Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Navigation Safety Technical Note

Revision A
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Sheringham and Dudgeon Extensions
Examination Submission
Navigational Safety Technical Note

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Presented to	Equinor New Energy Limited
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Abbreviations Table

Abbreviation	Definition
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
CNP	Critical National Priority
CO2	Carbon Dioxide
COLREGs	International Regulations for Preventing Collision at Sea
DCO	Development Consent Order
DEP	Dudgeon Extension Project
EIA	Environmental Impact Assessment
ES	Environmental Statement
ExA	Examining Authority
FSA	Formal Safety Assessment
GW	Gigawatt
IMO	International Maritime Organization
ISH	Issue Specific Hearing
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MGN	Marine Guidance Note
nm	Nautical Mile
nm^2	Square Nautical Mile
NMP	Navigation Management Plan
NPS	National Policy Statement
NRA	Navigational Risk Assessment
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
RNLI	Royal National Lifeboat Institution
SEP	Sheringham Extension Project
SOCG	Statement of Common Ground
SOLAS	International Convention for the Safety of Life at Sea

Abbreviation	Definition
SoS	Secretary of State
UNCLOS	United Nations Convention of the Law of the Sea 1982
UK	United Kingdom

1 Issue Specific Hearing 31st March 2023 and Examining Authority's Second Written Questions on Navigational Safety Matters

1. This submission into Deadline 3 of the Sheringham Shoal Extension Project (SEP) and Dudgeon Extension Project (DEP) examination summarises the Applicant's position on ongoing unresolved points on the Statement of Common Ground (SOCG) with the Maritime and Coastguard Agency (MCA) highlighted during the Issue Specific Hearing (ISH) 6 and forms the technical response to Question Q2.19.1.2 within the Examiners second written questions:

Examining Authority's (ExA's) Written Question "Q2.19.1.2 Background Data

2. ***MCA and Applicant, provide the background evidence to support your position relating to the matters discussed at ISH6 [EV-085] & [EV-089], particularly matters where there are issues of disagreement, such as navigational buffers and the potential collision risk, statistical calculations of vessels traversing through this sea area if the proposed wind farm sites are where currently proposed? Provide supporting illustrations, diagrams and plans".***

1.1 Objectives of the Submission

3. The overall objective of this submission is to address the shipping and navigation issues raised, and the ExA's questions relating to, shipping and navigation, in the course of the Examination to date. During the ISH6 on the 31st March 2023 the Applicant detailed the extensive work undertaken to date as part of the Navigation Risk Assessment (NRA) [APP-198] for the SEP and DEP. The Applicant noted that the sea area is complex and focussing on a single corridor calculation, which does not in isolation answer the question as to whether the development in situ is As Low is As Reasonably Practicable (ALARP), is an oversimplification of the NRA process.

4. On this basis, the key objectives of this submission are as follows, and are intended to guide the ExA's through some of the key elements of the NRA [APP-198] process and the technical detail related to collision risk modelling:

- **National Policy Statement (NPS)** – Establish the policy basis for the recommendation and decision making by the ExA and Secretary of State (SoS) respectively on the application in relation to shipping and navigation (see Section 1.3);
- **NRA Summary -** Summarise NRA findings in relation to navigational safety in particular collision risk (see Section 2);
- **Consultation Summary** - Summarise the engagement since 2018 and to date with the MCA (see Section 3);
- **Corridor Calculation** – Position on the application of the corridor calculation between SEP and DEP (see Section 4);
- **Baseline Traffic Numbers** Summarise commercial vessel movement numbers in the area (see Section 5);

- **Passing Distances** Provide the context around commercial vessel passing distances from existing wind farms in the area (see Section 6);
- **Collision Risk** Provide results of additional collision modelling for commercial undertaken post ISH6 (see Section 7); and
- **Existing Precedent** Summarise existing precedent in the region for large volumes of traffic within limited sea room (see Section 8).

5. This submission includes assessment undertaken by Anatec with additional support from the Applicant and their legal counsel.

1.2 Key Terms

6. For the purpose of this technical note the definition of "navigational buffer" (as referred to in the examiners written questions) refers to the distance which a vessel will likely pass an offshore wind turbine generator. It is noted that this distance is not mandatory but is for the vessel to decide depending on (but not limited to) its passage plan, vessel type, and the sea conditions.

7. Collision risk refers to two (or more) vessels (moving objects) being involved in a collision event; this is different to the calculation of allision risk which refers to a vessel alliding or striking a fixed object such a wind turbine generator.

8. The International Maritime Organization (IMO) International Regulations for Preventing Collisions at Sea (COLREGS) (IMO, 1972) is a set of rules which regulates how mariners should navigate when at sea. This includes (but is not limited to) rules on maintaining an appropriate lookout, safe speed, and collision avoidance. Compliance with these rules is mandatory for all vessels, and correct implementation mitigates against various potential hazards including collision risk.

9. A vessel encounter is an instance of two or more vessels passing in close proximity, noting vessel encounters are safely managed by the correct implementation of the COLREGS (IMO, 1972) as detailed above.

10. The "study area" in this technical note refers to a 10 nautical mile (nm) buffer of the SEP and DEP wind farm sites as shown in Figure 1.1. This is the same study area used for the primary analysis in the NRA, noting that a 10nm buffer is standard in similar shipping and navigation assessments.

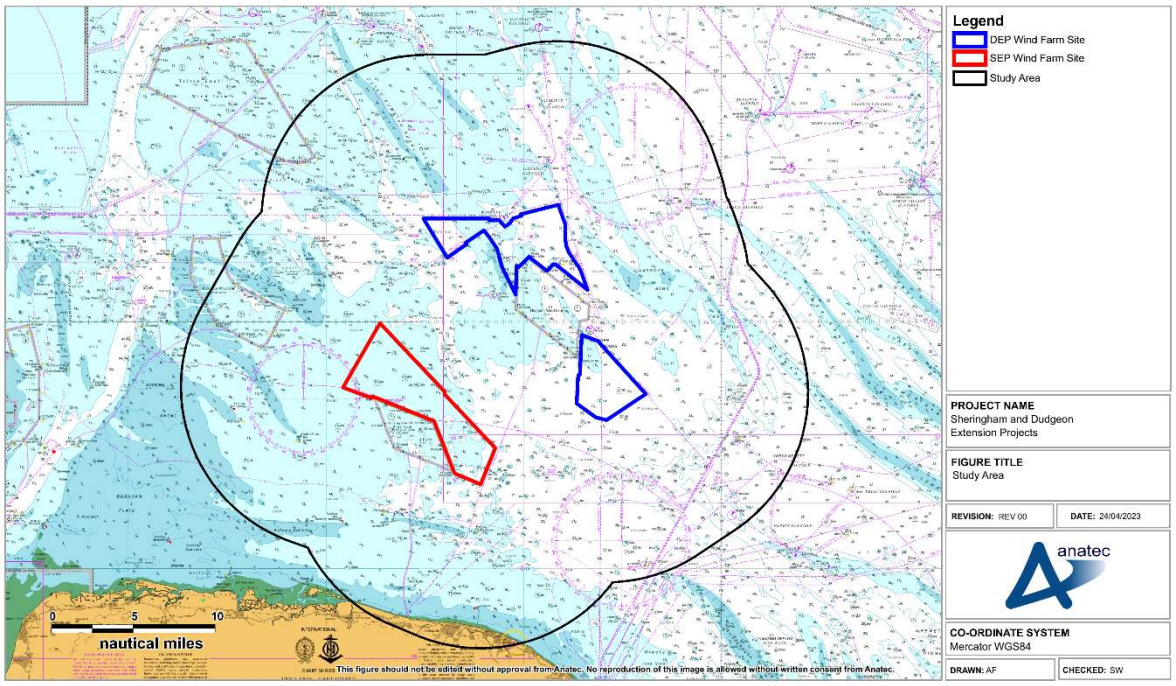

Figure 1.1: Study Area

1.3 National Policy Statement Policy Context

11. Section 104 of the Planning Act 2008 requires that, subject to given exceptions, the SoS *"must decide the application in accordance with any relevant NPS"*. With regard to shipping and navigation the relevant NPS policy is as set out within the designated NPS for Renewable Energy Infrastructure (EN-3) section (2.6) on "Offshore Wind".

12. For routes which are not *"recognised sea lanes essential to international navigation"* NPS EN-3 sets out the policy tests for decision making on applications that affect shipping and navigational safety in paragraphs 2.6.162 and 2.6.163, which cover *"strategic"* and *"less strategically important shipping routes"* respectively. Policy on decision making with regard to navigational safety is set out in paragraph 2.6.165.

13. The sea area between the existing Sheringham Shoal and Dudgeon Offshore Windfarms is transited by several vessel routes connecting East Coast United Kingdom (UK) ports such as Humber and Tees with Rotterdam (Netherlands) and Zeebrugge (Belgium) (NRA) [APP-198]. These routes are operating between navigational features within the study area including the Triton Knoll and Outer Dowsing Sand Banks, existing offshore windfarms and navigational buoyage. The area does not include *"recognised sea lanes essential to international navigation*" as recognised by article 60(7) of the United Nations Convention on the Law of the Sea 1982 (UNCLOS) i.e., IMO adopted routeing measures such as deep water routes or traffic separation schemes, it also does not include any lifeline ferry routes. It does include routes that could be considered "strategic" or "less strategic" noting that SEP

and DEP (with the Navigation Management Plan (NMP)[1] agreed and secured through the Draft Development Consent Order (DCO) [REP2-008]) do not cause longer transit times (NPS EN-3 2.6.162) and the Applicant has minimised impacts to ALARP (NPS EN-3 2.6.163).

1.3.1 Strategic Routes Essential to Navigation

14. NPS EN-3 policy in paragraph 2.6.162 covering *"strategic routes essential to navigation"* is that:

> *"2.6.162 The [SoS] should be satisfied that the site selection has been made with a view to avoiding or minimising disruption or economic loss to the shipping and navigation industries with particular regard to approaches to ports and to strategic routes essential to regional, national and international trade, lifeline ferries and recreational users of the sea. Where a proposed development is likely to affect major commercial navigation routes, for instance by causing appreciably longer transit times, the [SoS] should give these adverse effects substantial weight in its decision making. There may, however, be some situations where reorganisation of traffic activity might be both possible and desirable when considered against the benefits of the wind farm proposal. Such circumstances should be discussed with the MCA and the commercial shipping sector and it should be recognised that alterations might require national endorsement and international agreement and that the negotiations involved may take considerable time and do not have a guaranteed outcome.*

15. The elements of policy protection of strategic routes essential to navigation in the above paragraph are addressed as follows:

- **Site selection to minimise disruption/economic loss:** the sites have been selected to avoid interference with existing shipping routes and evidence presented is that there is no significant deviation and therefore economic loss to shipping arising from the site selection or layout, as stated by the Chamber of Shipping at ISH6 [EV-085 - 00:43:11:26]:

  > *"There will be some minor deviation caused by the development of the wind farm that was raised within by members of the Chamber of Shipping and by the Chamber of Shipping during the consultation process. The extent of that deviation is not necessarily extensive or large from a commercial perspective";*

- ***Transit times:*** transit times will not be "appreciably longer" as referred to in the NPS policy due the site selection respecting the existing shipping routes without significant incursions into it (see Table 18.1 of the NRA [APP-198]); and

[1] The NMP was developed and agreed to mitigate concerns from commercial operators associated with project vessels crossing (and causing delays) between SEP and DEP , with this mitigation in place no outstanding concerns remained.

- ***Reorganisation of traffic activity:*** is not required as a result of the development.

16. The site selection and application as a whole and its minimal effects on strategic routes essential to navigation are therefore fully in accordance with paragraph 2.6.162 of NPS EN-3.

1.3.2 Less Strategically Important Shipping Routes

17. NPS EN-3 paragraph 2.6.163 covering *"less strategically important shipping routes"* is that:

> *"2.6.163 Where a proposed offshore wind farm is likely to affect less strategically important shipping routes, a pragmatic approach should be employed by the [SoS]. For example, vessels usually tend to transit point to point routes between ports (regional, national and international). Many of these routes are important to the shipping and ports industry as is their contribution to the UK economy. In such circumstances the [SoS] should expect the applicant to minimise negative impacts to ALARP. Again, there may be some situations where reorganisation of traffic activity might be both possible and desirable when considered against the benefits of the wind farm application and such circumstances should be discussed with the MCA and the commercial shipping sector".*

18. The elements of policy protection of less strategically important shipping routes in the above paragraph are addressed as follows:

- **Minimisation of negative impacts:** as evidenced by the site selection the majority of SEP and DEP avoids any incursion into the shipping routes with some minor incursion (not significant) at DEP-North, in the pre-application consultation process and in the draft SOCG with the MCA (Revision B) [document reference 12.12] negative impacts on shipping have been minimised throughout the design and development of the scheme with the result that the Environmental Statement (ES) concludes that *"All impacts from both SEP or DEP in isolation, from SEP and DEP, and on a cumulative basis are assessed as being at most tolerable with additional mitigation and ALARP, which is not significant in Environmental Impact Assessment (EIA) terms"* [APP-099]; and
- **Reorganisation of traffic activity:** is not required as a result of the development.

19. The application and its minimal and tolerable effects on the less strategically important shipping routes are therefore fully in accordance with paragraph 2.6.163 of NPS EN-3.

1.3.3 Navigational Safety

20. NPS EN-3 paragraph 2.6.165 on navigational safety is that:

"2.6.165 The [SoS] should not consent applications which pose unacceptable risks to navigational safety after all possible mitigation measures have been considered".

21. This is informed and qualified by the following paragraphs:

"2.6.167 Providing proposed schemes have been carefully designed by the applicants, and that the necessary consultation with the MCA and the other navigation stakeholders listed above has been undertaken at an early stage, mitigation measures may be possible to negate or reduce effects on navigation to a level sufficient to enable the [SoS] to grant consent. The MCA will use the NRA as described in paragraph 2.6.156 above when advising the [SoS] on any mitigation measures proposed.

2.6.168 The [SoS] should, in determining whether to grant consent for the construction or extension of an offshore wind farm, and what requirements to include in such a consent, have regard to the extent and nature of any obstruction of or danger to navigation which (without amounting to interference with the use of such sea lanes) is likely to be caused by the development.

2.6.169 In considering what interference, obstruction or danger to navigation and shipping is likely and its extent and nature, the [SoS] should have regard to the likely overall effect of the development in question and to any cumulative effects of other relevant proposed, consented and operational offshore wind farms".

22. The elements of policy protection of navigational safety in the above are addressed as follows:

- ***Navigational safety in general:*** it is common ground between the Applicant, the MCA (draft SOCG with the MCA (Revision B) [document reference 12.12], the Chamber of Shipping [REP2-047] and Trinity House [REP1-049] that the NRA [APP-198] has been carried out with their full involvement throughout its preparation prior to its submission as part of the DCO application. It is also common ground with the Chamber of Shipping [REP2-047] and Trinity House [REP1-049] that that the resulting conclusion is that, with regard to any navigational safety risk in relation to the proposed development, with mitigation in place, this will be ALARP;
- ***Reliance upon mitigation in granting consent:*** as set out in NPS policy above, the MCA will use the NRA to determine its advice on the application, therefore it can be concluded that since the results of the NRA are that navigational safety risk is ALARP, in line with NPS policy, the application with mitigation measures in place consent can safely be granted under paragraph 2.6.167 inter alia; and
- ***Extent of mitigation:*** as established in the NRA [APP-198], the ES [APP-099] and in the remainder of this document, the extent and nature of obstruction, including in cumulative terms, has been reduced to be *not significant* in EIA terms as a result of

the siting of the proposed extensions, therefore in accordance with paragraph 2.6.168 and 2.6.169 any mitigation can be expected to minimal and in proportion with this finding.

23. Since the conclusion of the NRA is that the navigational risk posed by the application is ALARP, of the ES is that the effects on shipping are not significant in EIA terms and since any obstruction that would arise as a result of the development is minimal in nature, the application is fully in accordance with NPS policy on navigational risk as set out above.

1.3.4 Consultation Draft National Policy Statements

24. In September 2021 the Government issued revised draft NPSs for consultation, and in March 2023 new draft NPSs were published for a further consultation.

25. Following careful consideration of the March 2023 consultation draft NPS for Renewable Energy Infrastructure EN-3 and draft policy tests it contains for offshore windfarms in relation to navigation and shipping, no substantive proposed policy changes to those applying by virtue of the designated NPS EN-3 set out above, can be identified. The conclusion of ALARP in the NRA would therefore remain sufficient, under the draft NPS EN-3 for the project to be fully in accordance with NPS policy on navigation and shipping.

26. In relation to need for the project and the planning balance, the March 2023 consultation draft Overarching Energy NPS EN-1, would maintain government policy that the need for Nationally Significant Infrastructure Projects, such as SEP and DEP are, urgent, in the following terms:

> *"3.2.5 The [SoS] should assess all applications for development consent for the types of infrastructure covered by this NPS on the basis that the government has demonstrated that there is a need for those types of infrastructure which is urgent, as described for each of them in this Part.*
>
> *3.2.6 In addition, the [SoS] has determined that substantial weight should be given to this need when considering applications for development consent under the Planning Act 2008.*
>
> *3.2.7 The Secretary of State is not required to consider separately the specific contribution of any individual project to satisfying the need established in this NPS".*

27. Furthermore, the March 2023 consultation draft NPS EN-1, aims to develop the level of need in the case of offshore wind generation projects in particular, such as SEP and DEP, placing them in the new and additional category of "Critical National Priority" (CNP) projects, as follows:

> *"3.3.59 Government has concluded that there is a critical national priority (CNP) for the provision of nationally significant new offshore wind infrastructure (and supporting onshore and offshore network infrastructure).*
>
> *3.3.60 As set out in EN-3, subject to any legal requirements, the urgent need for CNP Infrastructure to achieving our energy objectives, together with the national security, economic, commercial, and net zero benefits, will in general outweigh any other residual impacts not capable of being addressed by application of the mitigation hierarchy. Government strongly supports the delivery of CNP Infrastructure and it should be progressed as quickly as possible".*

28. It should be noted that with the draft NPSs now in their second iteration, with extensive consultation and Parliamentary scrutiny to follow, these draft policies could change. Whilst any consultation draft NPS may be considered an important and relevant matter, the Planning Act 2008 requirement is that decisions must be made in accordance with the designated NPSs in force at the time.

29. In summary, the NRA determines navigational risk to be ALARP and therefore fully in accordance with NPS policy. However, since safety remains of key importance to the Applicant and an important and relevant matter to the application, the remainder of this document sets out in full the navigational safety assessment carried out to fully address the ExA's question Q2.19.1.2 Background Data. The detailed safety assessment work that follows is such that the ExA can be satisfied that the application, with mitigation agreed (including the NMP) and based on the proposed Order Limits, also fully accords with all relevant navigational safety requirements.

2 NRA Summary

30. The NRA [APP-198] is a process, not just the document that a project submits as part of the DCO application. It is a sum of all of the consultation, baseline data gathering, modelling and assessment through the four to five years of the project's pre application phase including the Section 42 consultation.

31. As highlighted at ISH6 the Applicant (and its consultants) view the NRA [APP-198] and it's ALARP statement as the output of the work undertaken and whilst it is the Applicant (and its consultants) that authors the NRA [APP-198] it is the stakeholders at all levels and stages that feed directly into that process to ensure the NRA represents the opinion of all interested parties. It is not a decision taken solely on the knowledge of the Applicant and its consultant but a representation of the overarching process.

32. As required under Marine Guidance Note (MGN) 654 (MCA, 2021), the Applicant undertook a full NRA [APP-198] process for the SEP and DEP projects, including a completed MGN 654 checklist to demonstrate compliance. A draft NRA was included at Preliminary Environmental Information Report (PEIR) stage which included (but

was not limited to) the following key elements to ensure there was sufficient information to allow for meaningful feedback from shipping and navigation stakeholders:

- 14 days vessel traffic survey data and additional analysis of 12 months Automatic Identification System (AIS) data (the 12 months of AIS data is not an MCA requirement but was included to ensure stakeholders could consider longer term data and for the NRA to fully capture vessel movements including at PEIR stage);
- Regular Operators consultation (i.e., consultation with vessel operators who use the area);
- Commercial vessel modelling (allision and collision);
- Encounters analysis (assessment of baseline vessel encounter rates);
- Corridor calculations and discussion of loss of searoom; and
- Draft Formal Safety Assessment[2] (FSA) (the means by which significance of risk created by the hazards assessed in the NRA process is determined).

33. Post PEIR, a hazard workshop was undertaken which the MCA participated in, and an additional 14 day vessel traffic survey was undertaken to bring the total up to 28 days as required under MGN 654.

34. Feedback received from the PEIR process (including from the MCA) was incorporated into the final NRA [APP-198] submitted with the Application received by the Planning Inspectorate on the 5th September 2022. In advance of this, a draft copy of the NRA was provided to the MCA via email on the 27th July 2022. It is noted there was no formal requirement for the Applicant to provide the NRA in advance of final DCO application submission, however it was agreed at a meeting between the MCA and the Applicant (29th March 2022, see Table 3.1) that it would be provided prior to submission.

35. The collision modelling aspects of the NRA remained unchanged throughout the iterations detailed above (including the draft NRA submitted at PEIR). The MCA did not indicate any specific concern on DEP-North or any other particular aspect of SEP and DEP at any point of the NRA process prior to formal submission. The Applicant therefore understood there to be no material concerns remaining (as was stated by the Applicant at ISH1) until those points raised in February 2023, post commencement of examination.

36. Based on the inputs assessed over the NRA process including consultation, modelling, baseline assessment and the hazard workshop, the final NRA found all hazards to be within ALARP parameters under the FSA.

[2] The International Maritime Organization (IMO) FSA (IMO, 2018), the standard and internationally recognised approach for marine risk assessment.

3 Consultation Summary

37. Consultation is considered a key component of the NRA [APP-198], and the Applicant has therefore ensured that key stakeholders have been included in the process. The MCA are one of the primary stakeholders from a shipping and navigation perspective, and therefore the Applicant initiated consultation with the MCA early in the process (pre scoping) and have continued to engage throughout the subsequent NRA process. A summary of the key consultation aspects undertaken with the MCA is provided in Table 3.1.

Table 3.1: Summary of Consultation with the MCA

Project Stage	Date	Consultation Aspect
Pre Scoping	25/09/2018	Meeting with MCA (and Trinity House).
Scoping	01/11/2019	MCA scoping response.
Pre PEIR	15/06/2020	Meeting with MCA (and Trinity House).
PEIR	10/06/2021	MCA response to PEIR.
Hazard Workshop	10/08/2021	MCA in attendance at Hazard Workshop.
	09/11/2021	Draft minutes and hazard log distributed.
	24/09/2021	Reminder sent to attendees for comments.
	19/11/2021	Final versions of minutes and hazard log distributed.
Pre Application	29/03/2022	Meeting with MCA (and Trinity House).
	29/06/2022	Meeting with MCA
	27/07/2022	Final Version of NRA provided to MCA.
Pre Examination	03/10/2022	NRA Published on Planning Inspectorate Website
Examination	10/01/2023	SOCG Meeting
Examination	14/02/2023	SOCG Meeting
Examination	09/02/2023	MCA Written Representation
Examination	09/02/2023	MCA Response to Written Questions
Examination	24/03/2023	Online Meeting
Examination	26/04/2023	Online Meeting

38. The Applicant highlights that Table 3.1 only shows consultation undertaken with the MCA. The NRA process included consultation with various other relevant shipping and navigation stakeholders including Trinity House, the Chamber of Shipping, the Royal Yachting Association, the Cruising Association, and also vessel operators utilising the area. These consultation aspects all fed into the NRA process and informed the final ALARP statement.

4 Corridor Calculation

39. During ISH6 there was discussion between the MCA, Applicant and the Examining Authority in relation to the corridor between SEP and DEP (as shown in green in Figure 4.1).

Following ISH6 the draft SOCG with the MCA (Revision B) [document reference 12.12] states that the Applicant and the MCA agree that the sea area between SEP and DEP (where bounded by turbines) is acceptable and compliant with MGN 654. As such, Sections 5-7 of this report now focus on concerns raised by the MCA relating to DEP-North, specifically the western edge.

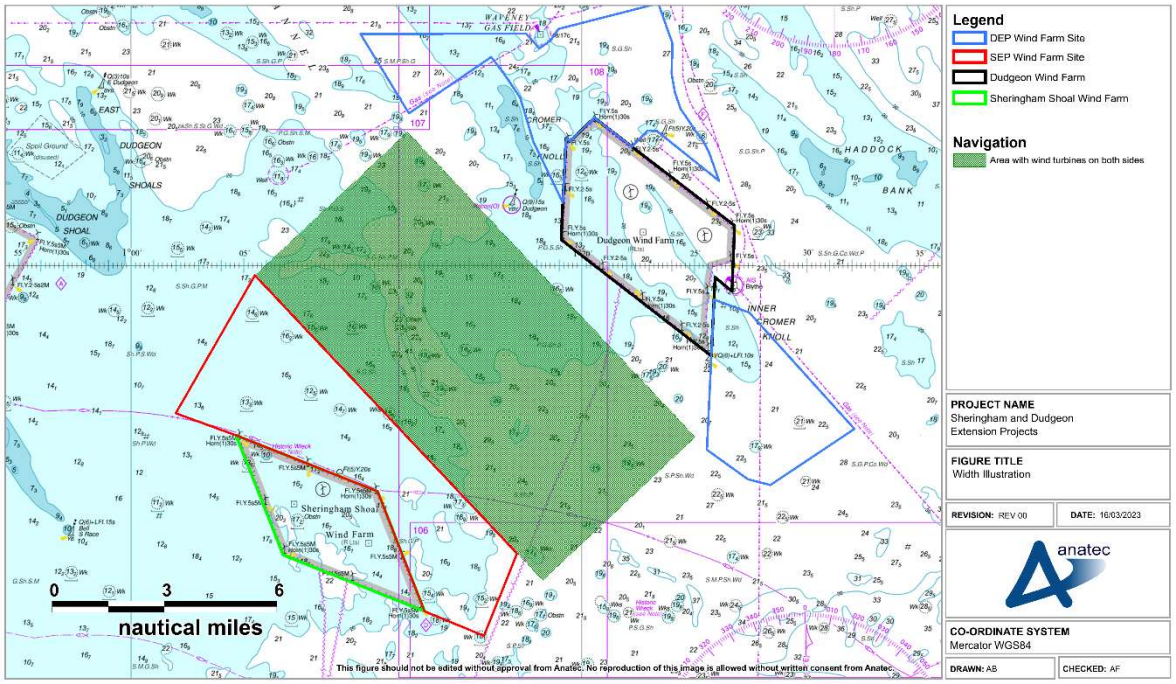

Figure 4.1: Corridor Between SEP and DEP

5 Baseline Vessel Traffic

5.1 Vessel Numbers

40. Vessel numbers (counts) in key areas of the study area have been derived from the 28 days of MGN 654 compliant vessel traffic survey data. This is the most recently available data considered in the NRA [APP-198], noting that there was found to be broad correlation between the vessel traffic survey data and the 12 months of long term AIS data.

41. The results are presented in Figure 5.1, which shows average total number of vessels per day (the numbers shown are inclusive of transits in both directions).

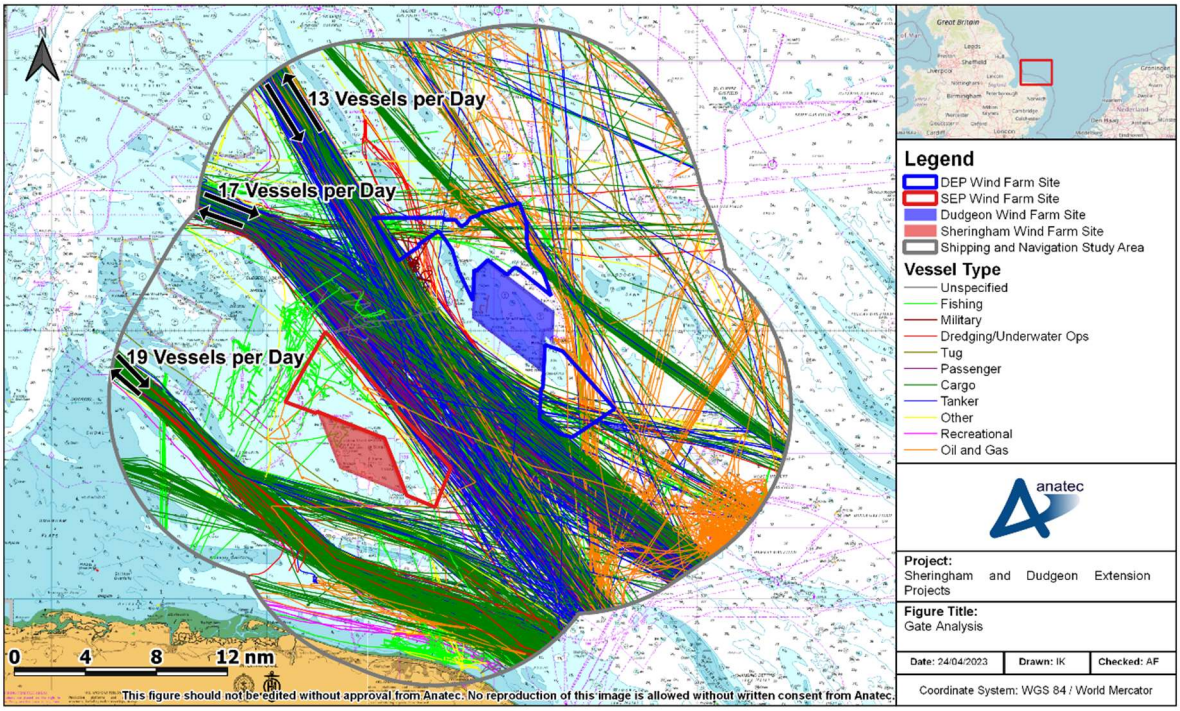

Figure 5.1: Approximate Vessel Numbers in Key Areas (based on 28 days vessel traffic survey data)

42. As shown, vessels operate on well defined pre-existing routeing, with key areas defined as follows:

- 13 vessels per day passing north of Triton Knoll offshore wind farm (OWF) (for the purposes of this technical note referred to as the "Outer Dowsing Channel");
- 17 vessels per day passing south of Triton Knoll OWF (for the purposes of this technical note referred to as the "Triton Knoll Channel"); and
- 19 vessels per day passing between the Race Bank and Docking Shoal in the southern extent of the study area (for the purposes of this technical note referred to as the "Race Bank Channel") (further detail on this traffic is provided in Section 8).

43. The majority of traffic through the "Triton Knoll Channel" joins the "Outer Dowsing Channel" traffic at a point south of the northwest extent of DEP-North. The area is busy in terms of vessel traffic, and vessel encounters do occur (the NRA [APP-198] identified an average of 63 per day in the entire study area). However, the Marine Accident and Investigation Branch (MAIB) incident data studied in the NRA indicated only one collision over the 20 year period studied (2000-2019), noting that based on the associated case data, this collision occurred during a personnel transfer between two vessels as opposed to an encounter between independently operating vessels. This is considered likely to be reflective of encounter situations being effectively

managed by implementation of COLREGS and the International Convention for the Safety of Life at Sea (SOLAS[3]) by prudent Mariners.

6 Passing Distances

44. There is no regulatory requirement for vessels to pass a set distance from wind turbine generators. Instead, vessels will account for the presence of structures in their passage planning and choose appropriate passing distances based on a number of factors including vessel size, weather conditions, and other relevant navigational features.

45. In their Deadline 2 Written Representation the MCA suggested that "*Commercial vessels will typically ensure a safety buffer of at least 1NM between their course and an offshore wind farm boundary and the traffic study shows this is 1.5NM*". During ISH6 it was noted that the 1.5nm referenced by the MCA was the minimum distance vessels were typically observed passing Triton Knoll OWF in the "Outer Dowsing Channel".

46. The Applicant in response noted that these passing distances are likely associated with vessels selecting waypoints in their passage planning associated with other features in the region, rather than a deliberate decision to pass 1.5nm from the wind turbine generators.

47. For vessels passing Triton Knoll OWF in the "Outer Dowsing Channel", the key feature is the Triton Knoll sand bank itself (i.e., the area of shallows directly south of the Triton Knoll OWF) which extends out in excess of 1nm beyond the southern extent of the Triton Knoll wind turbine generators. There is also a surface platform north of the Triton Knoll OWF associated with the Amethyst gas field which again is located further east than the northern edge of Triton Knoll OWF. The locations of these features are shown in Figure 6.1, which also shows the wind turbine generator positions on the northern periphery of the Triton Knoll OWF, and the line formed by joining the Amethyst platform to the southern extent of the Triton Knoll sand bank.

[3] SOLAS sets out minimum standards for the construction, equipment and operation of ships, compatible with their safety and importantly standard and requirements for vessel passage planning.

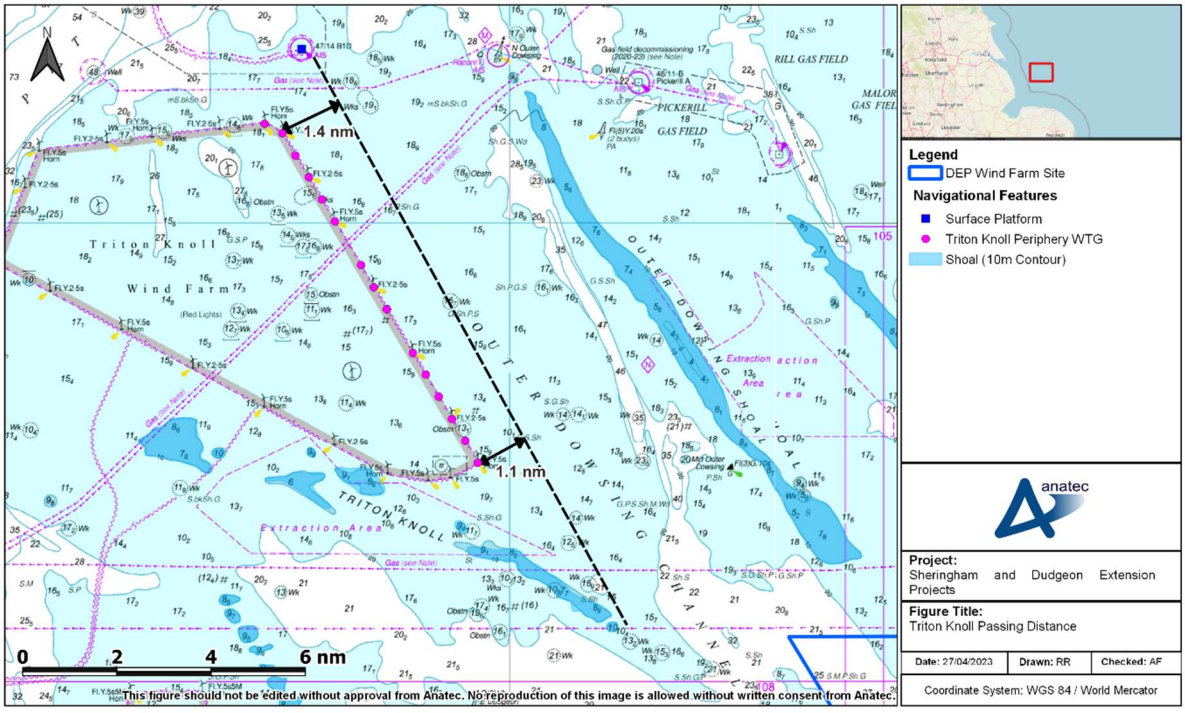

Figure 6.1: Triton Knoll OWF, Triton Knoll Bank, and Amethyst BID Platform

48. There is no regulatory requirement that vessels pass a certain distance from wind turbine generators, and evidence shows that mariners will define their own passing distances based on various factors. The NRA [APP-198] states the following:

"To date, internal and external studies undertaken by Anatec on behalf of the UK Government and individual clients show that vessels do pass consistently and safely within one nm of established OWFs (including between different wind farms) and these distances vary depending upon the sea room available as well as the prevailing conditions. This evidence also demonstrates that the Mariner defines their own safe passing distance based upon the conditions and nature of the traffic at the time, but they are shown to frequently pass one nm off established developments."

49. This statement aligns with the vessel traffic data in the area studied within the NRA in that vessels were recorded passing within 1nm of the existing projects, in particular Dudgeon OWF. The tracks identified within 1.5nm of the turbine periphery during the 12 months of AIS data studied for the NRA [APP-198] are shown in Figure 6.2 against 1nm and 1.5nm buffers of the turbine periphery for reference. To ensure the assessment focuses on passing distances any tracks intersecting the site boundary have been excluded.

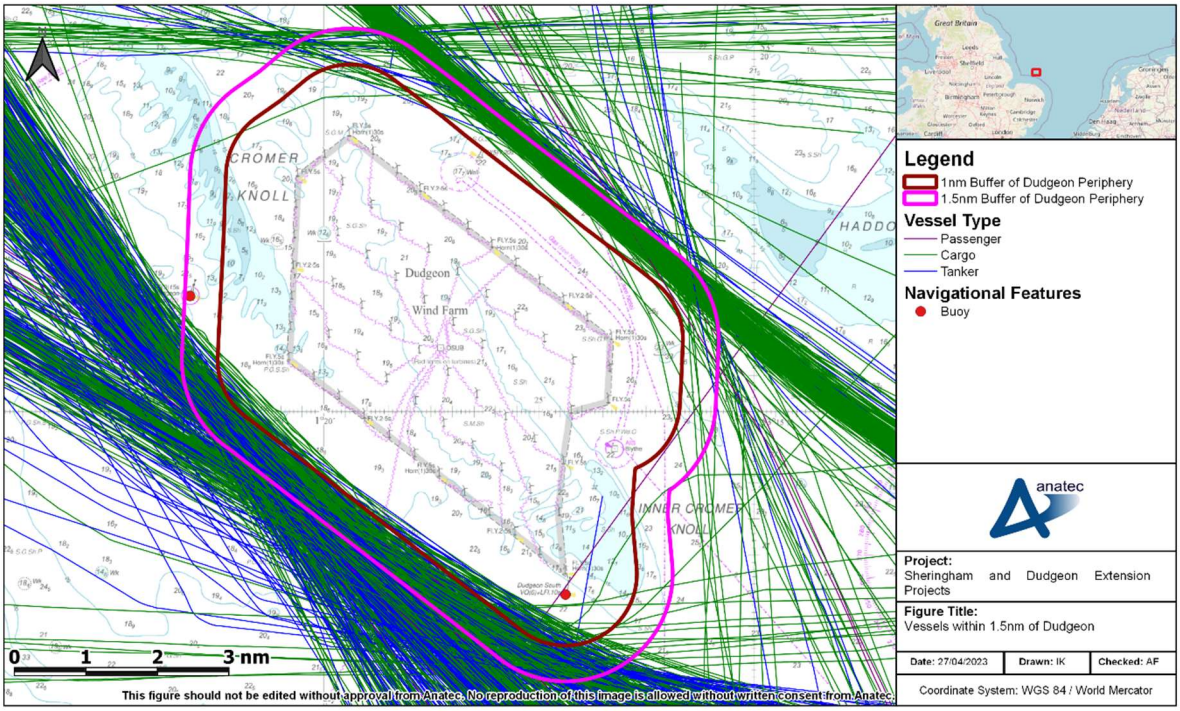

Figure 6.2: Vessels passing within 1.5nm of Dudgeon OWF (12-months vessel traffic)

50. An average of 2-3 commercial vessels per day were recorded within 1.5nm of the existing Dudgeon turbine periphery, with an average of approximately three per week passing within 1nm. It is noted that the presence of the Dudgeon and Dudgeon South cardinal buoys (shown in Figure 6.2) is likely to be influencing these passing distances.

51. Given the local features present (see Figure 6.1), and local evidence of vessels passing closer than 1nm to existing wind turbine generators in the area (see Figure 6.2), it is considered likely that the 1.5nm value referenced by the MCA is not resultant of a deliberate choice by vessels to avoid wind turbine generators by a set distance. It is instead reflective of prudent mariners accounting for other features in the surrounding sea area.

7 Collision Risk Modelling

52. In line with MCA requirements under MGN 654 including in particular Annex 1 (MCA Methodology for Assessing Marine Navigational Safety & Emergency Response Risks of Offshore Renewable Energy Installations), the NRA process for the SEP and DEP projects included allision and collision modelling to show predicted changes in risk. The modelling is considered a key part of any NRA process, and is undertaken using Anatec's COLLRISK software which conforms to the MCA Methodology referenced above and has been used for multiple successful wind farm applications for projects within UK waters.

53. The quantification undertaken via the modelling process then informs the qualification process which forms the key output of the NRA (i.e., to make the ALARP statement as per Section 1.3).

7.1 Traffic Merging For Triton Knoll Channel

54. This section focuses on collision risk associated with traffic passing DEP-North (north western edge). Prior to looking in detail at that route ('Outer Dowsing Channel') it is important to consider other traffic merging from the west. It is noted that the only main routes directly affected by the DEP-North (north western edge) are those through the 'Outer Dowsing Channel'. Traffic through the 'Triton Knoll Channel' does merge with the 'Outer Dowsing Channel' traffic however due to the location of the Triton Knoll Bank (shallows) the point where these two routes merge is south of the north west extent of DEP-North as shown in Figure 7.1. It is important to note that sea room does not change for the 'Triton Knoll Channel' traffic nor does it add to any increased traffic volume in the 'Outer Dowsing Channel' beyond DEP-North (north western extent).

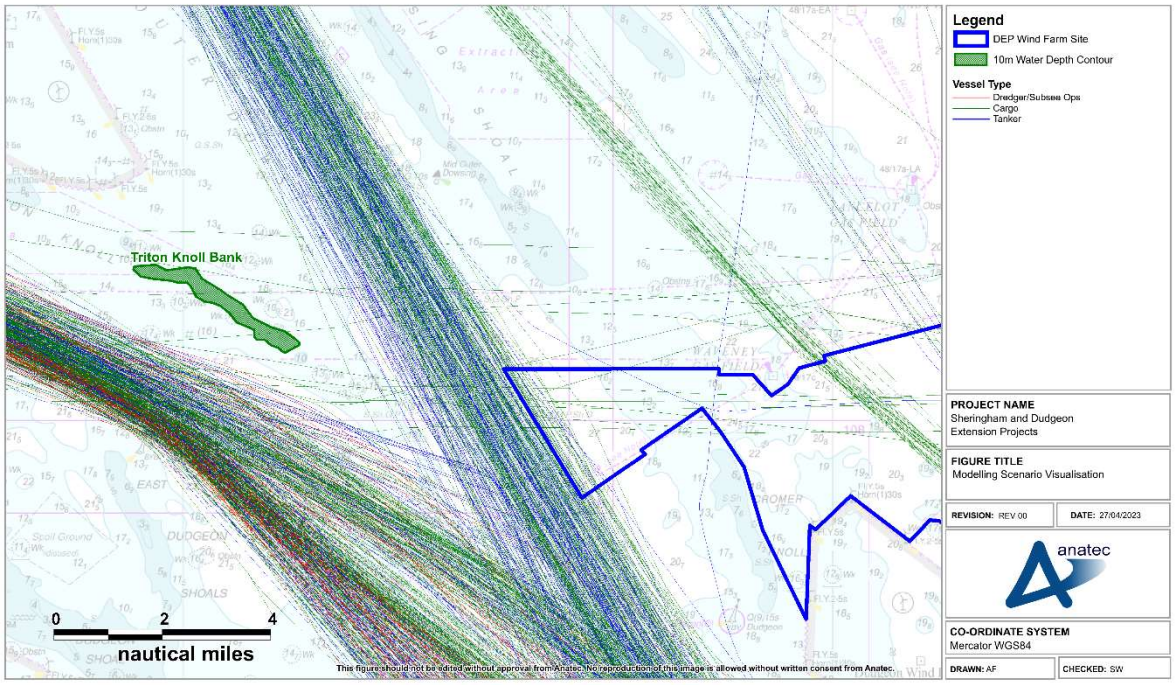

Figure 7.1: Traffic from the 'Outer Dowsing Channel' and the 'Triton Knoll Channel' shown to converge south of the North Western Extent of DEP-North

7.2 Collision Risk Summary within the NRA

55. The NRA included detailed third party vessel to third party vessel collision modelling to assess the change in collision risk arising from the SEP and DEP projects. The results of this modelling are presented in Table 7.1.

Table 7.1: NRA Collision Modelling Summary

Scenario	Without SEP&DEP	With SEP&DEP
Base case (0% traffic increase)	1 in 9.6 years	1 in 8.5 years
10% traffic increase	1 in 7.9 years	1 in 7 years
20% traffic increase	1 in 6.7 years	1 in 5.9 years

56. It is important to note that these collision risk values are inclusive of the entire 10nm study area (see Figure 1.1) around both the SEP and DEP wind farm sites (i.e., an area covering in excess of 1,000 square nautical miles (nm^2)), and include areas of pre-existing high collision risk (see Figure 8.2).

57. Further, the future case scenarios (rows 2 and 3 in Table 7.1) are inclusive of assumptions on traffic growth values, and as raised in ISH 6, the conservative assumptions on traffic growth are a larger contributor to the change in risk than the presence of the SEP and DEP projects (i.e., column 2 of Table 7.1 shows the collision frequencies assuming SEP and DEP are not present, and column 3 shows the collision frequencies assuming SEP and DEP are present **and** the effects of traffic growth assumptions). The traffic growth assumptions applied (in particular the 20%) are generally considered very conservative given they are applied to all vessel types. In reality, vessel numbers will fluctuate depending on a number of factors notably including market trends.

7.3 Additional Modelling

58. To demonstrate effects of the northwest extent of DEP-North on collision risk for traffic within the "Outer Dowsing Channel", Anatec has undertaken additional sensitivity modelling on behalf of the Applicant for the Examination. An additional scenario to those run in the NRA [APP-198] (see Section 7.2) has been undertaken to demonstrate how removing the north-western section of DEP-North would influence the collision risk.

59. For the purposes of the sensitive modelling scenario, it has been assumed that the full searoom currently available at the northwest extent of DEP-North will remain available post wind farm. This simulates a scenario where the northwest extent of DEP-North is not in situ, in order to demonstrate the difference that moving the DEP-North boundary could make to the overall navigational risk in the area. This is illustrated in Figure 7.2, which shows the following:

- A visualisation of the width of currently available sea room i.e., what has been modelled as a sensitivity scenario (shown as a blue arrow);

- A visualisation of the available searoom assumed for the purposes of the NRA modelling (shown as a purple arrow); and
- The tracks of commercial vessels recorded during the 28 days of vessel traffic survey data to illustrate how vessels currently navigate relative to the available searoom.

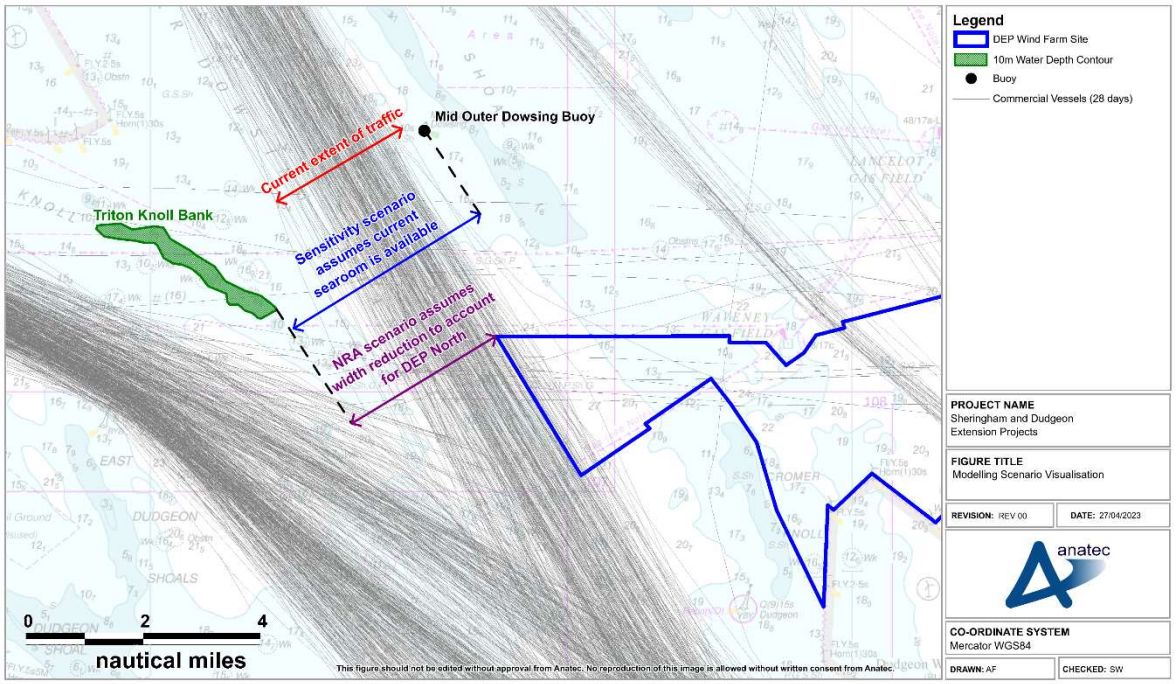

Figure 7.2: Sensitivity Scenario Illustration

60. The results of the additional sensitivity modelling are presented in Figure 7.3 and Table 7.2, including comparison against the pre wind farm and post wind farm modelling undertaken in the NRA [APP-198].

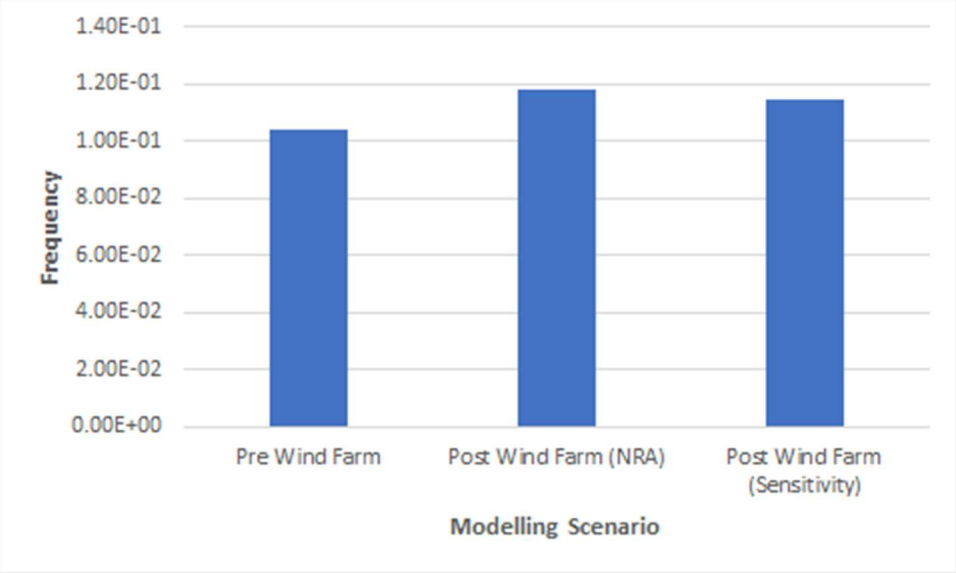

Figure 7.3: Additional Sensitivity Modelling - Comparison

Table 7.2: Additional Sensitivity Modelling Summary

Scenario	Frequency (Return Period)	% Change from NRA case
Post Wind Farm (NRA)	1 in 8.5 years	n/a
Post Wind Farm (Sensitivity)	1 in 8.7 years	-3%

61. The sensitivity analysis shows that removal of the northwestern extent of DEP-North results in a reduction of approximately 3% of the collision risk return period from the NRA scenario, which does not increase the expected number of collisions over the operational lifespan of SEP and DEP[4]. On this basis it is considered that removal of the northwestern extent of DEP-North has no material impact on changes in collision risk, and therefore, as found through the NRA process, the hazard is considered as being ALARP.

62. Given that the additional modelling demonstrates no material impact on collision risk, and further supports the conclusion in the NRA that the risk is ALARP, it is considered that a reduction of the northwest extent of DEP-North, and consequently the generation capacity of the project, would not be a justified or proportionate mitigation.

63. Paragraph 2.6.167 of NPS EN-3 requires that '*The MCA will use the NRA … when advising the [SoS] on any mitigation measures proposed'.* It also makes clear that effects on navigation can be negated such that consent can still be granted. Comments suggesting risk is somehow not ALARP, from whatever interested party,

[4] Assuming a 40-year operational lifespan, the same number of collisions is predicted based on the calculated return periods.

are contrary to the evidence presented within, and the conclusions of, the NRA. Therefore the Applicant reiterates that a reduction in the boundary of DEP-N cannot be justified since there is no evidence that doing so would have any material impact on the collision risk.

8 Existing Precedent

64. The general sea area within which the SEP and DEP projects are to be located is utilised by large volumes of traffic that navigate pre-existing hazards including shallows and banks, operational wind farms, and oil and gas infrastructure. The NRA [APP-198] considered a 10nm study area around the SEP and DEP windfarm sites (see Figure 1.1), and the traffic data and navigational features analyses showed that vessels already safely navigate channels where routes have restricted searoom. A notable example was identified as the routeing occurring between the Race Bank and Docking Shoal, located in the southern extent of the study area – the "Race Bank Channel".

65. Study of the data collected during the vessel traffic surveys indicates an average of 19 vessels per day pass between the two banks, with traffic width being approximately 1.0-1.2nm. Width between the banks varies between 1.6 and 2.3nm, and the channel formed is approximately 8nm in length. The northern extent of the channel is marked with buoyage, spaced 1.4nm apart.

66. These values are illustrated in Figure 8.1.

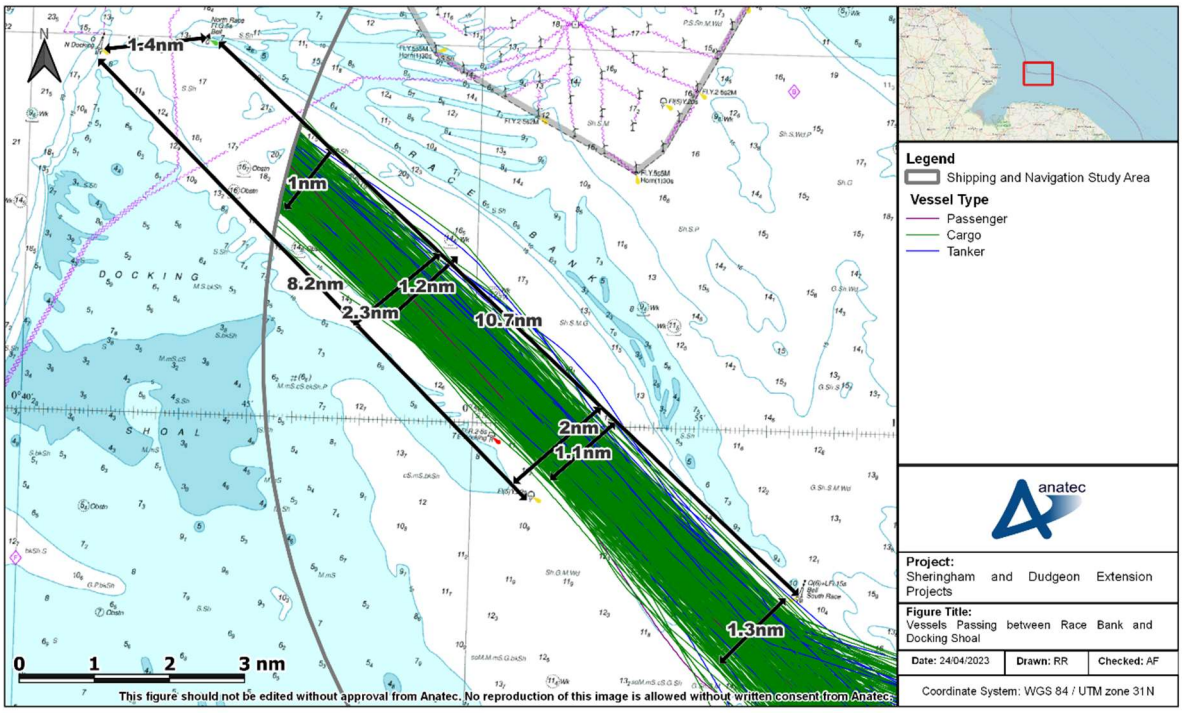

Figure 8.1: Race Bank and Docking Shoal (28 days vessel traffic)

67. The Applicant notes that:

- Based on the vessel traffic survey data, the "Race Bank Channel" is busier than the traffic associated with the routes passing the northwest extent of the DEP windfarm site through the "Outer Dowsing Channel" (19 vessels per day compared to 13 vessels per day);
- The vessels navigate through the "Race Bank Channel" in an area of searoom that is more restricted (i.e., narrower) than what will be available post wind farm at the northwest extent of the DEP windfarm site within the "Outer Dowsing Channel" (2.3nm vs 2.7nm);
- The length of the "Race Bank Channel" is longer than the restricted area that will be present at the DEP windfarm site (8nm vs 3nm); and
- There is no visible surface piercing hazard in the "Race Bank Channel" i.e., mariners rely on charted locations of the shallows and surface buoyage to safely navigate the area (for DEP-North, the wind turbine generators will be visible hazards).

68. These observations show that the "Race Bank Channel" is busier and more restricted than the "Outer Dowsing Channel" traffic passing the northern extent of the DEP windfarm site (assuming DEP is in situ). This is reflected in the collision modelling undertaken in the NRA [APP-198], which shows that the following spatial areas represent approximately equivalent proportions of the collision risk:

- The "Race Bank Channel"; and
- The area covered by the "Outer Dowsing Channel" extended to the DEP windfarm site northern extent.

69. This is illustrated in Figure 8.2 which shows these areas relative to a heat map of the post wind farm collision modelling results from the NRA. A total of 14%[5] of the collision risk is associated with the "Outer Dowsing Channel" traffic passing the northern extent of the DEP windfarm site, compared to 16%[6] of the risk from the "Race Bank Channel" traffic. It is also noted that, based on the modelling, the highest individual area of localised risk is within the "Race Bank Channel" (see red cells in Figure 8.2).

[5] Summing the collision frequencies in cells in the region shown over the Outer Dowsing Channel gives a value accounting for 14% of the total risk for study area.

[6] Summing the collision frequencies in cells in the region shown over the Race Bank Channel gives a value accounting for 16% of the total risk for study area.

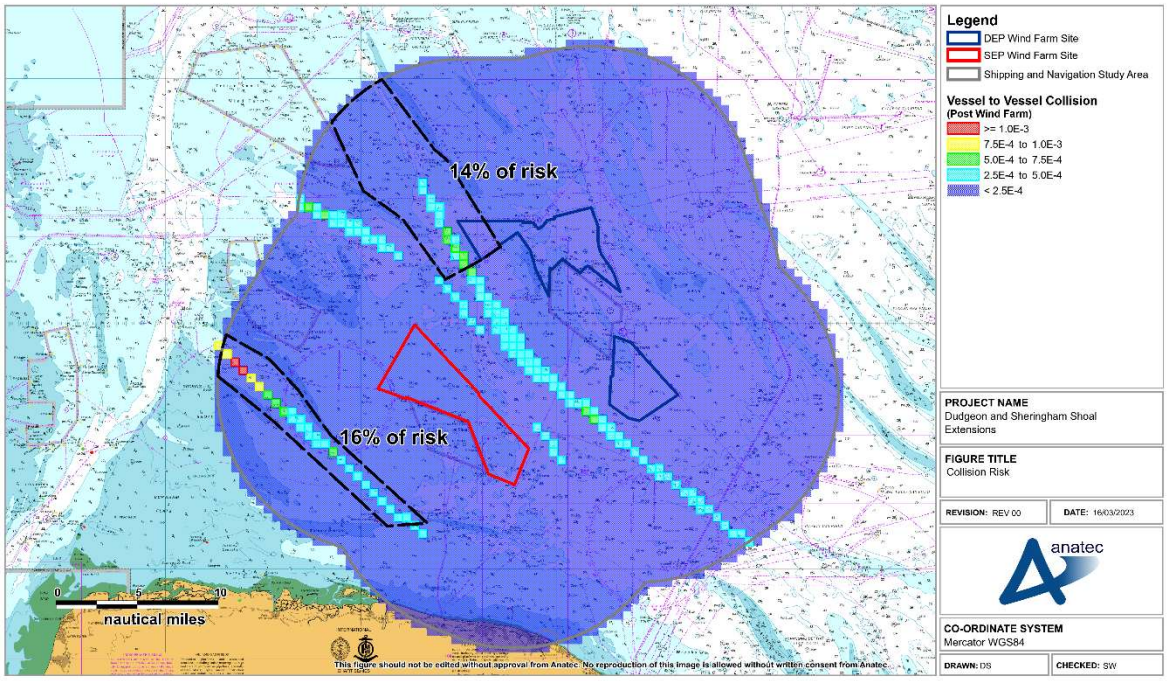

Figure 8.2: Collision Risk Heat Map

70. Maritime incident data studied for the NRA [APP-198] indicates there have been no collision or grounding incidents within the "Race Bank Channel" over the periods studied (20 years of MAIB data and ten years of Royal National Lifeboat Institution (RNLI) data). This indicates vessels are able to safely navigate through the area of restricted searoom, with the risks managed by the relevant aspects of COLREGS and SOLAS.

71. It is noted that the "Race Bank Channel" is just one example of an area of restricted searoom where vessels navigate that happens to be located within the study area. There are many other areas of restricted searoom within UK waters outside of the study area that are safely navigated, including areas in proximity to wind turbine generators (or other installations) and areas in proximity to shallows.

9 Summary

72. The key discussion points included in this technical note are summarised as follows:

- The Applicant has consulted with the MCA (and other stakeholders as demonstrated in the NRA [APP-198]) throughout the NRA process creating a robust assessment of navigation safety risk;
- The NRA found all hazards to be within ALARP parameters with mitigations in place and included a completed MGN 654 checklist to demonstrate MGN 654 compliance;
- The corridor between SEP and DEP is MGN 654 compliant based on the guidance and as noted in draft SOCG with the MCA (Revision B) [document reference 12.12];

- Amending the north west corner of DEP-North does not materially change collision frequency based on sensitivity modelling; and
- There is local evidence in the region of areas where pre-existing traffic is busier and more restricted than will be the case at DEP-North (western edge); incident and accident statistics show that these areas are routinely safely managed through COLREGS and SOLAS.

73. As per the ExA's second written questions when considering the policy requirement in National Policy Statement (NPS) EN-3 (Paragraph 2.6.161) the vessel routes passing between SEP and DEP and vessels routeing within the area and specifically the "Outer Dowsing Channel" do not constitute a recognised sea lane essential to international navigation in line with the policy requirement.

74. As noted in the NRA [APP-198] and this technical note, none of these routes are significantly impacted by the presence of SEP and DEP noting that safe sea room is maintained, and collision risk values are acceptable. This is supported by the consultation undertaken as part of the NRA process which demonstrates that general consensus was that Mariners do not have notable safety concerns about using the area in a future case environment (with SEP and DEP in situ).

75. In conclusion therefore, SEP and DEP:

- will help meet the urgent need for new and particularly low carbon energy to be brought forward and will displace fossil fuel generating stations reducing greenhouse gas emissions by approximately 700,000 to 1,500,000 tonnes Carbon Dioxide (CO_2) per year in line with the requirements of the Climate Change Act 2008 (2050 Target Amendment) Order, all in accordance with policies in NPS EN-1, pursuant to Project Objective 1, "Decarbonisation: To generate low carbon electricity from an offshore wind farm by 2030 in support of the UK target to generate 50 Gigawatt (GW) of offshore wind power by 2030 and associated carbon reduction targets" [APP-313];

- will also help reduce the current shortfall from the target for new offshore wind electricity generation capacity, in the context of the dwindling generation capacity of the UK as a whole, and enhance security of supply, in accordance with NPS EN-1, and contribute to the requirement for renewable energy supply in the Promotion of the Use of Energy from Renewable Sources Regulations 2011 pursuant to Project Objective 2, "Security of supply: To export electricity to the UK National Grid to support UK commitments for offshore wind generation and security of supply" [APP-313]; and

- as an Offshore Transmission Network Review Pathfinder Project SEP and DEP advances the concept of coordinated offshore wind project applications, provides power for over 785,000 homes, creates up to 1,730 and 230 full-time equivalent jobs in the construction and operational phases respectively, yields an estimated overall construction value of £2.14 billion and £800 million Gross Value Added, will maximise local skills and employment and deliver Biodiversity Net Gain, in accordance with NPS

and other government policy, pursuant to Project Objective 3, "Optimisation: To coordinate and optimise generation and export capacity within the constraints of available sites and onshore transmission infrastructure whilst delivering project skills, employment and investment benefits in the Norfolk area" [APP-313].

76. In line with policy in NPS EN-1, therefore, that *"the Examining Authority and Secretary of State should take into account its potential benefits including its contribution to meeting the need for energy infrastructure, job creation and any long term or wider benefits"* (paragraph 4.1.3) and in view of the Critical National Priority status proposed to be given to offshore wind applications by draft NPS EN-3, the minimal reduction is sea room posed by DEP-North to shipping and navigation is outweighed by the considerable public benefits of the Project outlined above, and for all the above reasons the balance, on this matter, weighs significantly in favour of development consent being granted.

10 References

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DECC (2023). DRAFT Overarching National Policy Statement for Energy (EN-3). London:DECC

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