargo vessels (65%). |
| 12 | 0 to 1 | Dundee–Rotterdam. Generally used by cargo vessels (51%) and offshore support vessels (41%). |
| 13 | 0 to 1 | Aberdeen–Eyemouth. Generally used by tankers (55%) and offshore support vessels (29%). |
| 14 | 0 to 1 | Forth ports–Pennsylvania. Generally used by tankers (49%) and passenger vessels (34%). |

22. From the vessel traffic survey data, there was an average of two to three unique commercial fishing vessels per day recorded within the Proposed Development array area shipping and navigation study area. Of these, 97% were recorded via AIS with 3% recorded via radar. VMS data indicates that the highest density areas for fishing activity are to the north of the Proposed Development array area.

23. From the vessel traffic survey data, only three unique recreational vessels were recorded within the Proposed Development array area shipping and navigation study area throughout the surveys. All three were recorded via AIS. The RYA Coastal Atlas of Recreational Boating (RYA, 2019) indicates a higher density of recreational activity towards the coast and Firth of Forth, with spare activity at the Proposed Development array area. Based on consultation feedback and the long-term vessel traffic data, there is estimated to be an average of two to three unique recreational vessels per day within the Proposed Development array area shipping and navigation study area.

24. A plot of vessel traffic data recorded within the Proposed Development export cable corridor shipping and navigation study area, colour coded by vessel type, is presented in Figure 13.6. A number of the vessel tracks recorded were classified as temporary (non-routine), such as the tracks of non-routeing survey vessels and vessels associated with the construction of NnG. These have therefore been excluded to ensure the analysis is not skewed and gives a fair representation of standard vessel traffic movements in the area.

25. For the summer period (July 2020), there was an average of 24 unique vessels per day recorded within the Proposed Development export cable corridor shipping and navigation study area, and 21 unique vessels per day within the Proposed Development export cable corridor itself. The main vessel types were commercial fishing vessels (32% within the Proposed Development export cable corridor shipping and navigation study area), tankers (27%) and cargo vessels (25%).

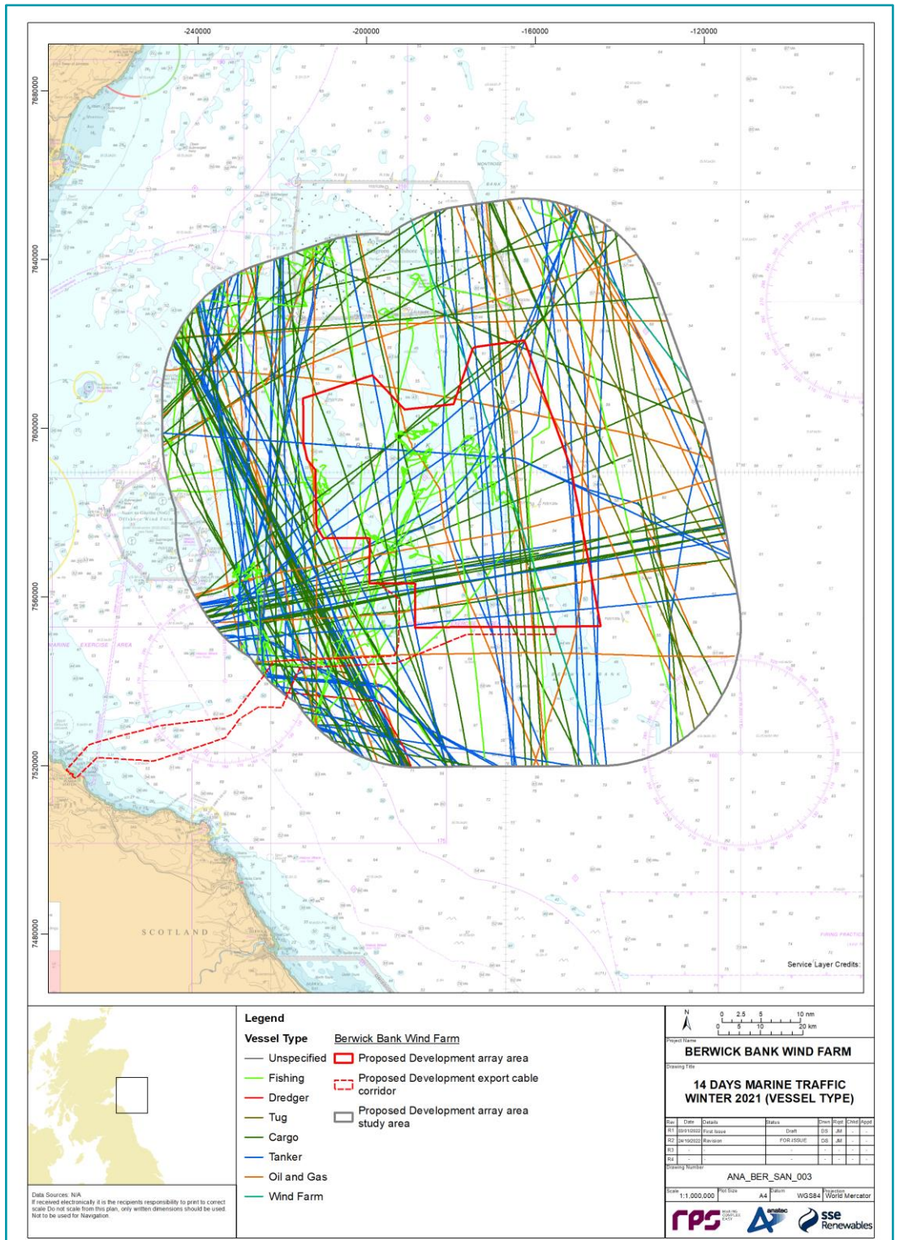


**Figure 13.3: Vessel Traffic Survey Data within Proposed Development Array Area Shipping and Navigation Study Area (14 Days, Winter 2021)**

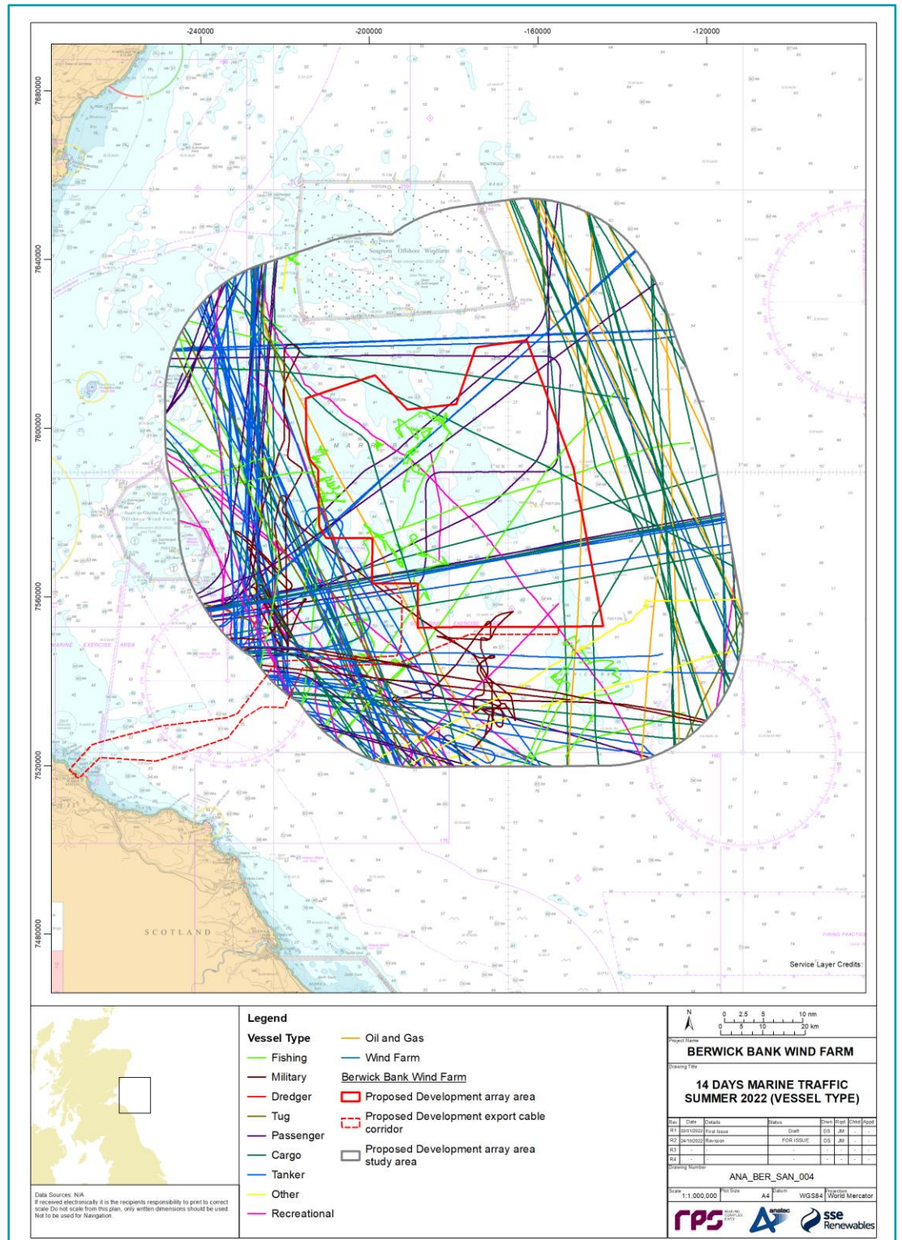


**Figure 13.4: Vessel Traffic Survey Data within Proposed Development Array Area Shipping and Navigation Study Area (14 Days, Summer 2022)**

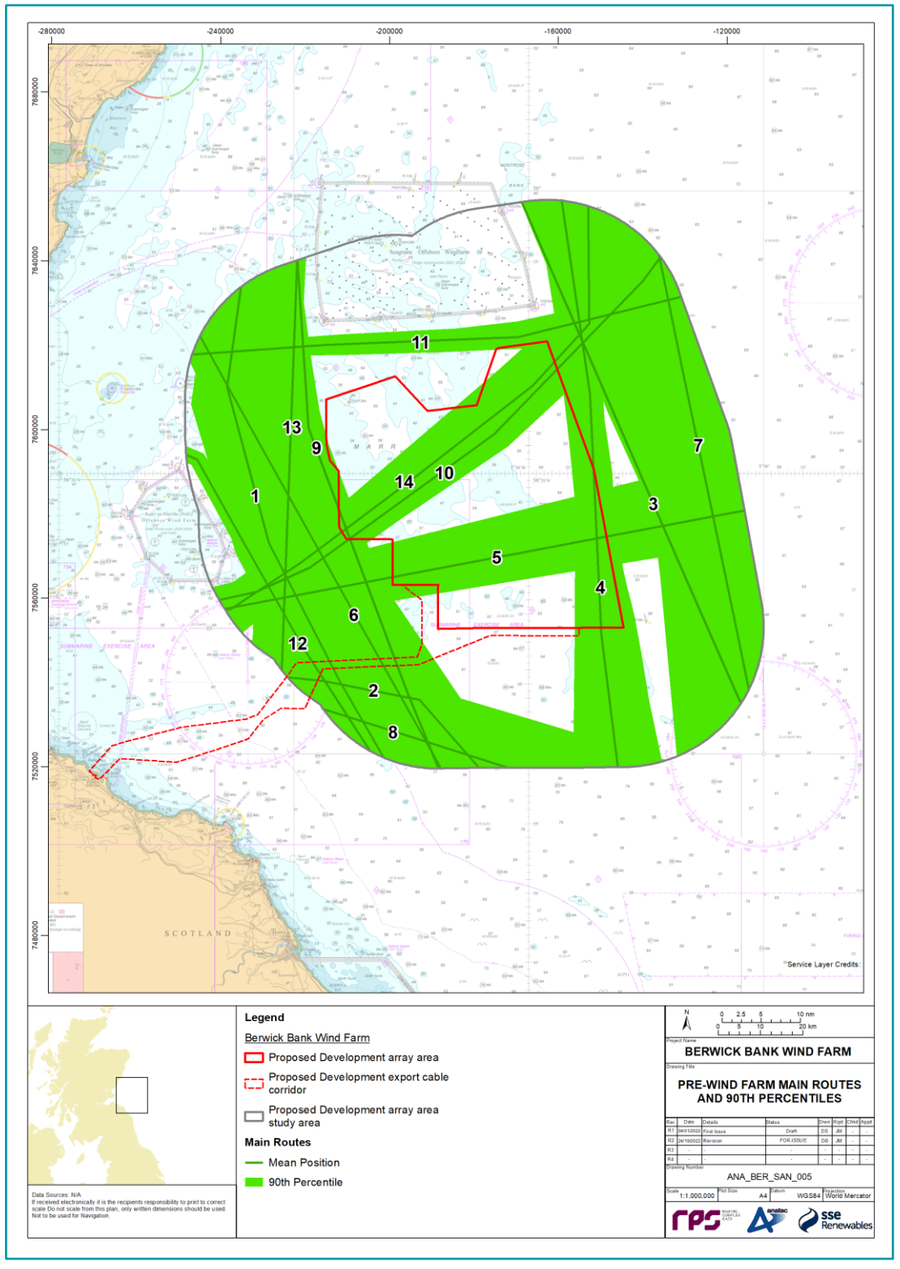


**Figure 13.5: Main Commercial Routes and 90th Percentiles within Proposed Development Array Area Shipping and Navigation Study Area**

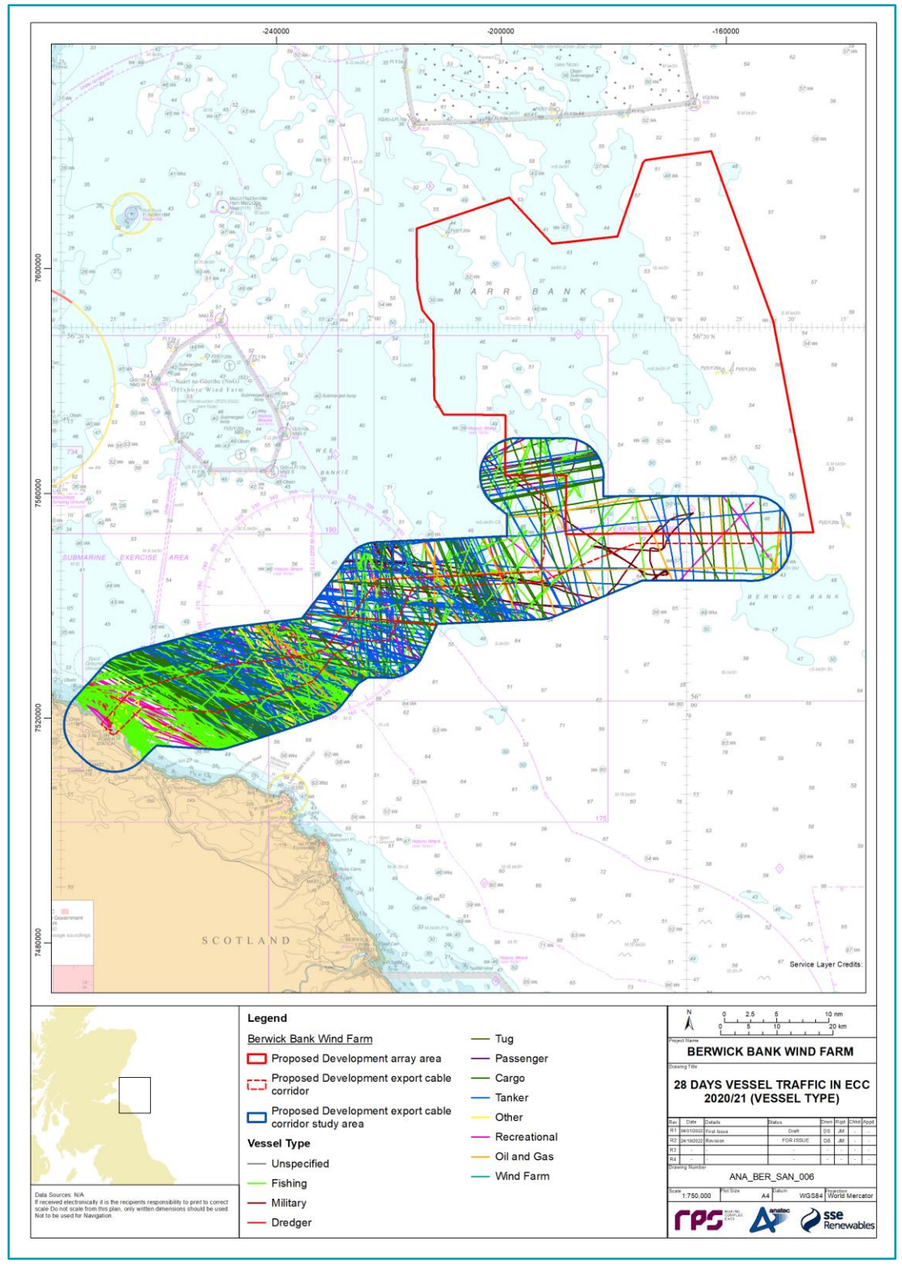


**Figure 13.6: Vessel Traffic Survey Data within Proposed Development Export Cable Corridor Shipping and Navigation Study Area (28 Days, 2021/22)**

26. For the winter period (January 2021), there was an average of 18 unique vessels per day recorded within the Proposed Development export cable corridor shipping and navigation study area, and 17 unique vessels per day within the Proposed Development export cable corridor itself. The main vessel types were tankers (36% within the Proposed Development export cable corridor shipping and navigation study area), cargo vessels (30%) and commercial fishing vessels (22%).

27. Passenger vessels were not present in the vessel traffic data. However, from an analysis of Anatec's in-house ShipRoutes database, a route operated by passenger vessels is known to cross the Proposed Development export cable corridor with an average of approximately one vessel every three to four days. This discrepancy is attributed to the COVID-19 pandemic and was confirmed by Forth Ports during consultation.

28. The RYA Scotland noted that the RYA Coastal Atlas is the highest quality dataset available for recreational vessel movements for which the COVID-19 pandemic has had a large effect. The RYA Coastal Atlas of Recreational Boating (RYA, 2019) (see section 13.7.1) has therefore been used to inform the baseline characterisation of recreational vessel movements with additional consultation also undertaken with recreational clubs within the wider Forth area.

### Emergency response resources and historical maritime incidents

29. A plot of emergency response resources in proximity to the Proposed Development is presented in Figure 13.7. Details of the emergency response resources are provided in Table 13.8.

**Table 13.8: Details of Emergency Response Resources**

| Emergency Response Resource | Details |
|---|---|
| SAR helicopters | The SAR helicopter service is operated by the Bristow Group out of 10 base locations around the UK, with the closest to the Proposed Development array area located at Inverness Airport (94 nm (174 km) to the north-west). |
| RNLI stations | The RNLI operate out of more than 230 stations around the UK, with the closest to the Proposed Development array area located at Eyemouth (19 nm (35 km) to the south-west). |
| His Majesty's Coastguard (HMCG) | The HMCG coordinates SAR operations through a network of nine Maritime Rescue Coordination Centres (MRCC), a Maritime Rescue Sub Centre (MRSC) and the Joint Rescue Coordination Centre (JRCC). The closest MRCC to the Proposed Development array area is located at Aberdeen (40 nm (74 km) to the north). |

30. A plot of the locations of accidents, injuries and hazardous incidents reported to the MAIB within the Proposed Development array area shipping and navigation study area between 2010 and 2019 is presented in Figure 13.7 Similar analysis within the Proposed Development export cable corridor shipping and navigation study area is provided in Section 9.5 of the NRA (volume 3, appendix 13.1).

31. An average of one incident every three years was reported to the MAIB within the Proposed Development array area shipping and navigation study area between 2010 and 2019. Incidents occurred inshore, north or south of the Proposed Development array area with no incidents reported within or offshore of the Proposed Development array area. One incident each of machinery failure, loss of control, and an accident to person were recorded.

32. A review of older MAIB incident data (2000 to 2009) indicates an average of one incident every two to three years. Therefore, there is a decreasing trend of MAIB reported incidents within the Proposed Development array area shipping and navigation study area over time.

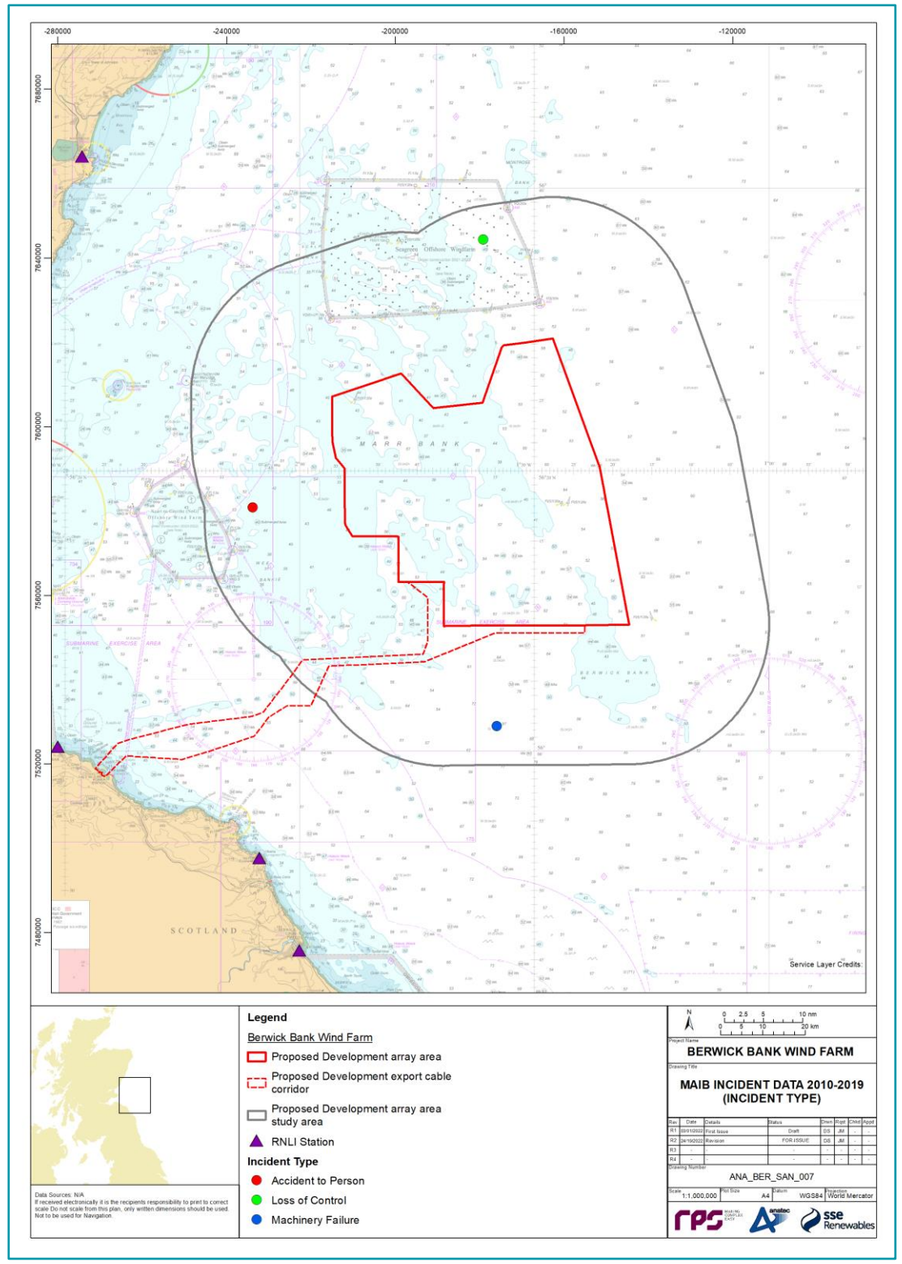


**Figure 13.7: Emergency Response Resources and MAIB Incident Data within Proposed Development Shipping and Navigation Study Areas (2010 to 2019)**

33. An average of one unique incident per year was responded to by the RNLI within the Proposed Development array area shipping and navigation study area between 2010 and 2019. One incident occurred within the Proposed Development array area itself, involving an 'other recreational' vessel which was in trouble. All other incidents occurred inshore of the Proposed Development array area.

### 13.7.2. FUTURE BASELINE SCENARIO

34. The EIA Regulations ((The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, The Marine Works (Environmental Impact Assessment) Regulations 2007, The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017)), require that a "*a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without 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*" is included within the Offshore EIA Report.

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

36. In relation to the current baseline, it is anticipated that, as with NnG and Seagreen, commercial vessel traffic will navigate around Inch Cape when construction commences. It is assumed that alternative routes will typically maintain a minimum mean distance of 1 nm from future wind farm structures in line with industry experience.

37. In terms of changes to vessel traffic volumes, two independent scenarios of potential growth in commercial vessel movements of 10% and 20% are estimated. These are considered conservative assumptions given that from consultation with Forth Ports there are no terminal or berth changes are planned which may affect vessel traffic in the future. Additionally, there are no commercial ferry routes planned, although it has been indicated in consultation that once Aberdeen South Harbour is operational there could be an increase in cruise traffic through the region.

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

39. For recreational vessel activity, there are no major developments which will increase the level of activity in the region. Therefore, to ensure a conservative approach, 10% and 20% growth scenarios in recreational vessel movements have been estimated.

### 13.7.3. DATA LIMITATIONS AND ASSUMPTIONS

#### Automatic Identification System data

40. It is assumed that vessels under an obligation to broadcast information via AIS have done so, across all vessel traffic datasets. It has also been assumed that the details broadcast via AIS (such as vessel type and dimensions) are accurate unless clear evidence to the contrary was identified. It is not anticipated that the comprehensiveness of the AIS data compromises the assessment.

#### Vessel traffic data for Proposed Development export cable corridor

41. Since the vessel traffic data for the Proposed Development export cable corridor consists of AIS only, the data has limitations associated with non-AIS targets. However, the MCA and NLB were content with the methodology for vessel traffic data collection for the Proposed Development export cable corridor shipping and navigation study area (see Table 13.3) which includes consideration of additional data sources such as Anatec's ShipRoutes database, VMS data, the UK Coastal Atlas of Recreational Boating (RYA, 2019) and consultation feedback. With these additional datasets incorporated, the characterisation of vessel traffic movements for the Proposed Development export cable corridor shipping and navigation study area is considered to be suitably comprehensive and adequate for the assessment.

#### COVID-19 pandemic

42. It is widely accepted that the COVID-19 pandemic has had a substantial effect on shipping movements globally. Therefore, the vessel traffic survey data collected in winter 2021 may be influenced by the pandemic. However, in line with best practices, the Applicant has agreed the approach to data collection with relevant stakeholders, including the MCA. This includes the use of long-term vessel traffic data predating the COVID-19 pandemic to validate the vessel traffic survey data. With this dataset incorporated, the characterisation of vessel traffic movements for the Proposed Development array area shipping and navigation study area is considered to be suitably comprehensive and adequate for the assessment.

#### Historical incident data

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

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

#### Admiralty charts

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

## 13.8. KEY PARAMETERS FOR ASSESSMENT

### 13.8.1. MAXIMUM DESIGN SCENARIO

46. The maximum design scenarios identified in Table 13.9 have been selected as those 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 of the Offshore EIA Report. 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 13.9: Maximum Design Scenario Considered for the Assessment of Potential Impacts on Shipping and Navigation**

| Potential Impact | Phase[1] | | | Maximum Design Scenario | Justification |
|---|---|---|---|---|---|
| | C | O | D | | |
| Vessel displacement | ✓ | ✓ | ✓ | Construction Phase<br>• single continuous construction phase of up to 96 months;<br>• full build out of the Proposed Development array area;<br>• buoyed construction area encompassing the maximum extent of the Proposed Development array area including presence of 500 m construction safety zones and 50 m pre commissioning safety zones;<br>• up to eight offshore export cables with total length 471 nm (872 km);<br>• up to 22 guard vessels making up to 1,488 return trips;<br>• up to eight survey vessels making up to 464 return trips;<br>• up to 14 Crew Transfer Vessels (CTVs) making up to 3,342 return trips; and<br>• up to ten cable protection installation vessels making up to 3,390 return trips.<br><br>**Operation and Maintenance Phase**<br>• operation and maintenance phase of up to 35 years;<br>• full build out of the Proposed Development array area; and<br>• presence of 500 m operational safety zones for major maintenance activities.<br><br>**Decommissioning Phase**<br><br>The maximum design scenario for the decommissioning phase assumes all structures above seabed level will be completely removed. Offshore cables and scour protection will be fully removed, rather than left in-situ. The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment. As for construction, assumptions are based on maximum build-out over the greatest area and use of temporary safety zones and buoyed decommissioning area. | Largest possible extent, greatest number of construction/decommissioning vessel activities associated with the Proposed Development export cable corridor (noting that construction/ decommissioning vessel activities associated with the Proposed Development array area will be contained within the buoyed construction/ decommissioning area) and greatest duration resulting in the maximum spatial and temporal effect on vessel displacement.<br><br>The safety risk for this impact associated with leaving buried cables in situ is low given that the maximum design scenario is defined by surface related activities. |
| Increased vessel to vessel collision risk between a third-party vessel and a project vessel | ✓ | ✓ | ✓ | **Construction Phase**<br>• single continuous construction phase of up to 96 months;<br>• full build out of the Proposed Development array area<br>• buoyed construction area encompassing the maximum extent of the Proposed Development including presence of 500 m construction safety zones and 50 m pre commissioning safety zones;<br>• up to nine main installation vessels making up to 297 return trips;<br>• up to 14 cargo barges making up to 194 return trips;<br>• up to nine support vessels making up to 714 return trips;<br>• up to 22 tug/anchor handlers making up to 794 return trips; | Largest possible extent, greatest number of vessel movements and activities associated with the Proposed Development 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. |

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

| Potential Impact | Phase[1] | | | Maximum Design Scenario | Justification |
|---|---|---|---|---|---|
| | C | O | D | | |
| | | | | • up to six cable installation vessels making up to 36 return trips;<br>• up to 22 guard vessels making up to 1,488 return trips;<br>• up to eight survey vessels making up to 464 return trips;<br>• up to 14 CTVs making up to 3,342 return trips;<br>• up to ten cable protection installation vessels making up to 3,390 return trips; and<br>• up to 20 resupply vessels making up to 245 return trips.<br><br>**Operation and Maintenance Phase**<br>• operation and maintenance phase of up to 35 years;<br>• full build out of the Proposed Development array area;<br>• presence of 500 m operational safety zones for major maintenance activities;<br>• up to four CTVs making up to 832 return trips per year;<br>• up to one jack-up vessel making up to two return trips per year;<br>• up to one cable repair vessel making up to five return trips throughout the operation and maintenance phase;<br>• up to two Service Operations Vessels (SOV) making up to 26 return trips per year;<br>• up to two SOV daughter craft making up to four movements per day around the Proposed Development array area;<br>• up to one cable survey vessel conducting a four-week survey per year; and<br>• up to one excavator/backhoe dredger making up to five return trips throughout the operation and maintenance phase.<br><br>**Decommissioning Phase**<br><br>The maximum design scenario for the decommissioning phase assumes all structures above seabed level will be completely removed. Offshore cables and scour protection will be fully removed, rather than left in-situ. The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment. As for construction, assumptions are based on maximum build-out over the greatest area and use of temporary safety zones and buoyed decommissioning area. | The safety risk for this impact associated with leaving buried cables in situ is low given that the maximum design scenario is defined by surface related activities. |
| Increased vessel to vessel collision risk between third-party vessels | ✓ | ✓ | ✓ | **Construction Phase**<br>• single continuous construction phase of up to 96 months;<br>• full build out of the Proposed Development array area;<br>• buoyed construction area encompassing the maximum extent of the Proposed Development array area including presence of 500 m construction safety zones and 50 m pre commissioning Safety Zones;<br>• up to eight offshore export cables with total length 471 nm (872 km);<br>• up to six cable installation vessels making up to 36 return trips;<br>• up to 22 guard vessels making up to 1,488 return trips;<br>• up to eight survey vessels making up to 464 return trips; | Largest possible extent, greatest number of construction/decommissioning vessel activities associated with the Proposed Development export cable corridor (noting that construction/ decommissioning vessel activities associated with the Proposed Development array area will be contained within the buoyed construction/ decommissioning area) and greatest duration resulting in the maximum spatial and temporal effect on vessel to vessel collision risk between third-party vessels. |

| Potential Impact | Phase[1] | | | Maximum Design Scenario | Justification |
|---|---|---|---|---|---|
| | C | O | D | | |
| | | | | • up to 14 CTVs making up to 3,342 return trips; and<br>• up to ten cable protection installation vessels making up to 3,390 return trips.<br><br>**Operation and Maintenance Phase**<br>• operation and maintenance phase of up to 35 years;<br>• full build out of the Proposed Development array area; and<br>• presence of 500 m operational safety zones for major maintenance activities.<br><br>**Decommissioning Phase**<br><br>The maximum design scenario for the decommissioning phase assumes all structures above seabed level will be completely removed. Offshore cables and scour protection will be fully removed, rather than left in-situ. The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment. As for construction, assumptions are based on maximum build-out over the greatest area and use of temporary safety zones and buoyed decommissioning area. | The safety risk for this impact associated with leaving buried cables in situ is low given that the maximum design scenario is defined by surface related activities. |
| Vessel to structure allision risk | ✓ | ✓ | ✓ | **Construction Phase**<br>• single continuous construction phase of up to 96 months;<br>• full build out of the Proposed Development array area;<br>• buoyed construction area encompassing the maximum extent of the Proposed Development array area including presence of 500 m construction safety zones and 50 m pre commissioning safety zones;<br>• up to 307 wind turbines and ten offshore substation platforms/offshore convertor station platforms partially constructed or not yet commissioned and indicatively located as per volume 1, chapter 3;<br>• wind turbines on piled jacket or suction caisson jacket foundations; and<br>• offshore substation platforms/offshore convertor station platforms on piled jacket or suction caisson jacket foundations.<br><br>**Operation and Maintenance Phase**<br>• operation and maintenance phase of up to 35 years;<br>• full build out of the Proposed Development array area;<br>• up to 307 wind turbines and ten offshore substation platforms/offshore convertor station platforms indicatively located as per volume 1, chapter 3;<br>• wind turbines on piled jacket or suction caisson jacket foundations; and<br>• offshore substation platforms/offshore convertor station platforms on piled jacket or suction caisson jacket foundations.<br><br>**Decommissioning Phase**<br><br>The maximum design scenario for the decommissioning phase assumes all structures above seabed level will be completely removed. Offshore cables and scour protection will be fully removed, rather than left in-situ. The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment. As for construction, assumptions are based on maximum build-out over the greatest area and use of temporary safety zones and buoyed decommissioning area. | Largest possible extent, greatest number of surface infrastructure and greatest duration resulting in the maximum spatial and temporal effect on vessel to structure allision risk.<br><br>The safety risk for this impact associated with leaving buried cables in situ is low given that the maximum design scenario is defined by surface related activities. |

| Potential Impact | Phase[1] | | | Maximum Design Scenario | Justification |
|---|---|---|---|---|---|
| | C | O | D | | |
| Reduced access to local ports | ✓ | ✓ | ✓ | **Construction Phase**<br>• single continuous construction phase of up to 96 months;<br>• full build out of the Proposed Development array area;<br>• buoyed construction area encompassing the maximum extent of the Proposed Development array area including presence of 500 m construction safety zones and 50 m pre commissioning safety zones;<br>• up to nine main installation vessels making up to 297 return trips;<br>• up to 14 cargo barges making up to 194 return trips;<br>• up to nine support vessels making up to 714 return trips;<br>• up to 22 tug/anchor handlers making up to 794 return trips;<br>• up to six cable installation vessels making up to 36 return trips;<br>• up to 22 guard vessels making up to 1,488 return trips;<br>• up to eight survey vessels making up to 464 return trips;<br>• up to 14 CTVs making up to 3,342 return trips;<br>• up to ten cable protection installation vessels making up to 3,390 return trips; and<br>• up to 20 resupply vessels making up to 245 return trips.<br><br>**Operation and Maintenance Phase**<br>• operation and maintenance phase of up to 35 years;<br>• full build out of the Proposed Development array area;<br>• presence of 500 m operational safety zones for major maintenance activities;<br>• up to four CTVs making up to 832 return trips per year;<br>• up to one jack-up vessel making up to two return trips per year;<br>• up to one cable repair vessel making up to five return trips throughout the operation and maintenance phase;<br>• up to two SOV making up to 26 return trips per year;<br>• up to one cable survey vessel conducting a four week survey per year; and<br>• up to one excavator/ backhoe dredger making up to five return trips throughout the operation and maintenance phase.<br><br>**Decommissioning Phase**<br><br>The maximum design scenario for the decommissioning phase assumes all structures above seabed level will be completely removed. Offshore cables and scour protection will be fully removed, rather than left in-situ. The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment. As for construction, assumptions are based on maximum build-out over the greatest area and use of temporary safety zones and buoyed decommissioning area. | Largest possible extent, greatest number of vessel activities associated with the Proposed Development and greatest duration resulting in the maximum spatial and temporal effect on access to local ports.<br><br>The safety risk for this impact associated with leaving buried cables in situ is low given that the maximum design scenario is defined by surface related activities. |
| Reduction of under keel clearance | | ✓ | | **Operation and Maintenance Phase**<br>• operation and maintenance phase of up to 35 years; | Largest possible extent of seabed infrastructure and greatest duration resulting in the maximum spatial and temporal effect on under keel clearance. |

| Potential Impact | Phase[1] | | | Maximum Design Scenario | Justification |
|---|---|---|---|---|---|
| | C | O | D | | |
| | | | | • up to 661 nm (1,225 km) of inter-array cables;<br>• up to 51 nm (94 km) of interconnector cables;<br>• up to eight offshore export cables with total length 471 nm (872 km);<br>• target minimum burial depth of 0.5 m for all subsea cables;<br>• cable protection requirement for up to 15% of all subsea cables;<br>• maximum cable protection height of 3 m and width of 20 m for all subsea cables (excluding crossings);<br>• up to 78 inter-array cable crossings with maximum height of 3.5 m; and<br>• up to 16 offshore export cable crossings with maximum height of 3.5 m. | |
| Interaction with subsea cables | | ✓ | ✓ | **Operation and Maintenance Phase**<br>• operation and maintenance phase of up to 35 years;<br>• up to 661 nm (1,225 km) of inter-array cables;<br>• up to 51 nm (94 km) of interconnector cables;<br>• up to eight offshore export cables with total length 471 nm (872 km);<br>• target minimum burial depth of 0.5 m for all subsea cables;<br>• cable protection requirement for up to 15% of all subsea cables;<br>• maximum cable protection height of 3 m and width of 20 m for all subsea cables (excluding crossings);<br>• up to 78 inter-array cable crossings with maximum height of 3.5 m; and<br>• up to 16 offshore export cable crossings with maximum height of 3.5 m.<br><br>**Decommissioning Phase**<br>Cable requirements as described for operation and maintenance phase. At decommissioning, it is expected that all cables and scour protection will be removed where it is possible and appropriate to do so. This will depend on the type of protection used and its condition at the time of removal. If it is deemed necessary to leave sections of cable in situ, the final proposal for decommissioning will be subject to pre-decommissioning surveys and best practice at the time. Cable exposures will be marked and notified and appropriate rectification works undertaken where practicable and feasible. | |
| Reduction of emergency response capability | ✓ | | | **Operation and Maintenance Phase**<br>• operation and maintenance phase of up to 35 years;<br>• full build out of the Proposed Development array area;<br>• up to 307 wind turbines and ten offshore substation platforms/offshore convertor station platforms partially constructed or not yet commissioned and indicatively located as per volume 1, chapter 3;<br>• up to four CTVs making up to 832 return trips per year;<br>• up to one jack-up vessel making up to two return trips per year;<br>• up to one cable repair vessel making up to five return trips throughout the operation and maintenance phase;<br>• up to two SOV making up to 26 return trips per year; | Largest possible extent, greatest number of vessel activities associated with the Proposed Development, greatest number of surface infrastructure and greatest duration resulting in the maximum spatial and temporal effect on emergency response capability. |

| Potential Impact | Phase[1] | | | Maximum Design Scenario | Justification |
|---|---|---|---|---|---|
| | C | O | D | | |
| | | | | • up to two SOV daughter craft making up to four movements per day around the Proposed Development array area;<br>• up to one cable survey vessel making one return trip per year; and<br>• up to one excavator/backhoe dredger making up to five return trips throughout the operation and maintenance phase. | |
| Interference with magnetic position fixing equipment | | ✓ | | **Operation and Maintenance Phase**<br>• operation and maintenance phase of up to 35 years;<br>• up to eight offshore export cables with total length 471 nm (872 km);<br>• target minimum burial depth of 0.5 m for all subsea cables;<br>• cable burial for 95% of all subsea cables;<br>• maximum cable protection height of 3 m and width of 20 m for all subsea cables (excluding crossings); and<br>• up to 16 offshore export cable crossings with maximum height of 3.5 m. | |

### 13.8.2. IMPACTS SCOPED OUT OF THE ASSESSMENT

47. The Shipping and Navigation Road Map (see volume 3, appendix 13.2) has been used to facilitate stakeholder engagement on topics to be scoped out of the assessment.

48. On the basis of the baseline environment and the project description outlined in volume 1, chapter 3 of the Offshore EIA Report, one impact is proposed to be scoped out of the assessment for shipping and navigation. This has been agreed with key stakeholders through consultation as discussed in volume 1, chapter 5. The impact scoped out is outlined, together with a justification for scoping it out, in Table 13.10.

49. Where discussions with consultees relevant to shipping and navigation took place after the publication of the Berwick Bank Wind Farm Scoping Opinion (MS-LOT, 2022), these are audited in the Audit Document for Post-Scoping Discussions (volume 3, appendix 5.1).

**Table 13.10: Impact Scoped Out of the Assessment for Shipping and Navigation (Tick Confirms the Impact is Scoped Out)**

| Potential Impact | Phase[2] | | | Justification |
|---|---|---|---|---|
| | C | O | D | |
| Interference with marine navigation, communications and position fixing equipment | ✓ | ✓ | ✓ | A detailed desktop assessment has been undertaken in volume 3, appendix 13.1 and concluded that the significance of risk was broadly acceptable for the impact including Very High Frequency (VHF), VHF direction finding, AIS, Navigation Telex (NAVTEX), Global Positioning System (GPS), marine radar, wind turbine generated noise and Sound Navigation Ranging (SONAR). Noting the MCA's scoping response, the element of the impact relating to Electromagnetic Fields (EMF) has not been scoped out. |

## 13.9. METHODOLOGY FOR ASSESSMENT OF EFFECTS

### 13.9.1. OVERVIEW

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

- MGN 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response and its annexes (MCA, 2021);
- MGN 372 (Merchant and Fishing) Offshore Renewable Energy Installations (OREI) Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2008);
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) O-139 on The Marking of Man-Made Offshore Structures (IALA, 2021 (a));
- IALA G1162 The Marking of Offshore Man-Made Structures (IALA, 2021 (b)); and
- The Royal Yacht Association's (RYA) Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy (RYA, 2019).

### 13.9.2. CRITERIA FOR ASSESSMENT OF EFFECTS

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

52. The criteria for defining severity of consequence in this chapter are outlined in Table 13.11. For the level of assistance required to manage environmental damage, the tiers indicated relate to the incident response matrix provided in the National Contingency Plan (MCA, 2014).

**Table 13.11: Definition of Terms Relating to the Severity of Consequence**

| Severity of Consequence | Definition |
|---|---|
| Negligible | No perceptible risk to people, property, the environment or business. |
| Minor | • slight injury(s) to people;<br>• minor damage to property (i.e. superficial damage);<br>• tier 1 environmental damage with local assistance required; and<br>• minor reputational risk to business limited to users. |
| Moderate | • multiple minor or single serious injury to people;<br>• damage to property not critical to operations;<br>• tier 2 environmental damage with limited external assistance required; and<br>• local reputational risk to business. |
| Serious | • multiple serious injuries or single fatality to people;<br>• damage to property resulting in critical risk to operations;<br>• tier 2 environmental damage with regional assistance required; and<br>• national reputational risk to business. |

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

| Severity of Consequence | Definition |
|---|---|
| Major | • multiple fatalities to people;<br>• total loss of property;<br>• tier 3 environmental damage with national assistance required; and<br>• international reputational risk to business. |

53. The criteria for defining frequency of occurrence in this chapter are outlined in Table 13.12.

**Table 13.12: Definition of Terms Relating to the Frequency of Occurrence**

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

54. The significance of the effect upon shipping and navigation is determined by correlating the severity of consequence and frequency of occurrence. The particular method employed for this assessment is presented in Table 13.13.

55. For the purposes of this assessment:

- a level of residual effect of unacceptable will be considered a 'significant' effect in terms of the EIA Regulations; and
- a level of residual effect of broadly acceptable or tolerable will be considered 'not significant' in terms of the EIA Regulations.

56. Effects of Unacceptable significance are therefore considered important in the decision-making process, whilst effects of Broadly Acceptable or Tolerable significance warrant little, if any, weight in the decision-making process.

**Table 13.13: Matrix Used for the Assessment of the Significance of the Effect**

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

57. Additionally, differences in terminology between this chapter (which uses EIA terminology) and the NRA (which uses FSA terminology) are summarised in Table 13.14.

**Table 13.14: Summary of Differences in Terminology Between EIA and NRA**

| EIA Term | NRA Term | Definition |
|---|---|---|
| Action | Cause | An event or activity that may create an impact. |
| Impact | Hazard | A potential to threaten human life, health, property or the environment. |
| Designed in measure | Embedded mitigation measure | A means of controlling a single element of impact which is embedded (standard or good practice measures utilised or in place). |
| Secondary | Additional mitigation measures | A means of controlling a single element of an impact which is additional to the risk with the designed in measures (or embedded mitigation) in place (required to reduce impact to not significant or As Low As Reasonably Practicable (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 | An impact sufferer(s). |

## 13.10. MEASURES ADOPTED AS PART OF THE PROPOSED DEVELOPMENT

58. As part of the Project design process, a number of measures have been proposed to reduce the potential for impacts on shipping and navigation (see Table 13.15). As there is a commitment to implementing these measures, they are considered inherently part of the design of the Proposed Development and have therefore been considered in the assessment presented in section 13.11 (i.e. the determination of magnitude and therefore significance assumes implementation of these measures). These measures are considered standard industry practice for this type of development.

**Table 13.15: Designed In Measures Adopted as Part of the Proposed Development**

| Designed In Measures Adopted as Part of the Proposed Development | Justification |
|---|---|
| Application for Safety Zones up to 500 m around structures where vessels are undertaking construction work during construction and periods of major maintenance and 50 m around partially completed or completed but not yet fully commissioned surface piercing structures during construction. | Protects third-party vessels from project vessels involved in construction and major maintenance activities which may be Restricted in their Ability to Manoeuvre (RAM). |
| Deployment of a buoyed construction area in agreement with the NLB. | Protects third-party vessels from project vessels involved in construction and major maintenance activities which may be Restricted in their Ability to Manoeuvre (RAM). |
| Suitable implementation 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 the MCA, NLB, Kingfisher and UKHO no later than 24 hours after discovered. | Minimises the risks of underwater allision with cable protection, anchor or fishing gear interaction with subsea cables and interference with magnetic position fixing equipment. |
| Compliance with MGN 654 and its annexes (in particular SAR annex 5 (MCA, 2021) and completion of a SAR checklist) where applicable. | Ensures the final array layout is suitable for SAR operations and that reductions in under keel clearance are acceptable. |
| Use of guard vessel(s) as required by risk assessment. | Maximises awareness of temporary hazards. |

| Designed In Measures Adopted as Part of the Proposed Development | Justification |
|---|---|
| Layout finalised through the DSLP via consultation with the MCA and NLB. | Ensures the final array layout is suitable for both surface and air based (for SAR purposes) navigation. |
| Lighting and marking of the Proposed Development array area in agreement with the NLB and in line with IALA G1162 (IALA, 2021 (b)). | Maximises awareness of the Proposed Development in both day and night conditions including in restricted visibility and assists with SAR operations. |
| Marine coordination and communication to manage project vessel movements. | Ensures 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. |
| Creation and implementation of a Marine Pollution Contingency Plan | Minimises the environmental effects in the event of an incident involving pollution. |
| Appropriate marking of structures (both within the Proposed Development array area and export cable corridor) on UKHO Admiralty Charts. | Maximises awareness of the Proposed Development allowing vessels to passage plan in advance. |
| Minimum blade clearance of 22 m above MHWS (in line with RYA policy (RYA, 2019). | Minimises the risk of blade allision particularly for sailing vessels with a mast, noting that the minimum blade clearance will be 37 m above Lowest Astronomical Tide (LAT). |
| Compliance of all project vessels with international marine regulations as adopted by the Flag State, notably the COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974). | Minimises the risk introduced due to the presence of project vessels. |
| Promulgation of information for vessel routes, timings and locations, Safety Zones and advisory safe passing distances as required via Kingfisher Bulletins. | Maximises awareness of the Proposed Development allowing vessels to passage plan in advance. |

## 13.11. ASSESSMENT OF SIGNIFICANCE

59. The potential effects arising from the construction, operation and maintenance and decommissioning phases of the Proposed Development are listed in Table 13.9, along with the maximum design scenario against which each impact has been assessed. An assessment of the likely significance of the effects of the Proposed Development on shipping and navigation receptors caused by each identified impact is given below.

### VESSEL DISPLACEMENT

#### Construction Phase

Severity of Consequence

60. Anticipated deviations for the main commercial routes identified from the vessel traffic data have been defined. The full methodology for main route deviations is provided in Section 15.5.1 of the NRA, with deviations established in line with industry experience and consultation feedback. For Shipping and Navigation, reference is made to ‘Seagreen’ (the collective 150 consented wind turbines that will be installed for Seagreen 1 and Seagreen Project 1A). This is on the basis Seagreen Project 1A is captured within the displacement footprint of Seagreen 1, which invalidates the need to distinguish the sub-projects. Although there will be no restrictions on entry into the buoyed construction area, other than active construction or pre-commissioning safety zones, based on experience at previously under construction offshore wind farms (including the nearby NnG and Seagreen), it is anticipated that commercial vessels will choose not to navigate internally within the buoyed construction area.

61. An illustration of the anticipated shift in the mean positions of the main commercial routes within the Proposed Development array area shipping and navigation study area for the maximum adverse scenario is presented in Figure 13.8. For the displaced routes, the increase in distance from the pre wind farm scenario is detailed in Table 13.16.

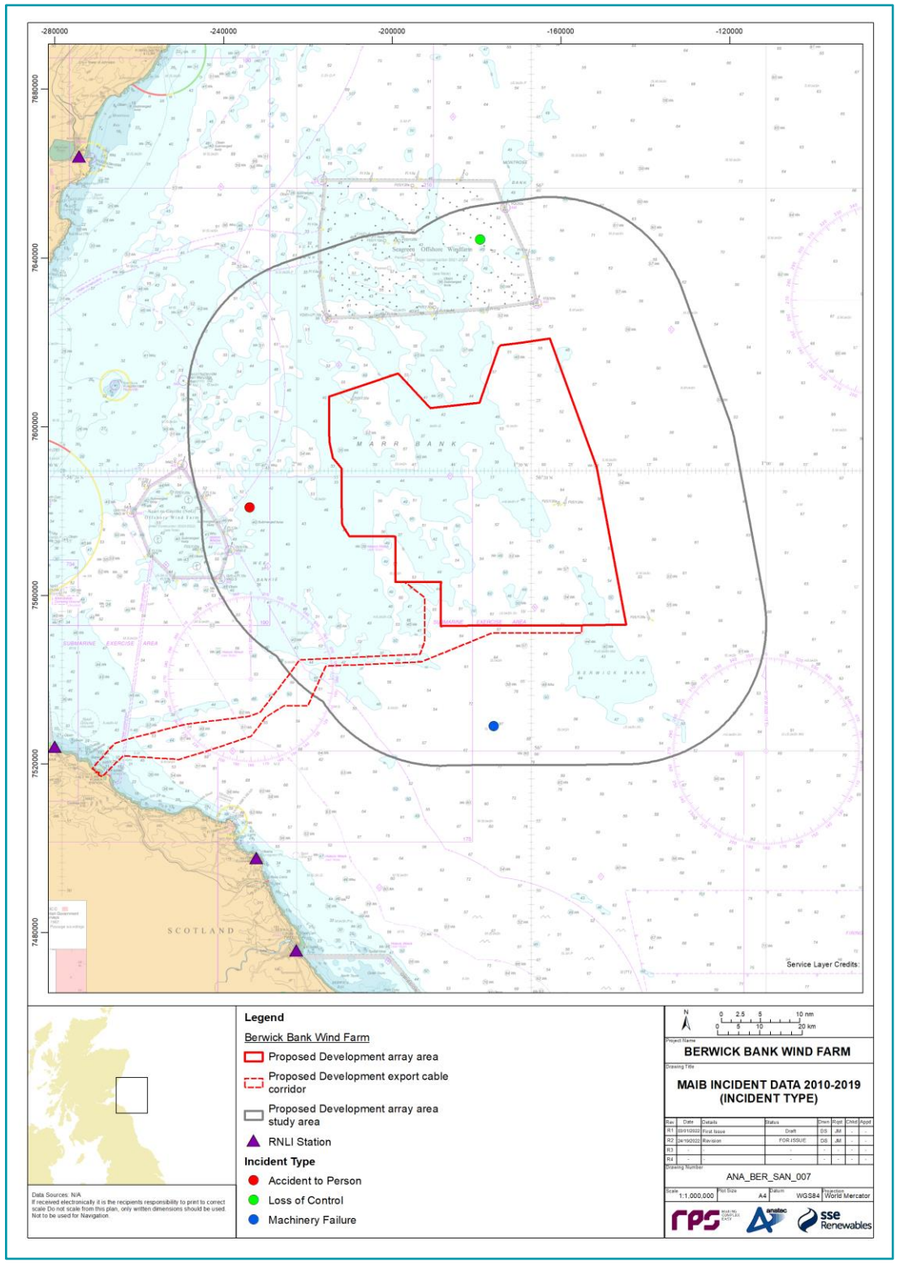


**Figure 13.8 Anticipated Main Commercial Routes Post Wind Farm within Proposed Development Array Area Shipping and Navigation Study Area**

**Table 13.16: Summary of Post Wind Farm Main Commercial Route Deviations within Proposed Development Array Area Shipping and Navigation Study Area**

| Route Number | Increase in Route Length (nm) | Change in Total Route Length (%) | Nature of Deviation |
|---|---|---|---|
| 3 | 0.3 | 0.1 | Passing slightly further east of the Proposed Development array area. |
| 4 | -0.1 | <0.1 | Passing slightly further east of the Proposed Development array area. |
| 5 | 3.4 | 0.8 | Passing south of the Proposed Development array area. |
| 9 | 0.2 | 0.1 | Passing slightly further west of the Proposed Development array area. |
| 10 | 0.8 | 0.2 | Passing west of the Proposed Development array area. |
| 11 | <0.1 | <0.1 | Slight course adjustment for passing between the Proposed Development array area and Seagreen |
| 14 | 26.0 | 0.8 | Passing south of the Proposed Development array area. |

62. A deviation will be required for seven out of the 14 main commercial routes identified, with the level of deviation varying between a 0.2 nm decrease for Route 9 (due to the route being anticipated to make a slight turn to maintain distance to the western boundary of the Proposed Development array area) and a 26.0 nm increase for Route 14.

63. During consultation, the NLB indicated that there is an east-west route through the Proposed Development which may be of concern. This concern was also raised by the UK Chamber of Shipping and HAV Ship Management, a Regular Operator in the area. Route 5 is representative of such a transit (noting that it includes vessels operated by HAV Ship Management) and is estimated to require a deviation of 3.4 nm following the placement of the buoyed construction area. However, this represents only a 0.8% change in the total route length, with the route operating between Forth ports and Baltic ports.

64. Additionally, Evergas, a Regular Operator in the area, indicated that there is a particular impact on routeing of vessels coming from the north. Route 14 is representative of such a transit (noting that it includes vessels operated by Evergas) and is estimated to require a deviation of 26 nm following the placement of the buoyed construction area. However, this represents only a 0.8% change in the total route length, with the route operating between Forth ports and Pennsylvania (United States).

65. Based on experience at previously under construction offshore wind farms (including the nearby NnG and Seagreen), it is anticipated that commercial fishing vessels and recreational vessels will also choose not to navigate internally within the buoyed construction area on a regular basis, although there will be no restrictions on such transits. There is sufficient sea room around the Proposed Development array area (and buoyed construction area) to allow such small craft to navigate an alternative route. It is noted that during consultation, the Forth Yacht Clubs Association indicated that habitual coastal cruising routes for smaller recreational craft generally lie inshore of the Proposed Development array area and so will be unaffected.

66. Those vessels that deviate offshore of the Proposed Development array area (such as Routes 4 and 14) will be more exposed to adverse weather given the greater distance from the UK coast. However, there is sufficient available sea room to the south and east of the Proposed Development array area to ensure that a safe distance can be maintained from the buoyed construction area.

67. In terms of existing adverse weather routeing, no substantial alternative routeing was observed in the long-term vessel traffic data, including during periods where adverse weather was known to be present. This is reflected in Regular Operator consultation with North Star Shipping and HAV Ship Management indicating that no impact is foreseen. Intrada Ship Management, another Regular Operator in the area, noted that given their vessels carry deck cargoes there is a particular sensitivity to rolling and pitching and adequate sea room is necessary to ensure headings can be selected to minimise the effect of the weather and tidal

direction. Additionally, Forth Ports have indicated that the region is known to experience significant bad weather with the FMA highlighting the Marr Bank as a particular hazard of note for large tankers navigating coastally in adverse weather.

68. For small craft, use of safe havens in adverse weather conditions was not observed within the vessel traffic survey data or long-term vessel traffic data.

69. The most likely consequences of the impact are increased journey times and distances leading to minor increases in emissions associated with increased fuel consumption. Although there is potential for the commercial consequence of disruption to schedules, the relatively low changes in total route length mean that it is likely that time losses can be made up through effective passage planning and increased speeds when in open seas. This will be assisted by the charting of the buoyed construction area and promulgation of information such as advisory safe passing distances which will allow vessels to passage plan the most safe and efficient route in advance. The maximum adverse scenario may include disruption to schedules, but this is considered highly unlikely given the international nature of routeing in the area and the ability to passage plan to minimise timing impacts.

70. The severity of consequence is therefore considered to be minor.

Frequency of Occurrence

71. The impact will be present throughout the construction phase which will last for up to eight years. The busiest main commercial route identified within the Proposed Development array area shipping and navigation study area for which an increased passage distance is required is Route 3, with an average of one to two vessels per day. In total, across all the routes for which an increased passage distance is required, there is an average of five vessels per day. Additionally, a proportion of the non-commercial vessel traffic may also be affected, noting that an average of one to two unique fishing vessels per day were recorded within the Proposed Development array area shipping and navigation study area throughout the vessel traffic surveys.

72. Therefore, it is anticipated that vessels will be exposed to the impact on a daily basis, particularly commercial vessels such as tankers and cargo vessels which constitute the majority of the vessel traffic, including those assigned to the main commercial routes.

73. The frequency of occurrence is therefore considered to be frequent.

Significance of the Effect

74. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

Secondary Mitigation and Residual Effect

75. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## Operation and Maintenance Phase

Severity of Consequence

76. Based on experience at existing operational offshore wind farms, it is anticipated that commercial vessels will generally choose not to navigate internally within the Proposed Development array area. Therefore, the anticipated deviations for the main commercial routes defined for the construction phase (around the buoyed construction area) are directly applicable for the operation and maintenance phase, as presented in Figure 13.8 and detailed in Table 13.16.

77. Since the size and location of the buoyed construction area and operational Proposed Development array area will be almost identical, the concerns raised during consultation outlined for the equivalent construction phase are directly applicable for the operation and maintenance phase. This includes the concerns relating to east-west and north-south routeing, which in both cases represents only a small percentage change in the total route length.

78. Based on experience at existing operational offshore wind farms, it is anticipated that commercial fishing vessels and recreational vessels may choose to navigate internally within the Proposed Development array area, particularly in favourable weather conditions. During consultation the CA noted that as offshore wind farms become more commonplace there is increasing comfort among recreational users with internal navigation.

79. The degree of comfort noted by the CA will be heightened by there being no restrictions on navigation internally within the Proposed Development array area other than any major maintenance safety zones. The minimum spacing between the Proposed Development wind turbines is 1,000 m which is large compared to many existing offshore wind farms, comparable to the minimum spacing which will exist at NnG (903 m) and Seagreen (996 m) once constructed, and comparable to the minimum spacing consented at Inch Cape (1,278 m). Furthermore, the wind turbines will likely be arranged in rows and columns with two lines of orientation[3] to further assist safe navigation by small craft. Comfort with internal navigation will likely increase throughout the lifetime of the Proposed Development. The final array layout will be agreed through the DSLP, which will include consultation with the MCA and NLB.

80. The same array layout benefits are also applicable to commercial fishing vessels. The Scottish Whitefish Producers Association have indicated that the minimum spacing between wind turbines may be insufficient to allow safe navigation, although given the points raised above the impact is not considered substantial. Effects on active fishing activity are considered in volume 2, chapter 12.

81. In relation to adverse weather routeing and use of safe havens, there are again no substantial concerns given the lack of such activities within the vessel traffic data. Forth Ports have indicated that the region is known to experience significant bad weather with the FMA highlighting the Marr Bank as a particular hazard of note for large tankers navigating coastally in adverse weather. However, the water depths associated

[3] In the event that the Project brings forward a single line of orientation layout post-consent, it is acknowledged that additional assessment will be required in line with MGN 654 requirements. This includes the undertaking of a safety justification to demonstrate that risk to navigation and SAR is ALARP, in consultation with the MCA.

with navigation over the Marr Bank are similar to those navigated in the pre wind farm scenario and therefore the additional impact is considered minimal.

82. The most likely consequences of the impact are as per the equivalent construction phase impact, namely increased journey times and distances leading to increased fuel consumption. Passage planning will be assisted by the charting of infrastructure associated with the Proposed Development and the promulgation of information. The maximum adverse scenario may include disruption to schedules, but this is considered highly unlikely given the international nature of routeing in the area and the ability to passage plan to minimise timing impacts. The severity of consequence is therefore considered to be minor.

Frequency of Occurrence

83. The impact will be present throughout the operation and maintenance phase which will last for up to 35 years. Since the anticipated deviations associated with the main commercial routes and the volumes of vessel traffic on such routes are the same as for the equivalent construction phase impact, it is again anticipated that vessels will be exposed to the impact on a daily basis.

84. The frequency of occurrence is therefore considered to be frequent.

Significance of the Effect

85. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

Secondary Mitigation and Residual Effect

86. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

### Decommissioning Phase

Severity of Consequence

87. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place resulting in the anticipated deviations for the main commercial routes defined for the construction phase being directly applicable for the decommissioning phase, as presented in Figure 13.8 and detailed in Table 13.16.

88. Therefore, the most likely consequences associated with the maximum adverse scenario are as per the equivalent construction phase impact.

89. The severity of consequence is therefore considered to be minor.

Frequency of Occurrence

90. The impact will be present throughout the decommissioning phase which will last for up to eight years. Since the anticipated deviations associated with the main commercial routes and the volumes of vessel traffic on such routes are the same as for the equivalent construction phase impact, it is again anticipated that vessels will be exposed to the impact on a daily basis.

91. The frequency of occurrence is therefore considered to be frequent.

Significance of the Effect

92. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

Secondary Mitigation and Residual Effect

93. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## INCREASED VESSEL TO VESSEL COLLISION RISK BETWEEN A THIRD-PARTY VESSEL AND A PROJECT VESSEL

### Construction Phase

Severity of Consequence

94. Up to 10,964 return trips 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, designated routes to and from construction ports and liaison with Project vessels for the other Outer Firth of Forth developments. Project vessels will also carry AIS and be compliant with relevant Flag State regulations including the COLREGs. This includes installation vessels working within the Proposed Development export cable corridor which as vessels Restricted in their Ability to Manoeuvre (RAM) are covered by COLREGs rule 18.

95. Safety zones will be applied for including up to 500 m around structures where vessels are undertaking construction work and 50 m around partially completed or completed but not yet fully commissioned surface piercing structures. Such safety zones will protect project vessels involved in construction which may be RAM and, if on-site, guard vessels will assist with monitoring safety zones.

96. Any lessons learnt from construction vessel movements associated with the Seagreen construction phase will be considered. Details of construction activities, including the presence of safety zones and any advisory safe passing distances, as defined by risk assessment, will be suitably promulgated to maximise awareness of ongoing construction activities.

97. Additionally, the use of lighting and marking including lights, marks, sounds, signals and other aids to navigation as required by the NLB and the MCA will further maximise awareness, both in day and night conditions including in restricted visibility. This includes the buoyed construction area which will be agreed with the NLB and within which Project vessels undertaking construction activities associated with the Proposed Development array area will generally be located. As per the impact on vessel displacement, it is anticipated that third-party vessels will not enter the buoyed construction area and therefore the level of exposure for Project vessels located on-site will be very low.

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

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

100. The most likely consequences in the event of a collision incident between a Project vessel and third party vessel are minor contact between the vessels resulting in minor damage to property and minor reputational effects on business but no perceptible effect on people. The maximum adverse scenario could involve one of the vessels foundering resulting in potential loss of life (PLL) and the environmental consequence of pollution. Such a scenario would be more likely if the third-party vessel involved was a small craft which may have weaker structural integrity than a commercial vessel. The Project's Marine Pollution Contingency Plan will be implemented to minimise the environmental effects should pollution occur.

101. The severity of consequence is therefore considered to be moderate.

Frequency of Occurrence

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

103. The frequency of occurrence is therefore considered to be extremely unlikely.

Significance of the Effect

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

Secondary Mitigation and Residual Effect

105. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## Operation and Maintenance Phase

Severity of Consequence

106. Up to 2,323 return trips per year by operation and maintenance vessels may be made throughout the operation and maintenance phase and will include vessels which are RAM. As per the construction phase, Project vessels will be managed by marine coordination, carry AIS and be compliant with relevant Flag State regulations.

107. Also, safety zones will be applied for including up to 500 m around structures where vessels are undertaking major maintenance work. Such safety zones will protect project vessels involved in major maintenance which may be RAM and, if on-site, guard vessels will assist with monitoring safety zones.

108. Any lessons learnt from operation and maintenance vessel movements associated with the Seagreen operation and maintenance phase will be considered, noting that Seagreen is expected to be fully commissioned in November 2023 (Seagreen Wind Energy Ltd., 2020). Similarly to the construction phase, details of major maintenance activities including the presence of safety zones and any advisory safe passing distances, as defined by risk assessment, will be suitably promulgated to maximise awareness of ongoing major maintenance activities.

109. Additionally, the use of lighting and marking as required by the NLB and the MCA will further maximise awareness, both in day and night conditions including in restricted visibility. As per the equivalent construction phase impact, in restricted visibility there is an increased risk of visual obstruction to third-party vessels in relation to identifying Project vessels entering and exiting the array. However, the COLREGs regulate vessel movements in adverse weather conditions, allowing more time to react to encounters. The carriage of AIS by project vessels will also assist with identifying their movements.

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

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

112. The severity of consequence is therefore considered to be moderate.

Frequency of Occurrence

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

114. The likelihood of an encounter is decreased compared to in the construction phase given that much fewer project vessels will generally be on-site at any time, although this is somewhat balanced by the much longer duration of the operation and maintenance phase.

115. The frequency of occurrence is therefore considered to be negligible.

Significance of the Effect

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

Secondary Mitigation and Residual Effect

117. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

### Decommissioning Phase

Severity of Consequence

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

119. Therefore, the most likely consequences associated with the maximum adverse scenario are as per the equivalent construction phase impact.

120. The severity of consequence is therefore considered to be moderate.

Frequency of Occurrence

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

122. The frequency of occurrence is therefore considered to be extremely unlikely.

Significance of the Effect

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

Secondary Mitigation and Residual Effect

124. No shipping and navigation mitigation is considered necessary because the predicted impact in the absence of mitigation is not significant in EIA terms.

## INCREASED VESSEL TO VESSEL COLLISION RISK BETWEEN THIRD PARTY VESSELS

### Construction Phase

Severity of Consequence

125. Anticipated deviations for the main commercial routes identified from the vessel traffic data have been defined, as described in the construction phase impact for vessel displacement. An illustration of the anticipated shift in the mean positions of the main commercial routes within the Proposed Development array area shipping and navigation study area for the maximum adverse scenario is presented in Figure 13.8. For the displaced routes, the increase in distance from the pre wind farm scenario is detailed in Table 13.16.

126. Although a deviation will be required for seven out of the 14 main commercial routes identified, the level of deviation is relatively low (less than 1.0 nm) for five of them. The two routes with larger deviations (Routes 5 and 14) involve passing around the south-eastern corner of the buoyed construction area, where they did not previously pass. This creates a pinch point where encounters between commercial vessels are more likely to occur and was confirmed by collision risk modelling (see Figure 16.5 in the NRA). Other pinch points include at the south-western corner of the buoyed construction area.

127. With the main commercial route deviations in place, the base case annual vessel to vessel collision frequency for commercial vessels is estimated to be $9.69\times10^{-4}$, corresponding to a return period of approximately one in 1,031 years. This represents a 15% increase in collision frequency compared to the pre wind farm base case scenario.

128. The return period of one in 1,031 years is considered below average compared to that estimated for other UK offshore wind farm developments and is reflective of the low volume of vessel traffic in the area compared to elsewhere in the UK. Experience from previous under construction offshore wind farms indicates that Masters regularly choose to transit greater than 1 nm from construction works, and there is sufficient sea room available for vessels to do so. This will reduce the effects of the aforementioned pinch points and reduce the likelihood of encounters.

129. Following consultation with the UK Chamber of Shipping and Forth Ports, it was confirmed that occasional vessel traffic movements associated with jack-ups, semi-submersibles and other platforms occur in the region. One such case (involving a Floating Production Storage and Offloading (FPSO) vessel) was identified in the long-term vessel traffic data (see appendix E of the NRA) and in such instances the vessel will often be under tow and RAM. Therefore, the collision risk associated with the vessel would be greater given the inability to take swift collision avoidance action in the event of an encounter. This will be particularly pertinent where such movements occur within the gap between the Proposed Development array area and Seagreen.

130. In the unrealistic scenario that Inch Cape is not built, there is potential for a small number of vessels to utilise the gap between the Proposed Development array area and Seagreen. There is an increased collision risk given the proximity to surface piercing structures to both port and starboard, reducing sea room for any collision avoidance action. The potential for fishing gear to be present within this gap is also highlighted, although the gap will be known to commercial fishing operators and they will be able to choose whether to deploy gear depending on the level of risk. Additionally, pots should always be marked appropriate to minimise the risk to other vessels and the gear.

131. During consultation the MCA highlighted the need to consider the potential squeeze of small craft into the routes of larger commercial vessels. Given that recreational traffic is primarily located inshore of the Proposed Development array area (as indicated by the Forth Yacht Clubs Association), the effect on recreational vessels is expected to be limited.

132. Commercial fishing vessel traffic is more likely to be affected since active fishing vessel activity is located within the proposed buoyed construction area and based on experience at previously under construction offshore wind farms (including the nearby NnG), it is anticipated that commercial fishing vessels will choose not to navigate internally within the buoyed construction area. Transits out of Eyemouth may interact with the pinch points previously noted for commercial vessels.

133. The most likely consequences in the event of a collision incident between third-party vessels are minor contact between the vessels resulting in minor damage to property and minor reputational effects on business but no perceptible effect on people. The maximum adverse scenario could involve one of the vessels foundering resulting in PLL and the environmental consequence of pollution. Such a scenario would be more likely if one of the vessels involved was a small craft which may have weaker structural integrity than a commercial vessel. The Project's Marine Pollution Contingency Plan will be implemented to minimise the environmental effects should pollution occur.

134. The severity of consequence is therefore considered to be moderate.

Frequency of Occurrence

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

136. The frequency of occurrence is therefore considered to be extremely unlikely.

Significance of the Effect

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

Secondary Mitigation and Residual Effect

138. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## Operation and Maintenance Phase

Severity of Consequence

139. Based on experience at existing operational offshore wind farms, it is anticipated that commercial vessels will generally choose not to navigate internally within the Proposed Development array area. Therefore, the anticipated deviations for the main commercial routes defined for the construction phase (around the buoyed construction area) are directly applicable for the operation and maintenance phase, as presented in Figure 13.8 and detailed in Table 13.16.

140. Since the size and location of the buoyed construction area and operational Proposed Development array area will be almost identical, the pinch points highlighted for the equivalent construction phase impact are again applicable.

141. Based on experience at existing operational offshore wind farms, it is anticipated that commercial fishing vessels and recreational vessels may choose to navigate internally within the Proposed Development array area, particularly in favourable weather conditions. Such navigation may result in an additional encounter and collision risk associated with these small craft exiting the Proposed Development array area. Although, with the application of good seamanship and given the high minimum spacing between wind turbines (1,000 m), there is not expected to be a visual obstruction to vessels passing at the edge of the Proposed Development array area.

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

143. The severity of consequence is therefore considered to be moderate.

Frequency of Occurrence

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

145. The frequency of occurrence is therefore considered to be extremely unlikely.

Significance of the Effect

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

Secondary Mitigation and Residual Effect

147. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

### Decommissioning Phase

#### Severity of Consequence

148. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place resulting in the anticipated deviations for the main commercial routes defined for the construction phase being directly applicable for the decommissioning phase, presented in Figure 13.8 and detailed in Table 13.16.

149. Therefore, the most likely consequences associated with the maximum adverse scenario are as per the equivalent construction phase impact.

150. The severity of consequence is therefore considered to be moderate.

#### Frequency of Occurrence

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

152. The frequency of occurrence is therefore considered to be extremely unlikely.

#### Significance of the Effect

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

#### Secondary Mitigation and Residual Effect

154. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## VESSEL TO STRUCTURE ALLISION RISK

### Construction Phase

#### Severity of Consequence

155. There are three distinct forms of allision risk which are considered – powered allision risk, drifting allision risk and internal allision risk.

156. Powered allision risk may be caused by human/navigational error, unfamiliarity with the Proposed Development and/or a failure of an aid to navigation. Experience from previous under construction offshore wind farms indicates that Masters regularly choose to transit greater than 1 nm from construction works, and there is sufficient sea room available for vessels to do so. In doing so, vessels are unlikely to navigate close enough to a structure to create an allision risk. Masters will also have experience navigating in proximity to NnG and Seagreen (which will be operational by the time of the construction phase) which will further reduce the risk of an allision incident associated with the Proposed Development.

157. This assertion (in terms of sufficient sea room being available) is also applicable within the gap between the Proposed Development array area and Seagreen given that the width of this gap varies between 2.8 and 6.0 nm. Usage is expected to be very low (only one main commercial route is anticipated to regularly utilise the gap) and sufficient sea room is available to allow a vessel navigating within the gap to maintain a minimum distance of 1 nm from wind farm structures (including pre-commissioned structures), minimising allision risk.

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

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

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

161. During consultation the MCA highlighted the need to consider the risk to drifting recreational craft in adverse weather or tidal conditions. A sailing vessel in such a situation could be exposed to an additional allision risk from its mast with wind turbine blades. Emergency action, such as the lowering of the sails, may prevent an allision occurring and the minimum blade clearance of 22 m above MHWS (see Table 13.15) is aligned with the minimum clearance the RYA recommend for minimising allision risk (RYA, 2019); indeed the Applicant is committed to a minimum blade clearance of 37 m above LAT. There is also potential for effects such as wind shear, masking and turbulence to occur, with previous studies of offshore wind farm developments concluding that wind turbines do reduce wind velocity downwind of a wind turbine (MCA, 2008) noting no negative effects on recreational craft reported. It is also noted that no practical issues have been raised by recreational users to date when operating in proximity to existing offshore wind farm developments.

162. As per the impact on vessel displacement, it is anticipated that third-party vessels will not enter the buoyed construction area and therefore internal allision risk is not considered relevant during this phase.

163. The most likely consequences in the event of an allision incident (powered or drifting) are minor damage to property with the vessel able to resume passage and undertake a full inspection at the next port. However, this will depend on multiple factors including the energy of the impact, structural integrity of the vessel and the sea state at the time. Given the potential for a non-steel construction, commercial fishing vessels and recreational vessels are considered more vulnerable. The maximum adverse scenario could involve the vessel foundering resulting in PLL and the environmental consequence of pollution. The Project's Marine Pollution Contingency Plan will be implemented to minimise the environmental effects should pollution occur.

164. The consequences are less likely to be severe for a drifting allision incident given that the speed at which the impact occurs (and subsequent energy of the impact) will generally be dictated by the wind and/or tidal speeds.

165. The severity of consequence is therefore considered to be moderate.

Frequency of Occurrence

166. The impact will be present throughout the construction phase which will last for up to eight years and will cover a greater spatial extent as more structures are installed. For powered allision incidents, safety zones of up to 50 m around partially completed or completed but not yet fully commissioned surface piercing structures will be in place and assist with ensuring that vessels are aware of the presence of structures. If on-site, guard vessels will assist with monitoring safety zones. Furthermore, the use of lighting and marking as required by the NLB and the MCA (including for partially completed structures), charting of the buoyed construction area and promulgation of information will allow vessels to passage plan a safe route in advance. The NLB stated during consultation that further discussions on lighting and marking will be appropriate once final layouts are under consideration. The final array layout will be agreed through the DSLP which will include consultation with the MCA and NLB. With these designed in measures in place, it is considered unlikely that a powered allision incident will occur.

167. For drifting allision incidents, the adrift vessel would initiate its emergency response procedures to avoid a closest point of approach (CPA) with a structure resulting in an allision. This may include emergency anchoring following a check of the relevant nautical charts (thus ensuring that the anchor deployment does not lead to other impacts such as anchor snagging on a subsea cable). Moreover, under SOLAS obligations (IMO, 1974), other nearby vessels including project vessels (via marine coordination) may be able to render assistance. There is also a possibility that a drifting vessel could regain power prior to alliding with a structure. Therefore, it is considered very unlikely that a drifting allision incident will occur.

168. The frequency of occurrence is therefore considered to be extremely unlikely.

Significance of the Effect

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

Secondary Mitigation and Residual Effect

170. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## Operation and Maintenance Phase

Severity of Consequence

171. Again, there are three distinct forms of allision risk which are considered – powered allision risk, drifting allision risk and internal allision risk.

172. Powered allision risk may be caused by human/navigational error, unfamiliarity with the Proposed Development and/or a failure of an aid to navigation. Experience from previous operational offshore wind farms indicates that Masters regularly choose to transit greater than 1 nm from the array, and there is sufficient sea room available for vessels to do so. In doing so, vessels are unlikely to navigate in close enough proximity to a structure to create an allision risk. Masters will also have experience navigating in proximity to the nearby NnG and Seagreen (which will also be operational by the time of the operation and maintenance phase) which will further reduce the risk of an allision incident.

173. With the main commercial route deviations in place, the base case annual powered vessel to structure allision frequency is estimated to be $1.52\times10^{-4}$, corresponding to a return period of approximately one in 6,581 years. This is below average compared to that estimated for other UK offshore wind farm developments. The greatest powered vessel to structure allision risk was associated with structures along the western edge of the array, where multiple main commercial routes pass at the minimum 1 nm distance. As discussed above, Masters may choose to transit at greater than 1 nm from the array, which would reduce the powered allision risk considerably.

174. From historical incident data, there has been two reported instances of a third-party vessel alliding with an operational wind farm structure in the UK. Both of these incidents involved a fishing vessel, with a RNLI lifeboat attending on both occasions and a helicopter deployed in one case. Given that the Proposed Development array area is located in the Outer Firth of Forth where there is varied vessel traffic including transits in and out of the Firth of Forth, there will likely be a heightened level of awareness meaning that such an incident is unlikely to occur at the Proposed Development array area.

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

176. With the main commercial route deviations in place, the base case annual drifting vessel to structure allision frequency is estimated to be $7.69\times10^{-5}$, corresponding to a return period of approximately one in 12,999 years. This is below average compared to that estimated for other UK offshore wind farm developments. The greatest drifting vessel to structure allision risk was associated with structures along the eastern and western edges of the array, where multiple main commercial routes pass at the minimum 1 nm distance. As discussed above, Masters may choose to transit at greater than 1 nm from the array, which would reduce the drifting allision risk considerably.

177. From historical incident data, there have been no reported instances of a drifting allision involving a third-party vessel with an operational wind farm structure in the UK. It is also noted that RNLI incident data indicates that cases of machinery failure (which may result in a drifting vessel) typically occur inshore of the Proposed Development array area at a distance within which a recovery could be expected prior to an allision occurring.

178. During consultation, the MCA highlighted the need to consider the risk to drifting recreational craft in adverse weather or tidal conditions. As per the equivalent construction phase impact, blade allision is possible for a sailing vessel with a mast, but the sails could be lowered and the minimum blade clearance of 22 m above MHWS (see section Table 13.15) is aligned with the minimum clearance the RYA recommend for minimising allision risk (RYA, 2019); indeed the Applicant is committed to a minimum blade clearance of 37 m above LAT. Effects such as wind shear, masking and turbulence could occur but previous studies conclude that no negative effects on recreational craft are reported.

179. As per the impact on vessel displacement, it is anticipated that commercial fishing vessels and recreational vessels may choose to navigate internally within the array, particularly in favourable weather conditions. Therefore, an internal allision risk exists for such smaller craft.

180. The base case annual fishing vessel to structure allision frequency is estimated to be $2.29\times10^{-1}$, corresponding to a return period of approximately one in 4.4 years. This is high compared to that estimated for other UK offshore wind farm developments and is reflective of the widespread fishing vessel activity and number of structures. This frequency does not account for the presence of safety zones of up to 500 m around structures where vessels are undertaking major maintenance work which will assist with ensuring that vessels are aware of the presence of structures.

181. For internal navigation it is also noted that the array layout forms a grid pattern with two lines of orientation for wind turbines (as requested by MGN 654), including an angle favourable for the steady volume of

fishing vessel transits in and out of Eyemouth. This will further assist safe navigation by small craft, with the need for changes in course minimised. However, the offshore substation platforms/offshore convertor station platforms are out of alignment with the wind turbines (noting that the array layout assessed is indicative at the time of the assessment and represents the MDS) which may result in extra care being required when navigating within the relevant rows of the array. Comfort with internal navigation will likely increase throughout the lifetime of the Proposed Development and appropriate lighting and marking will be in place to maximise awareness of the substation locations. The final array layout will be agreed through the DSLP will include consultation with the MCA and NLB.

182. The most likely consequences in the event of an allision incident (powered or drifting) are as per the equivalent construction phase impact, namely minor damage to property. The maximum adverse scenario could involve the vessel foundering resulting in PLL and the environmental consequence of pollution. The Proposed Development's Marine Pollution Contingency Plan (MPCP) will be implemented to minimise the environmental effects should pollution occur.

183. The consequences are less likely to be severe for a drifting allision incident given that the speed at which the impact occurs (and subsequent energy of the impact) will generally be dictated by the wind and/or tidal speeds. Likewise, a vessel navigating internally within the array is likely to be transiting at lower speeds, reducing the severity of impact.

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

Frequency of Occurrence

185. The impact will be present throughout the operation and maintenance phase which will last for up to 35 years. For powered allision incidents, major maintenance safety zones will be in place and assist with ensuring that vessels are aware of the presence of structures. If on-site, guard vessels will assist with monitoring safety zones. Furthermore, the use of lighting and marking as required by the NLB and the MCA and promulgation of information will allow vessels to passage plan a safe route in advance, with the NLB stating during consultation that further discussions on lighting and marking will be appropriate once final layouts are under consideration. With these designed in measures in place, it is considered unlikely that a powered allision incident will occur.

186. For drifting allision incidents, the adrift vessel would initiate its emergency response procedures to avoid a CPA with a structure potentially resulting in an allision. This may include emergency anchoring following a check of the relevant nautical charts (thus ensuring that the anchor deployment does not lead to other impacts such as anchor snagging on a subsea cable). Moreover, under SOLAS obligations (IMO, 1974), other nearby vessels including project vessels (via marine coordination) may be able to render assistance. It is, however, noted that the number of project vessels on-site will be substantially lower than during the construction phase. There is also a possibility that a drifting vessel could regain power prior to alliding with a structure. Therefore, it is considered unlikely that a drifting allision incident will occur.

187. The frequency of occurrence is therefore considered to be remote.

Significance of the Effect

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

Secondary Mitigation and Residual Effect

189. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## Decommissioning Phase

Severity of Consequence

190. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place and it is anticipated that third-party vessels will not enter. Therefore, the internal allision risk is not considered relevant during this phase.

191. Pre-decommissioning or partially removed structures will be similar in nature to pre-commissioning or partially completed structures, and the movement of third-party vessels around the buoyed decommissioning area is anticipated to be similar to that during the construction phase. Therefore, powered and drifting allision risk is anticipated to be similar in nature to that determined for the equivalent construction phase impact, including the most likely consequences and consequences associated with the maximum adverse scenario.

192. The severity of consequence is therefore considered to be moderate.

Frequency of Occurrence

193. The impact will be present throughout the decommissioning phase which will last for up to eight years and will cover a lesser spatial extent as more structures are removed. For powered allision incidents, safety zones of up to 50 m around partially removed surface piercing structures will be in place and assist with ensuring that vessels are aware of the presence of structures. If on-site, guard vessels will assist with monitoring safety zones. Furthermore, the use of lighting and marking as required by the NLB and the MCA (including for partially removed structures), charting of the buoyed decommissioning area and promulgation of information will allow vessels to passage plan a safe route in advance. With these designed in measures in place, it is considered unlikely that a powered allision incident will occur.

194. For drifting allision incidents, the adrift vessel would initiate its emergency response procedures to avoid a CPA with a structure resulting in an allision. This may include emergency anchoring following a check of the relevant nautical charts (thus ensuring that the anchor deployment does not lead to other impacts such as anchor snagging on a subsea cable). Moreover, under SOLAS obligations (IMO, 1974), other nearby vessels including project vessels (via marine coordination) may be able to render assistance. There is also a possibility that a drifting vessel could regain power prior to alliding with a structure. Therefore, it is considered very unlikely that a drifting allision incident will occur.

195. The frequency of occurrence is therefore considered to be extremely unlikely.

Significance of the Effect

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

Secondary Mitigation and Residual Effect

197. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## REDUCED ACCESS TO LOCAL PORTS

### Construction Phase

Severity of Consequence

198. Up to 10,964 return trips 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, designated routes to and from construction ports and liaison with project vessels for the other Outer Firth of Forth developments. Project vessels will also carry AIS and be compliant with Flag State regulations including the COLREGs.

199. Anticipated deviations for the main commercial routes identified from the vessel traffic data have been defined, as described in the construction phase impact for vessel displacement. An illustration of the anticipated shift in the mean positions of the main commercial routes within the Proposed Development array area shipping and navigation study area for the maximum adverse scenario is presented in Figure 13.8. For the displaced routes, the increase in distance from the pre wind farm scenario is detailed in Table 13.16.

200. The closest port or harbour to the Proposed Development array area is Arbroath Harbour, located approximately 23 nm (43 km) to the north-west, on the east coast of Scotland. 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 Firth of Forth or other local ports above and beyond the deviations outlined for the vessel displacement impact.

201. There are no pilot boarding locations associated with Forth, Tay and Montrose ports/harbours within the Outer Firth of Forth; pilot boarding stations associated with the Tay and Montrose are located in the close approaches to the respective ports. Additionally, during consultation, Forth Ports noted that their VTS system does not extend as far out as the Proposed Development array area and they do not have VTS authority over that area (even in an advisory capacity).

202. Offshore export cables installation may result in some disruption for those vessels crossing the Proposed Development export cable corridor in and out of the Firth of Forth, Firth of Tay and Montrose due to the presence of vessels which may be RAM, such as a cable laying vessel. However, the offshore export cables are expected to be installed in phases which will restrict any disruption to only a small portion of the total Proposed Development export cable corridor.

203. Any lessons learnt from construction vessel movements associated with the Seagreen construction phase will be considered and details of construction activities including the presence of safety zones and any advisory safe passing distances, as defined by risk assessment, will be suitably promulgated to maximise awareness of ongoing construction activities.

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

205. The severity of consequence is therefore considered to be minor.

Frequency of Occurrence

206. The impact will be present throughout the construction phase which will last for up to eight years. The busiest main commercial route identified within the Proposed Development array area shipping and navigation study area accessing a local port for which an increased passage distance is required is Route 5, with an average of one vessel per day. In total, across all the routes accessing a local port for which an increased passage distance is required, there is an average of two vessels per day. Additionally, a proportion of the non-commercial vessel traffic may also be affected, noting that an average of one to two unique fishing vessels per day were recorded within the Proposed Development array area shipping and navigation study area throughout the vessel traffic surveys. Fishing vessel routeing out of Eyemouth is of particular note.

207. Therefore, it is anticipated that vessels will be exposed to the impact on a daily basis, particularly commercial vessels such as tankers and cargo vessels which constitute the majority of the vessel traffic, including those assigned to the main commercial routes.

208. The frequency of occurrence is therefore considered to be frequent.

Significance of the Effect

209. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

Secondary Mitigation and Residual Effect

210. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

### Operation and Maintenance Phase

Severity of Consequence

211. Up to 2,323 return trips per year by operation and maintenance vessels may be made throughout the operation and maintenance phase and will include vessels which are RAM. As per the construction phase, Project vessels will be managed by marine coordination, carry AIS and be compliant with relevant Flag State regulations.

212. Based on experience at existing operational offshore wind farms, it is anticipated that commercial vessels will generally choose not to navigate internally within the Proposed Development array area. Therefore, the anticipated deviations for the main commercial routes defined for the construction phase (around the buoyed construction area) are directly applicable for the operation and maintenance phase, as presented in Figure 13.8 and detailed in Table 13.16.

213. As noted for the equivalent construction phase impact, the closest port or harbour to the Proposed Development array area is Arbroath Harbour (23 nm (43 km)). Again, 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 Firth of Forth or other local ports above and beyond the deviations outlined for the vessel displacement impact.

214. As noted for the equivalent construction phase impact, there are no pilot boarding locations associated with the Forth, Tay and Montrose within the Outer Firth of Forth, and pilot boarding stations associated with the Tay and Montrose are located in the close approaches to the respective ports. Additionally, during consultation, Forth Ports noted that their VTS system does not extend as far out as the Proposed Development array area and they do not have VTS authority over that area (even in an advisory capacity).

215. Disruption within the Proposed Development export cable corridor will be more limited during the operation and maintenance phase, due to the more limited nature of operation and maintenance works consisting of temporary and intermittent activities such as inspections, surveys, repairs and reburials.

216. Any lessons learnt from operation and maintenance vessel movements associated with the Seagreen operational phase will be considered and details of major maintenance activities including the presence of safety zones and any advisory safe passing distances, as defined by risk assessment, will be suitably promulgated to maximise awareness of ongoing operation and maintenance activities.

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

218. The severity of consequence is therefore considered to be minor.

Frequency of Occurrence

219. The impact will be present throughout the operation and maintenance phase which will last for up to 35 years. Since the anticipated deviations associated with the main commercial routes accessing a local port and the volumes of vessel traffic on such routes are the same as for the equivalent construction phase impact, it is again anticipated that vessels will be exposed to the impact on a daily basis. However, with lower levels of project vessel, restrictions on port access due to project vessel activity can be expected to be lower in frequency than during the construction phase.

220. The likelihood of non-commercial vessels being affected is lower than for the equivalent construction phase impact given that, based on experience at existing operational offshore wind farms, it is anticipated that small craft may choose to navigate internally within the array, particularly in favourable weather conditions. This will minimise disruption to routeing to and from local ports, particularly out of Eyemouth where there is a notable volume of fishing vessel activity.

221. The frequency of occurrence is therefore considered to be reasonably probable.

Significance of the Effect

222. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be reasonably probable. The effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

Secondary Mitigation and Residual Effect

223. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## Decommissioning Phase

Severity of Consequence

224. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, the number of return trips per year by decommissioning vessels will be similar and a buoyed decommissioning area analogous to the buoyed construction area will be in place resulting in the anticipated deviations for the main commercial routes defined for the construction phase being directly applicable for the decommissioning phase, as presented in Figure 13.8 and detailed in Table 13.16.

225. Therefore, the most likely consequences associated with the maximum adverse scenario are as per the equivalent construction phase impacts.

226. The severity of consequence is therefore considered to be minor.

Frequency of Occurrence

227. The impact will be present throughout the decommissioning phase which will last for up to eight years. Since the anticipated deviations associated with the main commercial routes accessing a local port and the volumes of vessel traffic on such routes are the same as for the equivalent construction phase impact, it is again anticipated that vessels will be exposed to the impact on a daily basis.

228. One notable difference in the decommissioning phase compared to the construction phase is that subsea cables are anticipated to be left *in situ* (although best practice will be followed at the time of decommissioning). This will reduce the likelihood of disruption for those vessels crossing the Proposed Development export cable corridor in and out of the Firth of Forth, Firth of Tay and Montrose.

229. The frequency of occurrence is therefore considered to be frequent.

Significance of the Effect

230. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

Secondary Mitigation and Residual Effect

231. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## REDUCTION OF UNDER KEEL CLEARANCE

### Operation and Maintenance Phase

Severity of Consequence

232. Up to 661 nm (1,225 km) of inter-array cables, 51 nm (94 km) of interconnector cables and eight offshore export cables with total length 471 nm (872 km) will be in place during the operation and maintenance phase. The target minimum burial depth for subsea cables will be 0.5 m with a maximum cable protection height of 3 m (excluding crossings). Cable burial is the preferred option of safeguarding the subsea cables, with up to 15% of all subsea cables anticipated to require cable protection.

233. There is an overlap between the offshore export cables for NnG and the Proposed Development export cable corridor. Where the crossing occurs, there will be a maximum cable protection height of 3.5 m against a water depth between 34 m and 43 m below CD. Therefore, the change in navigable water depth is likely to be up to 10%.

234. Seagreen 1 makes landfall at Carnoustie on the east coast of Scotland with no spatial overlap with the Proposed Development export cable corridor. Likewise, the inter-array cables for NnG and Seagreen 1 will be located entirely within the respective array areas, resulting in no spatial overlap with the Proposed Development export cable corridor.

235. A cable burial risk assessment will be undertaken to determine the implementation and monitoring of cable protection.

236. During consultation, the MCA raised that cable burial depth requires consideration and noted the requirements of MGN 654 (MCA, 2021). The Applicant intends to follow the guidance provided in MGN 654 where possible, and in particular cable protection will not change the charted water depth by more than 5% where possible. This also 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 [now superseded by MGN 654]*" (RYA, 2019). In the case of the crossing of the Proposed Development export cable corridor and the offshore export cables for NnG, any reduction in navigable water depth greater than 5% will be discussed with the MCA and the NLB post consent as per MGN 654.

237. Should an underwater allision occur, the most likely consequences are minor damage to property and minor reputational effects on business but no perceptible effect on people. The maximum adverse scenario may include the vessel foundering resulting in PLL and the environmental consequence of pollution. The Project's Marine Pollution Contingency Plan will be implemented to minimise the environmental effects should pollution occur.

238. The severity of consequence is therefore considered to be moderate.

Frequency of Occurrence

239. The likelihood of an underwater allision is greater for large commercial vessels with greater draughts, noting that only a minority of vessels recorded in the vessel traffic survey data were deep draught.

240. When considered with compliance with the requirements in MGN 654 any change to water depth of more than 5% chart datum will require consultation with the MCA and NLB and therefore reduce the likelihood of an underwater allision to very low for all vessel types, with sufficient clearance to avoid any effect.

241. The frequency of occurrence is therefore considered to be extremely unlikely.

Significance of the Effect

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

Secondary Mitigation and Residual Effect

243. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## INTERACTION WITH SUBSEA CABLES

### Operation and Maintenance Phase

Severity of Consequence

244. Up to 661 nm (1,230 km) of inter-array cables, 51 nm (94 km) of interconnector cables and eight offshore export cables with total length 471 nm (872 km) will be in place during the operation and maintenance phase. The target minimum burial depth for subsea cables will be 0.5 m with a maximum cable protection height of 3 m (excluding crossings). Cable burial is the preferred option of safeguarding the subsea cables, with up to 15% of all subsea cables anticipated to require cable protection.

245. A cable burial risk assessment will be undertaken to determine the implementation and monitoring of cable protection.

246. There are three anchoring scenarios which are considered for this impact:

- 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; and
- anchor dragging – caused by anchor failure.

247. Although there may be limited decision-making time if a vessel is drifting towards a hazard, it is anticipated that the charting of infrastructure including all subsea cables will inform any decision to anchor, as per Regulation 34 of SOLAS (IMO, 1974).

248. There is also a similar interaction risk associated with fishing gear. It is the responsibility of the fishermen to dynamically risk assess whether it is safe to undertake fishing activities within the array and to make a decision as to whether or not to fish. Active fishing activity is considered further in volume 2, chapter 12.

249. The most likely consequences are negligible damage to property (anchoring vessel, fishing vessel engaged in activity, subsea cable or fishing gear). The maximum adverse scenario may include damage to property including to the vessel's anchor, subsea cable and/or fishing gear (loss of). Additionally, in the case of a commercial fishing vessel the stability of the vessel could be compromised.

250. The severity of consequence is therefore considered to be minor.

Frequency of Occurrence

251. From the vessel traffic survey data, anchoring activity was identified using the AIS navigational status, a speed analysis of vessels travelling at a speed of less than one knot for more than 30 minutes, and a visual check for patterns characteristic of anchoring movements. Applying this criterion, only one anchored vessel was identified throughout the vessel traffic surveys. This was a recreational vessel located approximately 750 m off the coast between Dunbar and Skateraw.

252. Taking the low likelihood of a vessel anchoring in the area into account, alongside the burial and protection of cables as outlined above which will be determined by the cable burial risk assessment, it is considered highly unlikely that an anchor interaction incident would occur.

253. In the event that reburial of subsea cables is required, a guard vessel may be deployed, as determined by risk assessment, whilst awaiting the work to be undertaken to ensure that passing vessels are suitably aware of the increased interaction risk. This will ensure that the likelihood of a snagging incident is minimised, noting that any damage, destruction or decay of subsea cables will be notified to the MCA, NLB, Kingfisher and the UKHO no later than 24 hours after discovered.

254. The frequency of occurrence is therefore considered to be negligible.

Significance of the Effect

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

Secondary Mitigation and Residual Effect

256. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## REDUCTION OF EMERGENCY RESPONSE CAPABILITY

### Operation and Maintenance Phase

Severity of Consequence

257. Up to 2,323 return trips per year by operation and maintenance vessels may be made throughout the operation and maintenance phase. The presence of project vessels will increase the likelihood of an incident, with the potential to diminish emergency response capability.

258. The closest SAR helicopter service base location is at Inverness Airport, approximately 94 nm (174 km) to the north-west of the Proposed Development array area, although incidents occurring within the Proposed Development export cable corridor are typically responded to out of Prestwick (100 nm (185 km) to the west). The closest RNLI station is at Eyemouth, approximately 19 nm (35 km) to the south-west, with numerous other stations located along the coast. The closest MRCC is at Aberdeen, approximately 40 nm (74 km) to the north.

259. From historical MAIB and RNLI incident data, the frequency of incidents in the area is relatively low, with the majority of cases occurring inshore of the Proposed Development array area. Given the distance offshore, the RNLI are frequent responders, with an average of one unique incident per year responded to within the Proposed Development array area shipping and navigation study area. Casualty vessels are typically fishing vessels and recreational vessels.

260. From SAR helicopter taskings data, the frequency of incidents in the area responded to by a SAR helicopter is relatively low, with only two taskings reported within the Proposed Development array area shipping and navigation study area in the six-year period between April 2015 and March 2021, both out of the Inverness base.

261. The Proposed Development array area is a large area to search (approximately 294 $nm^2$ (1,008 $km^2$)) compared to other existing offshore wind farms. However, it is unlikely that a SAR operation will require a search of the entire Proposed Development array area; it is much more likely that a search could be restricted to a specific area within the array where a casualty is known to be located (inclusive of considerations and assumptions made relating to the drift of the casualty).

262. With the presence of the array, the likelihood of an incident requiring emergency response will be greater given the presence of some of the impacts already outlined (collision, allision, underwater allision and snagging risks). During consultation, the RNLI noted that this may change the general location of incidents in the area which may then require a review of the future location of emergency response assets.

263. However, given that project vessels will be managed by marine coordination and be complaint with Flag State regulations including the COLREGs, it is anticipated that an incident can be suitably managed. In particular, project vessels will be equipped to assist in the event of an incident, either through self-help capability or – in the case of a third-party vessel – through SOLAS obligations (IMO, 1974), in liaison with the MCA. From historical incident data, there are 13 known instances of incidents responded to by vessels associated with UK offshore wind farm developments. Therefore, the additional demand for dedicated emergency response assets is not likely to be substantial.

264. During consultation, the MCA highlighted the need for consideration of effects on emergency response including completion of a SAR Checklist. The Applicant intends to comply with MGN 654 and its annexes (in particular SAR annex 5) (MCA, 2021) including completion of a SAR Checklist and Emergency Response Cooperation Plan (ERCoP). The minimum spacing between wind turbines is 1,000 m which is large compared to many existing offshore wind farms, comparable to the minimum spacing which will exist at NnG (903 m) and Seagreen (996 m) once constructed, and comparable to the minimum spacing consented at Inch Cape (1,278 m). Furthermore, the structures (wind turbines and offshore substation platforms/offshore convertor station platforms) are arranged in a grid pattern with two lines of orientation (as requested by MGN 654) to further assist safe navigation by SAR helicopters. The final array layout will be agreed through the DSLP which will include consultation with the MCA and NLB. Lighting and marking of the array for SAR purposes will also be discussed with the MCA and NLB.

265. In terms of internal navigation by SAR assets, SAR annex 5 states that it is "*highly likely that a helicopter refuge area will be required between adjacent developments*" and "*distances less than 1 nm are unlikely to be considered acceptable*" (MCA, 2021). On this basis, the 2.7 nm separation between the Proposed Development array area and Seagreen is considered a suitable helicopter refuge area, with SAR helicopters able to reorientate upon exiting one array and prior to entering another.

266. The most likely consequences are a delay to an emergency response request due to strained emergency response resources with minor effects on business but ultimately no issue executing the request and so no perceptible effect on people or the environment. The maximum adverse scenario may include a delay to an emergency response due to an inability to undertake an effective search resulting in PLL and the environmental consequence of pollution. The Project's Marine Pollution Contingency Plan will be implemented to minimise the environmental effects should pollution occur.

267. The severity of consequence is therefore considered to be moderate.

Frequency of Occurrence

268. As of August 2022, there have been no collisions as a result of the presence of an offshore wind farm in the UK and ten reported cases of an allision between a vessel and a wind turbine in the UK, corresponding to an average of 1,570 years of wind turbine operation per allision incident in the UK. Although this analysis considers only collision and allision incidents, it is not anticipated that the presence of the Proposed Development will result in any substantial increase in the need for SAR operations, and it is noted that the baseline level of incidents requiring emergency response is relatively low.

269. The frequency of occurrence is therefore considered to be remote.

Significance of the Effect

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

Secondary Mitigation and Residual Effect

271. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## INTERFERENCE WITH MAGNETIC POSITION FIXING EQUIPMENT

### Operation and Maintenance Phase

Severity of Consequence

272. A magnetic compass is a navigational instrument for determining direction relative to the earth's magnetic poles. It consists of a magnetised pointer (usually marked on the north end) free to align itself with the earth's magnetic field. Like any magnetic device, compasses are affected by nearby ferrous materials as well as by local electromagnetic forces, such as magnetic fields emitted from power cables. As the compass still serves as an essential means of navigation in the event of power loss or as a secondary source, it must not be affected to the extent that safe navigation is prohibited.

273. However, the majority of commercial vessel traffic uses non-magnetic gyrocompasses as the primary means of navigation, which are unaffected by Electromagnetic Field (EMF). Therefore, in general it is considered unlikely that any EMF interference created by subsea cables will have a significant impact on vessel navigation in the Proposed Development array area and export cable corridor. Nevertheless, since magnetic compasses can still serve as an essential means of navigation in the event of power loss, as a secondary source, or as some smaller craft (fishing or leisure) may rely on it as their sole means of navigation, it has been assessed within this EIA Report.

274. The important mitigating factors with respect to severity of consequence and EMF effects on magnetic compasses are listed below noting that section 13 of NRA concludes that for both buried and protected Direct Current (DC) cables the magnetic field will decrease exponentially with vertical distance between a vessel and the seabed (cable location):

- water depth;
- burial depth (or protection); and
- type of current (alternating or direct) running through the cables.

275. The offshore export cables and inter-array cables for the Proposed Development could be Alternating Current (AC), DC or a combination of both. As shown in section 13 of the NRA, studies indicate that AC does not emit an EMF significant enough to impact marine magnetic compasses; therefore the following assessment relates to DC cables only.

276. Regarding water depth, approximately 98.5% of the Proposed Development export cable corridor is in water depths greater than 6 m (below chart datum (CD)) and approximately 97.9% is in depths greater than 20 m below CD. Therefore, there is a significant vertical distance along the majority of the Proposed Development export cable corridor.

277. Evidence suggested (section 13 of the NRA) where subsea cables are buried or protected the magnetic field will also decrease exponentially with vertical distance. Where subsea cables cannot be buried and are instead protected, the magnetic field is expected to be below the Earth's magnetic field within 5 m from the seabed. Within shallow waters effects of EMF will also be mitigated by the installation of the offshore export cables by a trenchless technique (e.g. Horizontally Direction Drilled (HDD)) (out to between 488 m and 1,500 m from MHWS).

278. Inter-array cables are considered within acceptable limits given the water depths within the Proposed Development array area and use of burial/protection methods as required.

279. Therefore, given that 98.5% of the offshore export cable(s) will be buried and approximately 99.0% of the Proposed Development export cable corridor is in water depths greater than 6 m, there are not anticipated to be any effects on compass deviation for the majority of the Proposed Development export cable corridor (or the subsea cable(s) laid within it). The most likely consequences associated with the maximum adverse scenario are anticipated to be limited noting the substantial vertical distances along the majority of the Proposed Development export cable corridor and the offshore export cable(s) being installed by a trenchless technique (e.g. HDD) in the nearshore area (out to between 488 m and 1,500 m from MHWS).

280. The severity of consequence is therefore considered to be minor.

Frequency of Occurrence

281. Along the Proposed Development export cable corridor vessel traffic is assumed to pass (in the majority) perpendicular to the direction of the offshore export cable(s). For vessels not transiting over the offshore export cable(s), time spent directly above the cable(s) will be limited given the width of the cable(s), noting this increases horizontal distance.

282. Given DC cables produce static magnetic fields which decrease with the horizontal distance from the cables, by assuming a horizontal distance of 450 m (maximum adverse scenario from assuming eight offshore export cables buried side by side with minimum 50 m spacing), magnetic compass interference should only be experienced directly above or in direct proximity to the offshore export cables, noting again that effects decrease quickly with horizontal distance as the vessel moves away from the offshore export cables location.

283. The frequency of occurrence is therefore considered to be negligible.

Significance of the Effect

284. During consultation, the MCA stated that a deviation of three degrees will be accepted for 95% of the cable route and a five degree deviation accepted for the remaining 5%. In summary, based on designed in measures of water depth, burial and use of trenchless technique (e.g. HDD)/direct pipes within the shallow water, the Proposed Development is anticipated to be within the requirements defined by the MCA.

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

Secondary Mitigation and Residual Effect

286. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

### 13.11.1. PROPOSED MONITORING

287. No additional monitoring is required.

## 13.12. CUMULATIVE EFFECTS ASSESSMENT

### 13.12.1. METHODOLOGY

288. The CEA assesses the impact associated with the Proposed Development together with other relevant plans, projects and activities. Cumulative effects are therefore the combined effect of the Proposed Development in combination with the effects from a number of different projects, on the same receptor or resource. Please see volume 1, chapter 6 for detail on CEA methodology.

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

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

- tier 1 assessment – Proposed Development (Berwick Bank Wind Farm offshore) with Berwick Bank Wind Farm onshore;
- tier 2 assessment – All plans/projects assessed under Tier 1, plus projects which became operational since baseline characterisation, those under construction, those with consent and submitted but not yet determined;
- tier 3 assessment – All plans/projects assessed under Tier 2, plus those projects with a Scoping Report; and
- tier 4 assessment – All plans/projects assessed under Tier 3, which are reasonably foreseeable, plus those projects likely to come forward where an Agreement for Lease (AfL) has been granted.

291. The specific projects scoped into the CEA for shipping and navigation are outlined in Table 13.17, with this scoping based upon data confidence, effect-receptor pathways, surface piercing infrastructure and the spatial/temporal scales involved. In particular, projects over 50 nm from the Proposed Development array area or with low data confidence have been excluded.

292. The range of potential cumulative impacts that are identified and included in Table 13.18 is a subset of those considered for the Proposed Development alone CEA assessment. This is because some of the potential impacts identified and assessed for the Proposed Development alone, are localised and temporary in nature. It is considered therefore, that these potential impacts have limited or no potential to interact with similar changes associated with other plans or projects. These have therefore not taken forward for detailed assessment.

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

294. For the CEA for shipping and navigation, reference is made to 'Seagreen' (the collective 150 consented wind turbines that will be installed for Seagreen 1 and Seagreen Project 1A). This is on the basis Seagreen Project 1A is captured within the displacement footprint of Seagreen 1, which invalidates the need to distinguish the sub-projects.

295. As described in volume 1, chapter 3, the Applicant is developing an additional export cable grid connection to Blyth, Northumberland (the Cambois connection). Applications for necessary consents (including marine licenses) will be applied for separately. The CEA for the Cambois connection is based on information presented in the Cambois connection Scoping Report (SSER, 2022e), submitted in October 2022. The Cambois connection has not been scoped into the CEA for shipping and navigation on the basis that Cambois connection does not adequately satisfy the effect-receptor pathway criteria (given the lack of surface infrastructure).

**Table 13.17: List of Other Projects and Plans Considered Within the CEA for Shipping and Navigation**

| Development | Status [i.e. Application, Consented, Under Construction, Operational] | Distance from Array Area (km) | Distance from Offshore Export Cable Route (km) | Description of Development | Dates of Construction (If Applicable) | Dates of Operation (If Applicable) | Overlap with the Proposed Development [e.g. Project Construction Phase Overlaps with Proposed Development Construction Phase] |
|---|---|---|---|---|---|---|---|
| **Tier 2** | | | | | | | |
| **Offshore Wind Projects and Associated Cables** | | | | | | | |
| European Offshore Wind Deployment Centre | Operational | 85 | 113 | Offshore wind farm with 11 wind turbines fully operational since 2018. | N/A | 2018 to 2040 (22 years) | Operational phase overlap with Proposed Development construction and operation and maintenance phases. |
| Inch Cape | Consented | 7.6 | 33 | Offshore wind farm with up to 72 wind turbines awarded a Contract for Difference (CfD) in July 2022. | 2023 to 2025 | 2025 to 2065 (30 years) | Operational phase overlap with Proposed Development operation and maintenance phase. |
| Kincardine | Operational | 54 | 93 | Offshore wind farm with six wind turbines fully operational since 2021. | N/A | 2021 to 2046 (25 years) | Operational phase overlap with Proposed Development construction and operation and maintenance phases. |
| Levenmouth Demonstration Turbine | Operational | 70 | 43 | Demonstration wind turbine fully operational since 2013. | N/A | 2013 to 2029 (15 years) | Operational phase overlap with Proposed Development construction and operation and maintenance phases. |
| NnG | Under construction | 16 | 15 | Offshore wind farm with 56 wind turbines currently under construction including buoyed construction area. | May 2020 to November 2022 | 2022 to 2047 (25 years) | Operational phase overlap with Proposed Development construction and operation and maintenance phases. |
| Seagreen | Under construction | 5.0 | 35 | Offshore wind farm with 150 wind turbines currently under construction including buoyed construction area. | 2021 to 2025[4] | 2023 to 2048 (25 years) | Operational phase overlap with Proposed Development construction and operation and maintenance phases. |
| **Infrastructure** | | | | | | | |
| Energy Park Fife | Operational | 69 | 43 | Decommissioning facility located at Methil within the Firth of Forth. | N/A | Permanent | Operational phase overlap with all Proposed Development phases. |
| Inch Cape Met Mast | Operational | 19 | 39 | Single surface structure for gathering meteorological data. | N/A | Unknown | TBC |
| **Tier 3** | | | | | | | |
| **Offshore Wind Projects and Associated Cables** | | | | | | | |
| Forthwind | Scoped | 69 | 41 | Demonstration wind turbine and Met Mast. | TBC | TBC | TBC |

[4] Dates cover construction periods for Seagreen 1 (2021 – 2023) and Seagreen 1A (2023 -2025).

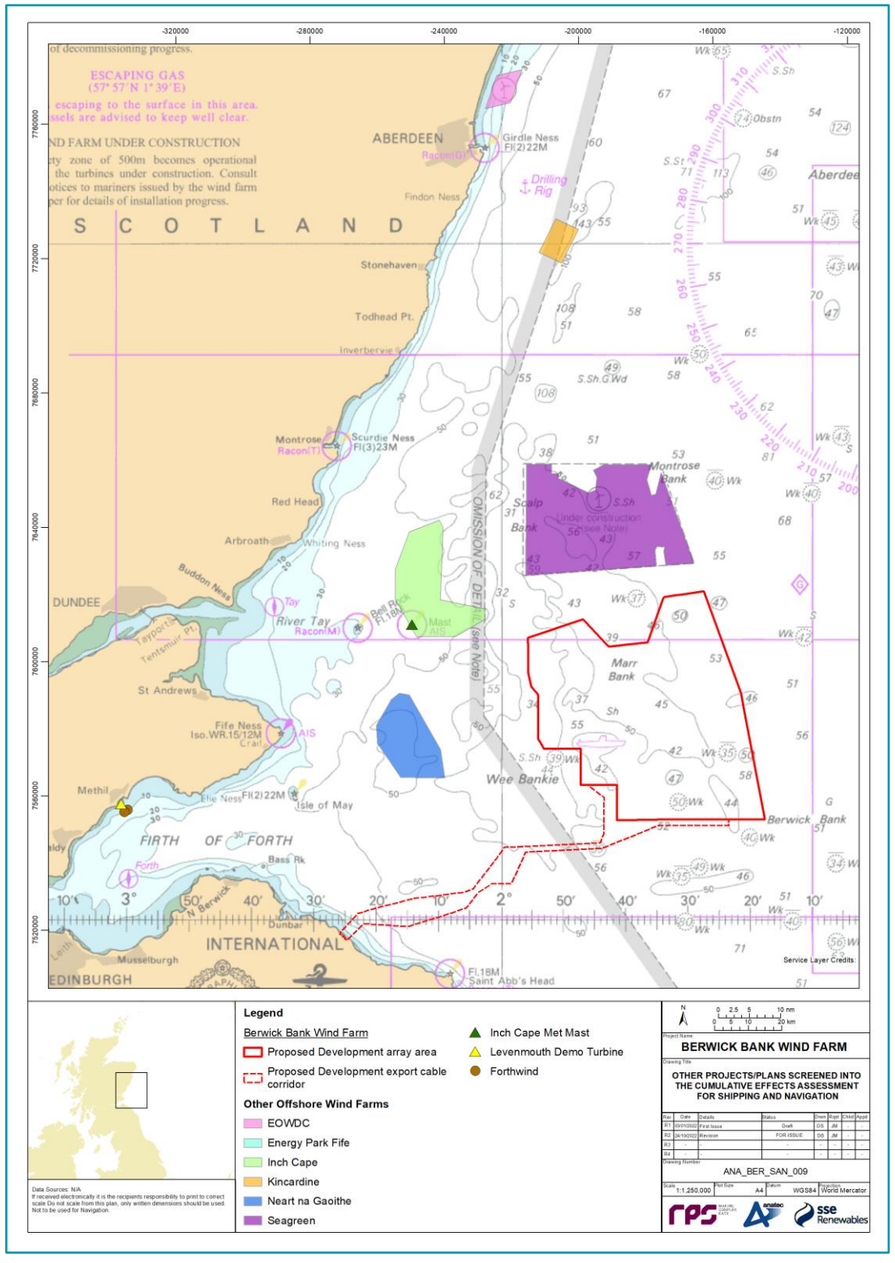


**Figure 13.9: Other Projects/Plans Screened into the Cumulative Effects Assessment for Shipping and Navigation**

## 13.12.2. MAXIMUM DESIGN SCENARIO

296. The maximum design scenarios identified in Table 13.18 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the details provided in volume 1, chapter 3 of the Offshore EIA Report as well as the information available on other projects and plans (see volume 3, appendix 6.4), to inform a 'maximum design scenario'. 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 wind turbine layout), to that assessed here, be taken forward in the final design scheme.

**Table 13.18: Maximum Design Scenario Considered for the Assessment of Potential Cumulative Effects on Shipping and Navigation**

| Potential Cumulative Effect | Phase[5] | | | Tier | Maximum Design Scenario |
|---|---|---|---|---|---|
| | C | O | D | | |
| Vessel displacement | ✓ | ✓ | ✓ | 2 | **Construction Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects.<br><br>**Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects.<br><br>**Decommissioning Phase**<br>The maximum design scenario for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar. Full build out of all CEA tier 2 projects is again assumed. |
| | | | | 3 | **Construction Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects.<br><br>**Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects.<br><br>**Decommissioning Phase**<br>The maximum design scenario for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar. Full build out of all CEA tier 2 and tier 3 projects is again assumed. |
| Increased vessel to vessel collision risk between a third-party vessel and a project vessel | ✓ | ✓ | ✓ | 2 | **Construction Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects. |

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

| Potential Cumulative Effect | Phase[5] C | Phase[5] O | Phase[5] D | Tier | Maximum Design Scenario |
|---|---|---|---|---|---|
| | | | | | **Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects.<br><br>**Decommissioning Phase**<br><br>The maximum design scenario for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar. Full build out of all CEA tier 2 projects is again assumed. |
| | | | | 3 | **Construction Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects.<br><br>**Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects.<br><br>**Decommissioning Phase**<br><br>The maximum design scenario for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar. Full build out of all CEA tier 2 and tier 3 projects is again assumed. |
| Increased vessel to vessel collision risk between third-party vessels | ✓ | ✓ | ✓ | 2 | **Construction Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects.<br><br>**Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects.<br><br>**Decommissioning Phase**<br><br>The maximum design scenario for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar. Full build out of all CEA tier 2 projects is again assumed. |

| Potential Cumulative Effect | Phase[5] C | Phase[5] O | Phase[5] D | Tier | Maximum Design Scenario |
|---|---|---|---|---|---|
| | | | | 3 | **Construction Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects.<br>**Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects.<br>**Decommissioning Phase**<br>The maximum design scenario for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar. Full build out of all CEA tier 2 and tier 3 projects is again assumed. |
| Vessel to structure allision risk | ✓ | ✓ | ✓ | 2 | **Construction Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects.<br>**Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects.<br>**Decommissioning Phase**<br>The maximum design scenario for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar. Full build out of all CEA tier 2 projects is again assumed. |
| | | | | 3 | **Construction Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects.<br>**Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; |

| Potential Cumulative Effect | Phase[5] C | Phase[5] O | Phase[5] D | Tier | Maximum Design Scenario |
|---|---|---|---|---|---|
| | | | | | • full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects.<br><br>**Decommissioning Phase**<br><br>The maximum design scenario for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar. Full build out of all CEA tier 2 and tier 3 projects is again assumed. |
| Reduced access to local ports | ✓ | ✓ | ✓ | 2 | **Construction Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects.<br><br>**Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects.<br><br>**Decommissioning Phase**<br><br>The maximum design scenario for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar. Full build out of all CEA tier 2 projects is again assumed. |
| | | | | 3 | **Construction Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects.<br><br>**Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects.<br><br>**Decommissioning Phase**<br><br>The maximum design scenario for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar. Full build out of all CEA tier 2 and tier 3 projects is again assumed. |

| Potential Cumulative Effect | Phase[5] C | Phase[5] O | Phase[5] D | Tier | Maximum Design Scenario |
|---|---|---|---|---|---|
| Reduction of under keel clearance | | ✓ | | 2 | **Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects. |
| | | | | 3 | **Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects. |
| Interaction with subsea cables | | ✓ | | 2 | **Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects. |
| | | | | 3 | **Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects. |
| Reduction of emergency response capability | ✓ | | | 2 | **Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects. |
| | | | | 3 | **Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects. |
| Interference with magnetic position fixing equipment | ✓ | | | 2 | **Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation; and<br>• full build out of all CEA tier 2 projects. |
| | | | | 3 | **Operation and Maintenance Phase**<br>• same parameters for the Proposed Development as considered for the maximum design scenario for the assessment of the equivalent impact for the Proposed Development in isolation;<br>• full build out of all CEA tier 2 projects; and<br>• full build out of all CEA tier 3 projects. |

## 13.12.3. CUMULATIVE EFFECTS ASSESSMENT

297. A description of the significance of cumulative effects upon shipping and navigation receptors arising from each identified impact is given below.

### VESSEL DISPLACEMENT

Tier 2

Construction phase

**Severity of consequence**

298. For those CEA tier 2 projects already *in situ*, the anticipated deviations for the main commercial routes identified from the vessel traffic data are as per those defined for the assessment of the Proposed Development in isolation, as presented in Figure 13.8 and detailed in Table 13.16. This includes the under construction NnG and Seagreen which had a buoyed construction area in place at the time of data collection (summer 2022 only in the case of Seagreen) and based on experience at under construction and operational offshore wind farms the vessel deviations will be equivalent.

299. With the presence of those CEA tier 2 projects not yet *in situ* (Inch Cape), anticipated deviation options for the main commercial routes identified from the vessel traffic data have been defined. The full methodology for main route deviations is provided in section 15.5.1 of the NRA, with deviations established in line with industry experience and consultation feedback. section 15.6 of the NRA provides a detailed (including illustrative) breakdown of the anticipated deviation options; the key findings relating to this impact are provided in Table 13.19.

**Table 13.19: Key Vessel Displacement Findings for Anticipated Deviation Options (CEA Tier 2)**

| Routeing Scenario | Key Findings |
|---|---|
| Between Forth ports and northern ports (passing north of NnG) | There are three options:<br>• Pass inshore of Inch Cape – a small deviation, charted water depths could be considered suitable. However, vessels carrying hazardous cargoes may deem navigation unsuitable due to the proximity to shore, potential for mechanical failures and interaction with Firth of Tay and Montrose vessel traffic. Forth Ports would have to contact vessels asking for intentions.<br>• Utilise the MGN 654 compliant navigation corridor between the Proposed Development array area and Inch Cape – a moderate deviation with a similar number of additional course adjustments needed compared to the other options.<br>• Pass offshore of the Proposed Development array area – a very large deviation with greater exposure to adverse weather. There is sufficient sea room to the south and east of the Proposed Development array area to ensure a safe distance can be maintained from wind farm structures. |
| Between Forth ports and northern ports (passing south of NnG) | There are three options:<br>• Passing inshore of Inch Cape – a large deviation, less feasible given the need to pass north of the Isle of May or alter course sharply once beyond the two special marks located east of the Isle of May. Gas carriers with flammable cargoes on this route may deem navigation unsuitable due to the proximity to shore and potential for failures. May increase the occurrence of incidents between Arbroath and Anstruther. |
| Between Forth ports and eastern ports | There are three options:<br>• Pass inshore of Inch Cape and north of Seagreen – a large deviation, charted water depths are suitable. Passes close to Bell Rock and may not be deemed a safe option by some vessels.<br>• Pass south of the Proposed Development array area – a very large deviation, with potential to compromise vessel schedules although there is likely to be sufficient opportunity to make up time and soften the extent of the deviation. |
| Between Forth ports and southern ports | No deviations expected given the distance from CEA tier 2 projects noting that none were anticipated due to the presence of the Proposed Development in isolation. |
| North-south following UK east coast | There are three options:<br>• Pass inshore of Inch Cape – a moderate deviation, water depths are suitable. Passes close to Bell Rock and may not be deemed a safe option by some vessels. Forth Ports would have to contact vessels asking for intentions.<br>• Utilise the MGN 654 compliant navigation corridor between the Proposed Development array area and Inch Cape – a small deviation with a similar number of course adjustments needed compared to the pre wind farm route. Larger vessels in adverse weather may be subject to under keel clearance risk from the shallow Marr Bank although associated depths are similar to those navigated on the pre wind farm route.<br>• Pass offshore of the Proposed Development array area – a decrease in route length but with greater exposure to adverse weather, both when passing the Proposed Development and Kincardine. |
| Between Dundee and eastern ports | There is one option:<br>• Pass north of Inch Cape and Seagreen – a large deviation, charted water depths are suitable. There is sufficient sea room to the west and north of Inch Cape to ensure a safe distance can be maintained from wind farm structures and once in the open Central North Sea likely to be sufficient opportunity to make up time and soften the extent of the deviation. |

300. Utilising the navigation corridor between the Proposed Development array area and Inch Cape is an option available for multiple routeing scenarios. A safety case for this navigation corridor has been undertaken in section 19.1 of the NRA and concludes the proposed corridor is compliant with MGN 654 and meets safety of navigation expectations. Furthermore, the navigation corridor is shaped such that vessels are able to pass directly through with minimum additional course adjustments, including alignment between the western boundaries of the Proposed Development array area and Seagreen (during consultation RYA Scotland indicated that this alignment makes it obvious how vessels will intend to transit through the area when passage planning).

301. There is potential for increased exposure to radar interference for navigation corridor users. However, the length of the corridor and subsequent distance and duration that any vessel will spend transiting the corridor is minimal. Therefore, the distance (and duration) for which any vessel could be within less than 1.5 nm from wind turbines will be low and it is very unlikely that vessels will navigate within 0.5 nm of a wind turbine. Risk can also be mitigated by adjustment of radar controls, ensuring that the effect is within parameters already safely managed at existing offshore wind farm developments.

302. Given that the corridor is MGN 654 compliant there are several alternatives for vessels, noting that the maximum adverse scenario (which may include the vessel foundering resulting in PLL and the environmental consequence of pollution) is unlikely.

303. Based on experience at existing operational offshore wind farms, it is anticipated that commercial fishing vessels and recreational vessels may choose to navigate internally within the various arrays which are operational, particularly in favourable weather conditions. However, during consultation RYA Scotland commented that recreational users may be discouraged from navigating in and around the navigation corridor given the potential presence of commercial traffic noting that the navigation corridor will be compliant with MGN 654. There is potential that north-south recreational users may choose to navigate internally within the eastern portion of Inch Cape (depending on layout), thus avoiding the navigation corridor.

304. Overall, the most likely consequences are increased journey times and distances leading to the environmental consequence of increased fuel consumption. There is also potential for the business consequence of disruption to schedules, and although changes in total route length may be possible to make up through increased speeds when in open seas and effective passage planning, the deviations are generally slightly greater than for the equivalent impact for the Proposed Development in isolation. This is particularly relevant for vessels where utilising the proposed navigation corridor between the Proposed Development array area and Inch Cape may not be considered suitable. Subsequently the benefits of promulgation of information and charting of the buoyed construction area for passage planning are likely to be more limited than for the Proposed Development in isolation.

305. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

306. The impact will be present throughout the construction phase which will last for up to eight years. Again, since the anticipated deviations associated with the main commercial routes and the volumes of vessel traffic on such routes are as per the assessment of the Proposed Development in isolation, it is again anticipated that vessels will be exposed to the impact on a daily basis.

307. The frequency of occurrence is therefore considered to be frequent.

**Significance of effect**

308. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The cumulative effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

**Further mitigation and residual effect**

309. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation(beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Operation and maintenance phase

**Severity of consequence**

310. Since all CEA tier 2 projects will be *in situ* during the operation and maintenance phase, the anticipated deviation options identified for the construction phase (around the buoyed construction area in the case of the Proposed Development) are directly applicable for the operation and maintenance phase, as detailed in Table 13.19.

311. Some of the CEA tier 2 projects may be decommissioned during the operation and maintenance phase, although for the maximum adverse scenario it is assumed that all CEA tier 2 projects will remain *in situ* throughout the operation and maintenance phase.

312. The size and location of the buoyed construction area will be slightly larger (given that buoys will be placed between 500 and 1000 m from the Proposed Development array area) than the operational Proposed Development array area and therefore the impacts on shipping and navigation will be equal to or less than during the construction phase.

313. This includes concerns relating to use of the navigation corridor between the Proposed Development array area and Inch Cape as well as the potential for small craft to be displaced from the area noting that the navigation corridor is MGN 654 compliant.

314. Therefore, the most likely consequences associated with the maximum adverse scenario are as per the equivalent construction phase impact.

315. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

316. The impact will be present throughout the operation and maintenance phase which will last for up to 35 years. Again, since the anticipated deviation options associated with the main commercial routes and the volumes of vessel traffic on such routes are as per the assessment of the Proposed Development in isolation, it is again anticipated that vessels will be exposed to the impact on a daily basis.

317. The frequency of occurrence is therefore considered to be frequent.

**Significance of effect**

318. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The cumulative effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

**Further mitigation and residual effect**

319. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Decommissioning phase

**Severity of consequence**

320. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place resulting in the anticipated deviation options identified for the construction phase being directly applicable for the decommissioning phase, as detailed in Table 13.19.

321. Therefore, the most likely consequences associated with the maximum adverse scenario are as per the equivalent construction phase impact.

322. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

323. The impact will be present throughout the decommissioning phase which will last for up to eight years. Again, since the anticipated deviation options associated with the main commercial routes and the volumes

of vessel traffic on such routes are the same as for the equivalent construction phase impact, it is again anticipated that vessels will be exposed to the impact on a daily basis.

**324.** The frequency of occurrence is therefore considered to be frequent.

**Significance of effect**

325. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The cumulative effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

**Further mitigation and residual effect**

326. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Tier 3

Construction phase

**Severity of consequence**

327. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, the most likely consequences are as per the equivalent CEA tier 2 construction phase impact.

328. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

329. The impact will be present throughout the decommissioning phase which will last for up to eight years. Again, since the anticipated deviation options associated with the main commercial routes and the volumes of vessel traffic on such routes are as per the assessment of the Proposed Development in isolation, it is again anticipated that vessels will be exposed to the impact on a daily basis.

330. The frequency of occurrence is therefore considered to be frequent.

**Significance of effect**

331. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The cumulative effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

**Further mitigation and residual effect**

332. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Operation and maintenance phase

**Severity of consequence**

333. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 operation and maintenance phase impact.

334. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

335. The impact will be present throughout the decommissioning phase which will last for up to eight years. Again, since the anticipated deviation options associated with the main commercial routes and the volumes of vessel traffic on such routes are as per the assessment of the Proposed Development in isolation, it is again anticipated that vessels will be exposed to the impact on a daily basis.

336. The frequency of occurrence is therefore considered to be frequent.

**Significance of effect**

337. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The cumulative effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

**Further mitigation and residual effect**

338. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Decommissioning phase

**Severity of consequence**

339. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, the most likely consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 operation and maintenance phase impact.

340. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

341. The impact will be present throughout the decommissioning phase which will last for up to eight years. Again, since the anticipated deviation options associated with the main commercial routes and the volumes of vessel traffic on such routes are as per the assessment of the Proposed Development in isolation, it is again anticipated that vessels will be exposed to the impact on a daily basis.

342. The frequency of occurrence is therefore considered to be frequent.

**Significance of effect**

343. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The cumulative effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

**Further mitigation and residual effect**

344. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## INCREASED VESSEL TO VESSEL COLLISION RISK BETWEEN A THIRD-PARTY VESSEL AND A PROJECT VESSEL

Tier 2

Construction phase

**Severity of consequence**

345. Up to 10,964 return trips 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, designated routes to and from construction ports and liaison with project vessels for the other Outer Firth of Forth developments. Project vessels will also carry AIS and be compliant with Flag State regulations including the COLREGs.

346. Collision incidents are local in nature, occurring only when two (or more) vessels pass within a small distance of each other within the same sea area. Accounting for the distance between the Proposed Development array area and the CEA tier 2 projects, it is therefore anticipated that the proposed navigation corridor between the Proposed Development array area and Inch Cape is a potential location where this impact may be exacerbated compared to the equivalent impact for the Proposed Development in isolation.

347. In particular, should a project vessel operate within the navigation corridor then a third-party vessel utilising the corridor may be faced with fewer options for collision avoidance given the reduced sea room available. A safety case for this navigation corridor has been undertaken in section 19.1 of the NRA and included consideration of the presence of project vessels. It was noted that any movements by project vessels within or in proximity to the corridor will be made in line with the designed in measures including compliance with the COLREGs, as outlined above. A similar measure is provided in the Inch Cape EIA Report (ICOL, 2018) and marine coordination will include communication with the developer of Inch Cape which may also be operating project vessels.

348. With these designed in measures in place, it is not anticipated that project vessels (for either the Proposed Development or Inch Cape) will have any detrimental effect on the ability of navigation corridor users to make passage safely.

349. Therefore, the most likely consequences associated with the maximum adverse scenario are as per the equivalent construction phase impact for the Proposed Development in isolation.

350. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

351. The impact will be present throughout the construction phase which will last for up to eight years. With the designed in measures noted above implemented, it is considered unlikely that an encounter between a third-party vessel and a project vessel will occur. In the event that such an encounter does occur, collision avoidance action would be implemented by the vessels as per the COLREGs, thus ensuring that the likelihood of the encounter developing into a collision incident is very low. In the case of the navigation corridor, implementation of the COLREGs may be more difficult but the traffic management procedures implemented by project vessels should ensure that navigation corridor users are unimpeded.

352. The frequency of occurrence is therefore considered to be extremely unlikely.

**Significance of effect**

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

**Further mitigation and residual effect**

354. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Operation and maintenance phase

**Severity of consequence**

355. Up to 2,323 return trips per year by operation and maintenance vessels may be made throughout the operation and maintenance phase and will include vessels which are RAM. As per the construction phase, project vessels will be managed by marine coordination, carry AIS and be compliant with Flag State regulations.

356. As per the equivalent construction phase impact, collision incidents are local in nature, occurring only when two (or more) vessels pass within a small distance of each other within the same sea area. Accounting for the distance between the Proposed Development array area and the CEA tier 2 projects, it is therefore anticipated that the navigation corridor between the Proposed Development array area and Inch Cape is a potential location where this impact may be exacerbated compared to the equivalent impact for the Proposed Development in isolation.

357. As per the equivalent construction phase impact, should a project vessel operate within the navigation corridor then a third-party vessel may be faced with fewer options for collision avoidance given the reduced sea room available. As outlined for the equivalent construction phase impact, a safety case for this navigation corridor has been undertaken in section 19.1 of the NRA and included consideration of the presence of project vessels. In particular, measures such as compliance with the COLREGs and communication with the developer of Inch Cape will be implemented.

358. With these designed in measures in place, it is not anticipated that project vessels (for either the Proposed Development or Inch Cape) will have any detrimental effect on the ability of navigation corridor users to make passage safely.

359. Therefore, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent construction phase impact.

360. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

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

362. The likelihood of an encounter is decreased compared to in the construction phase given that much fewer project vessels will generally be on-site at any time, although this is somewhat balanced by the much longer duration of the operation and maintenance phase.

363. The frequency of occurrence is therefore considered to be negligible.

**Significance of effect**

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

**Further mitigation and residual effect**

365. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Decommissioning phase

**Severity of consequence**

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

367. Therefore, the most likely consequences associated with the maximum adverse scenario are as per the equivalent construction phase impact, including in relation to the navigation corridor between the Proposed Development array area and Inch Cape.

368. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

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

370. The frequency of occurrence is therefore considered to be extremely unlikely.

**Significance of effect**

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

**Further mitigation and residual effect**

372. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Tier 3

Construction phase

**Severity of consequence**

373. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, this impact is only considered relevant in the event that construction vessels operate in and out of ports within the Firth of Forth. In particular, Forthwind is located close to the Port of Methil and Energy Park Fife.

374. However, as outlined for the equivalent CEA tier 2 construction phase impact, project vessels will be managed by marine coordination, including the use of designated routes to and from construction ports. Project vessels will also carry AIS and be compliant with Flag State regulations including the COLREGs. With these designed in measures in place, the most likely consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 construction phase impact.

375. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

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

377. The frequency of occurrence is therefore considered to be extremely unlikely.

**Significance of effect**

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

**Further mitigation and residual effect**

379. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Operation and maintenance phase

**Severity of consequence**

380. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, this impact is only considered relevant in the event that operation and maintenance vessels operate in and out of ports within the Firth of Forth. In particular, Forthwind is located close to the Port of Methil and Energy Park Fife.

381. With the same designed in measures in place as outlined for the equivalent construction phase impact, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 construction phase impact.

382. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

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

384. The likelihood of an encounter is decreased compared to in the construction phase given that much fewer project vessels will generally make transit to and from the Proposed Development, although this is somewhat balanced by the much longer duration of the operation and maintenance phase.

385. The frequency of occurrence is therefore considered to be negligible.

**Significance of effect**

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

**Further mitigation and residual effect**

387. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Decommissioning phase

**Severity of consequence**

388. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 decommissioning phase impact.

389. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

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

391. The frequency of occurrence is therefore considered to be extremely unlikely.

**Significance of effect**

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

**Further mitigation and residual effect**

393. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## INCREASED VESSEL TO VESSEL COLLISION RISK BETWEEN THIRD-PARTY VESSELS

Tier 2

Construction phase

**Severity of consequence**

394. Anticipated deviation options for the main commercial routes identified from the vessel traffic data have been defined. The full methodology for main route deviations is provided in section 15.5.1 of the NRA, with deviations established in line with industry experience and consultation feedback. section 15.6 of the NRA provides a detailed (including illustrative) breakdown of the anticipated deviation options; the key findings are provided in Table 13.19.

395. Considering the anticipated deviation options outlined in Table 13.19, there are five primary deviation options which cover all affected routeing scenarios. Three of these options – passing south of the Proposed Development array area, offshore of the Proposed Development array area, north of Seagreen – result in lower collision risk given that there is sufficient available sea room for vessels to safely navigate a suitable distance from each other and the arrays.

396. For one of the other deviation options – passing inshore of Inch Cape – the following concerns exist relating to collision risk:

- proximity to surface piercing structures (Inch Cape, Bell Rock) result in limited available sea room and subsequently increased collision risk for passing vessels;
- encounters with small craft may be increased with the presence of coastal fishing pots displacing recreational vessels into deviated commercial vessels; and
- passing vessels may be displaced into extensive potting areas and spoil grounds.

397. Based on the inclusion of a MGN 654 compliant navigation corridor it is considered unlikely that many vessels will pass inshore of Inch Cape. For the last deviation option – utilising the navigation corridor between the Proposed Development array area and Inch Cape – the proximity to surface piercing structures to both port and starboard introduce increased collision risk for passing vessels.

398. For the navigation corridor between the Proposed Development array area and Inch Cape, a safety case has been undertaken in the NRA (see section 19.1) and concluded that the corridor meets safety of navigation expectations. In particular, the corridor is not expected to experience a high volume of passing traffic (given alternative safe options are available – passing offshore of the Proposed Development) and is compliant with various relevant guidance which has been applied including from MGN 654, Permanent International Association of Navigation Congresses (PIANC) (PIANC, 2018), and Maritime Institute Netherlands (MARIN) (Nautical Institute, 2013) and the COLREGs (IMO, 1972/77). This includes the assurance that there is sufficient sea room available within the corridor to allow any necessary collision avoidance action in the event of an encounter between transiting vessels (minimum width of 4.1 nm).

399. Moreover, the shape of the navigation corridor between the Proposed Development array area and Inch Cape contains a compliant parallelogram. This means that vessels using the corridor have a clear view of each other when passing and also of any non-transiting small craft located at either side of the corridor, including in low visibility, further reducing collision risk.

400. There is also a potential for encounters with small craft within the navigation corridor including active fishing vessels which may be unable to make a manoeuvre in sufficient time to avoid an oncoming commercial vessel. However, given the available sea room within the corridor, it is anticipated that the passing vessel would comfortably be able to pass safely around any small craft in the corridor.

401. The most likely consequences in the event of a collision incident between third-party vessels are minor contact between the vessels resulting in minor damage to property and minor reputational effects on business but no perceptible effect on people. The maximum adverse scenario may include one of the vessels foundering resulting in PLL and the environmental consequence of pollution. Such a scenario would be more likely if one of the vessels involved was a small craft which may have lower structural integrity than a commercial vessel. The Project's Marine Pollution Contingency Plan will be implemented to minimise the environmental effects should pollution occur.

402. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

403. The impact will be present throughout the construction phase which will last for up to eight years. For passing commercial vessels alone, from the vessel traffic data it is anticipated that for the future case scenario an average of three to four transits per day through the navigation corridor may be made by potential users. The likelihood of an encounter between passing vessels (either overtaking or head-on) is therefore very low, with sufficient sea room as per MGN 654 to allow interactions with small craft to be mitigated. The promulgation of information and charting of the buoyed construction area will also maximise awareness of ongoing construction activities, thus allowing third-party vessels to passage plan in advance.

404. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

406. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of mitigation is not significant in EIA terms.

Operation and maintenance phase

**Severity of consequence**

407. Since all CEA tier 2 projects will be *in situ* during the operation and maintenance phase, the anticipated deviation options for the construction phase (around the buoyed construction area in the case of the Proposed Development) are directly applicable for the operation and maintenance phase, as detailed in Table 13.19.

408. Some of the CEA tier 2 projects may be decommissioned during the operation and maintenance phase, although for the maximum adverse scenario it is assumed that all CEA tier 2 projects will remain *in situ* throughout the operation and maintenance phase.

409. The size and location of the buoyed construction area will be slightly larger (given buoys will be placed between 500 and 1000 m from the Proposed Development array area) than the operational Proposed Development array area and therefore the impacts of shipping and navigation will be equal to or less.

410. Therefore, the most likely consequences and consequences associated with the maximum adverse scenario are slightly lower than the equivalent construction phase impact. However the severity of consequence is still considered to be moderate.

**Frequency of occurrence**

411. The impact will be present throughout the operation and maintenance phase which will last for up to 35 years. Again, from the vessel traffic data and interpretation of potential navigation corridor users it is anticipated that the likelihood of an encounter between passing vessels or small craft is very low.

412. The promulgation of information and charting of infrastructure will maximise awareness of ongoing operation and maintenance activities, thus allowing third-party vessels to passage plan in advance.

413. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

415. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Decommissioning phase

**Severity of consequence**

416. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place resulting in the anticipated deviation options identified for the construction phase being directly applicable for the decommissioning phase, as detailed in Table 13.19.

417. Therefore, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent construction phase impact.

418. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

419. Again, from the vessel traffic data and interpretation of potential navigation corridor users it is anticipated that the likelihood of an encounter between passing vessels or small craft is very low.

420. The promulgation of information and charting of the buoyed decommissioning area will maximise awareness of ongoing operation and maintenance activities, thus allowing third-party vessels to passage plan in advance.

421. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

423. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Tier 3

Construction phase

**Severity of consequence**

424. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 construction phase impact.

425. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

426. The impact will be present throughout the construction phase which will last for up to eight years. Again, given the distance from the Proposed Development array area and that this project is located within a different sea area, the likelihood of a third-party collision incident is as per the equivalent CEA tier 2 construction phase impact.

427. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

429. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of mitigation is not significant in EIA terms.

Operation and maintenance phase

**Severity of consequence**

430. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 operation and maintenance phase impact.

431. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

432. The impact will be present throughout the operation and maintenance phase which will last for up to 35 years. Again, given the distance from the Proposed Development array area and that this project is located within a different sea area, the likelihood of a third-party collision incident is as per the equivalent CEA tier 2 construction phase impact.

433. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

435. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Decommissioning phase

**Severity of consequence**

436. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 decommissioning phase impact.

437. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

438. The impact will be present throughout the decommissioning phase which will last for up to eight years. Again, given the distance from the Proposed Development array area and that this project is located within a different sea area, the likelihood of a third-party collision incident is as per the equivalent CEA tier 2 decommissioning phase impact.

439. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

441. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## VESSEL TO STRUCTURE ALLISION RISK

Tier 2

Construction phase

**Severity of consequence**

442. Allision incidents are local in nature, occurring only when a vessel is located in proximity to a surface piercing structure. Accounting for the distance between the Proposed Development array area and the CEA tier 2 projects, it is therefore anticipated that the vessels navigating within the navigation corridor between the Proposed Development array area and Inch Cape will be subject to a cumulative allision risk.

443. A drifting allision risk exists within the corridor in the event of mechanical failure or technical failure, adverse weather and/or navigational system error. A vessel adrift may only develop into an allision situation if in proximity to a wind farm structure (including pre-commissioned structure) and this is only the case where the adrift vessel is located in proximity to the navigation corridor and the wind and/or tide directs the vessel towards a structure.

444. The most likely consequences and consequences associated with the maximum adverse scenario in the event of an allision incident (powered and drifting) are as per the equivalent construction phase impact for the Proposed Development in isolation.

445. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

446. The impact will be present throughout the construction phase which will last for up to eight years and will cover a greater spatial extent as more structures are installed. For powered allision incidents, safety zones of up to 50 m around partially completed or completed but not yet fully commissioned surface piercing structures (at the Proposed Development array area) will be in place and assist with ensuring that vessels are aware of the presence of structures. If on-site, guard vessels will assist with monitoring safety zones. Furthermore, the use of lighting and marking as required by the NLB and the MCA (including for partially completed structures), charting of the buoyed construction area and promulgation of information will allow vessels to passage plan a safe route in advance. The NLB stated during consultation that further discussions on lighting and marking will be appropriate once final layouts are under consideration. The final array layout will be agreed through the DSLP which will include consultation with the MCA and NLB. With these designed in measures in place it is considered unlikely that a powered allision incident will occur.

447. For drifting allision incidents, the adrift vessel would initiate its emergency response procedures to avoid a closing CPA with a structure resulting in an allision. This may include emergency anchoring following a check of the relevant nautical charts (thus ensuring that the anchor deployment does not lead to other impacts such as anchor snagging on a subsea cable). Moreover, under SOLAS obligations (IMO, 1974), other nearby vessels including project vessels (via marine coordination) for all relevant CEA tier 2 projects may be able to render assistance. There is also a possibility that a drifting vessel could regain power prior to alliding with a structure.

448. Since a vessel utilising the navigation corridor may have surface piercing structures to both port and starboard (depending upon the status of wind turbine installation of the Proposed Development), the likelihood of an allision incident is greater. This is particularly notable for drifting allision given the closer proximity a vessel is likely to attain to a structure when becoming adrift and the greater potential for the wind and/or tide to direct the vessel towards a structure.

449. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

451. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Operation and maintenance phase

**Severity of consequence**

452. As per the equivalent construction phase impact, allision incidents are local in nature, occurring only when a vessel is located in proximity to a surface piercing structure. Accounting for the distance between the Proposed Development array area and the CEA tier 2 projects, it is therefore anticipated that the vessels navigating within the navigation corridor between the Proposed Development array area and Inch Cape will be subject to a cumulative allision risk.

453. Some of the CEA tier 2 projects (including Seagreen and Inch Cape) may be decommissioned during the operation and maintenance phase, although for the maximum adverse scenario it is assumed that all CEA tier 2 projects will remain *in situ* throughout the operation and maintenance phase.

454. In relation to the navigation corridor, the same points outlined for the equivalent construction phase impact exist. A drifting allision risk also exists, although a vessel adrift may only develop into an allision situation if in proximity to a structure and this is only the case where the adrift vessel is located in proximity to the navigation corridor and the wind and/or tide directs the vessel towards a structure.

455. The most likely consequences and consequences associated with the maximum adverse scenario in the event of an allision incident (powered and drifting) are as per the equivalent construction phase impact.

456. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

457. The impact will be present throughout the operation and maintenance phase which will last for up to 35 years. For powered allision incidents, major maintenance safety zones of up to 500 m will be in place (at the Proposed Development array area) and assist with ensuring that vessels are aware of the presence of structures. If on-site, guard vessels will assist with monitoring safety zones. Furthermore, the use of lighting and marking as required by the NLB and the MCA, charting of infrastructure and promulgation of information will allow vessels to passage plan a safe route in advance. The NLB stated during consultation that further discussions on lighting and marking will be appropriate once final layouts are under consideration. The final array layout will be agreed through the DSLP which will include consultation with the MCA and NLB. With these designed in measures in place, it is considered unlikely that a powered allision incident will occur.

458. For drifting allision incidents, the adrift vessel would initiate its emergency response procedures to avoid a closing CPA with a structure resulting in an allision. This may include emergency anchoring following a check of the relevant nautical charts (thus ensuring that the anchor deployment does not lead to other impacts such as anchor snagging on a subsea cable). Moreover, under SOLAS obligations (IMO, 1974), other nearby vessels including project vessels (via marine coordination) for all relevant CEA tier 2 projects may be able to render assistance. There is also a possibility that a drifting vessel could regain power prior to alliding with a structure.

459. As for the equivalent construction phase impact, since a vessel utilising the navigation corridor may have surface piercing structures to both port and starboard, the likelihood of an allision incident is greater. This is particularly notable for drifting allision given the closer proximity a vessel is likely to be to a structure when becoming adrift and the greater potential for the wind and/or tide to direct the vessel towards a structure.

460. Although internal allision risk is not directly considered relevant to the cumulative impact (since it is specific to each individual array), there is potential for small craft to navigate through one array and into another. This is of particular note for vessels navigating between the Proposed Development array area and Inch Cape. Both projects include a layout with two lines of orientation (noting that a final array layout for Inch Cape has not yet been published but the project was consented with two lines of orientation layout) and

similar minimum spacing. Therefore, it is anticipated that any small craft navigating between the arrays will be able to adapt effectively. The bearing of the lines of orientation in each array may be different, but the 4.1 nm minimum distance between the adjacent arrays is considered suitable to allow small craft to orientate themselves suitably after existing one array and prior to entering another, noting that MGN 654 states that the need for lines of orientation suitable for continuous passage applies for "*adjacent boundaries less than 1 nm apart*" (MCA, 2021).

461. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

463. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Decommissioning phase

**Severity of consequence**

464. As per the equivalent construction phase impact, allision incidents are local in nature, and accounting for the distance between the Proposed Development array area and the CEA tier 2 projects, it is therefore anticipated that vessels navigating within the navigation corridor between the Proposed Development array area and Inch Cape will be subject to a cumulative allision risk.

465. Some of the CEA tier 2 projects (including Seagreen and Inch Cape) may be decommissioned during or prior to the decommissioning phase, although for the maximum adverse scenario it is assumed that all CEA tier 2 projects will remain *in situ* throughout the decommissioning phase.

466. In relation to the navigation corridor, the same points outlined for the equivalent construction phase impact exist. A drifting allision risk also exists, although a vessel adrift may only develop into an allision situation if in proximity to a structure and this is only the case where the adrift vessel is located in proximity to the navigation corridor and the wind and/or tide directs the vessel towards a structure.

467. With the presence of safety zones, use of guard vessels where on-site, use of lighting and marking as required by the MCA and NLB (including for partially removed structures), charting of the buoyed decommissioning area and promulgation of information, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent construction phase impact.

468. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

469. The impact will be present throughout the decommissioning phase which will last for up to eight years and will cover a lesser spatial extent as more structures are removed. For powered allision incidents, safety zones of up to 50 m around partially removed surface piercing structures (at the Proposed Development array area) will be in place and assist with ensuring that vessels are aware of the presence of structures. If on-site, guard vessels will assist with monitoring safety zones. Furthermore, the use of lighting and marking as required by the NLB and the MCA (including for partially removed structures), charting of the buoyed decommissioning area and promulgation of information will allow vessels to passage plan a safe route in advance. With these designed in measures in place, it is considered unlikely that a powered allision incident will occur.

470. For drifting allision incidents, the adrift vessel would initiate its emergency response procedures to avoid a closing CPA with a structure resulting in an allision. This may include emergency anchoring following a check of the relevant nautical charts (thus ensuring that the anchor deployment does not lead to other impacts such as anchor snagging on a subsea cable). Moreover, under SOLAS obligations (IMO, 1974), other nearby vessels including project vessels (via marine coordination) for all relevant CEA tier 2 projects may be able to render assistance. There is also a possibility that a drifting vessel could regain power prior to alliding with a structure.

471. Since a vessel utilising the navigation corridor may have surface piercing structures to both port and starboard (depending upon the status of wind turbine removal of the Proposed Development), the likelihood of an allision incident is greater. This is particularly notable for drifting allision given the closer proximity a vessel is likely to be to a structure when becoming adrift and the greater potential for the wind and/or tide to direct the vessel towards a structure.

472. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

474. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Tier 3

Construction phase

**Severity of consequence**

475. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 construction phase impact.

476. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

477. The impact will be present throughout the construction phase which will last for up to eight years. Again, given the distance from the Proposed Development array area and that this project is located within a different sea area, the likelihood of a third-party collision incident is as per the equivalent CEA tier 2 construction phase impact.

478. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

480. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Operation and maintenance phase

**Severity of consequence**

481. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 operation and maintenance phase impact.

482. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

483. The impact will be present throughout the operation and maintenance phase which will last for up to 35 years. Again, given the distance from the Proposed Development array area and that this project is located within a different sea area, the likelihood of a third-party collision incident is as per the equivalent CEA tier 2 operation and maintenance phase impact.

484. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

486. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Decommissioning phase

**Severity of consequence**

487. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 decommissioning phase impact.

488. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

489. The impact will be present throughout the decommissioning phase which will last for up to eight years. Again, given the distance from the Proposed Development array area and that this project is located within a different sea area, the likelihood of a third-party collision incident is as per the equivalent CEA tier 2 decommissioning phase impact.

490. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

492. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## REDUCED ACCESS TO LOCAL PORTS

Tier 2

Construction phase

**Severity of consequence**

493. Anticipated deviation options for the main commercial routes identified from the vessel traffic data have been defined. The full methodology for main route deviations is provided in Section 15.5.1 of the NRA, with deviations established in line with industry experience and consultation feedback. section 15.6 of the NRA provides a detailed (including illustrative) breakdown of the anticipated deviation options; the key findings are provided in Table 13.19.

494. Given the relative distance to ports in the area and the anticipated deviations for the main commercial routes, it is anticipated that there may be some disruption to port access, particularly for vessels accessing the Firth of Forth from the north. This is due to the navigation corridor between the Proposed Development array area and Inch Cape potentially being discounted as an option for many vessels (particularly larger commercial vessels) as discussed in the cumulative vessel displacement impact, leaving only options with greater deviations. This may make ports located within the Firth of Forth less attractive to operators; however the large-scale and importance of the Firth of Forth for ports is noted, with it considered unlikely that the greater deviations will be sufficient to discourage operators from using the Firth of Forth, particularly when noting that passage planning may assist with minimising timing impacts.

495. Additionally, during consultation Forth Ports noted that if vessels deviate inshore of Inch Cape, then there may be a need for Forth Ports (as the VTS operator for the Firth of Forth) to contact such vessels to ask for intentions.

496. The construction of Inch Cape could overlap with the construction phase, noting that dates for construction are unknown. Likewise, there will be overlap between the operation and maintenance phases for all CEA tier 2 developments (with the possible exception of Inch Cape depending on timescales). Therefore, the cumulative presence of project vessels will be greater than for the Proposed Development in isolation. However, 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 (for the Proposed Development and potentially Inch Cape) and from the array (for all CEA tier 2 projects), designated routes to and from maintenance ports and liaison with project vessels for the other Outer Firth of Forth developments. This latter measure is particularly relevant in the event of overlap with the construction works for Inch Cape. Project vessels will also carry AIS and be compliant with Flag State regulations including the COLREGs.

497. With the designed in measures listed above and lessons learnt from construction vessel movements associated with the Seagreen construction phase, the effect due to the presence of CEA tier 2 projects is anticipated to be manageable.

498. The most likely consequences are as per the equivalent operation and maintenance phase impact for the Proposed Development in isolation. The consequences associated with the maximum adverse scenario are largely as per the equivalent construction phase impact for the Proposed Development in isolation but also include increased business effects relating to loss of custom and additional third-party workload.

499. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

500. The impact will be present throughout the construction phase which will last for up to eight years. The busiest main commercial route identified within the Proposed Development array area shipping and navigation study area accessing a local port for which an increased passage distance is required is Route 5, with an average of one vessel per day. In total, across all the routes accessing a local port for which an increased passage distance is required, there is an average of two vessels per day. Additionally, a proportion of the non-commercial vessel traffic may be affected, noting that an average of one to two unique fishing vessels per day were recorded within the Proposed Development array area shipping and navigation study area throughout the vessel traffic surveys.

501. Therefore, it is anticipated that vessels will be exposed to the impact on a daily basis, particularly commercial vessels such as tankers and cargo vessels which constitute the majority of the vessel traffic, including those assigned to the main commercial routes.

502. The frequency of occurrence is therefore considered to be frequent.

**Significance of effect**

503. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The cumulative effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

**Further mitigation and residual effect**

504. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Operation and maintenance phase

**Severity of consequence**

505. Since all CEA tier 2 projects will be *in situ* during the operation and maintenance phase, the anticipated deviation options identified for the construction phase (around the buoyed construction area in the case of the Proposed Development) are directly applicable for the operation and maintenance phase, as detailed in Table 13.19.

506. Therefore, concerns raised for the equivalent construction phase impact are directly applicable. This includes disruption to port access due to the navigation corridor between the Proposed Development array area and Inch Cape potentially being discounted as an option for many vessels, with the resulting potential for lost business.

507. Additionally, there is potential for additional third-party workload for Forth Ports due to a need to contact vessels deviating inshore of Inch Cape, as per the equivalent construction phase impact.

508. The construction of Inch Cape could overlap with the operation and maintenance phase, noting that dates for construction are unknown. Likewise, there will be overlap between the operation and maintenance phases for all CEA tier 2 projects. Therefore, the cumulative presence of project vessels will be greater than for the Proposed Development in isolation. However, 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 arrays (for all CEA tier 2 projects) and the buoyed construction area (potentially for Inch Cape), designated routes to and from maintenance ports and liaison with project vessels for the other Outer Firth of Forth developments. This latter measure is particularly relevant in the event of overlap with the construction works for Inch Cape. Project vessels will also carry AIS and be compliant with Flag State regulations including the COLREGs.

509. With the designed in measures listed above and lessons learnt from construction vessel movements associated with the Seagreen operation and maintenance phase, the effect due to the presence of CEA tier 2 projects is anticipated to be manageable.

510. The most likely consequences are as per the equivalent operation and maintenance phase impact for the Proposed Development in isolation. The consequences associated with the maximum adverse scenario are largely as per the equivalent construction phase impact but also include increased effects relating to loss of custom and additional third-party workload.

511. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

512. The impact will be present throughout the operation and maintenance phase which will last for up to 35 years. The busiest main commercial route identified within the Proposed Development array area shipping and navigation study area accessing a local port for which an increased passage distance is required is Route 5, with an average of one vessel per day. In total, across all the routes accessing a local port for which an increased passage distance is required, there is an average of two vessels per day. Additionally, a proportion of the non-commercial vessel traffic may be affected, as noted for the equivalent construction phase impact.

513. Therefore, it is anticipated that vessels will be exposed to the impact on a daily basis, particularly commercial vessels such as tankers and cargo vessels which constitute the majority of the vessel traffic, including those assigned to the main commercial routes.

514. The frequency of occurrence is therefore considered to be frequent.

**Significance of effect**

515. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The cumulative effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

**Further mitigation and residual effect**

516. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Decommissioning phase

**Severity of consequence**

517. Since the methods used to remove infrastructure are expected to be similar to those used for installation, this impact is expected to be similar in nature to the equivalent construction phase impact. In particular, a buoyed decommissioning area analogous to the buoyed construction area will be in place resulting in the

anticipated deviation options identified for the construction phase being directly applicable for the decommissioning phase, as detailed in Table 13.19. At this time, additional deviation options may be available since CEA tier 2 projects may have been decommissioned; in line with the maximum adverse scenario for port access concerns relating to the presence of infrastructure it is assumed that CEA tier 2 projects will remain *in situ* throughout the decommissioning phase.

518. Therefore, concerns raised for the equivalent construction phase impact are directly applicable. This includes disruption to port access due to the navigation corridor between the Proposed Development array area and Inch Cape potentially being discounted as an option for many vessels, with the resulting loss of custom.

519. Additionally, there is potential for additional third-party workload for Forth Ports due to a need to contact vessels deviating inshore of Inch Cape, as per the equivalent construction phase impact.

520. The operation and maintenance and decommissioning of the CEA tier 2 projects could overlap the decommissioning phase, resulting in the cumulative presence of project vessels being greater than for the Proposed Development in isolation, particularly in the event of decommissioning CEA tier 2 projects. However, 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 decommissioning areas (for the Proposed Development and potentially CEA tier 2 projects) and the arrays (potentially for CEA tier 2 projects), designated routes to and from decommissioning ports and liaison with project vessels for the other Outer Firth of Forth developments. This latter measure is particularly relevant in the event of overlap with the decommissioning works for CEA tier 2 projects. Project vessels will also carry AIS and be compliant with Flag State regulations including the COLREGs.

521. With the designed in measures listed above and lessons learnt from decommissioning vessel movements associated with the Seagreen decommissioning phase (if this has occurred by the time of the decommissioning phase), there is anticipated to be limited additional effect due to the presence of CEA tier 2 projects.

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

**Frequency of occurrence**

523. The impact will be present throughout the decommissioning phase which will last for up to eight years. The busiest main commercial route identified within the Proposed Development array area shipping and navigation study area accessing a local port for which an increased passage distance is required is Route 5, with an average of one vessel per day. In total, across all the routes accessing a local port for which an increased passage distance is required, there is an average of two vessels per day (assuming for the maximum adverse scenario that CEA tier 2 projects remain *in situ* throughout the decommissioning phase). Additionally, a proportion of the non-commercial vessel traffic may be affected, as noted for the equivalent construction phase impact.

524. Therefore, it is anticipated that vessels will be exposed to the impact on a daily basis, particularly commercial vessels such as tankers and cargo vessels which constitute the majority of the vessel traffic, including those assigned to the main commercial routes.

525. The frequency of occurrence is therefore considered to be frequent.

**Significance of effect**

526. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The cumulative effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

**Further mitigation and residual effect**

527. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Tier 3

Construction phase

**Severity of consequence**

528. The only CEA tier 3 development is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, this impact is only considered relevant in the event that construction vessels for the Proposed Development operate in and out of ports within the Firth of Forth. In particular, Forthwind is located close to the Port of Methil and Energy Park Fife.

529. The construction of Forthwind could overlap with the construction phase, noting that dates for construction are unknown. Likewise the potential overlap noted for CEA tier 2 projects in the equivalent CEA tier 2 construction phase impact applies. However, as outlined for the equivalent CEA tier 2 construction phase impact, project vessels will be managed by marine coordination, including the use of designated entry and exit points, designated routes and liaison with project vessels for the other developments in the region. This latter measure is particularly relevant in the event of overlap with the construction works for Inch Cape or Forthwind. Project vessels will also carry AIS and be compliant with Flag State regulations including the COLREGs.

530. With the designed in measures listed above and lessons learnt from construction vessel movements associated with the Seagreen construction phase, the effect due to the presence of CEA tier 2 and tier 3 projects is anticipated to be manageable.

531. The most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 construction phase impact.

532. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

533. The impact will be present throughout the construction phase which will last for up to eight years. The busiest main commercial route identified within the Proposed Development array area shipping and navigation study area accessing a local port for which an increased passage distance is required is Route 5, with an average of one vessel per day. In total, across all the routes accessing a local port for which an increased passage distance is required, there is an average of two vessels per day. Additionally, a proportion of the non-commercial vessel traffic may be affected, as noted for the equivalent CEA tier 2 impact.

534. Therefore, it is anticipated that vessels will be exposed to the impact on a daily basis, particularly commercial vessels such as tankers and cargo vessels which constitute the majority of the vessel traffic, including those assigned to the main commercial routes.

535. The frequency of occurrence is therefore considered to be frequent.

**Significance of effect**

536. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The cumulative effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

**Further mitigation and residual effect**

537. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Operation and maintenance phase

**Severity of consequence**

538. The only CEA tier 3 development is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, this impact is only considered relevant in the event that operation and maintenance vessels operate in and out of ports within the Firth of Forth. In particular, Forthwind is located close to the Port of Methil and Energy Park Fife.

539. The construction of Forthwind could overlap with the operation and maintenance phase, noting that dates for construction are unknown. Likewise the potential overlap noted for CEA tier 2 projects in the equivalent CEA tier 2 construction phase impact applies. However, as outlined for the equivalent CEA tier 2 construction phase impact, project vessels will be managed by marine coordination, including the use of designated entry and exit points, designated routes and liaison with project vessels for the other developments in the region. This latter measure is particularly relevant in the event of overlap with the construction works for Inch Cape or Forthwind. Project vessels will also carry AIS and be compliant with Flag State regulations including the COLREGs.

540. With the designed in measures listed above and lessons learnt from operation and maintenance vessel movements associated with the Seagreen operation and maintenance phase, the effect due to the presence of CEA tier 2 and tier 3 projects is anticipated to be manageable.

541. The most likely consequences associated with the maximum adverse scenario are as per the equivalent construction phase impact.

542. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

543. The impact will be present throughout the operation and maintenance phase which will last for up to 35 years. The busiest main commercial route identified within the Proposed Development array area shipping and navigation study area accessing a local port for which an increased passage distance is required is Route 5, with an average of one vessel per day. In total, across all the routes accessing a local port for which an increased passage distance is required, there is an average of two vessels per day. Additionally, a proportion of the non-commercial vessel traffic may be affected, as noted for the equivalent CEA tier 2 impact.

544. Therefore, it is anticipated that vessels will be exposed to the impact on a daily basis, particularly commercial vessels such as tankers and cargo vessels which constitute the majority of the vessel traffic, including those assigned to the main commercial routes.

545. The frequency of occurrence is therefore considered to be frequent.

**Significance of effect**

546. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The cumulative effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

**Further mitigation and residual effect**

547. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Decommissioning phase

**Severity of consequence**

548. The only CEA tier 3 development is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, this impact is only considered relevant in the event that decommissioning vessels operate in and out of ports within the Firth of Forth. In particular, Forthwind is located close to the Port of Methil and Energy Park Fife.

549. The operation and maintenance and decommissioning of Forthwind could overlap with the decommissioning phase, noting that dates for decommissioning are unknown. Likewise the potential overlap noted for CEA tier 2 projects in the equivalent CEA tier 2 decommissioning phase impact applies. However, as outlined for the equivalent CEA tier 2 decommissioning phase impact, project vessels will be managed by marine coordination, including the use of designated entry and exit points, designated routes and liaison with project vessels for the other developments in the region. This latter measure is particularly relevant in the event of overlap with the decommissioning works for CEA tier 2 and tier 3 projects. Project vessels will also carry AIS and be compliant with Flag State regulations including the COLREGs.

550. With the designed in measures listed above and lessons learnt from decommissioning vessel movements associated with the Seagreen decommissioning phase (if this has occurred by the time of the decommissioning phase), the effect due to the presence of CEA tier 2 and tier 3 projects is anticipated to be manageable.

551. The most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent construction phase impact.

552. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

553. The impact will be present throughout the decommissioning phase which will last for up to eight years. The busiest main commercial route identified within the Proposed Development array area shipping and navigation study area accessing a local port for which an increased passage distance is required is Route 5, with an average of one vessel per day. In total, across all the routes accessing a local port for which an increased passage distance is required, there is an average of two vessels per day. Additionally, a proportion of the non-commercial vessel traffic may be affected, as noted for the equivalent CEA tier 2 impact.

554. Therefore, it is anticipated that vessels will be exposed to the impact on a daily basis, particularly commercial vessels such as tankers and cargo vessels which constitute the majority of the vessel traffic, including those assigned to the main commercial routes.

555. The frequency of occurrence is therefore considered to be frequent.

**Significance of effect**

556. Overall, the severity of consequence is deemed to be minor and the frequency of occurrence is considered to be frequent. The cumulative effect will, therefore, be of **tolerable** adverse significance, which is not significant in EIA terms.

**Further mitigation and residual effect**

557. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## REDUCTION OF UNDER KEEL CLEARANCE

### Tier 2

Operation and maintenance phase

**Severity of consequence**

558. Inch Cape makes landfall at Cockenzie within the Firth of Forth with no spatial overlap with the Proposed Development export cable corridor. Likewise, the inter-array cables for CEA tier 2 projects not considered in the equivalent impact for the Proposed Development in isolation (i.e. Inch Cape) will be located entirely within the array area, resulting in no spatial overlap with the Proposed Development export cable corridor.

559. Since there is no additional effect due to the presence of the CEA tier 2 projects, the most likely consequences associated with the maximum adverse scenario are as per the equivalent impact for the Proposed Development in isolation.

560. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

561. Taking into account the anticipated deviation options for vessel routeing with the presence of CEA tier 2 projects, the likelihood of an underwater allision incident may be exacerbated for the Seagreen offshore export cables due to vessels utilising the navigation corridor between the Proposed Development array area and Inch Cape. However, taking into account that vessels would generally cross perpendicular to the Seagreen offshore export cables (thus minimising time spent over any cable protection) and the charted water depth for the area (typically between 33 m and 61 m), the likelihood of an underwater allision incident remains very low.

562. Additionally, the same mitigation measures which are designed in for the Proposed Development will be applied for the Seagreen offshore export cables, including compliance with the guidance provided in MGN 654.

563. The frequency of occurrence is therefore considered to be extremely unlikely.

**Significance of effect**

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

**Further mitigation and residual effect**

565. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

### Tier 3

Operation and maintenance phase

**Severity of consequence**

566. There is no overlap between the offshore export cables for CEA tier 3 projects and the Proposed Development export cable corridor, with Forthwind making landfall at Energy Park Fife within the Firth of Forth.

567. Since there is no additional effect due to the presence of the CEA tier 3 projects, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 impact.

568. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

569. Taking into account the anticipated deviation options for vessel routeing with the presence of CEA tier 2 and tier 3 projects, the likelihood of an underwater allision incident is determined to be as per the equivalent CEA tier 2 impact, including after consideration of the navigation corridor between the Proposed Development array area and Inch Cape.

570. The frequency of occurrence is therefore considered to be extremely unlikely.

**Significance of effect**

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

**Further mitigation and residual effect**

572. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of mitigation is not significant in EIA terms.

## INTERACTION WITH SUBSEA CABLES

### Tier 2

Operation and maintenance phase

**Severity of consequence**

573. A cable burial risk assessment is a standard requirement for all offshore wind farm developments. Therefore, it is assumed that for all CEA tier 2 projects the subsea cables will be suitably buried and protected with compliance with the guidance provided in MGN 654.

574. As per the equivalent impact for the Proposed Development in isolation, it is anticipated that the charting of infrastructure including all subsea cables will inform any decision to anchor, as per Regulation 34 of SOLAS (IMO, 1974) and noting that all CEA tier 2 projects are or will be charted.

575. With limited additional effect due to the presence of the CEA tier 2 projects, the most likely consequences and consequences associated with the maximum adverse scenario (underwater allision) are as per the equivalent impact for the Proposed Development in isolation.

576. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

577. Taking into account the anticipated deviation options for vessel routeing with the presence of CEA tier 2 projects, there is not considered to be any substantial increase in the likelihood of an anchor snagging (or fishing gear snagging) incident. This includes with consideration of vessels utilising the navigation corridor between the Proposed Development array area and Inch Cape; although the likelihood of a drifting allision incident is greater (as discussed in the cumulative impact for allision risk), it is assumed that any preventative emergency anchoring action would be undertaken following a check of the relevant nautical charts.

578. The frequency of occurrence is therefore considered to be negligible.

**Significance of effect**

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

**Further mitigation and residual effect**

580. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Tier 3

Operation and maintenance phase

**Severity of consequence**

581. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, the impact is considered only relevant for effects arising from project vessel movements and if operation and maintenance vessels operate in and out of ports within the Firth of Forth. In particular, Forthwind is located close to the Port of Methil and Energy Park Fife.

582. If project vessels were to operate out of these locations, there is a potential that third-party vessels intending to make berth at Methil may be unable to due to project vessel movements (including vessels which are RAM). However, any such scenario would be short-term, meaning that the need for anchoring may be limited. Furthermore, there are numerous designated anchorage areas within the Firth of Forth (including in proximity to Forthwind) which a third-party vessel would likely use.

583. Therefore, the most likely consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 impact.

584. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

585. Accounting for the above scenario, the likelihood of an anchor snagging (or fishing gear snagging) incident is very low given that it is assumed that the subsea cables associated with Forthwind will be suitably buried and protected with compliance with the guidance provided in MGN 654. Moreover, any decision to anchor would be made following a check of the relevant nautical charts.

586. The frequency of occurrence is therefore considered to be negligible.

**Significance of effect**

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

**Further mitigation and residual effect**

588. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## REDUCTION OF EMERGENCY RESPONSE CAPABILITY

Tier 2

Operation and maintenance phase

**Severity of consequence**

589. As with the equivalent impact for the Proposed Development in isolation, the presence of project vessels will increase the likelihood of an incident, with the potential to diminish emergency response capability. This will be exacerbated for the CEA tier 2 scenario given that project vessels will be present for multiple projects in the area, with Seagreen (already *in situ*) and Inch Cape in close enough proximity and large enough scale to have a notable effect.

590. Historical incident data indicates that the frequency of incidents in the area is relatively low and the majority of cases occur inshore of the Proposed Development array area, involving fishing vessels and recreational vessels. SAR helicopter taskings data indicates that the frequency of incidents in the area responded to by a SAR helicopter is relatively low.

591. The cumulative area to search across the Proposed Development array area and CEA tier 2 projects is very large (approximately 480 $nm^2$ (1,684 $km^2$) for the Proposed Development array area, Seagreen and Inch Cape alone). However, it is unlikely that a SAR operation will require a search of multiple arrays, noting that Seagreen and Inch Cape are located approximately 2.7 nm and 4.1 nm from the Proposed Development array area, respectively.

592. With the presence of the CEA tier 2 projects, the likelihood of an incident requiring emergency response will be greater given that some of the impacts already outlined (collision, allision, underwater allision and snagging risks). During consultation, the RNLI noted that this may change the general location of incidents in the area which may then require a review of the future location of emergency response assets.

593. However, project vessels will be managed by marine coordination and be compliant with Flag State regulations including the COLREGs. In particular, project vessels will be equipped to assist in the event of an incident, either through self-help capability or – in the case of a third-party vessel – through SOLAS obligations (IMO, 1974), in liaison with the MCA. From historical incident data, there are 13 known instances of incidents responded to by vessels associated with UK offshore wind farm developments. Therefore, the additional demand for dedicated emergency response assets is not likely to be substantial, particularly given that cumulatively there is an increased likelihood that a project vessel across the Proposed Development and CEA tier 2 projects will be able to respond.

594. In terms of internal navigation by SAR assets, Annex 5 of MGN 654 states that it is "*highly likely that a helicopter refuge area will be required between adjacent developments*" and "*distances less than 1 nm are unlikely to be considered acceptable*" (MCA, 2021). On this basis, the 4.1 nm separation between the Proposed Development array area and Inch Cape is considered a suitable helicopter refuge area, with SAR helicopters able to reorientate upon exiting one array and prior to entering another.

595. The most likely consequences are as per the equivalent impact for the Proposed Development in isolation, namely minor effects on business but no perceptible effect on people or the environment. For the maximum adverse scenario, a delay to an emergency response due to an inability to undertake an effective search could result in PLL and the environmental consequence of pollution. The Project's Marine Pollution Contingency Plan will be implemented to minimise the environmental effects should pollution occur.

596. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

597. Historically, the rate of collision and allision incidents due to the presence of an offshore wind farm in the UK is low. Although the likelihood of an incident requiring an emergency response may be greater for the cumulative scenario given the increased presence of infrastructure and activities, this is offset by the greater ability to respond to a third-party incident due to greater presence of on-site project vessels.

598. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

600. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

### Tier 3

Operation and maintenance phase

**Severity of consequence**

601. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, this impact is considered relevant in terms of the increased likelihood of an incident and subsequent stress on emergency response resources but not in terms of internal access to arrays.

602. As with the Proposed Development and CEA tier 2 projects, it is anticipated that the Inverness and Prestwick SAR helicopter service bases would be mobilised in the event of an incident within the Firth of Forth, although differing RNLI stations would likely respond. Given the small-scale of Forthwind, it is not anticipated that the effect on emergency response capability will be substantially increased compared to the equivalent CEA tier 2 impact. Therefore, the most likely consequences and consequences associated with the maximum adverse scenario are as per the equivalent CEA tier 2 impact.

603. The severity of consequence is therefore considered to be moderate.

**Frequency of occurrence**

604. Historically, the rate of collision and allision incidents due to the presence of an offshore wind farm in the UK is low. Although the likelihood of an incident requiring an emergency response may be greater for the cumulative scenario given the increased presence of infrastructure and activities, this is offset by the greater ability to respond to a third-party incident due to greater presence of on-site project vessels.

605. The frequency of occurrence is therefore considered to be remote.

**Significance of effect**

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

**Further mitigation and residual effect**

607. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

## INTERFERENCE WITH MAGNETIC POSITION FIXING EQUIPMENT

### Tier 2

Operation and maintenance phase

**Severity of consequence**

608. Interference with magnetic position fixing equipment is local in nature, occurring only when a vessel is located in proximity to a subsea cable. Accounting for the distance between the Proposed Development export cable corridor and CEA tier 2 projects, it is therefore not anticipated that the presence of the CEA tier 2 projects will result in any change to the severity of consequence anticipated for the equivalent impact for the Proposed Development in isolation. This includes within the navigation corridor between the Proposed Development and Inch Cape; no subsea cables will be installed within the corridor from either project.

609. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

610. Accounting for the distance between the Proposed Development export cable corridor and CEA tier 2 projects, the likelihood of effect is not anticipated to be increased. Therefore, the frequency of occurrence is considered to be identical to the equivalent impact for the Proposed Development in isolation.

611. The frequency of occurrence is therefore considered to be negligible.

**Significance of effect**

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

**Further mitigation and residual effect**

613. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

Tier 3

Operation and maintenance phase

**Severity of consequence**

614. The only CEA tier 3 project is Forthwind, located approximately 37 nm (69 km) from the Proposed Development array area within the Firth of Forth. Given the distance from the Proposed Development array area and that this project is located within a different sea area, the impact is considered to be identical to the equivalent CEA tier 2 impact.

615. The severity of consequence is therefore considered to be minor.

**Frequency of occurrence**

616. Again, due the lack of proximity of Forthwind, the likelihood of effect is considered identical to the equivalent CEA tier 2 impact.

617. The frequency of occurrence is therefore considered to be negligible.

**Significance of effect**

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

**Further mitigation and residual effect**

619. No shipping and navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 13.15) is not significant in EIA terms.

### TRANSBOUNDARY EFFECTS

620. A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to shipping and navigation from the Proposed Development upon the interests of other European Economic Area (EEA) States has been assessed as part of the EIA. The potential transboundary impacts are summarised below:

- vessel displacement for commercial routeing between international ports.

621. Commercial vessels undertaking international voyages may be displaced due to the presence of the Proposed Development and CEA projects. Given the international use of AIS transceivers on commercial vessels, the baseline assessment of vessel traffic movements (Section 13.7) captures the relevant receptors for this transboundary impact. The impact has also subsequently been suitably considered for the cumulative scenario in section 13.12, concluding that the effect is of tolerable significance, which is not significant in EIA terms. Therefore, it can be concluded that there are no significant transboundary effects as a result of the Proposed Development.

## 13.3. INTER-RELATED EFFECTS (AND ECOSYSTEM ASSESSMENT)

622. A description of the likely inter-related effects arising from the Proposed Development on shipping and navigation is provided in volume 3, appendix 20.1 of the Offshore EIA Report.

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

- vessel displacement;
- increased vessel to vessel collision risk between a third-party vessel and a project vessel;
- increased vessel to vessel collision risk between third-party vessels;
- vessel to structure allision risk; and
- reduced access to local ports.

624. No inter-related effects (Project lifetime effects) are predicted to arise during the construction, operation and maintenance phase, and decommissioning of the Proposed Development are predicted, since the potential impacts listed above will not be further exacerbated over the lifetime of the Proposed Development.

625. 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.

## 13.4. SUMMARY OF IMPACTS, MITIGATION MEASURES, LIKELY SIGNIFICANT EFFECTS AND MONITORING

626. Information on shipping and navigation within the shipping and navigation study areas was collected through desktop review, site-specific surveys and consultation, including vessel traffic surveys undertaken in line with the requirements of MGN 654 (MCA, 2021).

627. Table 13.20 presents a summary of the potential impacts, mitigation measures and residual effects in respect to shipping and navigation. The impacts assessed include:

- vessel displacement;
- increased vessel to vessel collision risk between a third-party vessel and a project vessel;
- increased vessel to vessel collision risk between third-party vessels;
- vessel to structure allision risk;
- reduced access to local ports;
- reduction of under keel clearance;
- interaction with subsea cables;
- reduction of emergency response capability; and
- interference with magnetic position fixing equipment.

628. Overall, it is concluded that there will be no significant effects arising from the Proposed Development in isolation during the construction, operation and maintenance or decommissioning phases.

629. Table 13.21 presents a summary of the potential cumulative effects, mitigation measures and residual effects. The cumulative impacts assessed are as per the assessment of the Proposed Development in isolation. Overall, it is concluded that there will be no significant cumulative effects from the Proposed Development alongside other projects/plans.

630. The following potential transboundary impact has been identified in regard to effects of the Proposed Development and is considered to be of **tolerable** significance, which is not significant in EIA terms:

- vessel displacement for commercial routeing between international ports.

**Table 13.20: Summary of Potential Environmental Effects, Mitigation and Monitoring**

| Description of Impact | Phase | | | Severity of Consequence | Frequency of Occurrence | Significance of Effect | Additional Measures | Residual Effect | Proposed Monitoring |
|---|---|---|---|---|---|---|---|---|---|
| | C | O | D | | | | | | |
| Vessel displacement | ✓ | ✓ | ✓ | Minor | Frequent | Tolerable | None | Tolerable | None |
| Increased vessel to vessel collision risk between a third-party vessel and a project vessel | ✓ | ✓ | ✓ | Moderate | Extremely unlikely (negligible for operation and maintenance phase) | Broadly acceptable | None | Broadly acceptable | None |
| Increased vessel to vessel collision risk between third-party vessels | ✓ | ✓ | ✓ | Moderate | Extremely unlikely | Broadly acceptable | None | Broadly acceptable | None |
| Vessel to structure allision risk | ✓ | ✓ | ✓ | Moderate | Remote (extremely unlikely for construction/decommissioning phase) | Tolerable (broadly acceptable for construction/decommissioning phases) | None | Tolerable (broadly acceptable for construction/ decommissioning phases) | None |
| Reduced access to local ports | ✓ | ✓ | ✓ | Minor | Frequent (reasonably probable for operation and maintenance phase) | Tolerable | None | Tolerable | None |
| Reduction of under keel clearance | × | ✓ | × | Moderate | Extremely unlikely | Broadly acceptable | None | Broadly acceptable | None |
| Interaction with subsea cables | × | ✓ | × | Minor | Negligible | Broadly acceptable | None | Broadly acceptable | None |
| Reduction of emergency response capability | × | ✓ | × | Moderate | Remote | Tolerable | None | Tolerable | None |
| Interference with magnetic position fixing equipment | × | ✓ | × | Minor | Negligible | Broadly acceptable | None | Broadly acceptable | None |

**Table 13.21: Summary of Potential Cumulative Environment Effects, Mitigation and Monitoring**

| Description of Impact | Phase | | | Cumulative Effects Assessment Tier | Severity of Consequence | Frequency of Occurrence | Significance of Effect | Additional Measures | Residual Effect | Proposed Monitoring |
|---|---|---|---|---|---|---|---|---|---|---|
| | C | O | D | | | | | | | |
| Vessel displacement | ✓ | ✓ | ✓ | Tier 2 | Minor | Frequent | Tolerable | None | Tolerable | None |
| | | | | Tier 3 | Minor | Frequent | Tolerable | None | Tolerable | None |
| Increased vessel to vessel collision risk between a third-party vessel and a project vessel | ✓ | ✓ | ✓ | Tier 2 | Moderate | Extremely unlikely (negligible for the operation and maintenance phase) | Broadly acceptable | None | Broadly acceptable | None |
| | | | | Tier 3 | Moderate | Extremely unlikely (negligible for the operation and maintenance phase) | Broadly acceptable | None | Broadly acceptable | None |
| Increased vessel to vessel collision risk between third-party vessels | ✓ | ✓ | ✓ | Tier 2 | Moderate | Remote | Tolerable | None | Tolerable | None |
| | | | | Tier 3 | Moderate | Remote | Tolerable | None | Tolerable | None |
| Vessel to structure allision risk | ✓ | ✓ | ✓ | Tier 2 | Moderate | Remote | Tolerable | None | Tolerable | None |
| | | | | Tier 3 | Moderate | Remote | Tolerable | None | Tolerable | None |
| Reduced access to local ports | ✓ | ✓ | ✓ | Tier 2 | Minor | Frequent | Tolerable | None | Tolerable | None |
| | | | | Tier 3 | Minor | Frequent | Tolerable | None | Tolerable | None |
| Reduction of under keel clearance | × | ✓ | × | Tier 2 | Moderate | Extremely unlikely | Broadly acceptable | None | Broadly acceptable | None |
| | | | | Tier 3 | Moderate | Extremely unlikely | Broadly acceptable | None | Broadly acceptable | None |
| Interaction with subsea cables | × | ✓ | × | Tier 2 | Minor | Negligible | Broadly acceptable | None | Broadly acceptable | None |
| | | | | Tier 3 | Minor | Negligible | Broadly acceptable | None | Broadly acceptable | None |
| Reduction of emergency response capability | × | ✓ | × | Tier 2 | Moderate | Remote | Tolerable | None | Tolerable | None |
| | | | | Tier 3 | Moderate | Remote | Tolerable | None | Tolerable | None |
| Interference with magnetic position fixing equipment | × | ✓ | × | Tier 2 | Minor | Negligible | Broadly acceptable | None | Broadly acceptable | None |
| | | | | Tier 3 | Minor | Negligible | Broadly acceptable | None | Broadly acceptable | None |

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