Liverpool Bay CCS Ltd
HYNET CARBON DIOXIDE TRANSPORTATION AND STORAGE PROJECT - OFFSHORE

Environmental Statement
Volume 3, Appendix L: Navigational Risk Assessment Technical Report

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HyNet Carbon Capture and Storage Navigational Risk Assessment

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Presented to	RPS Group on behalf of Eni UK Limited
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00	25 July 2023	First Issue
01	2 August 2023	Updated based on RPS comments
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03	21 September 2023	Includes vessel movements associated with repurpose of existing assets

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Abbreviation	Definition
AHTS	Anchor Handling Tug Supply
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
ALB	All-Weather Lifeboat
ATBA	Area to be Avoided
AtoN	Aid to Navigation
CAA	Civil Aviation Authority
CBA	Cost Benefit Analysis
CBRA	Cable Burial Risk Assessment
CCS	Carbon Capture and Storage
CD	Chart Datum
CEA	Cumulative Effects Assessment
CLV	Cable Lay Vessel
CO_2	Carbon Dioxide
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea
CSIP	Cable Specification and Installation Plan
CTV	Crew Transfer Vessel
DECC	Department of Energy & Climate Change
DfT	Department for Transport
DSV	Dive Support Vessel
DWT	Deadweight Tonnage
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
ES	Environmental Statement
EU	European Union

Abbreviation	Definition
FLCP	Fisheries Liaison and Coexistence Plan
FLO	Fisheries Liaison Officer
FSA	Formal Safety Assessment
GPS	Global Positioning System
GT	Gross Tonnage
HLV	Heavy Lift Vessel
HMCG	His Majesty's Coastguard
HVDC	High Voltage Direct Current
ILB	Inshore Lifeboat
IMO	International Maritime Organization
INNS	Invasive Non-Native Species
JRCC	Joint Rescue Coordination Centre
km	Kilometre(s)
kV	Kilovolt(s)
LAT	Lowest Astronomical Tide
LCV	Light Construction Vessel
m	Metre(s)
MAIB	Marine Accident and Investigation Branch
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MDS	Maximum Design Scenario
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MMV	Monitoring, Measurement and Verification
MPCP	Marine Pollution Contingency Plan
MRCC	Maritime Rescue Coordination Centre
NAVTEX	Navigational Telex
nm	Nautical Mile(s)
NRA	Navigational Risk Assessment

Abbreviation	Definition
NtM	Notice to Mariners
NUI	Normally Unmanned Installation
OP	Offshore Platform
OREIs	Offshore Renewable Energy Installations
OWF	Offshore Wind Farm
PDE	Project Design Envelope
PINS	Planning Inspectorate
PLL	Potential Loss of Life
PoA	Point of Ayr
RAM	Restricted in Ability to Manoeuvre
RNLI	Royal National Lifeboat Institution
RYA	Royal Yachting Association
SAR	Search and Rescue
SOLAS	Safety of Life at Sea
TSS	Traffic Separation Scheme
UK	United Kingdom
UKC	Under Keel Clearance
UKHO	United Kingdom Hydrographic Office
UNCLOS	United Nations Convention on Law of the Sea
VMP	Vessel Management Plan
VMS	Vessel Monitoring System

1 Introduction

1.1 Background

Anatec was commissioned by RPS Group on behalf of Liverpool Bay CCS Ltd to undertake a Navigational Risk Assessment (NRA) for the proposed Carbon Capture and Storage (CCS) development.

The proposed development consists of newly installed subsea cables, a new CCS platform located close to the existing platform at the Douglas Complex, as well as repurposing of existing platforms and pipelines at the Hamilton, Hamilton North and Lennox fields.

This NRA presents information on the proposed development relevant to existing and estimated future navigational activity and forms the technical appendix to volume 2, chapter 9 of the ES of the Environmental Statement (ES).

1.2 Navigational Risk Assessment

An Environmental Impact Assessment (EIA) is a process which identifies the environmental effects of a proposed development, both negative and positive. One requirement of the EIA for offshore projects is the NRA. Following Marine Guidance Note (MGN) 654 (Ref. i), this NRA includes:

- outline of methodology applied in the NRA;
- summary of consultation undertaken with shipping and navigation stakeholders to date;
- lessons learnt from previous offshore developments;
- summary of the project description relevant to shipping and navigation;
- baseline characterisation of the existing environment;
- discussion of potential impacts on navigation, communication and position fixing equipment;
- cumulative and transboundary overview;
- future case marine traffic characterisation;
- assessment of navigational risk (following the Formal Safety Assessment (FSA) process); and
- outline of embedded mitigation measures.

It is noted that the MGN 654 guidance is intended to apply to renewable energy installations rather than CCS developments, however it is considered that much of the guidance is applicable to the Proposed Development.

Potential hazards are considered for each phase of the development as follows:

- Construction;
- Operation and maintenance; and
- Decommissioning.

The assessment of the Project is based on a parameter-based Project Design Envelope (PDE) approach, which is recognised in the Overarching National Policy Statement for Energy (EN-1) (Ref. ii), the NPS for Renewable Energy Infrastructure (EN-3) (Ref. iii) and Planning Inspectorate Advice Note Nine: Rochdale Envelope (Ref. iv). The PDE includes conservative assumptions to form a Maximum Design Scenario (MDS) which is considered and assessed for all risks. Further details on the design envelope are provided in volume 1, chapter 3.

The shipping and navigation baseline and risk assessment has been undertaken based upon the information available and responses received at the time of preparation, including the MDS as discussed above.

2 Project Description Relevant to Shipping and Navigation

This section outlines the details of the project design envelope of relevance to shipping and navigation. An overview of the existing and proposed infrastructure included within the Proposed Development is presented in Figure 2.1.

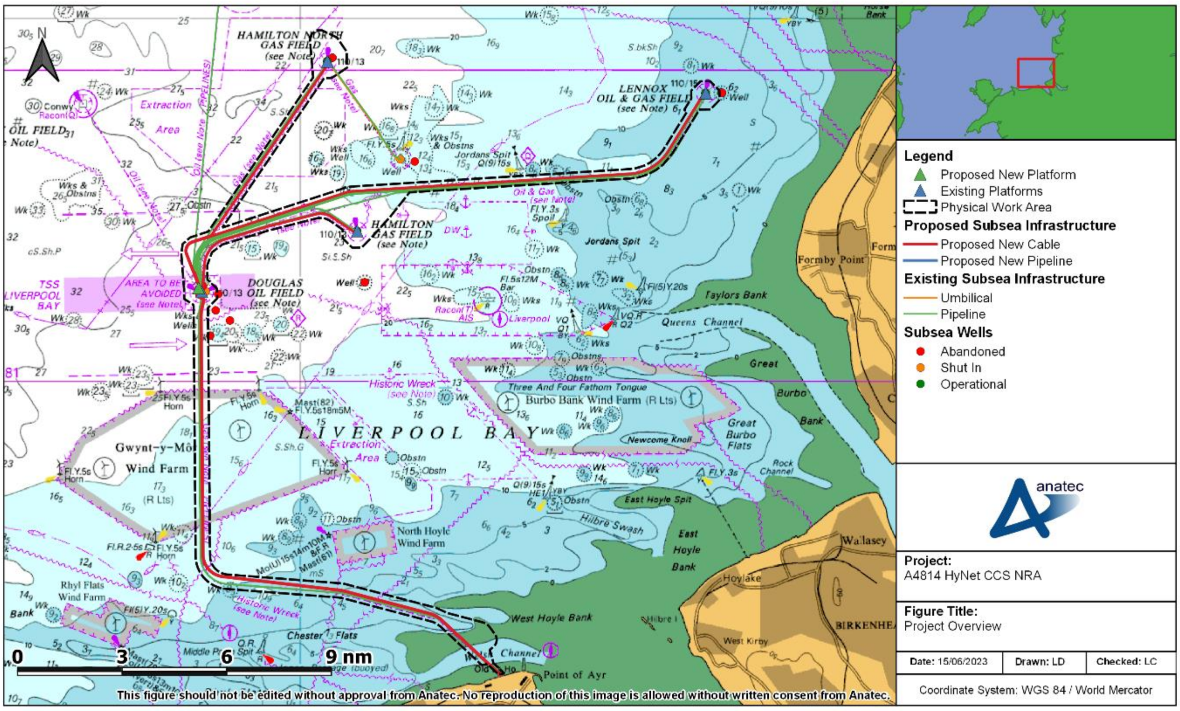

Figure 2.1: Project Overview

The Proposed Development will include:

- installation of a new Douglas CCS platform to replace the existing Douglas Process platform to receive carbon dioxide (CO_2) from the onshore Point of Ayr (PoA) Terminal and distribute CO_2 to the Hamilton Main, Hamilton North, and Lennox wellhead platforms and when necessary, provide heating;
- installation of new topsides on the Hamilton Main, Hamilton North, and Lennox wellhead platforms to receive and inject CO_2 into the depleted hydrocarbon reservoirs;
- repurposing of the existing subsea natural gas pipelines for their change of use from hydrocarbon to CO_2 service;
- installation of new sections of pipeline to connect the new Douglas CCS platform to the existing subsea natural gas pipelines;
- development of the Hamilton Main, Hamilton North, and Lennox reservoirs for CO_2 storage through up to eight injection wells created by side tracking of existing production wells. This includes drilling and recompletion operations, all of which will be within the existing footprint (template) of each platform;

- implementation of a programme of Monitoring, Measurement and Verification (MMV) activities. This includes the drilling of two new monitoring wells, one at Hamilton North and one at Hamilton Main. Additional monitoring wells will be created from the recompletion of existing wells within the existing footprint (template) of each platform: one monitoring well created by side-tracking an existing well in Lennox; and two sentinel wells, one in Hamilton North and one in Lennox;
- installation, including trenching, and some dredging, of two submarine 33kV armoured cables, with integrated fibre-optic cable connections (35 km from PoA Terminal onshore to the new Douglas CCS platform, including within the intertidal/foreshore area up to Mean High Water Springs (MHWS), within Welsh waters only);
- installation, including trenching, of new power cables with integrated fibre-optic connecting the new Douglas CCS platform with the Hamilton Main (12 km; 33 kV), Hamilton North (15 km; 33 kV) and Lennox (35 km; 33 kV) platforms; and
- installation of concrete mattresses and external cable protection, at crossings of existing cables, and in areas where cable burial is not deemed feasible, or as a remedial secondary protection measure if the target cable depth of lowering cannot be achieved.

The locations of the platforms involved in the project are presented in Table 2.1.

Table 2.1: Project Platform Locations

Platform	Geographical Coordinates (ED50 UTM Zone 30N)	
	Easting	Northing
Proposed Douglas CCS Platform	461607.79 m	5932596.10 m
Existing Douglas Complex	461779.86 m	5932406.84 m
Hamilton North	468497.05 m	5944501.07 m
Hamilton	470012.16 m	5935548.50 m
Lennox	488435.99 m	5942739.87 m

The proposed CCS Project consists of a new platform located within the 500m safety zone at the existing Douglas Complex, with existing pipelines repurposed for CO_2 transport. New power cables are also planned to follow the existing pipeline routes, details of which are presented in Section 2.2.

The focus of the NRA is on the construction and operation of the new Douglas CCS platform and the new cables that will be installed, as well as vessel movements to and from the sites for activities associated with installation of new topsides at the existing platforms, repurposing of existing assets (e.g. pipelines) and drilling of wells within the existing footprint of the Hamilton Main, Hamilton North and Lennox platforms. However, works carried out within the existing Safety Zones are not covered in the NRA.

2.1 Platform Details

Figure 2.2 presents the location of the proposed Douglas CCS platform.

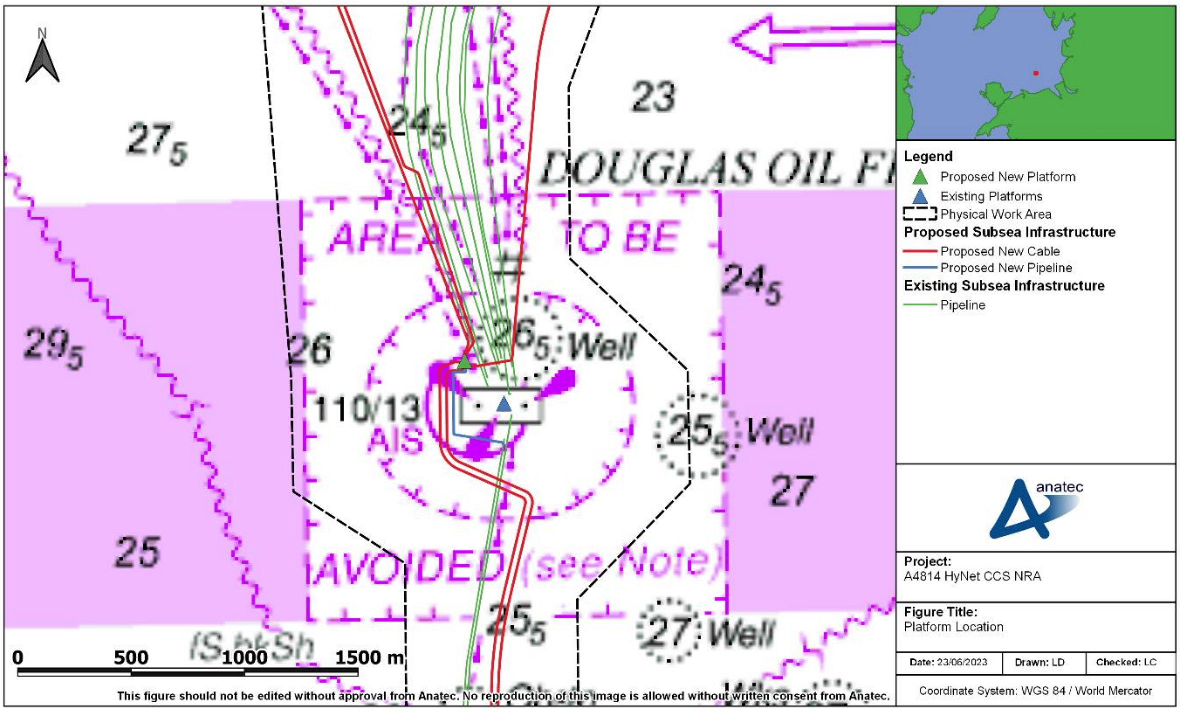

Figure 2.2: Proposed Douglas CCS Platform Location

The proposed location of the platform is approximately 200 m to the north of the existing Douglas accommodation platform, within the 500 m safety zone at the existing Douglas complex, which sits between the lanes of the Liverpool Bay Traffic Separation Scheme (TSS). There is a charted area to be avoided around the Douglas complex, lining up with the traffic separation zone.

The existing Douglas Complex consists of three linked platforms: a wellhead platform, a production platform and an accommodation platform. The Douglas platform is typically manned, while the other platforms which form part of the project are normally unmanned installations (NUI).

Table 2.2: Douglas CCS Platform Details

Parameter	Douglas CCS Platform
Height of weather deck (above LAT) (m)	35.5
Topside length (m)	33

Parameter	Douglas CCS Platform
Topside width (m)	30

2.2 Cables

It is expected that there will be two power cables from the proposed Douglas CCS platform to the landfall at the Point of Ayr, following approximately the same route as the existing pipeline from the Douglas platform to land. The cables are expected to be installed in two separate trenches with a minimum separation distance of 30m.

In addition to the Point of Ayr to Douglas cables, three further cables are proposed to connect the proposed Douglas CCS platform to the Hamilton, Hamilton North and Lennox platforms. These cables also approximately follow the routes of existing pipelines running between the platforms.

2.2.1 Cable Design and Protection

There are expected to be up to five cables installed as part of the proposed development. These will be 3-core power cables armoured with bundled fibre optic cables, rated up to 33kV. Cables will range between 10.87km and 33.99km in length, with a diameter of 152.4mm.

Target burial depths are anticipated to be between 2m and 3m, with the entirety of both Point of Ayr – Douglas cables expected to be buried. Cable burial is expected to be carried out via ploughing. It is assumed that suitable burial depths or additional protection methods against external hazards will be informed by a Cable Burial Risk Assessment (CBRA).

External cable protection may be required at cable crossings. There are 42 identified possible cable crossings associated with the 5 cables. Freshly quarried rock is anticipated to be used to protect the cable crossings for the Point of Ayr – Douglas cables, while concrete mattresses are also considered for the cables to the three satellite platforms. A maximum height of 0.8m is anticipated for any cable crossings.

The length and number of expected crossings for each of the cables are presented in Table 2.3.

Table 2.3: Proposed Cable Details

Parameter	Point of Ayr to Douglas (Cable 1)	Point of Ayr to Douglas (Cable 2)	Douglas to Hamilton	Douglas to Hamilton North	Douglas to Lennox
Cable length	33.99 km	33.95 km	10.87 km	14.89 km	32.34 km
Cable Crossings	10	10	8	8	6

2.3 Installation Activities

This section describes the vessels involved in installation activities and provides an indicative programme for the works.

The maximum number of return trips for the installation of the new Douglas CCS platform and the proposed new cables, and repurposing of existing assets are presented in Table 2.4.

Table 2.4: Vessels Involved in Installation Activities

Vessel Type	Maximum on Site at One Time					Maximum Number of Return Trips				
	Douglas CCS	Cables	Douglas Re-Use	Repurpose	Total	Douglas CCS	Cables	Douglas Re-Use	Repurpose	Total
Heavy Lift Vessel (HLV)	1			1	2	2			2	4
Jack Up		1		1	2		1		3	4
Anchor Handling Tug Supply (AHTS)	4		7	6	17	4		10	8	22
Cargo Barge	3		5	4	12	3		9	5	17
Dive Support Vessel (DSV)/Light Construction Vessel (LCV)	1	1 (shared)		2	3	1	1 (shared)		2	3
Survey Vessel		1 (shared)	1	1	2		1 (shared)	3	1 (shared)	3
Crew Transfer Vessel	1	1	2	2	6	28	4	76	108	216
Cable Installation Vessel		1			1		1			1
Support Vessel		3	2		5		3	80		83
Multicat		2			2		2			2

Vessel Type	Maximum on Site at One Time					Maximum Number of Return Trips				
	Douglas CCS	Cables	Douglas Re-Use	Repurpose	Total	Douglas CCS	Cables	Douglas Re-Use	Repurpose	Total
Working Boat		3			3		3			3
Support Vessel (for trenching)		1			1		1			1
Seabed Preparation Vessel		1 (shared)	1		1		1 (shared)	1		1
Cable Protection Installation		1			1		1			1
Cable Burial Installation		1			1		1			1
Pre-comm Vessel			1		1			2		2
Total	**10**	**38**	**17**	**17**	**63**	**19**	**181**	**17**	**128**	**364**

The installation of the proposed Douglas CCS platform and new cables are expected to be carried out in Q1-Q2 2026. Preparations for the shore approach of the power cables from Douglas to Point of Ayr are proposed to commence in Q2 2025. Installation works for the new platform are expected to take up to five months, while cable laying works are expected to take up to two months. There will also be additional vessel movements associated with works to repurpose existing assets at the Hamilton Main, Hamilton North and Lennox platforms between Q4 2024 and Q3 2028.

2.4 Maximum Design Scenario

The maximum design scenario considered within the impact assessment in Section 10 is presented in Table 2.5.

Table 2.5: Maximum Design Scenario

Potential Impact	Phase			Maximum Design Scenario	Potential Impact
	C	O&M	D		
Vessel displacement leading to increased vessel to vessel collision risk between third-party vessels	✓	✓	✓	**Construction Phase** ▪ Cable installation expected to take up to two months ▪ Douglas CCS platform installation expected to take up to five months ▪ Maximum of 2 HLV on site making up to 4 return trips ▪ Maximum of 2 jack-up vessels on site making up to 4 return trips ▪ Maximum of 17 tug/anchor handlers making up to 22 return trips ▪ Maximum of 12 cargo barges making up to 17 return trips ▪ Maximum of 3 dive support/light construction vessels making up to 3 return trips ▪ Maximum of 2 survey vessels making up to 3 return trips ▪ Maximum of 6 crew transfer vessels making up to 216 return trips ▪ Maximum of one cable installation vessel making one return trip ▪ Maximum of 5 support vessels making up to 83 return trips ▪ Maximum of 2 multicats making up to 2 return trips	Greatest number of vessels associated with the Proposed Development and greatest duration, resulting in the maximum temporal effect and maximum displacement of third-party vessels, leading to the maximum effect on vessel to vessel collision risk

Potential Impact	Phase			Maximum Design Scenario	Potential Impact
	C	O&M	D		
				▪ Maximum of 3 working boats making up to 3 return trips ▪ Maximum of one trench support vessel making one return trip ▪ Maximum of one seabed preparation vessel making one return trip ▪ Maximum of one cable protection installation vessel making one return trip ▪ 500m advisory safe passing distances around cable installation vessels ▪ 500m safety zone around the Douglas platform **Operation and Maintenance Phase** ▪ Anticipated operation and maintenance phase lasting 25 years. ▪ Maximum of one jack-up vessel on site at one time, making up to 15 return trips ▪ Maximum of 3 other vessels (multi-purpose support/Inspection, maintenance and repair vessels (IMR)) on site at one time making up to 15 return trips ▪ 500 m safety zone around the Douglas CCS platform ▪ 500 m advisory safe passing distance around cable maintenance vessels during periods of major maintenance	

Potential Impact	Phase			Maximum Design Scenario	Potential Impact
	C	O&M	D		
				Decommissioning Phase It is anticipated that decommissioning works will be similar in terms of the maximum design scenario to the construction phase.	
Increased vessel to vessel collision risk between third-party vessels and project vessels	✓	✓	✓	**Construction Phase** ▪ Cable installation expected to take up to two months ▪ Douglas CCS platform installation expected to take up to five months ▪ Overall programme of works at existing platforms expected to take up to four years ▪ Maximum of 2 HLV on site making up to 4 return trips ▪ Maximum of 2 jack-up vessels on site making up to 4 return trips ▪ Maximum of 17 tug/anchor handlers making up to 22 return trips ▪ Maximum of 12 cargo barges making up to 17 return trips ▪ Maximum of 3 dive support/light construction vessels making up to 3 return trips ▪ Maximum of 2 survey vessels making up to 3 return trips ▪ Maximum of 6 crew transfer vessels making up to 216 return trips	Greatest number of vessels associated with the Proposed Development and greatest duration, resulting in the maximum temporal effect, on vessel to vessel collision risk involving a project vessel and third-party vessel.

Potential Impact	Phase			Maximum Design Scenario	Potential Impact
	C	O&M	D		
				▪ Maximum of one cable installation vessel making one return trip ▪ Maximum of 5 support vessels making up to 83 return trips ▪ Maximum of 2 multicats making up to 2 return trips ▪ Maximum of 3 working boats making up to 3 return trips ▪ Maximum of one trench support vessel making one return trip ▪ Maximum of one seabed preparation vessel making one return trip ▪ Maximum of one cable protection installation vessel making one return trip ▪ 500 m advisory safe passing distances around cable installation vessels ▪ 500 m safety zone around the Douglas platform **Operation and Maintenance Phase** ▪ Anticipated operation and maintenance phase lasting 25 years. ▪ Maximum of one jack-up vessel on site at one time making up to 15 return trips	

Potential Impact	Phase			Maximum Design Scenario	Potential Impact
	C	O&M	D		
				▪ Maximum of 3 other vessels (multi-purpose support/IMR vessels) on site at one time making up to 15 return trips ▪ One mobile offshore drilling unit (MODU) anticipated on site for well operations every 10 years **Decommissioning Phase** ▪ It is anticipated that decommissioning works will be similar in terms of the maximum design scenario to the construction phase.	
Vessel to platform allision risk	×	✓	×	**Operation and Maintenance Phase** ▪ Anticipated operation and maintenance phase lasting 25 years. ▪ Platform topside dimensions of 33 m x 30 m	Maximum dimensions and operational lifetime of the project resulting in the maximum temporal effect on vessel to platform allision risk.
Reduced access to local ports	✓	✓	✓	**Construction Phase** ▪ Cable installation expected to take up to two months ▪ Douglas CCS platform installation expected to take up to 5 months ▪ Overall programme of works at existing platforms expected to take up to 4 years ▪ Maximum of 2 HLV on site making up to 4 return trips ▪ Maximum of 2 jack-up vessels on site making up to 4 return trips	Maximum duration of the installation works and operational lifetime of the Proposed Development, utilising the maximum number of project vessels, resulting in the maximum effect on access to local ports.

Potential Impact	Phase			Maximum Design Scenario	Potential Impact
	C	O&M	D		
				▪ Maximum of 17 tug/anchor handlers making up to 22 return trips ▪ Maximum of 12 cargo barges making up to 17 return trips ▪ Maximum of 3 dive support/light construction vessels making up to 3 return trips ▪ Maximum of 2 survey vessels making up to 3 return trips ▪ Maximum of 6 crew transfer vessels making up to 216 return trips ▪ Maximum of one cable installation vessel making one return trip ▪ Maximum of 5 support vessels making up to 83 return trips ▪ Maximum of 2 multicats making up to 2 return trips ▪ Maximum of 3 working boats making up to 3 return trips ▪ Maximum of 1 trench support vessel making one return trip ▪ Maximum of one seabed preparation vessel making 1 return trip ▪ Maximum of one cable protection installation vessel making 1 return trip	

Potential Impact	Phase			Maximum Design Scenario	Potential Impact
	C	O&M	D		
				▪ 500 m advisory safe passing distances around cable installation vessels ▪ 500 m safety zone around the Douglas platform **Operation and Maintenance Phase** ▪ Anticipated operation and maintenance phase lasting 25 years. ▪ 500 m safety zone around the Douglas CCS platform ▪ 500 m advisory safe passing distance around cable maintenance vessels during periods of major maintenance ▪ One mobile offshore drilling unit (MODU) anticipated on site for well operations every 10 years **Decommissioning Phase** ▪ It is anticipated that decommissioning works will be similar in terms of the maximum design scenario to the construction phase.	
Anchor interaction with subsea cable	×	✓	×	**Operation and Maintenance Phase** ▪ Anticipated operation and maintenance phase lasting 25 years. ▪ 5 subsea cables with a total length of 126 km ▪ Target burial depth of 2-3 m	Greatest length of subsea cables and maximum number of cable crossings with external protection giving the maximum potential for anchor interaction.

Potential Impact	Phase			Maximum Design Scenario	Potential Impact
	C	O&M	D		
				▪ 42 potential cable crossings with a total cable length of 8.4 km ▪ External rock protection at cable crossings with a maximum height of 0.8 m.	
Fishing gear interaction with subsea cable	×	✓	×	**Operation and Maintenance Phase** ▪ Anticipated operation and maintenance phase lasting 25 years. ▪ 5 subsea cables with a total length of 126 km ▪ Target burial depth of 2-3 m ▪ 42 potential cable crossings with a total cable length of 8.4 km ▪ External rock protection at cable crossings with a maximum height of 0.8 m.	Greatest length of subsea cables and maximum number of cable crossings with external protection giving the maximum potential for fishing interaction.
Vessel grounding due to reduced under keel clearance	×	✓	×	**Operation and Maintenance Phase** ▪ Anticipated operation and maintenance phase lasting 25 years. ▪ 5 subsea cables with a total length of 126 km ▪ Target burial depth of 2-3 m ▪ 42 potential cable crossings with a total cable length of 8.4 km ▪ External rock protection at cable crossings with a maximum height of 0.8 m.	Greatest length of subsea cables and maximum number of cable crossings with external protection giving the maximum potential for reduced under keel clearance.

Potential Impact	Phase			Maximum Design Scenario	Potential Impact
	C	O&M	D		
Interference with magnetic compasses	✗	✓	✗	**Operation and Maintenance Phase** ▪ Anticipated operation and maintenance phase lasting 25 years. ▪ 5 subsea cables with a total length of 126 km ▪ Target burial depth of 2-3 m	Greatest length of subsea cables and maximum temporal impact on magnetic compasses
Reduction of emergency response capability due to increased incident rates for SAR responders and increased demand on the available resources	✓	✓	✓	**Construction Phase** ▪ Cable installation expected to take up to two months ▪ Douglas CCS platform installation expected to take up to five months ▪ Overall programme of works at existing platforms expected to take up to four years ▪ Maximum of 2 HLV on site making up to 4 return trips ▪ Maximum of 2 jack-up vessels on site making up to 4 return trips ▪ Maximum of 17 tug/anchor handlers making up to 22 return trips ▪ Maximum of 12 cargo barges making up to 17 return trips ▪ Maximum of 3 dive support/light construction vessels making up to 3 return trips ▪ Maximum of 2 survey vessels making up to 3 return trips	Greatest length of subsea cables and maximum project vessels on site giving the maximum potential for reduction SAR capability

Potential Impact	Phase			Maximum Design Scenario	Potential Impact
	C	O&M	D		
				▪ Maximum of 6 crew transfer vessels making up to 216 return trips ▪ Maximum of one cable installation vessel making one return trip ▪ Maximum of 5 support vessels making up to 83 return trips ▪ Maximum of 2 multicats making up to 2 return trips ▪ Maximum of 3 working boats making up to 3 return trips ▪ Maximum of 1 trench support vessel making one return trip ▪ Maximum of 1 seabed preparation vessel making one return trip ▪ Maximum of 1 cable protection installation vessel making one return trip ▪ 500 m advisory safe passing distances around cable installation vessels ▪ 500 m safety zone around the Douglas platform **Operation and Maintenance Phase** ▪ Anticipated operation and maintenance phase lasting 25 years. ▪ 500m safety zone around the Douglas CCS platform	

Potential Impact	Phase			Maximum Design Scenario	Potential Impact
	C	O&M	D		
				▪ 500 m advisory safe passing distance around cable maintenance vessels during periods of major maintenance ▪ One mobile offshore drilling unit (MODU) anticipated on site for well operations every 10 years. **Decommissioning Phase** ▪ It is anticipated that decommissioning works will be similar in terms of the maximum design scenario to the construction phase.	

3 Guidance and Legislation

3.1 Policy

The relevant marine policy for shipping and navigation in relation to the Proposed Development are set out in volume 2, chapter 9. The following relevant policy documents have been considered in the ES chapter and throughout the NRA:

- UK Marine Policy Statement (Ref. v)
- North West Marine Plan (Ref. vi)
- Welsh National Marine Plan (Ref. vii)

3.2 Legislation

The following legislation is considered relevant to the assessment:

- United Nations Convention on the Law of the Sea (UNCLOS) (Ref. viii);
- Submarine Telegraph Act (1885) (Ref. ix) ;
- International Regulations for Preventing Collisions at Sea (COLREGS) (Ref. x); and
- Chapter V, Safety of Navigation, of the Annex to the International Convention for the Safety of Life at Sea (SOLAS) (Ref. xi).

3.3 Primary Guidance

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

- *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 (Ref. i); and
- *Revised Guidelines for FSA for Use in the IMO (International Maritime Organization) Rule-Making Process* (Ref. xii).

MGN 654 highlights issues that shall be considered when assessing the effect on navigational safety from offshore renewable energy developments proposed in United Kingdom (UK) internal waters, UK territorial sea or the UK Exclusive Economic Zone (EEZ), including any offshore transmission infrastructure, i.e. offshore cables. It is noted that while CCS projects are not considered renewable energy developments, much of the guidance is considered to be applicable to the Proposed Development.

The MCA methodology is centred on risk management and requires a submission that shows that sufficient controls are, or will be, in place for the assessed risk to be judged as broadly acceptable or tolerable with mitigation (see Section 10). Across volume 2, chapter 9 of the ES and the NRA both base and future case levels of risk have been identified, along with what measures are required to ensure the future case remains broadly acceptable or tolerable with mitigation.

3.4 Other Guidance

Other guidance documents used during the assessment are as follows:

- MGN 661 (Merchant and Fishing) Navigation – Safe and Responsible Anchoring and Fishing Practices (Ref. xiii).

4 Navigational Risk Assessment Methodology

4.1 FSA Methodology

A shipping and navigation user can only be exposed to a risk caused by a hazard if there is a pathway through which a risk can be transmitted between the source activity and the user. In cases where a user is exposed to a risk, the overall significance of risk to the user is determined. This process incorporates a degree of subjectivity. The assessments presented herein for shipping and navigation users have considered the following criteria:

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

4.2 FSA Process

The IMO FSA process as approved by the IMO in 2018 under Maritime Safety Committee – Marine Environment Protection Committee (MEPC).2/circ. 12/Rev.2 will be applied to the risk assessment within this NRA, and volume 2, chapter 9 of the ES.

The FSA process is a structured and systematic methodology based upon risk analysis and Cost Benefit Analysis (CBA) (if applicable) to reduce impacts to As Low as Reasonably Practicable (ALARP). There are five basic steps within this process as illustrated by Figure 4.1 and summarised in the following list:

- step 1 – Identification of hazards (a list is produced of hazards prioritised by risk level specific to the problem under review);
- step 2 – Risk assessment (investigation of the causes and initiating events and risks of the more important hazards identified in step 1);
- step 3 – Risk control options (identification of measures to control and reduce the identified risks);
- step 4 – CBA (identification and comparison of the benefits and costs associated with the risk control options identified in step 3); and
- step 5 – Recommendations for decision-making (defining of recommendations based upon the outputs of steps 1 to 4).

Figure 4.1: Flow chart of the FSA methodology

It is noted that hazards of a commercial nature are considered outside the remit of the NRA but have been assessed using the FSA process in volume 2, chapter 9 of the ES, where appropriate.

The FSA assigns each impact a "severity of consequence" and "frequency of occurrence" to evaluate the significance during the construction, operation and maintenance and decommissioning phases of the proposed development.

Table 4.1 and Table 3.2 identify how the severity of consequence and the frequency of occurrence has been defined, respectively.

Table 4.1: Severity of Consequence Ranking Definitions

Rank	Description	Definition			
		People	Property	Environment	Business
1	Negligible	No perceptible risk	No perceptible risk	No perceptible risk	No perceptible risk
2	Minor	Slight injury(ies)	Minor damage to property, i.e. superficial damage	Tier 1[1] local assistance required	Minor reputational risks – limited to users

[1] Tier 1 – Local (within the capability of one local authority, offshore installation operator or harbour authority

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

Table 4.2: Frequency of Occurrence Ranking Definitions

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

The severity of consequence and frequency of occurrence are then used to define the significance of risk via a tolerability matrix approach as shown in Table 4.3. The significance of risk is defined as Broadly Acceptable (low risk), Tolerable (intermediate risk) or Unacceptable (high risk).

[2] Tier 2 – Regional (beyond the capability of one local authority or requires additional contracted response from offshore operator or from ports or harbours

[3] Tier 3 – National (requires national resources coordinated by the MCA for a shipping incident and the operator for an offshore installation incident)

Table 4.3: Tolerability Matrix and Risk Rankings

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

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

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

4.3 Cumulative Impact Assessment Methodology

The hazards identified in the FSA are also assessed for cumulative risks with the inclusion of other projects and proposed developments. The developments selected as relevant to the cumulative impact assessment are based upon the results of a screening exercise and the development of a 'long list' of cumulative developments relevant to the Proposed Development.

4.4 Study Area

The proposed development is located within the Liverpool Bay off the north coast of Wales, and comprises a single newly installed platform, inside the existing Safety Zone of the Douglas Complex, as well as subsea cables connecting to the nearby Lennox, Hamilton and Hamilton North Platforms. An additional cable is planned connecting the landfall at Point of Ayr on the north coast of Wales.

For the baseline traffic analysis, a study area was defined to cover a bounding box encompassing a minimum 5nm buffer of the cable routes and a 10nm buffer on the proposed new platform location. The study area is presented in Figure 4.2.

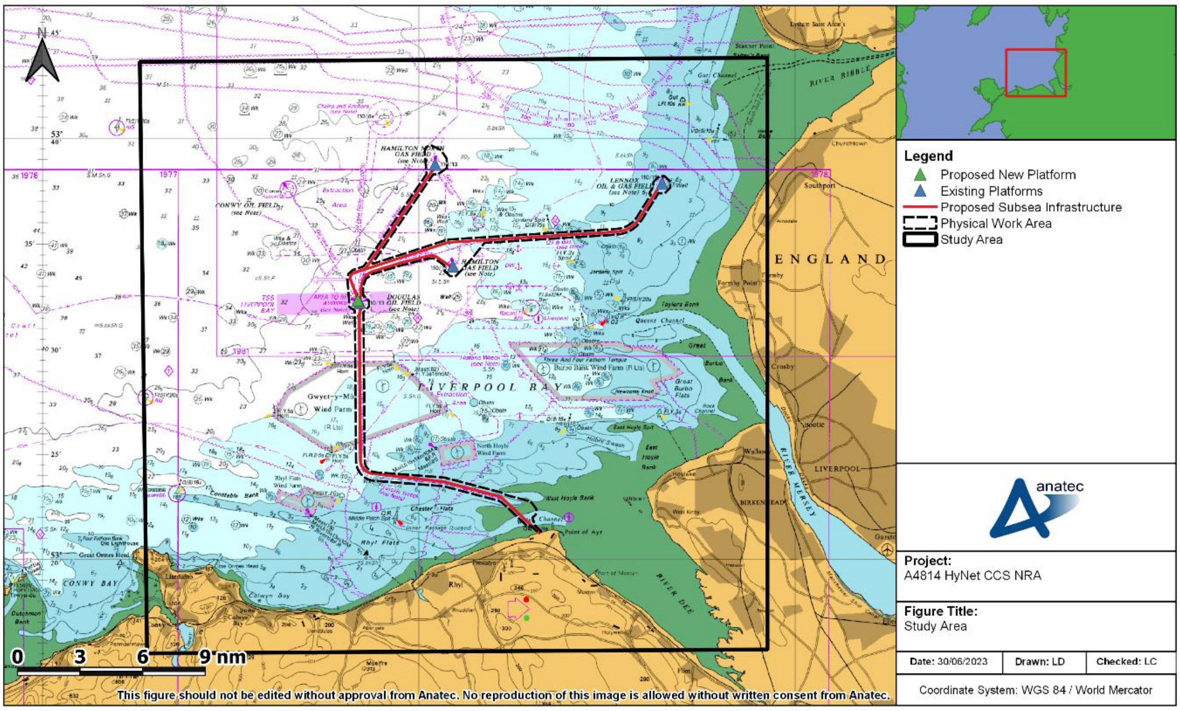

Figure 4.2: Study Area

The study area is considered sufficient to characterise the shipping activity and navigational features of relevance to the Proposed Development to encompass any vessel traffic that may be impacted by the Proposed Development. In addition to the study area, a Physical Work Area is defined around the cable route and platform location, which captures all areas in which work involved in the Project may take place.

The study area was presented to key stakeholders during consultation, including the MCA and Trinity House, as part of discussions on the NRA methodology.

5 Consultation

5.1 Stakeholders

The following shipping and navigation stakeholders have been consulted as part of the NRA process:

- MCA;
- Trinity House;
- Royal Yachting Association (RYA);
- UK Chamber of Shipping;
- Port of Liverpool; and
- Port of Mostyn.

5.2 Consultation Responses

Responses were received from stakeholders during consultation undertaken in the NRA process, either during virtual meetings, or through the Scoping Opinion. The key points and where they have been addressed in the NRA are presented in Table 5.1.

Table 5.1: Summary of Key Points Raised during Consultation

Date	Consultee and type of response	Issue raised	Response to issue raised and/or where considered in the NRA
27/01/2023	OPRED – Scoping Opinion	Section 3.5: Offshore Construction Phase - Offshore Power and Fibre Optic (FO) Cables. Clarification regarding the target cable burial depth is requested. It is advised that, if a minimum cable burial depth cannot be met due to ground condition, the cable should (generally) be protected by rock armouring in order to reduce the risk of navigational hazards.	Cables are anticipated to be buried to a target depth of between 2-3m, as per Section 2. Where burial is not possible, such as at cable crossings, external protection is to be deployed in line with the findings of a CBRA (see Section 13).
		The development area for the Project carries a significant amount of through traffic to major ports, with a number of important international shipping routes in close proximity. The Developer is required to take into consideration any changes in vessel routing, particularly in heavy weather, to ensure shipping can continue to make safe passage without large-scale deviations. Any reduction in navigable depth should be referenced to chart data.	The vessel traffic baseline has been characterised in Section 9. Vessel displacement has been considered and local port access assessed in Section 10. Due to the project largely coinciding with existing infrastructure, it is not anticipated that significant deviation will be required, with deviations mostly being temporary, localised deviations during the construction phase.
		The Navigational Risk Assessment should establish how the phases of the Project are managed to a point where risks are reduced and considered to be 'as low as reasonably practicable' (ALARP).	The FSA methodology is described in Section 4, with embedded mitigation measures used to reduce the risks to ALARP outlined in Section 13.
		It noted that the ES will consider the potential impacts of the construction, operation and maintenance and decommissioning phases of the Project and will follow the IMO Formal Safety Assessment methodology. The ES should provide details on the possible impacts of navigational issues for both commercial and recreational craft specifically: i. Collision Risk; ii. Navigational Safety; iii. Risk Management and Emergency response including potential impacts to search and rescue (SAR) and emergency response in the area to ensure there are no impacts on SAR operations;	The listed impacts have been assessed within Section 10, with impacts assessed for all three phases of the Proposed Development. Impacts have been assessed following the IMO FSA as outlined in Section 4.

Date	Consultee and type of response	Issue raised	Response to issue raised and/or where considered in the NRA
		iv. Marking and lighting of site and information to mariners; v. Effect on small craft navigational and communication equipment; vi. The risk to drifting recreational craft in adverse weather or tidal conditions; and vii. The likely squeeze of small craft into the routes of larger commercial vessels."	
		A safe realistic under keel clearance (UKC) assessment should be undertaken for the maximum drafts of vessels, both observed and anticipated. A link to The Maritime and Coastguard Agency (MCA) Under Keel Clearance Policy is provided in Annex 2.	Under keel clearance has been assessed within the impact assessment presented in Section 10. If areas are identified where water depth reduction may exceed 5%, a detailed draught assessment will be carried out post-consent to determine any safety risk to navigation.
		The Developer should ensure that any cables which need to be buried meet the appropriate burial depth and that evidence of this is provided by completing a Burial Protection Index study.	Cables are expected to be buried to a target depth of 2-3m. Cable burial and protection will be informed by CBRA (see Section 13).
		Subject to the traffic volumes, the Developer should note that an anchor penetration study may also be necessary. If cable protection measures are required (rock bags or mattresses), the MCA is willing to accept a 5% reduction in surrounding reference depths referenced to Chart Datum. This will be particularly relevant where depths are decreasing towards shore and potential impacts on navigable water increase. Where this is not achievable, the Developer must discuss this further with the MCA and Trinity House.	Suitable cable burial and/or external protection will be informed by a CBRA as noted in Section 13. Following surveys, if it is identified that additional protection is required and the MCA condition of no more than 5% reduction in water depth is exceeded, a review of impacts on shipping local to the affected area will be carried out. Consultation with the MCA and Trinity House will also be carried out as per MGN 654.
		It is advised that no effects are scoped out of the ES assessment with regards to shipping and navigation pending the outcome of the Navigational Risk Assessment (NRA) and further stakeholder consultation.	No effects were scoped out of the assessment with regards to shipping and navigation, which is presented in Section 10.

Date	Consultee and type of response	Issue raised	Response to issue raised and/or where considered in the NRA
26/06/2023	RYA – Consultation meeting	RYA are content with the NRA methodology, impacts, consultees, and mitigation measures presented.	Noted that RYA are content with the approach.
		It was noted that the local recreational users are unlikely to have any issues with the Proposed Development.	Noted that the Proposed Development is unlikely to cause issues for recreational users in the area.
27/06/2023	Port of Liverpool – Consultation meeting	It was noted that the baseline presented aligned with the experience of the Port of Liverpool in the area, noting that wind farm vessels cross the Rock Channel out of the Mersey broadcasting as passenger vessels.	Wind farms vessels are represented appropriately within the baseline assessment in Section 9. Noted that the data recorded is in agreement with local experience.
		It was noted that ferry operators may be a useful consultee. The Port of Liverpool offered to disseminate information to ferry operators.	Noted. Ferry operators will be informed of the works via the Port of Liverpool and local Notices to Mariners (Section 13).
		It was noted that dredging takes place constantly within the Queen's Channel, however the TSS lies outside the port limits and is not dredged.	Dredging activity has been noted in the traffic baseline presented in Section 9.
		It was recommended that use of Liverpool pilots could be considered for the project vessels as they form a liaison with vessel traffic. Local notices to mariners can also be issued by the port.	Liaison with local ports and harbours and promulgation of information via local notices to mariners are noted as embedded mitigation as listed in Section 13.
		Part of the Proposed Development lies within the Port of Liverpool limits and will require liaison with the port.	Liaison with local ports and harbours is noted as an embedded mitigation as listed in Section 13.
		No concerns were raised with the Proposed Development or the proposed methodology for the assessment, noting that much of the infrastructure coincides or replaces existing infrastructure.	Noted that no concerns were raised with the methodology presented.
29/06/2023	MCA – Consultation meeting	The RYA Coastal Atlas was recommended as a data source to inform on recreational traffic.	Consultation was undertaken with the RYA to inform the NRA, with no concerns raised regarding recreational vessels in the area. Therefore Automatic Identification System (AIS) was considered sufficient to inform on recreational activity in the area.

Date	Consultee and type of response	Issue raised	Response to issue raised and/or where considered in the NRA
		The MCA queried whether decommissioning works at the existing Douglas complex were included within the scope of the assessment.	Douglas decommissioning works are subject to a separate permit process and are not included within the scope of the NRA. Consideration has been given to the overlapping timescales, with the existing Douglas complex and the proposed Douglas CCS platform expected to be on site at the same time for a period of time.
		The MCA raised no concerns with the NRA methodology, impacts or mitigation measures presented.	Noted that the MCA accept the methodology, impacts and mitigation measures presented.
29/06/2023	Trinity House – Consultation meeting	Trinity House noted that the platform lighting and marking falls under the remit of the Standard Marking Schedule as opposed to IALA guidance.	Suitable lighting and marking will be in place on the Douglas CCS platform in accordance with the Standard Marking Schedule and in agreement with Trinity House, as noted in Section 13.
		Trinity House raised no concerns with the NRA methodology, impacts or mitigation measures presented.	Noted that Trinity House accept the methodology, impacts and mitigation measures presented.
29/06/2023	Port of Mostyn – Consultation meeting	Port of Mostyn raised no concerns with the NRA methodology, impacts or mitigation measures presented.	Noted that the Port of Mostyn accept the methodology, impacts and mitigation measures presented.
		It was noted that there are several wind farm projects being developed in the area and the Port of Mostyn may see an increase in the vessels associated with these, including potentially construction vessels.	Future wind farm developments and potential resultant changes to the vessel traffic baseline are noted in Section 9.9 and considered in the cumulative assessment (Section 11).
29/06/2023	UK Chamber of Shipping – Consultation meeting	It was noted that the project boundaries for offshore wind farms in the planning phase may differ from the as-built footprint of arrays.	Possible changes to planned wind farm boundaries are noted in the discussion of the future traffic baseline detailed in Section 9.9.
		It was noted that the construction of wind farms in the area may lead to significant traffic deviations and alter the existing traffic baseline.	Noted in the future traffic baseline presented in Section 9.9 that traffic patterns may change in response to the construction of offshore wind farms. Traffic deviations considered in the cumulative assessment (Section 11)

Date	Consultee and type of response	Issue raised	Response to issue raised and/or where considered in the NRA
		The Chamber queried whether the proposed Douglas CCS platform would qualify for an automatic 500m safety zone, but noted that they would support.	It is assumed that a new 500m safety zone will be established around the new Douglas platform as part of the embedded mitigation measures listed in Section 13.
		Disruption to the Liverpool Bay TSS during the construction phase was noted to be the primary concern for the Chamber, given that the as-built project would have minimal differences to existing infrastructure.	Vessel deviations and reduced access to local ports and harbours has been assessed within the impact assessment presented in Section 10 Disruption to the Liverpool Bay TSS is expected to be very short-term and localised due to the speed of the cable-lay activities.
		The Chamber raised no concerns with the NRA methodology, impacts or mitigation measures presented.	Noted that the Chamber accept the methodology, impacts and mitigation measures presented.

6 Data Sources

The main data sources used to characterise the shipping and navigation baseline relative to the proposed development and inform the impact assessment are presented in Table 6.1.

Table 6.1: Data Sources used to inform the Shipping and Navigation Baseline

Title	Source	Purpose
Vessel traffic	Twelve months of AIS data – 2022	Characterising vessel traffic movements within the study area
Navigational features	Admiralty nautical charts 1978 & 1826 (Ref. xiv)	Characterising other navigational features in the proximity to the proposed development
	Admiralty Sailing Directions NP37 "*West Coasts of England and Wales Pilot*" (Ref. xv)	
Wind farm boundaries and agreements	GIS for wind farms within England and Wales, The Crown Estate (TCE) 2022	Characterising wind farm boundaries and agreements in proximity to the proposed development
Maritime incidents	Marine Accident and Investigation Branch (MAIB) incident data, 2012-2021	Review of maritime incidents in proximity to the proposed development
	Royal National Lifeboat Institution (RNLI) incident data, 2013-2022	
	Department for Transport (DfT) UK civilian Search And Rescue (SAR) helicopter taskings (April 2015 – 2022)	
Additional fishing data	Vessel Monitoring System (VMS) satellite fishing data 2020, Marine Management Organisation (MMO)	Provide further information on fishing activities in proximity to the proposed development

6.1 AIS Data

The baseline shipping analysis is based on an up-to-date data set consisting of twelve months of AIS data collected for the study area. The data covers the entirety of 2022, and therefore captures the full range of seasonal variation.

AIS equipment is required to be fitted on all vessels of 300 gross tonnes (GT) and upwards engaged on international voyages, cargo vessels of 500 GT and upwards not engaged on international voyages, and passenger vessels irrespective of size, built on or after 1 July 2002. Under the Merchant Shipping (Vessel Traffic Monitoring and Reporting Requirements) Regulations 2004 (as amended in 2011), fishing vessels of 15 m or more in length overall, UK registered or operating in UK waters, must be fitted with an approved (Class A) AIS (regulation 8A). In addition, all UK and European Union (EU) registered fishing vessels of length 15 m and above are required to carry AIS equipment. Smaller fishing vessels (below 15 m) as well as recreational craft are not required to carry AIS but a proportion does so voluntarily. It is also noted that military vessels are not obligated to broadcast on AIS at all times. Therefore, these vessels (e.g. fishing, recreational and military vessels) will be under-reported within the AIS data.

The reporting interval between position reports for a given vessel typically ranges between a few seconds and up to three minutes, depending on its speed and navigational status (less frequent for anchored and moored vessels).

6.2 Data Limitations

6.2.1 AIS Data

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. There may be occasional range limitations in tracking certain vessels, especially smaller (Class B AIS) vessels in winter. However, it is not considered that the comprehensiveness of the AIS data compromises confidence in the assessment.

Since the vessel traffic data for the study area consists of AIS only, the data has limitations associated with non-AIS targets. Therefore, additional data sources such as VMS data and consultation feedback have been considered when assessing the baseline environment.

Military vessels are not required to broadcast on AIS and may therefore be under-represented. It is assumed that the Ministry of Defence will be consulted as part of the consenting programme.

6.2.2 Historical Incident Data

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.

The RNLI incident data cannot be considered comprehensive of all incidents in the study area. Although hoax and false alarms are excluded, any incident to which an RNLI resource was not mobilised has not been accounted for in this dataset. Nevertheless, the RNLI incident data is still considered to be an appropriate resource for the characterisation of historical incidents and adequate for the assessment.

6.2.3 Admiralty Charts

The Admiralty Charts published by the United Kingdom Hydrographic Office (UKHO) are updated periodically, and therefore the information shown may not reflect the real-time features within the area with total accuracy. Taking into account the consultation which has been undertaken, Admiralty Charts are considered to be a suitably comprehensive and adequate resource for the assessment of navigational features within the area. For aids to navigation, only those charted and considered key to establishing the shipping and navigation baseline are shown.

7 Navigational Features

7.1 Overview

An overview of the key navigational features in proximity to the proposed development is presented in Figure 7.1. Following this, navigational features are discussed individually in more detail in the following subsections.

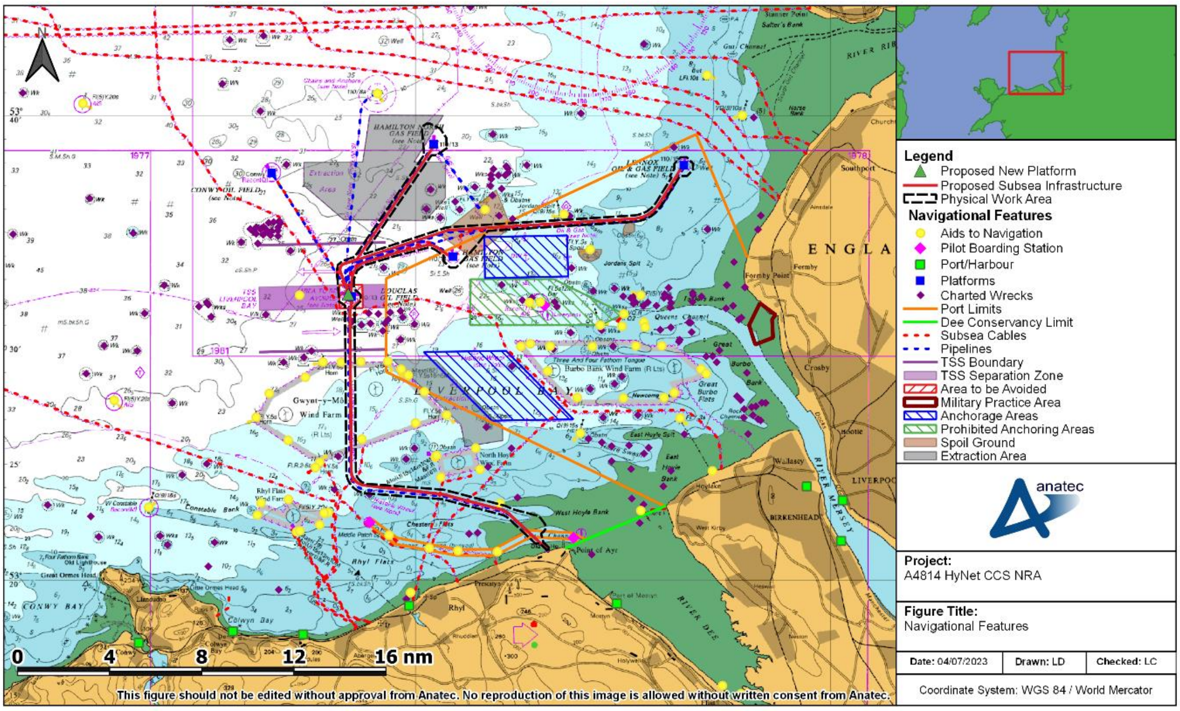

Figure 7.1: Navigational Features

7.2 Subsea Cables and Pipelines

Figure 7.2 presents the subsea cables and pipelines in proximity to the proposed development.

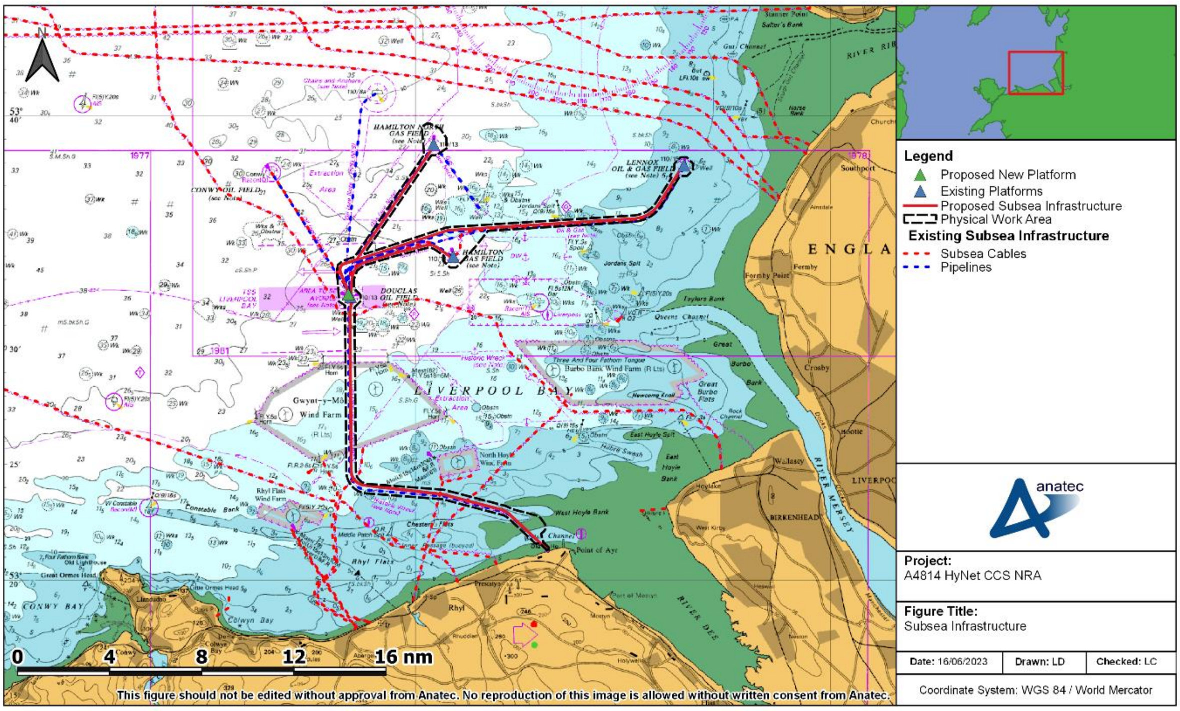

Figure 7.2: Subsea Infrastructure

There are several subsea cables in the area associated with the offshore wind farms, cables connecting to Ireland and the Isle of Man, as well as existing pipelines connecting to the oil and gas infrastructure. Several cables cross the proposed development, including the export cables to the Burbo Bank, North Hoyle and Gwynt-y-Môr wind farms, as well as the Western Link power cable which links Hoylake on the English coast to Ireland, and crosses the proposed development 0.8nm south of the proposed Douglas CCS platform. To the north of the proposed development, there are several subsea cables running between the English coast and both the Isle of Man and Ireland. In addition to existing cables, the proposed MaresConnect interconnector is expected to make landfall to the west of the Proposed Development, on the north coast of Wales.

As noted in Section 2, several of the existing pipelines in the area are anticipated to be repurposed as part of the proposed development.

7.3 Offshore Wind Farms

Figure 7.3 presents the locations of existing and planned offshore wind farms in proximity to the development, colour-coded by the status of the wind farm.

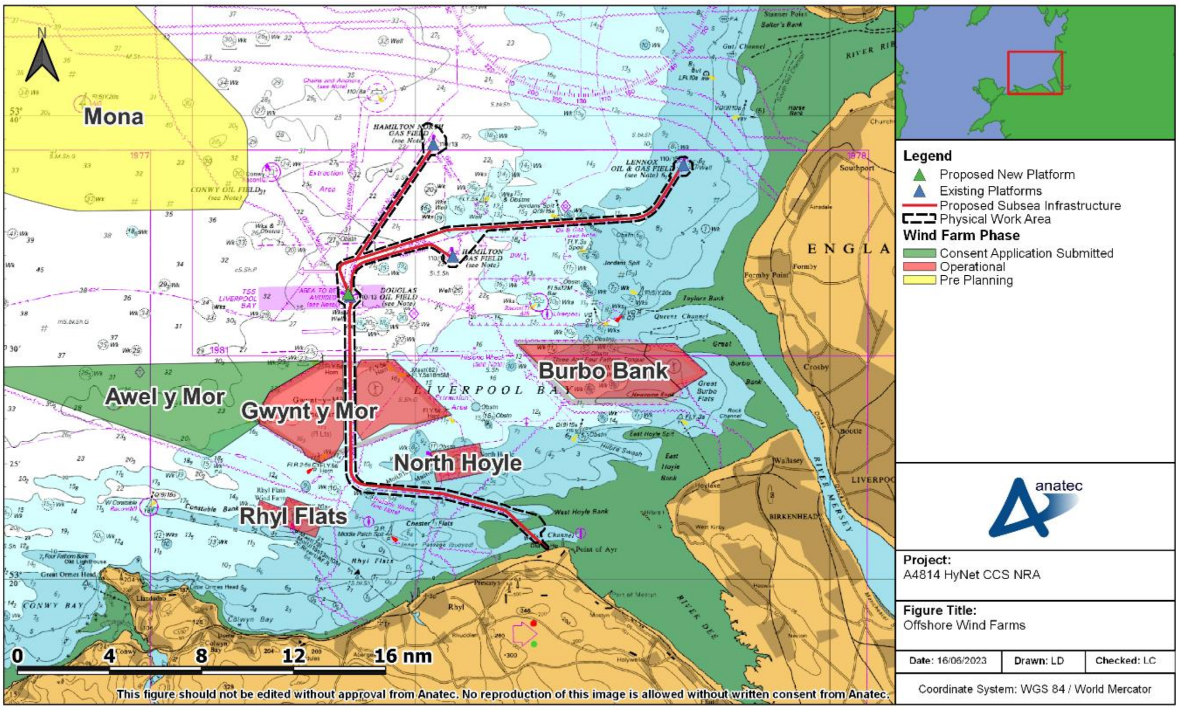

Figure 7.3: Offshore Wind Farms

There are six offshore wind farm projects in proximity to the proposed development, at various stages of development. Four of the wind farms are operational. The proposed cable route passes through the Gwynt y Môr site, following the same corridor as existing pipelines. The cable route to Point of Ayr also passes close to the Rhyl Flats and North Hoyle wind farms, which lie 1.8nm to the west and 0.5nm to the north of the cable route, respectively. Burbo Bank, including the Burbo Bank Extension, lies approximately 4.7nm southeast of the existing Hamilton platform which forms part of the proposed development.

In addition to the existing operational wind farms, the Awel y Môr offshore wind farm is planned to adjoin the Gwynt y Môr site to the west of the cable route, and is awaiting a decision on its consent application. To the northwest of the cable, the Mona offshore wind farm is in a pre-planning stage. It was noted in consultation that given the stage of the Awel-y-Mor and Mona projects, it is likely that the site boundaries presented may differ significantly from the as-built boundaries if consent is obtained.

7.4 Ports and Harbours

Figure 7.4 presents the ports and harbours in proximity to the proposed developments.

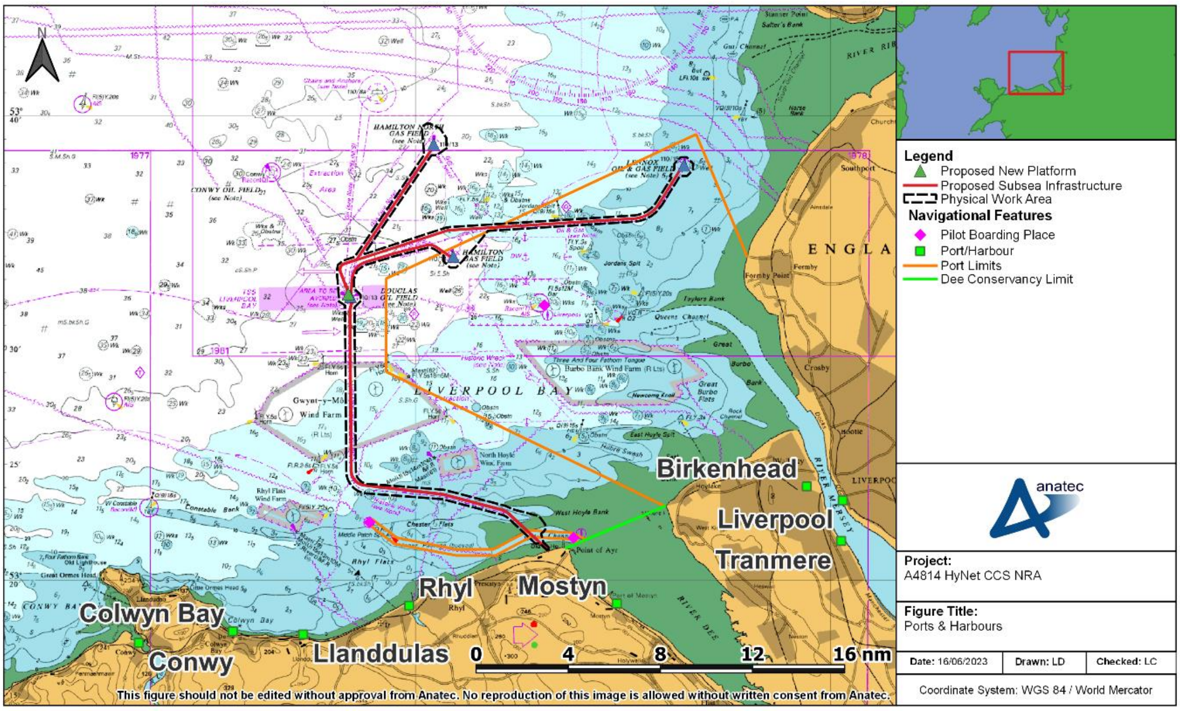

Figure 7.4: Ports and Harbours

The most significant ports in the vicinity of the proposed development are the Port of Liverpool in the River Mersey, and the Port of Mostyn in the River Dee. The River Mersey is accessed via the Queen's Channel, the entrance to which is located approximately 13.2 nm east of the proposed Douglas CCS platform. The Mersey also houses Birkenhead ferry terminal, and Tranmere oil terminal, as well as the entrance to the Manchester Ship Canal.

The limits of the Port of Liverpool extend into Liverpool Bay. The existing platforms at both Lennox and Hamilton are within the port limits, as is a section of the proposed cable to the Lennox field. The Port of Liverpool operates a VTS with an information service and operates radar surveillance. Pilotage for the Port of Liverpool is compulsory for all vessels of length greater than 82 m, and for all vessels carrying hazardous cargoes, or 12 or more passengers. The pilot boarding station is located at the entrance to the Queen's Channel, though it is noted that in adverse weather, pilots may board further west off Point Lynas.

The Port of Mostyn is located within the River Dee, to the south of the proposed development. Entrance to the Dee is via the Welsh Channel, which the port limits of Mostyn extend to cover. The Welsh Channel is approximately 500 m wide, and is crossed by the proposed cable route close to the landfall at Point of Ayr. The Port of Mostyn lies within the Dee Conservancy, with the port authority being the Dee Conservancy Harbour Authority, which is part of Natural Resources Wales. Pilotage to the Port of Mostyn or the River Dee is compulsory for all vessels over 20 m.

Other ports and harbours in the area include Rhyl, Colwyn Bay, Llanddulas and Conwy.

7.5 IMO Routeing Measures

Figure 7.5 presents the IMO routeing measures in place in proximity to the Proposed Development.

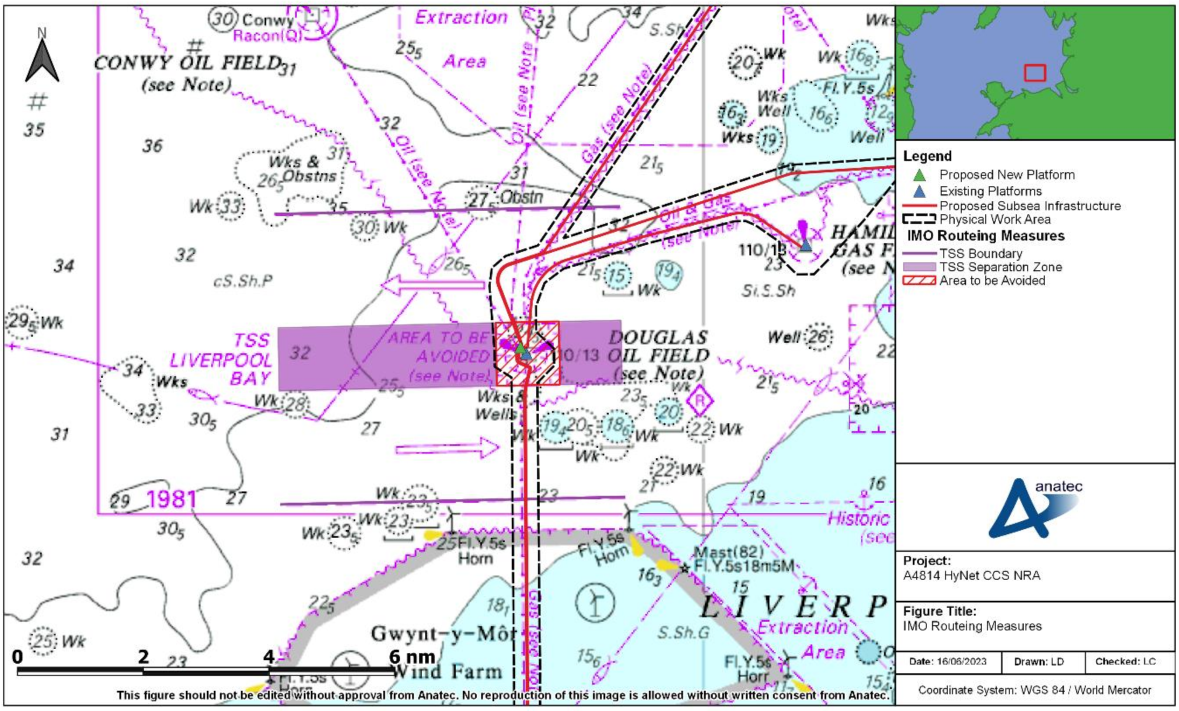

Figure 7.5: IMO Routeing Measures

The most significant routeing measure in the area is the Liverpool Bay TSS, which the proposed cable route intersects, as the existing Douglas complex is located in between the two lanes of the TSS. In addition to a 500m safety zone, the Douglas complex is also surrounded with an Area to be Avoided (ATBA) which fills the gap in the separation zone of the TSS.

7.6 Anchoring Areas

Figure 7.6 presents an overview of the designated anchoring areas within the study area.

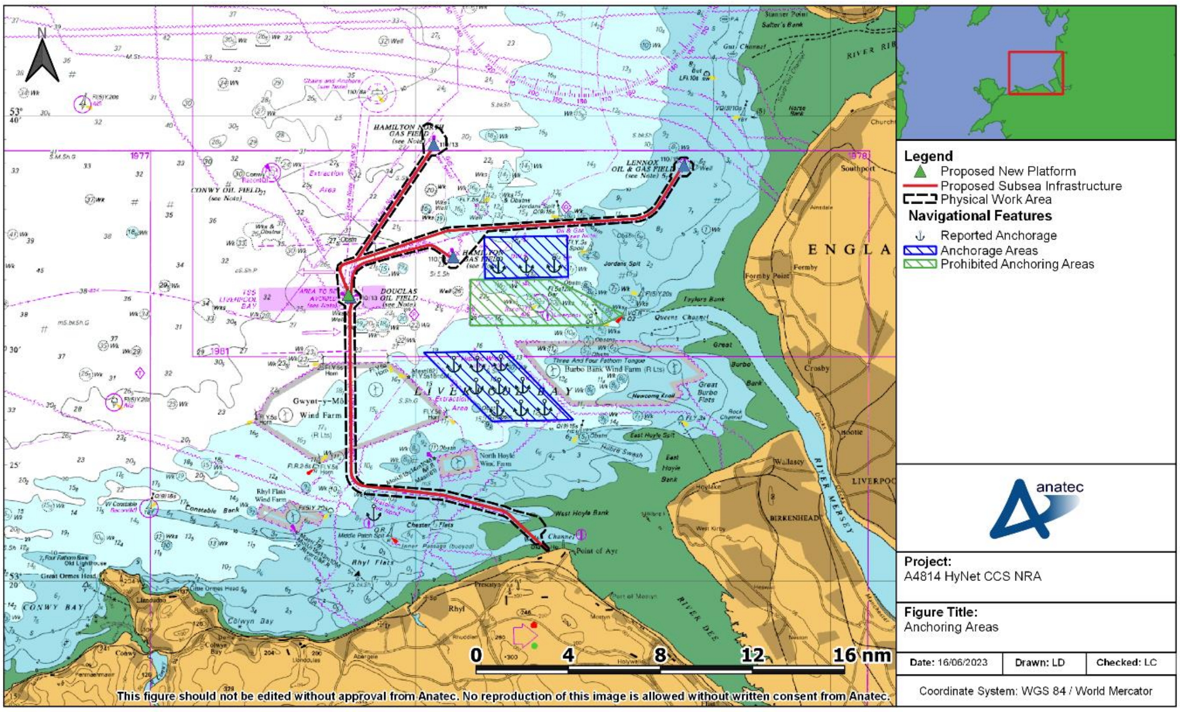

Figure 7.6: Anchoring Areas

There are three notable anchorage areas in proximity to the Proposed Development. The northernmost of these is located approximately 0.5 nm south of the cable route to Lennox, with this noted as a deep water anchorage, containing three anchor berths. A prohibited anchoring area borders this area to the south.

Further south, between the Burbo Bank and Gwynt y Môr wind farms, an anchorage area with nine anchor berths is located. A further reported anchorage is located south of the Douglas – Point of Ayr cable route, close to the outer pilot boarding area for the Port of Mostyn.

7.7 Aids to Navigation and Charted Wrecks

Figure 7.7 presents the charted wrecks and aids to navigation (AtoN) in the vicinity of the proposed development.

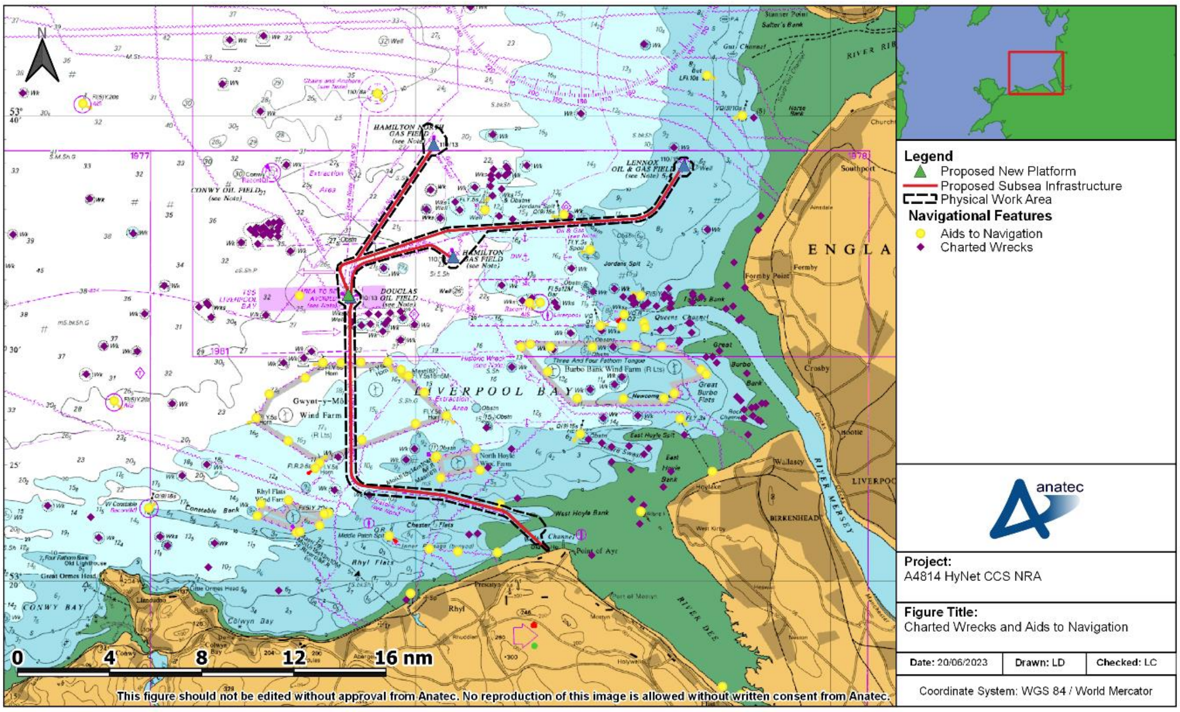

Figure 7.7: Charted Wrecks and Aids to Navigation

There are a number of AtoNs throughout the study area, including buoys marking various channels, such as the Queen's Channel and the Welsh Channel, which serve as the main entrances to the ports of Liverpool and Mostyn respectively. The various wind farms within the study area have peripheral turbines marked and lit as significant peripheral structures, serving as AtoN.

There are several charted wrecks in the area, with notable clusters around the Douglas field, to the southeast and northwest. There are also a large number on the banks and shallow waters close to shore. There is one wreck within the Physical Work Area, located approximately 1.2 nm south of the proposed Douglas platform. There is also a historic wreck located on the edge of the physical work area, approximately 600 m to the south of the cable route.

8 Emergency Response Overview

This section summarises the existing emergency response resources (including SAR) and reviews historical maritime incident data to establish baseline incident rates in proximity to the proposed development.

8.1 SAR Helicopters

In July 2022, the Bristow Group were awarded a new 10 year contract by the MCA (as an executive agency of the DfT) commencing in September 2024 to provide helicopter SAR operations in the UK. Bristow have been operating the service since April 2015.

There are currently ten base locations for the SAR helicopter service. The most relevant station to the proposed development is at Caernarfon, located approximately 32 nm to the southwest of the proposed development. The base houses two Sikorsky S-92 helicopters, with an operational range of 458 nm. Other bases which were recorded responding to incidents in the study area were Humberside, located 100 nm to the east of the proposed development, St Athan, approximately 120 nm to the south and Lee on Solent, 174 nm to the southeast. Figure 8.1 presents the location of Caernarfon helicopter base relative to the study area, as well as the SAR helicopter taskings recorded within the study area between April 2015 and March 2022.

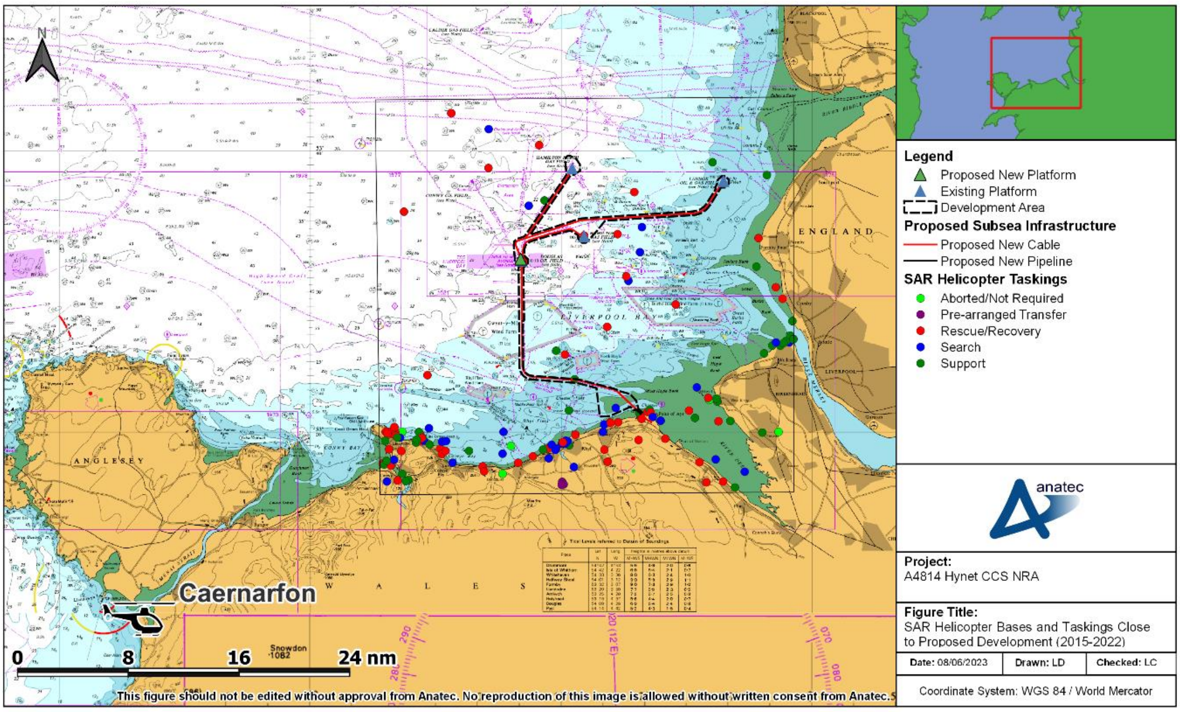

Figure 8.1: SAR Helicopter Bases and Taskings Close to Proposed Development (2015-2022)

Between April 2015 and March 2022, 153 helicopter taskings were recorded within the study area. The majority of these were concentrated in coastal areas, primarily on the Welsh coast south of the proposed development. There were several taskings in close proximity to the landfall of the cable at Point of Ayr. There were 15 taskings recorded within the development area, with 12 of these being rescue/recovery operations, two support operations and one search operation. Twelve taskings were recorded in close proximity to the Douglas complex. Rescue/recovery operations were the most common type within the study area, accounting for 46% of taskings, followed by support operations (25%) and search operations (24%). Caernarfon responded to 95% of taskings within the study area.

8.2 RNLI

The RNLI operate a fleet of more than 350 lifeboats based out of more than 230 stations across the UK and Ireland, including both all-weather lifeboats (ALBs) and inshore lifeboats (ILBs). There are numerous RNLI stations in proximity to the proposed development, which are presented in Figure 8.2.

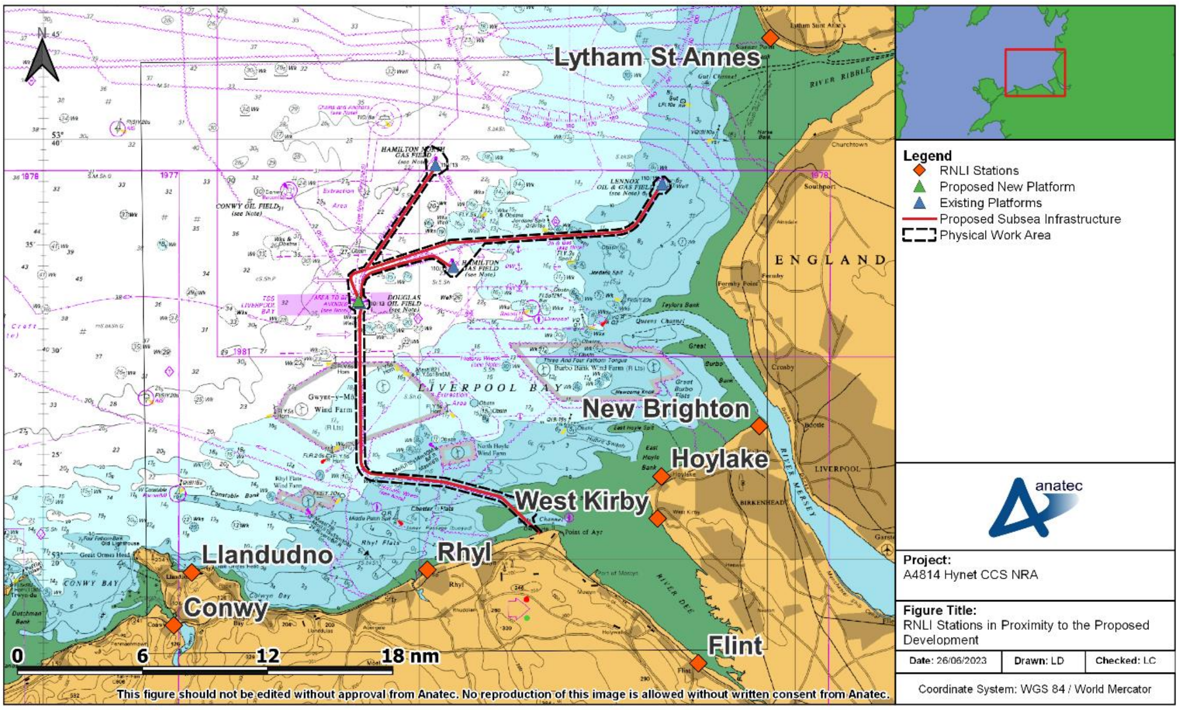

Figure 8.2: RNLI Stations in Proximity to the Proposed Development

RNLI incident data covering 2013-2022 has also been analysed to establish the types and frequency of incidents occurring in the study area. Rhyl responded to 34% of incidents within the study area, with New Brighton (14%), Llandudno (13%), Conwy (13%) and Hoylake (11%) also responding to a significant proportion of incidents. RNLI incidents within the study area, colour-coded by incident type, are presented in Figure 8.3.

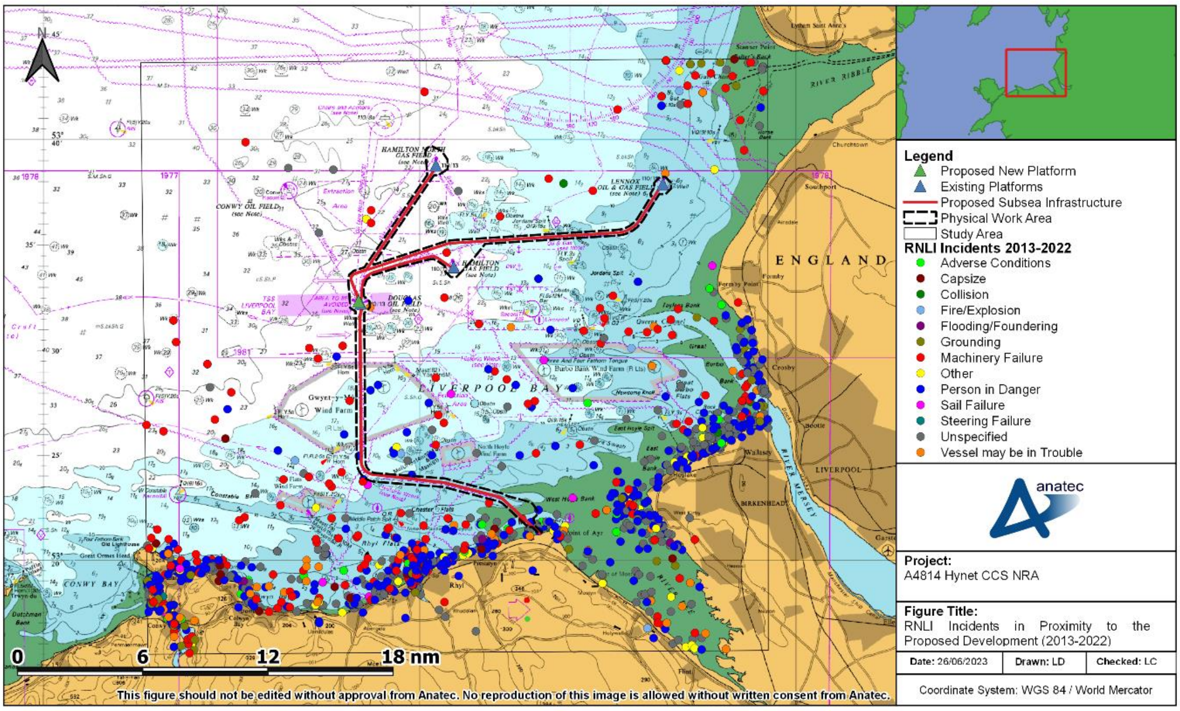

Figure 8.3: RNLI Incidents in Proximity to the Proposed Development (2013-2022)

Over the ten year period between 2013 and 2022, there were an average of 158 RNLI callouts per year within the study area, with these generally concentrated in coastal areas. Figure 8.4 presents the distribution of incident types reported by the RNLI.

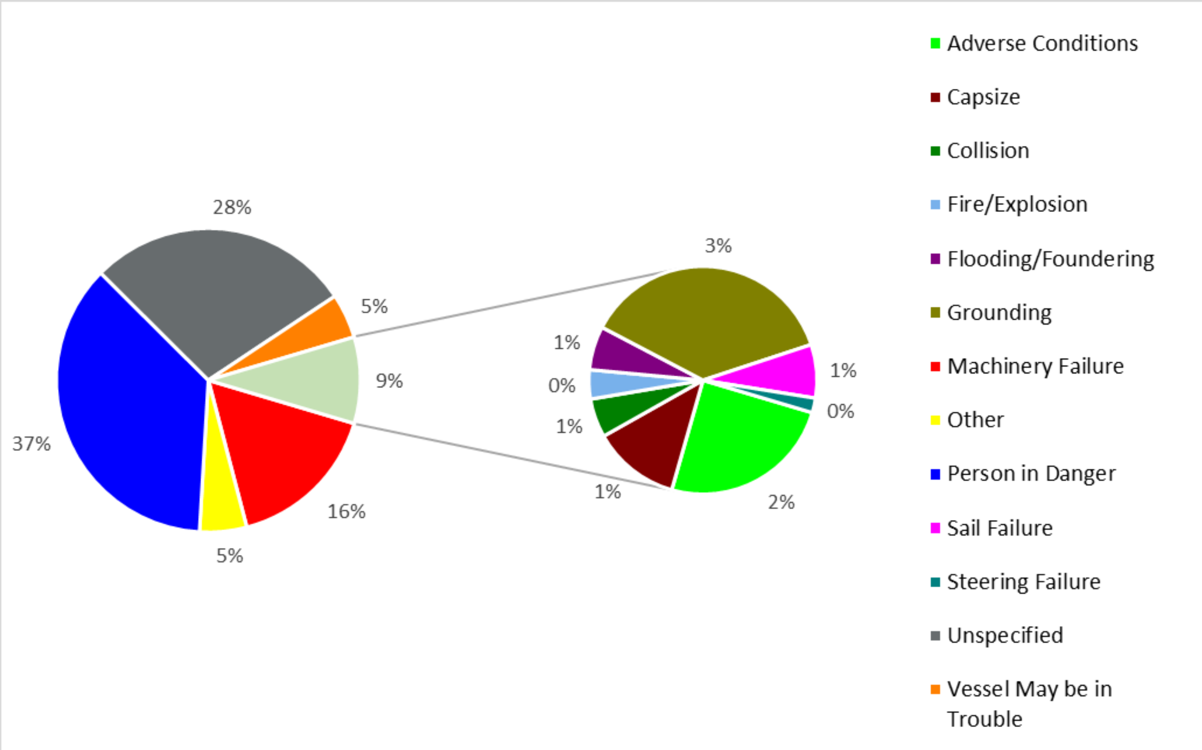

Figure 8.4 : RNLI Incident Type Distribution (2013-2022)

The most common type of incident recorded was "Person in Danger", accounting for 37% of incidents, followed by machinery failures (16%). A significant number of incidents were of unspecified type, with these generally located in coastal areas.

After "Person in Danger" incidents, the most common casualty types were recreational vessels (25%) and personal craft (10%). Again a significant proportion of incidents were classed as having unspecified casualties. Incidents involving fishing vessels, wind farm vessels and oil and gas vessels were recorded within the study area.

Within the Physical Work Area, there were a total of six incidents recorded in the 10 year period, with three machinery failures and three "person in danger" incidents.

8.3 Marine Rescue Coordination Centres and Joint Rescue Coordination Centres

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

The HMCG coordinates SAR operations through a network of 11 Maritime Rescue Coordination Centres (MRCC), including a Joint Rescue Coordination Centre (JRCC) based in Hampshire.

All of the MCA's operations, including SAR, are divided into 18 geographical regions. The proposed development is within Area 15: "Great Orme to West Scottish Border including the Lakes". The closest MRCC to the proposed development is at Holyhead, located approximately 40nm to the west. It is noted that incident response is not necessarily coordinated by the nearest MRCC, as operators may be unavailable and calls re-routed to another MRCC.

8.4 MAIB

All UK flagged vessels and non-UK flagged vessels in UK territorial waters (12nm), a UK port or carrying passengers to a UK port are required to report incidents to the MAIB. Data arising from these reports are assessed within this section, covering the ten-year period between 2012 and 2021. Figure 8.5 presents the locations of incidents recorded within the study area, colour-coded by incident type.

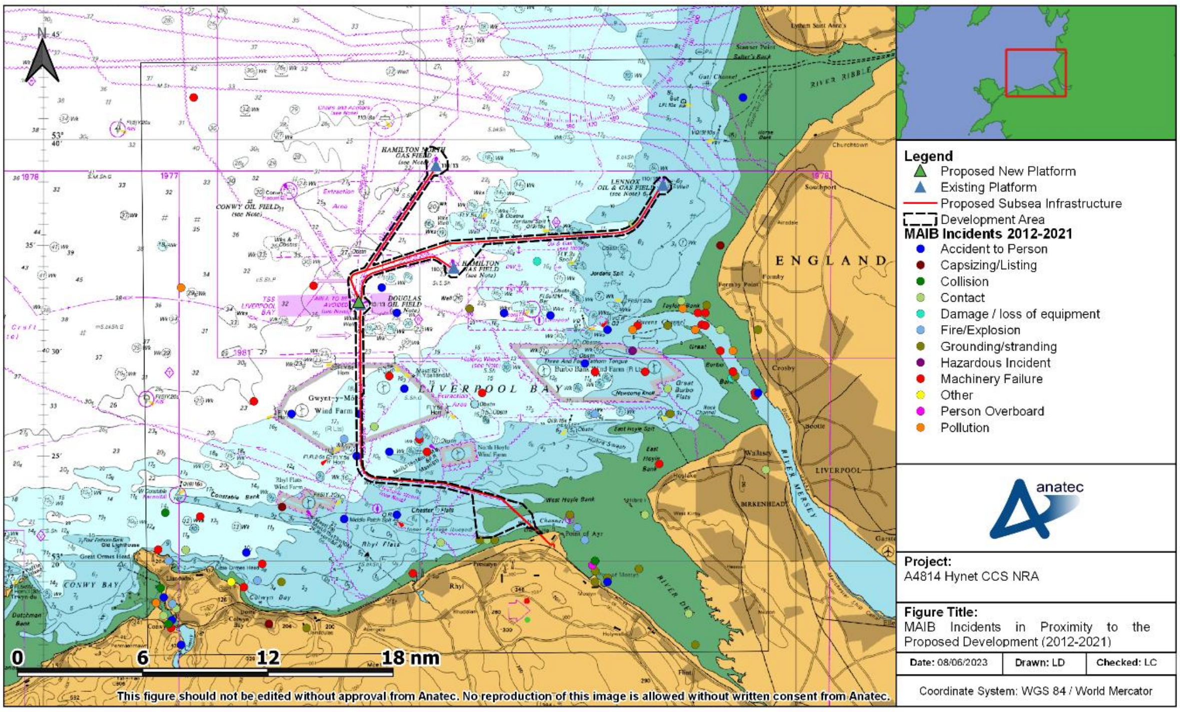

Figure 8.5: MAIB Incidents in Proximity to the Proposed Development (2012-2021)

Over the ten year period, there was an average of 12 to 13 incidents per year recorded within the study area. The most common incident types were machinery failures (22%), "Accident to Person" (19%) and grounding/stranding incidents (18%). The most common type of vessel involved in incidents was "other commercial", which includes vessels such as workboats, dredgers, SAR craft and tugs, and accounted for 36% of incidents recorded by the MAIB. Cargo vessels (22%), service ships (15%) and recreational craft (11%) also accounted for a significant number of incidents within the study area. The distribution of the vessel type impacted by incidents as reported by the MAIB is presented in Figure 8.6.

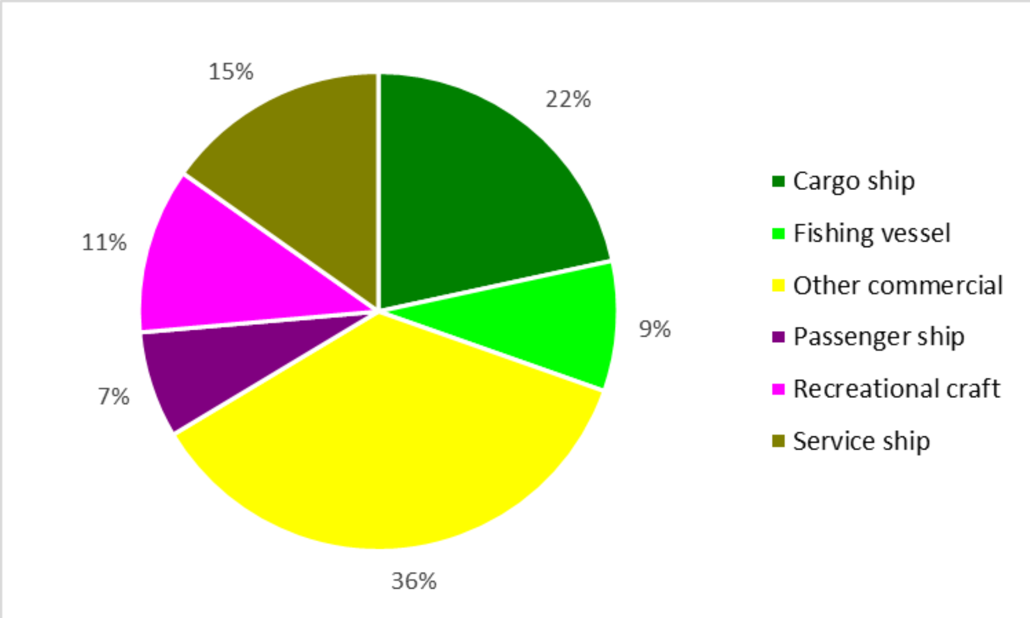

Figure 8.6: MAIB Incident Distribution by Vessel Type (2012 – 2021)

9 Vessel Traffic Movements

9.1 Introduction

This section presents an overview of vessel traffic movements within the study area, identified from the 12 months of AIS data from 1 January to 31 December 2022.

A number of the vessel tracks recorded were classified as temporary (non-routine), such as the tracks of vessel undertaking surveys. These have therefore been excluded to ensure the analysis is not skewed and gives a fair representation of normal vessel traffic movements in the area.

9.2 Vessel Numbers

Figure 9.1 presents the average daily unique vessel count within the study area and within the Physical Work Area per month.

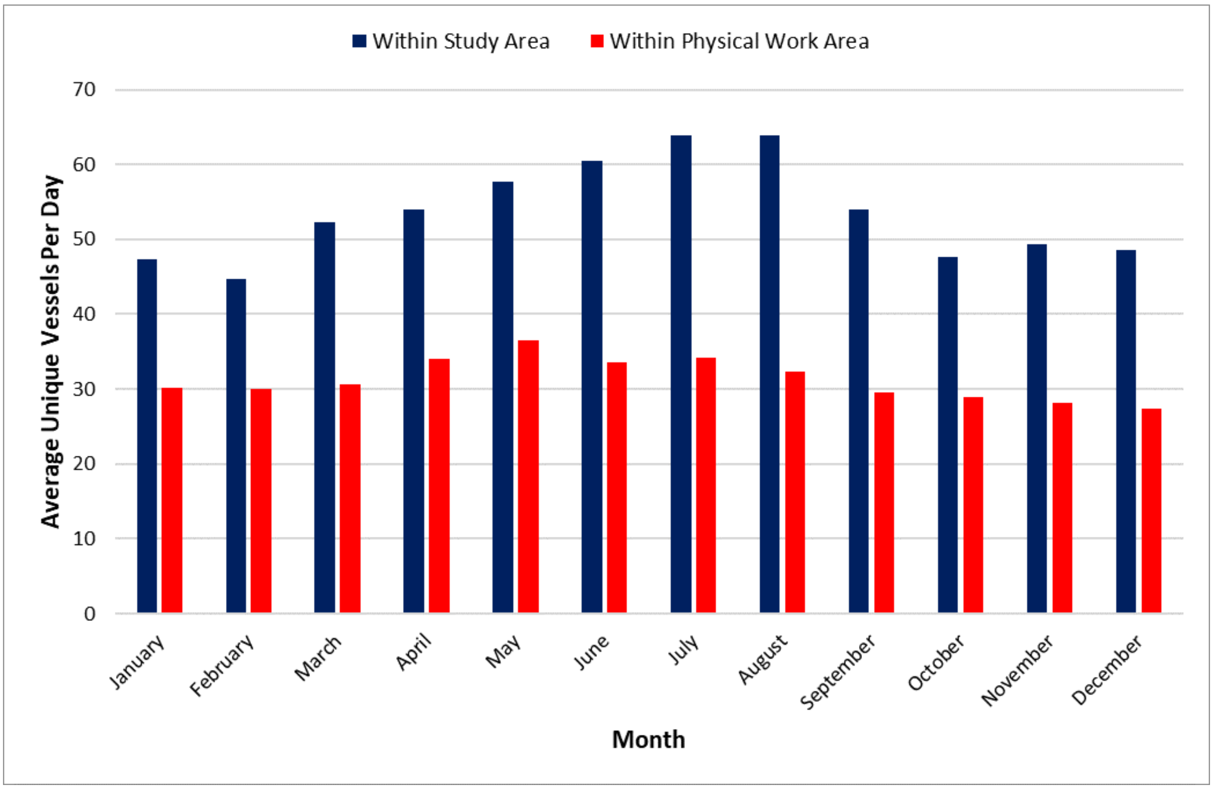

Figure 9.1: Average Daily Vessel Count per Month

There was an average of 54 unique vessels per day[4] within the study area during 2022. July was the busiest month of the year, with an average of 64 vessels per day, while the quietest month was February, with an average of 45 vessels per day. The difference between the summer and winter months can be attributed to an increase in passenger, recreational and

[4] Unique vessels per day is preferred to AIS track counts in order to avoid the over-counting of vessels due to multiple transits or broken AIS tracks.

wind farm support activity during the summer months. Within the Physical Work Area, there were an average of 31 vessels per day, with the most vessels recorded in May with 36 vessels per day, compared with a low of 27 per day in December.

9.3 Vessel Type

Figure 9.2 presents the AIS tracks colour-coded by vessel type.

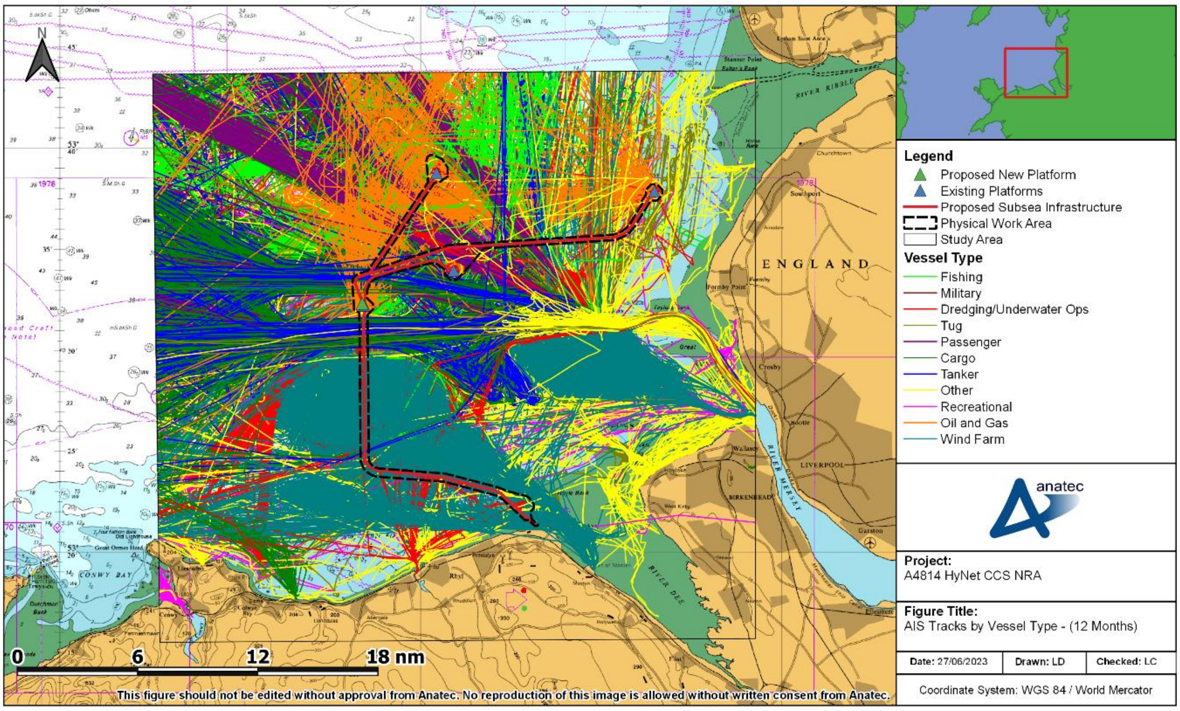

Figure 9.2: AIS Tracks by Vessel Type – (12 Months)

Wind farm support vessels were mostly recorded within and on passage to the various wind farms in the study area, with ports such as Mostyn and Liverpool serving as operation ports for wind farm support vessels. Vessels transiting to Mostyn utilise the Welsh Channel, which is intersected by the cable route between Douglas and Point of Ayr. Wind farm support vessels were also recorded transiting to Bangor, west of the study area. Oil and gas support vessels were typically recorded in the northern extent of the study area, in proximity to the Liverpool Bay fields such as Hamilton, Douglas and Lennox. Vessels were also recorded on passage to the Morecambe and Calder fields, north of the study area, with Liverpool acting as a key port for the oil and gas industry in the Irish Sea. Vessels were recorded throughout the Physical Work Area, particularly crossing it in the Liverpool Bay TSS, and in the near shore area. Oil and gas vessels and fishing vessels were also recorded operating in the north of the study area close to the cable routes.

Routeing of the main vessel types is discussed in Sections 9.3.1 to 9.3.4, while fishing vessel activity is described in Section 9.8. Figure 9.3 presents the vessel type distribution within the study area, based on unique vessels per day.

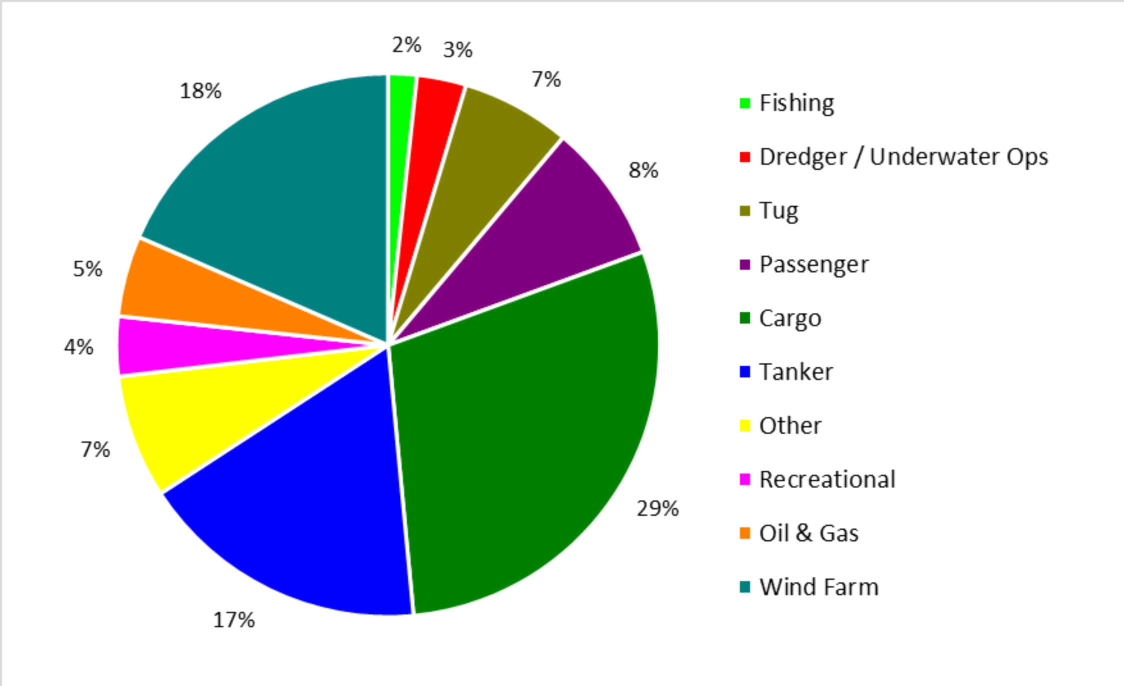

Figure 9.3: Vessel Type Distribution

The most common vessel type within the study area was cargo vessels, accounting for 29% of vessels. This was followed by wind farm vessels (18%) and tankers (17%). Vessels in the 'other' category, which accounted for 7% of traffic, included pilot vessels, research/survey vessels in transit and RNLI lifeboats.

9.3.1 Cargo Vessels and Tankers

The tracks of cargo vessels and tankers are presented in Figure 9.4 to provide a clearer overview of the routes followed by these vessels.

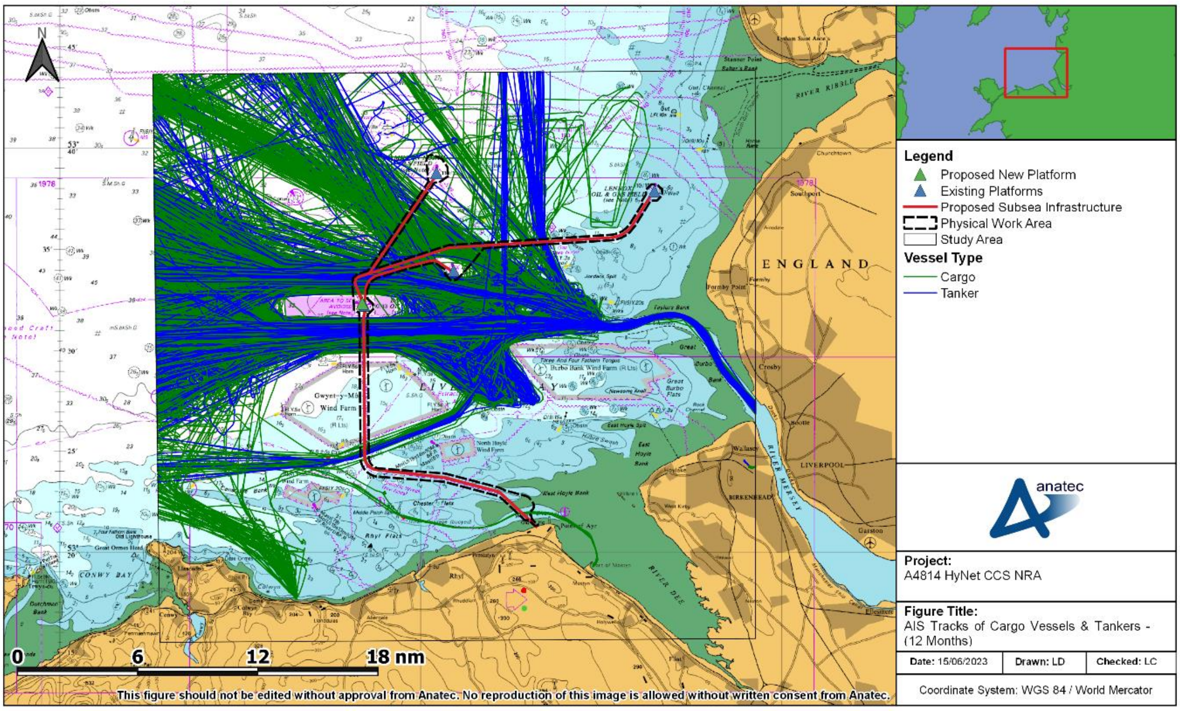

Figure 9.4: AIS Tracks of Cargo Vessels and Tankers – (12 Months)

There was an average of 16 cargo vessels and 9 tankers per day[5] within the study area. It can be seen that the cargo vessel and tanker traffic within the area is primarily related to vessels visiting Liverpool, with a high volume of these vessels recorded using the Queen's Channel. Vessels of these types were frequently recorded using the two lanes of the Liverpool Bay TSS, which crosses the cable routes, heading east-west through the study area, while transits heading northwest to southeast were also common. Further vessel routes were recorded crossing the cable route heading north-south and NW-SE through the study area on passage to destinations such as Ireland. Vessels were also frequently recorded at anchor in the anchorages within Liverpool Bay, which is further discussed in Section 9.7.

9.3.2 Passenger Vessels

Figure 9.5 presents the tracks of passenger vessels recorded within the study area.

[5] Based on unique vessels per day

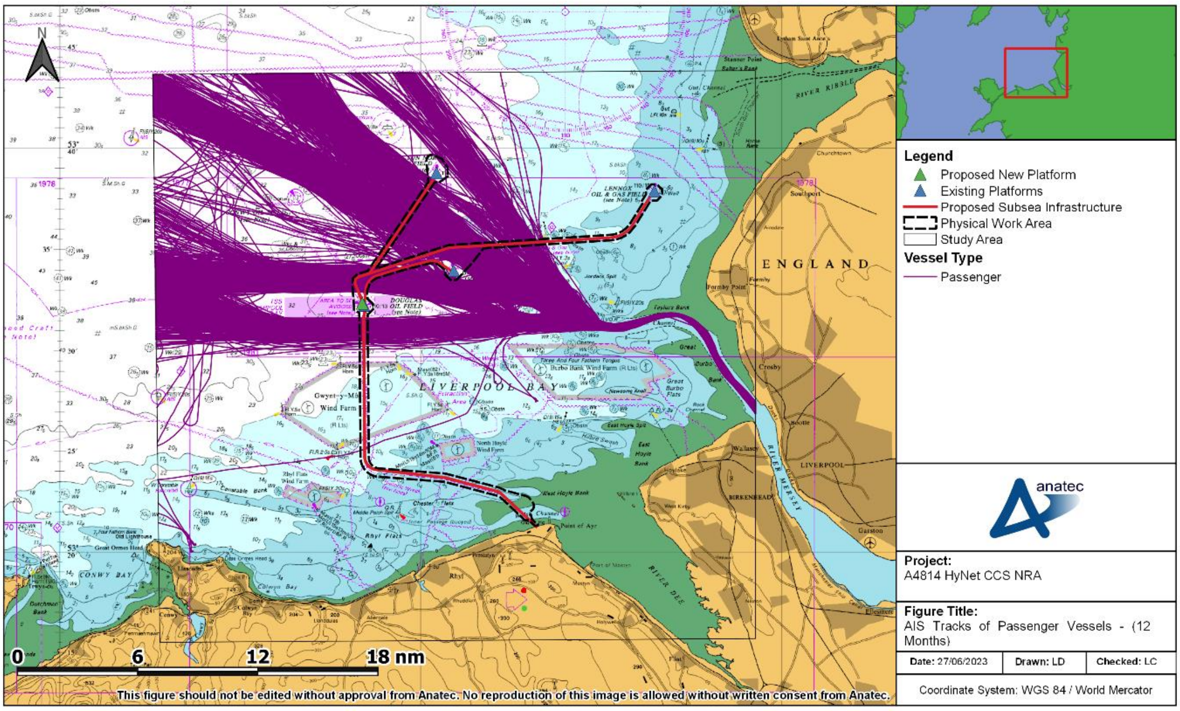

Figure 9.5: AIS Tracks of Passenger Vessels – (12 Months)

There was an average of four to five passenger vessels per day[6] recorded within the study area during 2022. Passenger vessels recorded within the study area included both cruise ships visiting the Port of Liverpool, as well as regular ferries on routes to destinations including the Isle of Man, Dublin and Belfast. The majority of passenger vessels were recorded either entering or leaving Liverpool, with main routes passing to the northwest of the study area (typically routes to Belfast), while the majority of the largest passenger vessels were recorded utilising the Liverpool Bay TSS.

Cruise ships were recorded frequently within the study area, with destinations such as Ireland, Iceland and Spain frequently reported, while the Port of Liverpool hosts an active cruise terminal. The largest cruise ship was 326 m in length, recorded both entering and exiting the Port of Liverpool via the Queen's Channel and the Liverpool Bay TSS in May 2022.

9.3.3 Wind Farm Vessels

Figure 9.5 presents the tracks of wind farm vessels recorded within the study area.

[6] Based on unique vessels per day

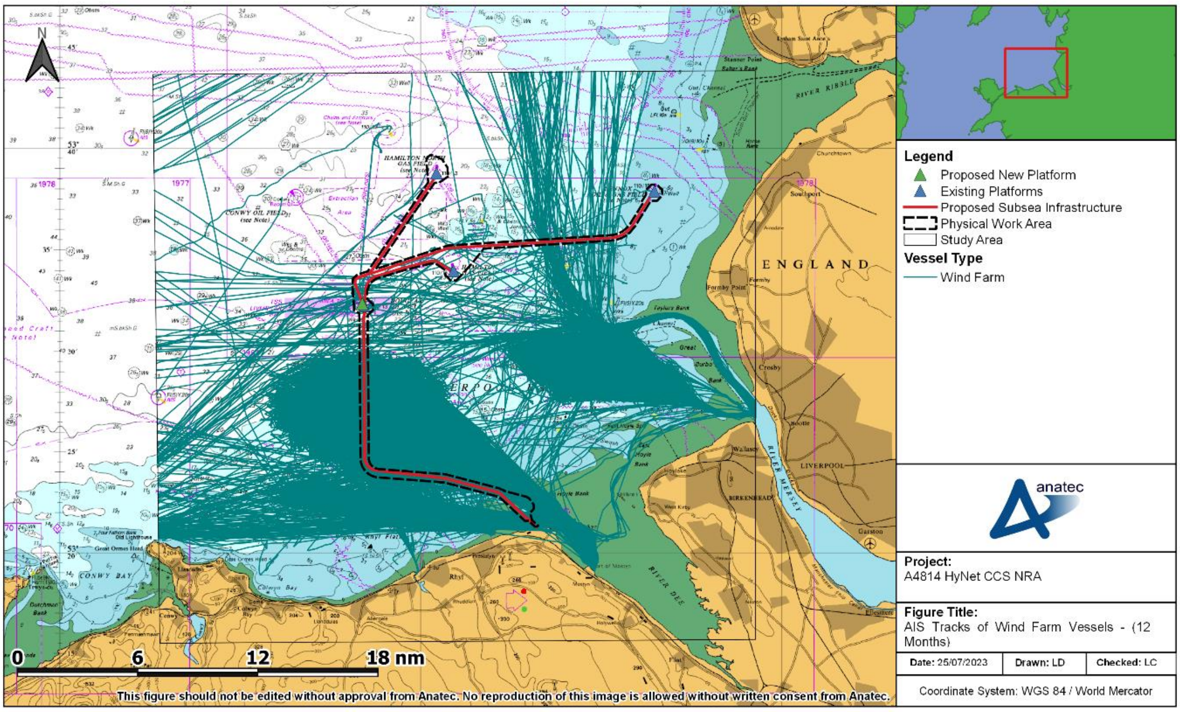

Figure 9.6: AIS Tracks of Wind Farm Vessels – (12 Months)

There were an average of 10 wind farm vessels recorded per day[7]. Wind farm vessels were primarily recorded working at the wind farms within the study area such as Burbo Bank, Gwynt y Môr, North Hoyle and Rhyl Flats. The main ports used by wind farm vessels were Mostyn, which was recorded serving all four wind farms, and the Port of Liverpool, which primarily served Burbo Bank. Wind farms vessels were recorded crossing the Proposed Development within the Welsh Channel, when entering or exiting Mostyn, and while working at Gwynt y Môr. Vessels were also recorded passing close to the Douglas location and crossing the cable route to Lennox while on passage to the north.

9.3.4 Recreational Vessels

Figure 9.7 presents the tracks of recreational vessels recorded in the study area, colour-coded by vessel length.

[7] Based on unique vessels per day

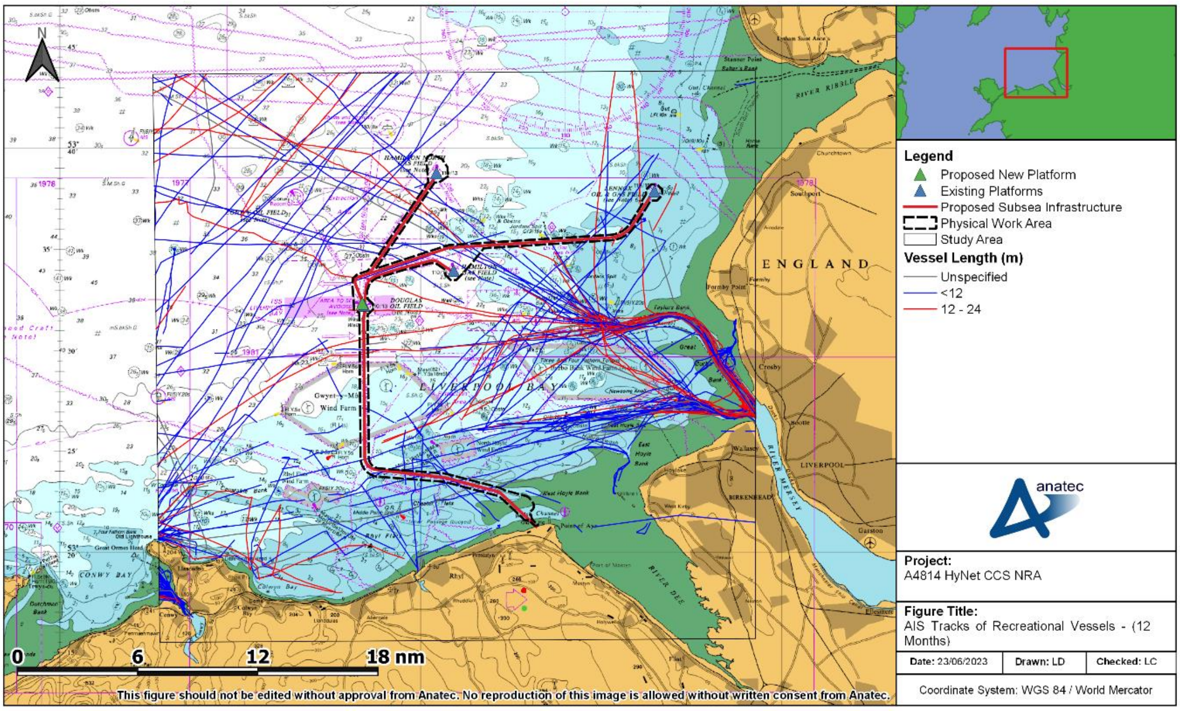

Figure 9.7: Recreational Vessels – (12 Months)

Recreational activity was recorded on AIS throughout the study area, with the smallest recreational vessels (less than 9m in length) typically recorded close to the shore, particularly heading east-west along the Welsh coastline. The majority of recreational activity was recorded emerging from the River Mersey via both the Queen's Channel and the Rock Channel, with vessels also recorded visiting Formby, just to the north of the Mersey. A number of recreational vessels were also recorded further offshore, passing to the northwest of the Proposed Development and the other fields within Liverpool Bay. Recreational vessels were recorded crossing the Proposed Development across the extent of the cable routes.

Figure 9.8 presents the number of recreational vessels recorded within the study area per month[8]. It is noted that recreational activity is likely to be under-represented as recreational craft are not required to broadcast on AIS.

[8] Based on unique vessels per day

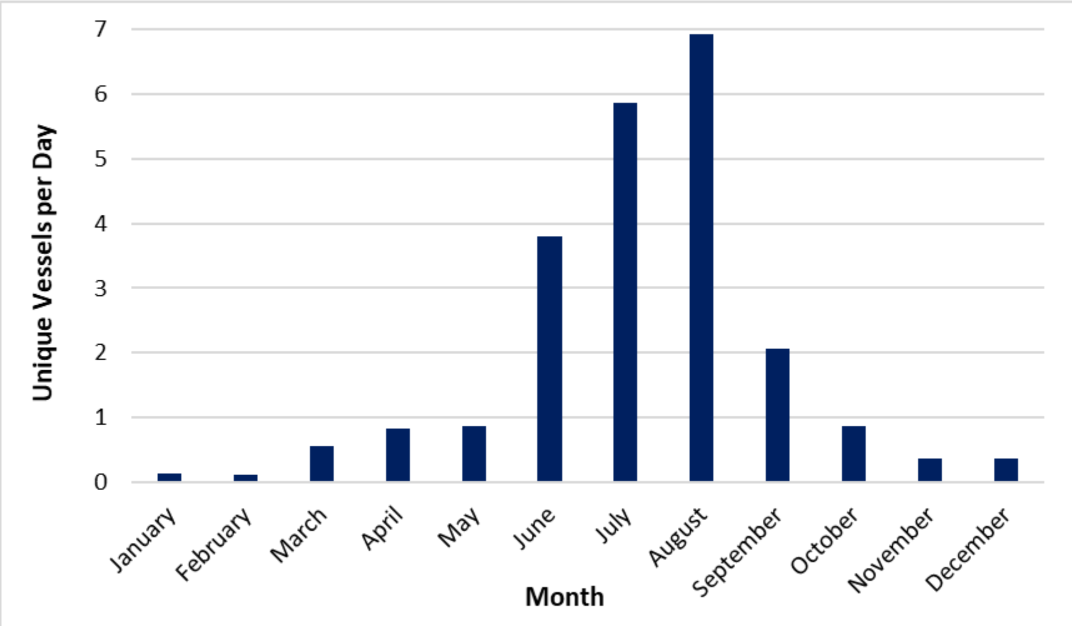

Figure 9.8: Daily Recreational Vessel Count per Month

It can be seen that recreational vessels were predominantly recorded within the study in the summer months (June to August), peaking at an average of approximately seven recreational vessels per day in August. Recreational activity was low outside of the summer period, with less than one recreational vessel recorded per day on average from January to May and from October to December.

9.4 Vessel Density

Figure 9.9 presents the vessel density for all AIS vessel tracks based on the number of tracks intersecting each cell of a 500 m x 500 m grid covering the study area. The cells are colour-coded such that approximately 20% of cells fall into each category.

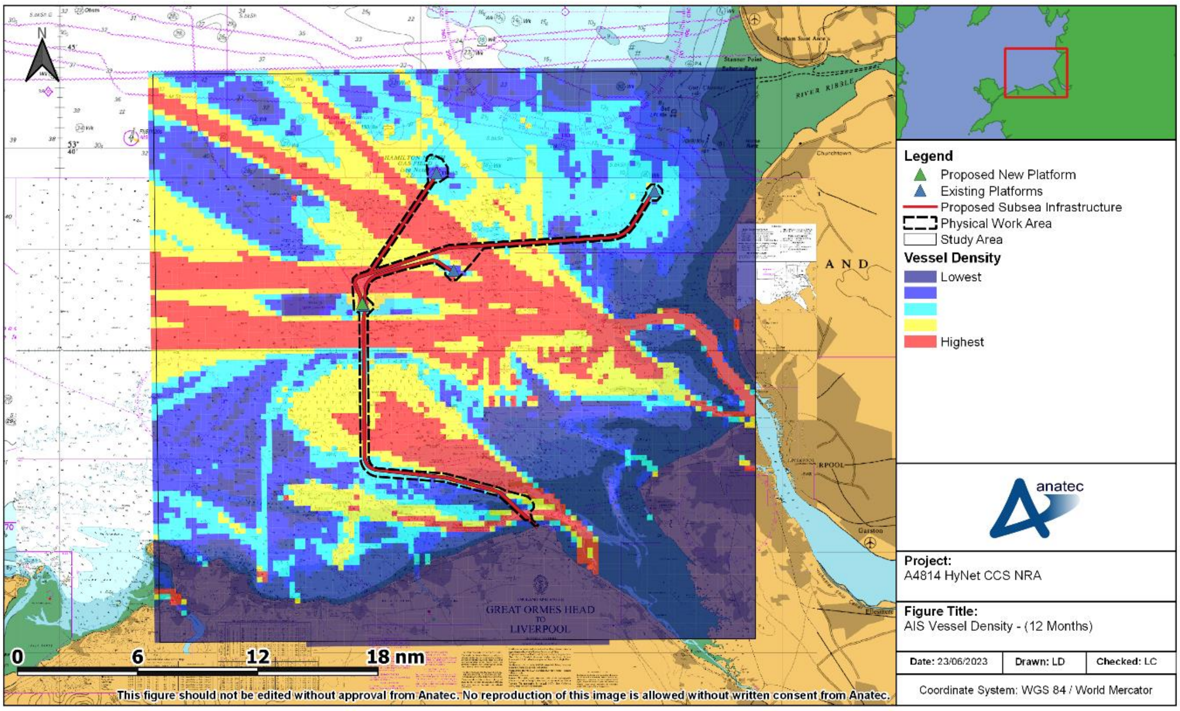

Figure 9.9: AIS Vessel Density – (12 Months)

High-density cells within the study are associated with busy vessel routes, such as those using the Queen's Channel which serves as an entrance to Liverpool, as well as other ports within the study area. Wind farm vessels transiting to/from and working within the various wind farms within the study area also correspond to regions of high density, as do the two lanes of the Liverpool Bay TSS passing north and south of the Douglas complex. Further high-density is observed on the NW-SE routes used by the regular ferries running from Liverpool to Ireland.

Lower density areas tend to be around the coastal waters, and in the NE corner of the study area. The proposed cable routes pass through a number of high density regions of the study area, including the Gwynt-y- Môr wind farm, both lanes of the Liverpool Bay TSS, as well as the routes passing to the NW corner of the study area and the wind farm traffic associated with the Port of Mostyn and the Rhyl Flats wind farm. Density in proximity to the proposed Douglas CCS platform is elevated due to traffic visiting the existing Douglas complex.

9.5 Vessel Sizes

9.5.1 Vessel Length

Figure 9.10 presents the AIS tracks colour-coded by vessel length. The vessel length distribution is then presented in Figure 9.11, based on unique vessels per day. It is noted that the distribution shown excludes vessels of unspecified length, which made up less than 1% of vessels recorded within the study area.

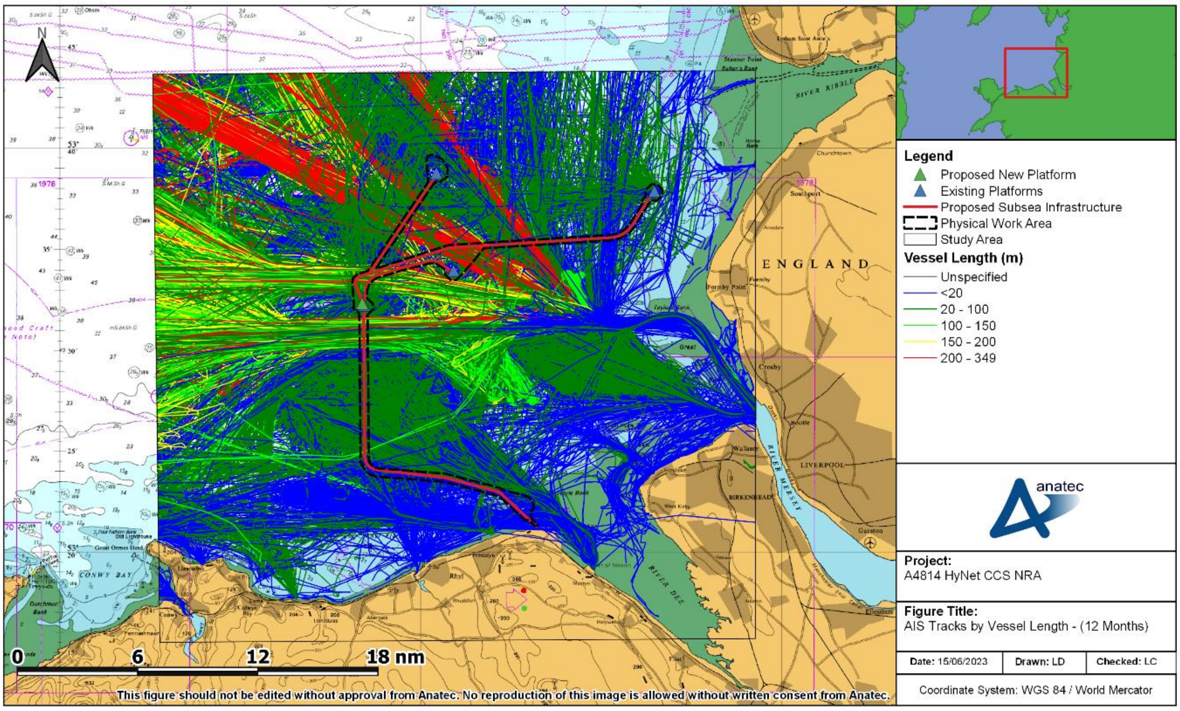

Figure 9.10: AIS Tracks by Vessel Length – (12 Months)

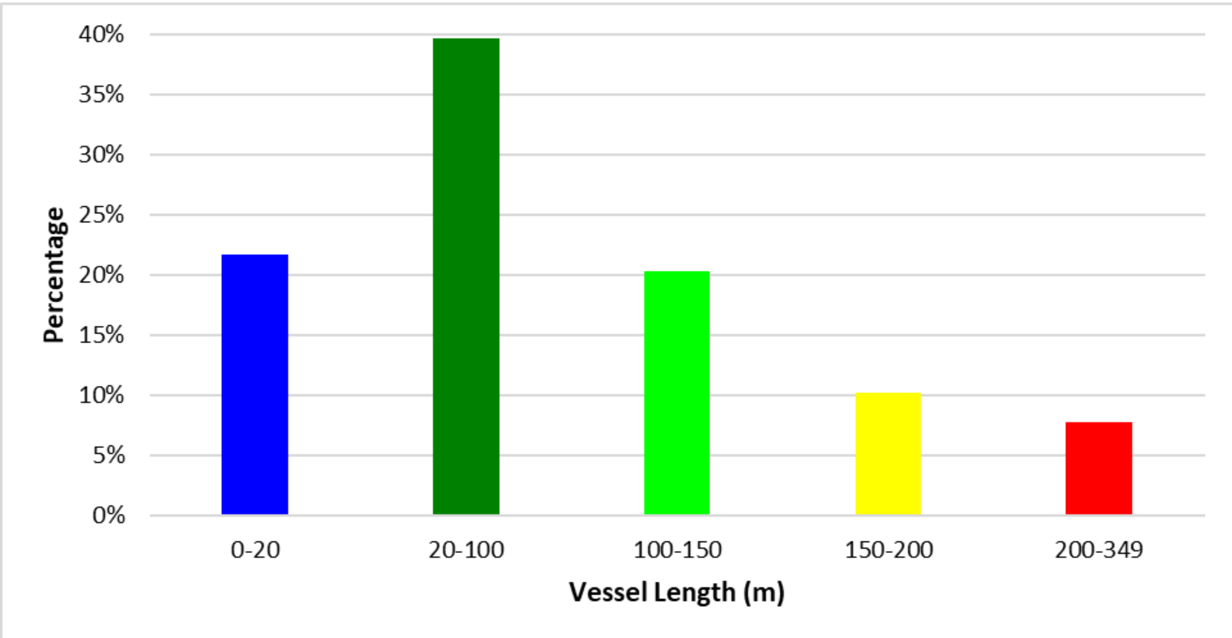

Figure 9.11: AIS Vessel Length Distribution

The largest vessels in the study area tended to be cargo vessels, tankers and passenger vessels, which were generally recorded using the Queen's Channel while visiting Liverpool, or within the Liverpool Bay TSS. Vessels of greater than 200 m were also recorded on the ferry routes passing between Liverpool and Belfast. Smaller vessels in the study area included wind farm support vessels, pilot vessels, lifeboats and fishing vessels, and were most frequently recorded in coastal areas and on routes to the wind farms. Fishing vessels were frequently recorded close to the various oil and gas fields within the study area. Due to the location of the TSS, the largest vessels therefore tended to cross the Proposed Development to the north and south of the Douglas location, while on approach or departure for Liverpool.

The average vessel length recorded within the study area was 91m. The largest vessel recorded within the study area was a 349 m container ship, recorded utilising the Liverpool Bay TSS on passage between Liverpool and Antwerp. The vessel was recorded transiting both in and out of Liverpool. Vessels were most commonly in the 20 to 100 m range, with only 8% of vessel greater than 200 m.

9.5.2 Vessel Draught

Figure 9.12 presents the AIS tracks colour-coded by vessel draught.

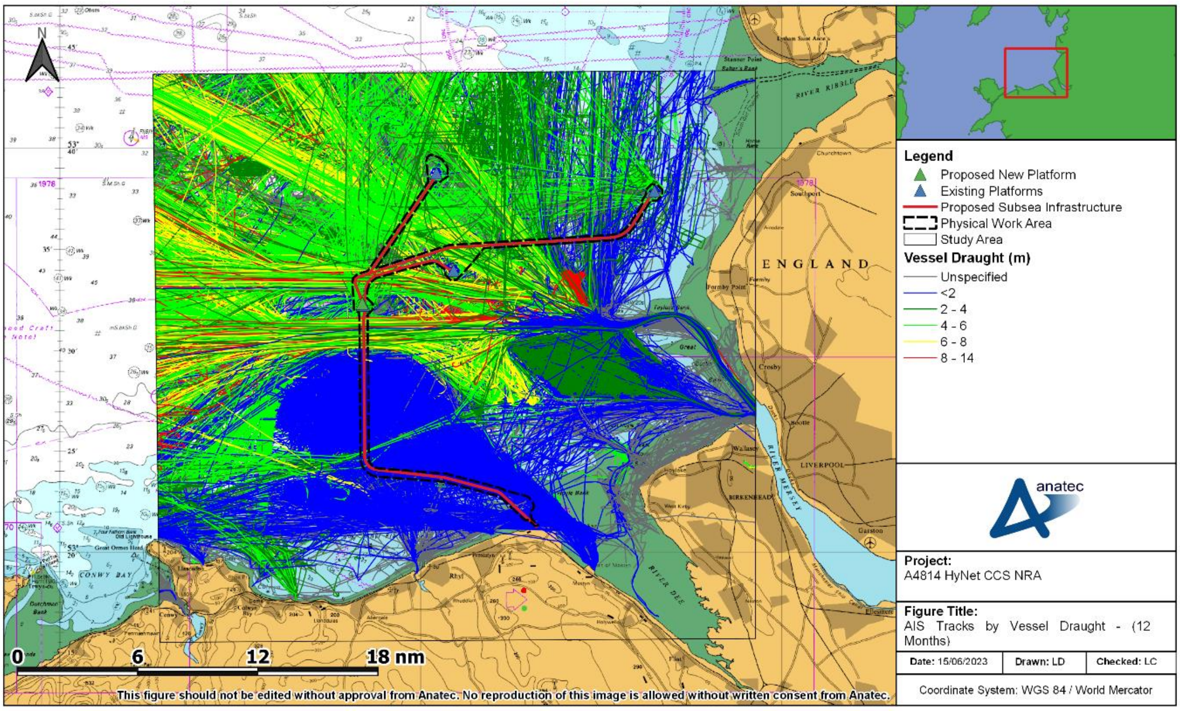

Figure 9.12: AIS Tracks by Vessel Draught – (12 Months)

The deepest draught vessels were typically recorded using the Liverpool Bay TSS, and were generally cargo vessels and tankers. Dredgers with draughts of greater than 8 m were also recorded working to the north of the Burbo Bank offshore wind farm. Shallower draught vessels included crew transfer vessels heading to the various wind farms within the study area, as well as pilot vessels and lifeboats working in coastal areas. Similar to vessel length, the deepest draught vessels crossing the Proposed Development were recorded using the Liverpool Bay TSS, with vessels crossing in the nearshore areas (such as wind farm vessels) tending to have shallower draughts.

Figure 9.13 presents the distribution of vessel draughts recorded within the study area.

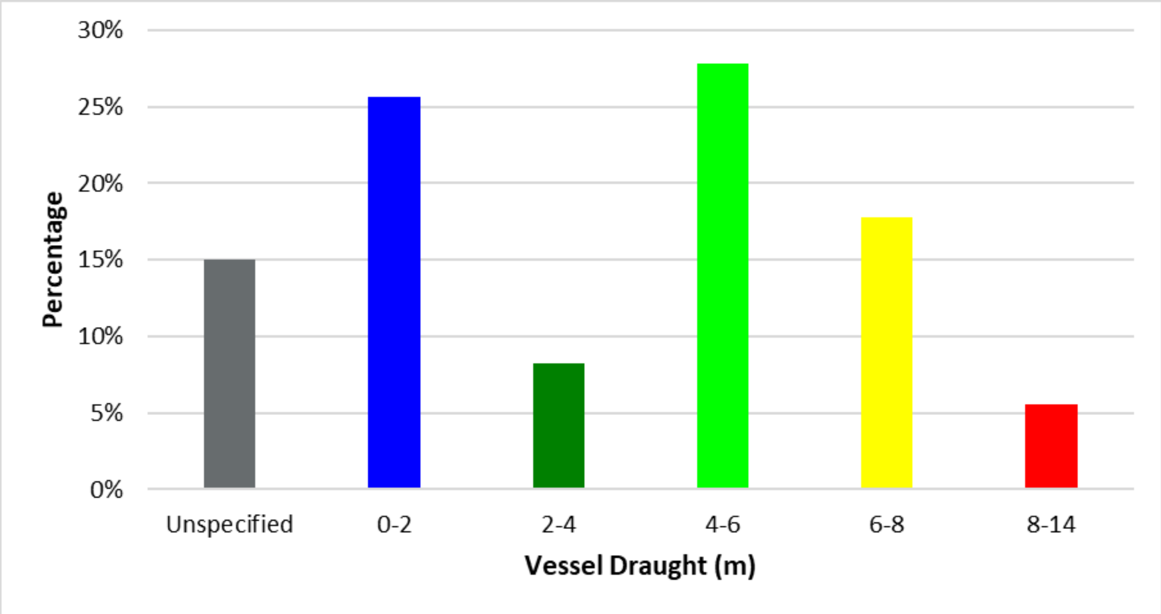

Figure 9.13: AIS Vessel Draught Distribution

The average draught of vessels recorded within the study area is 4.5 m, with the largest draught recorded being 14m. This largest draught was recorded by a crude oil tanker recorded using the Liverpool Bay TSS and the Queen's Channel heading to Tranmere from Algeria. It is noted that draught information was unavailable for approximately 15% of vessels on AIS.

9.5.3 Vessel Deadweight Tonnage

Figure 9.14 presents the tracks of vessels recorded within the study area during 2022, colour-coded by vessel deadweight tonnage (DWT). It is noted that DWT is not broadcast on AIS, and therefore has been researched separately by Anatec where possible, based on the ship identity information. In some cases, approximations were based on the vessel type and dimensions (mainly for small fishing vessels and recreational craft estimated to be less than 100 DWT). Figure 9.15 presents the distribution of vessel DWT within the study area.

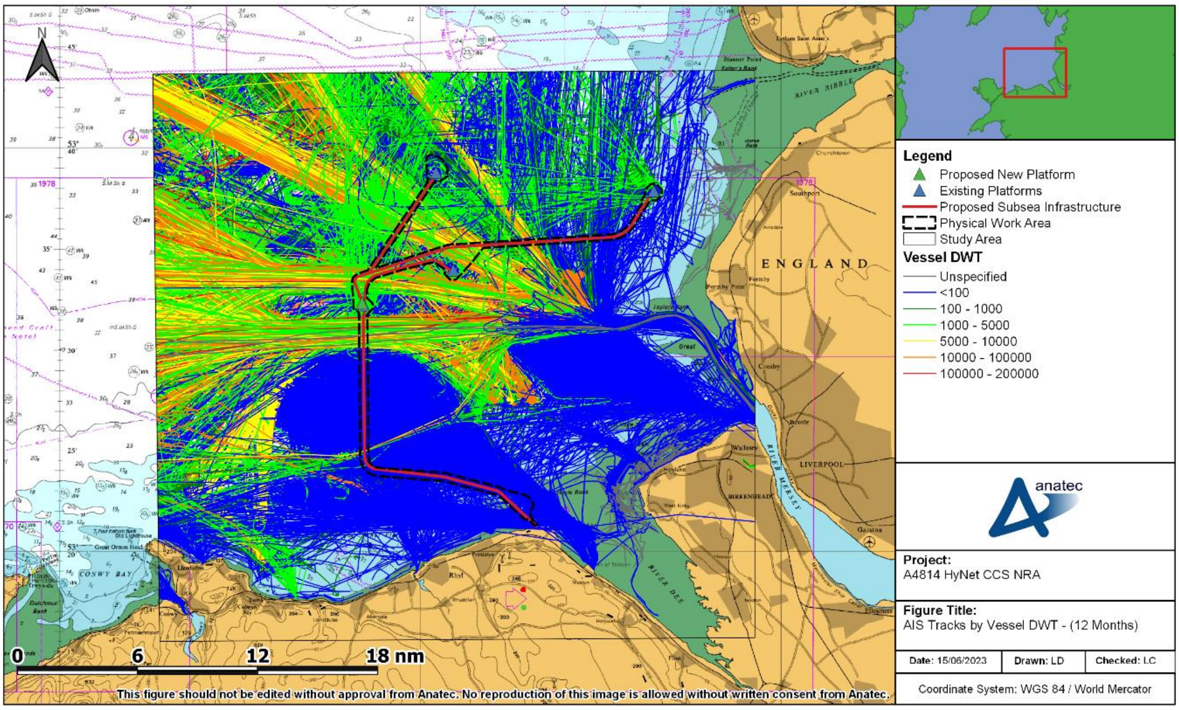

Figure 9.14: AIS Tracks by Vessel DWT – (12 Months)

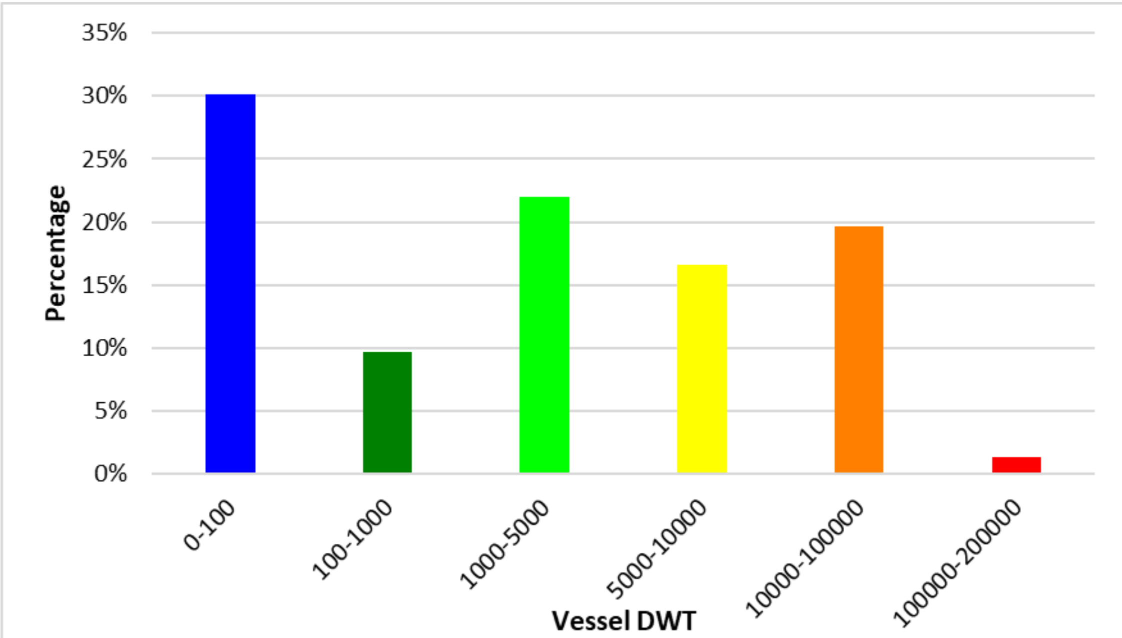

Figure 9.15: Vessel DWT Distribution

Vessel patterns in DWT follow a similar trend to length and draught, with the largest vessels typically being cargo vessels and tankers recorded transiting the Liverpool Bay TSS, or within the anchorages in Liverpool Bay. Smaller vessels tended to be associated with the wind farms in the area.

The average DWT of vessels recorded within the study area was 8644 DWT, with the largest vessel being a crude oil tanker with 164,608 DWT recorded visiting Tranmere via the Liverpool Bay TSS. Only 1% of vessels had a DWT greater than 100,000, with 30% of vessels falling under 100 DWT.

9.6 Vessel Speed

Figure 9.16 presents AIS tracks colour-coded by vessel speed.

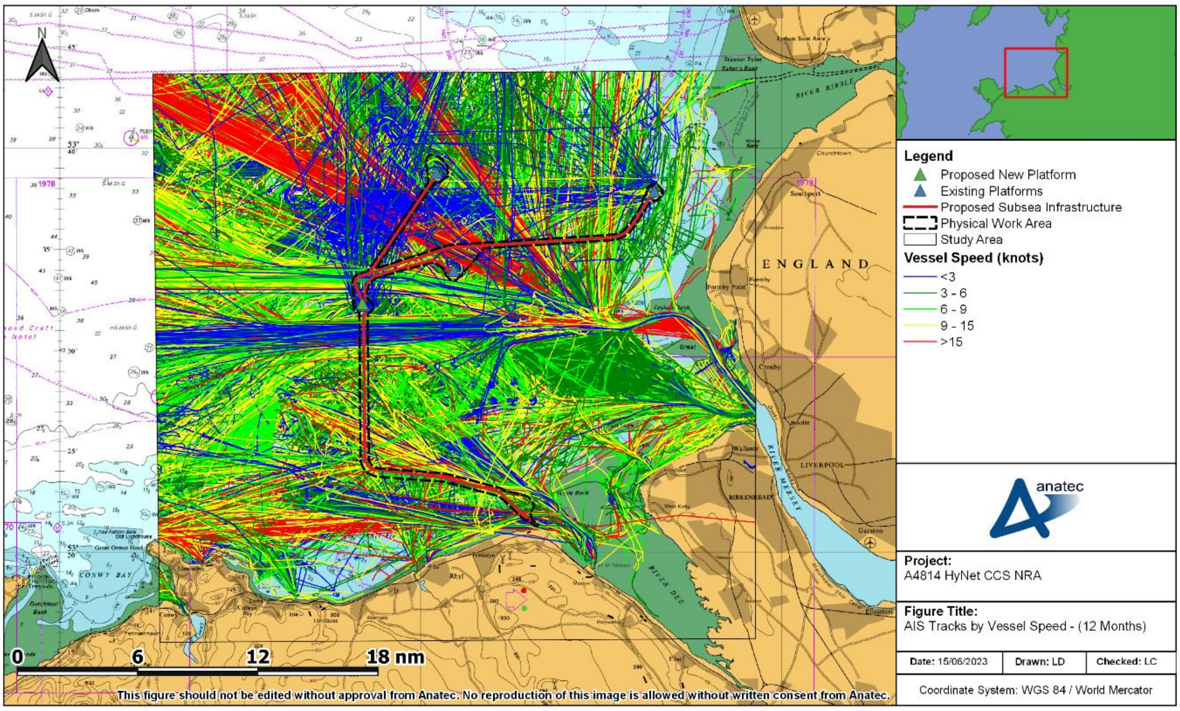

Figure 9.16: AIS Tracks by Vessel Speed – (12 Months)

The fastest vessels tended to be wind farm support vessels on passage to or from the various wind farms within the study area, as well as passenger vessels on regular ferry routes. Several fast moving wind farm vessels were recorded crossing the cable routes close to the landfall and in proximity to the Gwynt-y- Môr wind farm. The regular ferries were recorded on routes between Liverpool and destinations such as Belfast, Dublin and the Isle of Man, with these routes typically crossing the cable routes to the north of the Douglas CCS platform. Slower moving vessels tended to be fishing vessels, potentially engaged in active fishing in the vicinity of the oil and gas installations within Liverpool Bay, as well as vessels slowing on approach to anchorages or within the Queen's Channel. It is noted that the speeds shown are the average speed of the entire track, and do not indicate instantaneous speed at a particular point in a vessel's voyage.

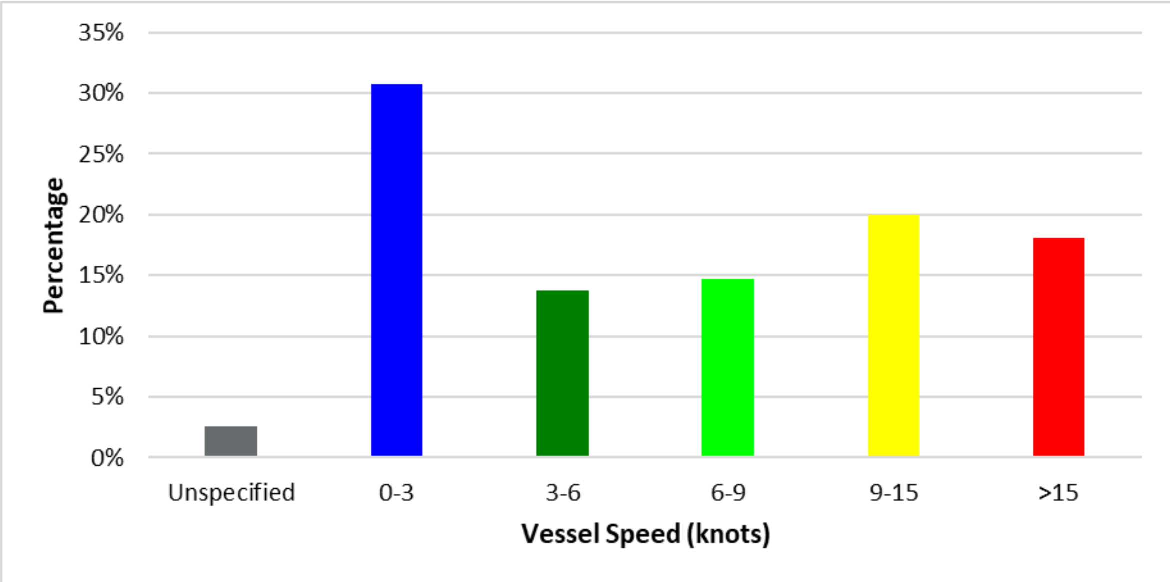

Figure 9.17: AIS Vessel Speed Distribution

The average of vessels recorded in the study area was 8.0 knots. The fastest vessel recorded within the study area was a lifeboat recorded travelling at an average speed of 35.8 knots.

9.7 Anchored Vessels

Figure 9.18 presents the locations of anchored vessels within the study area, colour-coded by vessel type.

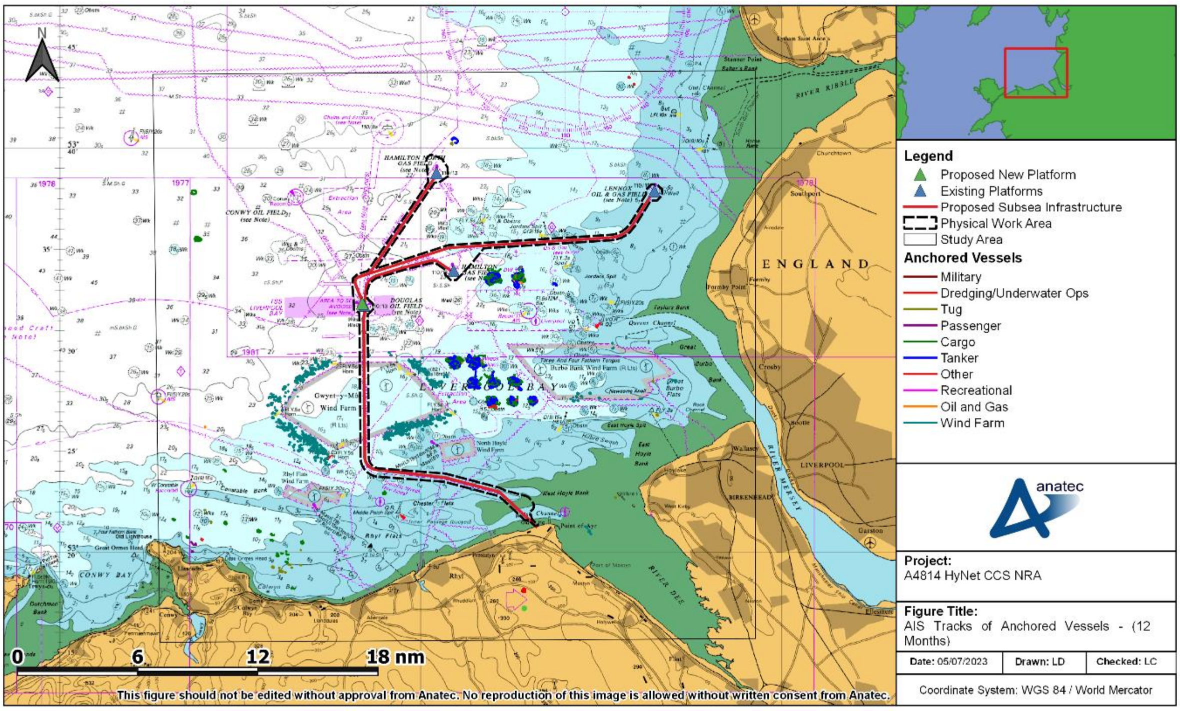

Figure 9.18: AIS Tracks of Anchored Vessels – (12 Months)

It can be seen that a significant proportion of the anchored vessels within the study area were concentrated within the charted anchorage area located between the Gwynt y Môr and Burbo Bank wind farms. A large number of wind farm vessels were also recorded at anchor around the boundaries of the two wind farms, particularly at Gwynt-y- Môr. The distribution of vessel type among anchored vessels is presented in Figure 9.19. The most common type of vessels at anchor were tankers (45%), followed by cargo vessels (29%) and wind farm vessels (22%).

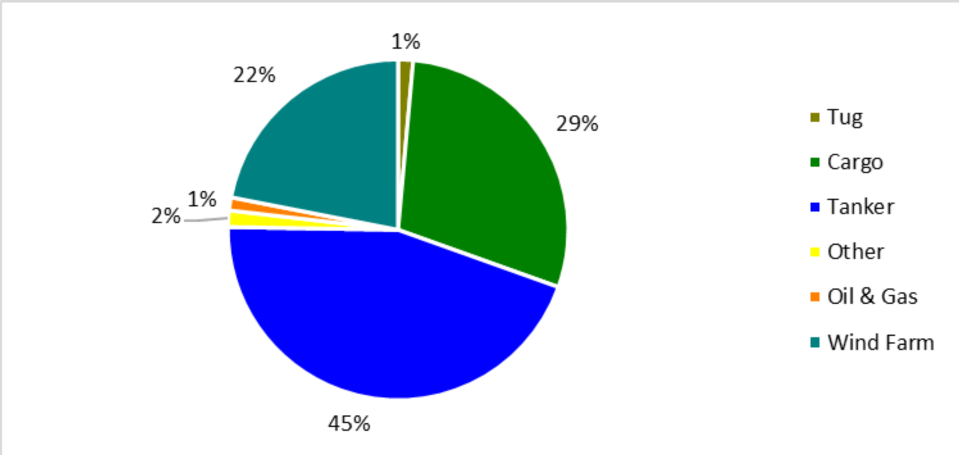

Figure 9.19: Anchored Vessel Type Distribution

9.8 Baseline Fishing Analysis

This section presents an analysis of fishing vessel activity in the study area using the results of the twelve months AIS analysis and additional Vessel Monitoring System (VMS) satellite data. Both AIS and VMS datasets cover fishing vessels 15 m and above in length.

Smaller vessels are therefore under-represented, particularly within the 6nm fisheries limit.

9.8.1 AIS Analysis

9.8.1.1 Vessel Numbers

Figure 9.20 presents the average number of fishing vessels per day[9] each month during 2022.

[9] Based on unique vessels per day within the study area

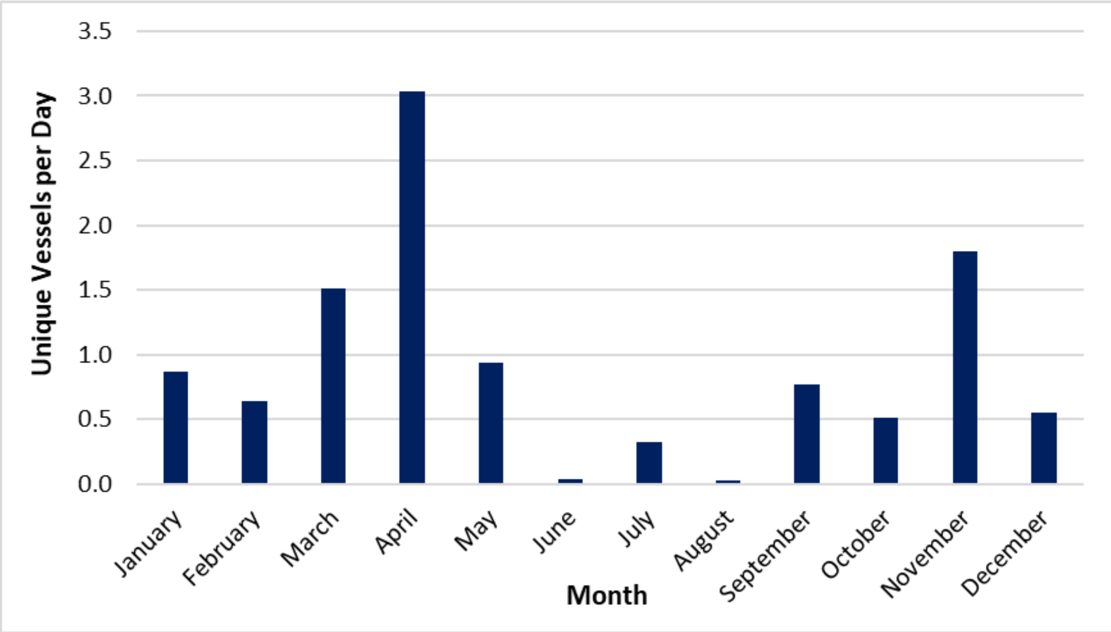

Figure 9.20: Daily Fishing Vessel Count per Month

The busiest month was April, with approximately three vessels per day, with the quietest being June and August, with a fishing vessel recorded once in each month. Over the course of the year, there was an average of one fishing vessel per day recorded within the study area.

9.8.1.2 Gear Type

Figure 9.21 presents the tracks of fishing vessels, colour-coded by gear type. Following this, Figure 9.22 presents the distribution of gear types recorded within the study area.

The majority of fishing vessel activity was recorded in the northwest of the study area, particularly in proximity to the oil and gas fields in the study area. Significant dredging activity was recorded in this area, while potters/whelkers were particularly active around the Gwynt y Môr wind farm site. Fishing activity close to the Proposed Development primarily included dredgers working to the north of the Douglas CCS platform, intersecting the cable route to the satellite platforms.

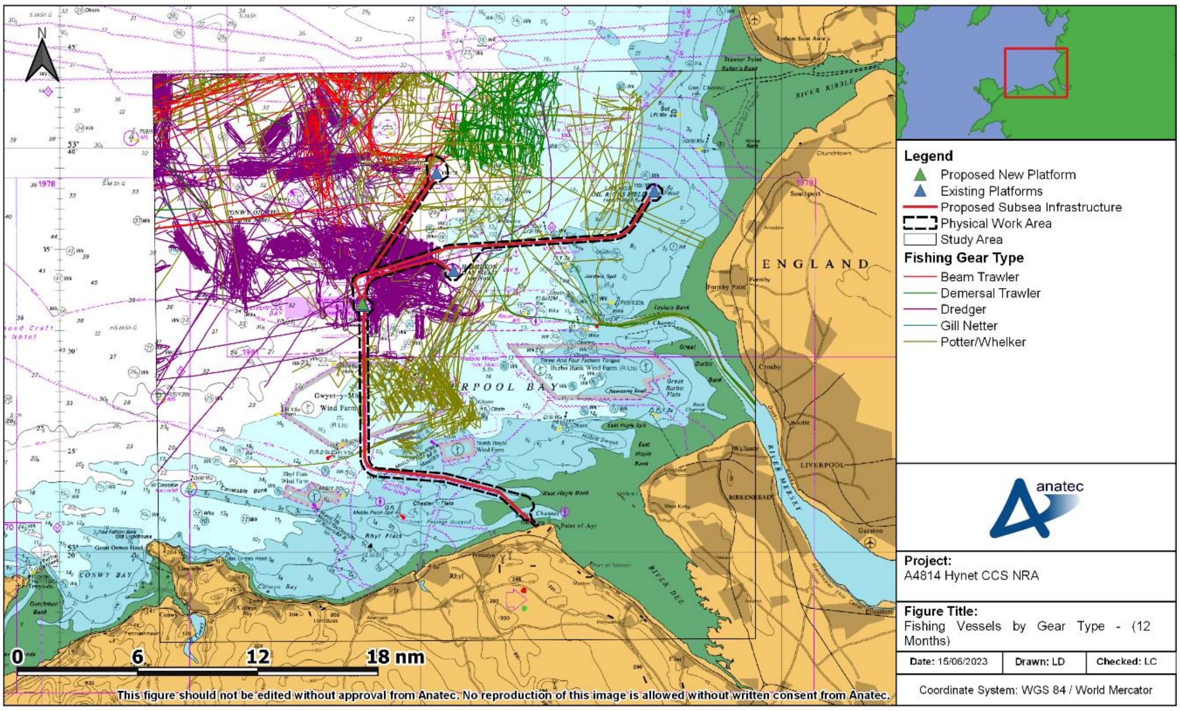

Figure 9.21: Fishing Vessels by Gear Type - (12 Months)

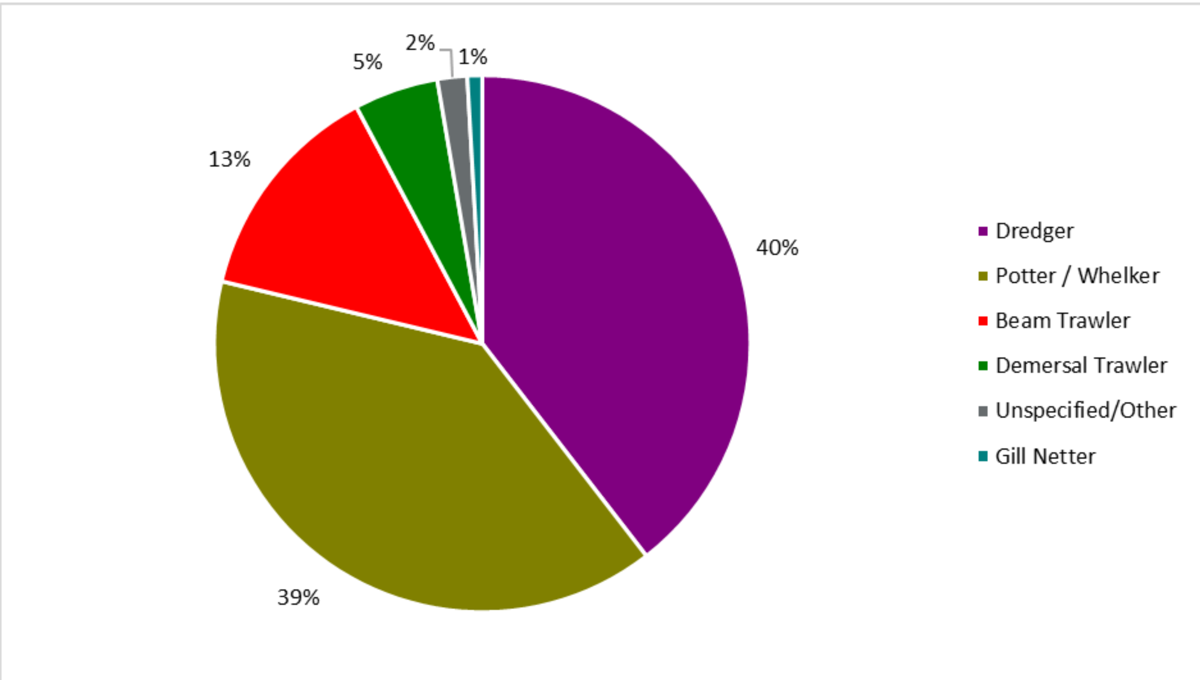

Figure 9.22: Fishing Gear Type Distribution

The most common gear types recorded in the study area were dredgers (40%) and potters (39%). Fishing vessels carrying demersal gear (i.e. dredgers, beam trawlers and demersal trawlers), which have the greatest chance of interacting with subsea cables, contributed 58% of fishing gear types recorded in the area.

9.8.2 VMS Analysis

Fishing vessel intensity is presented in Figure 9.23, based on VMS data from the MMO. VMS is a satellite tracking system in which fishing vessels broadcast positions once every one to two hours for vessels of length 12 m and above , noting that the available data from the MMO covers only vessels of length 15 m and above. New legislation requiring all fishing vessels to be fitted with VMS will be in place prior to the beginning of the construction period. The data is comprehensive for UK vessels globally, and fishing vessels from EC countries within British Fishery limits and certain other countries, e.g., Norway. The cells are colour-coded based on active fishing vessel time recorded within the cell.

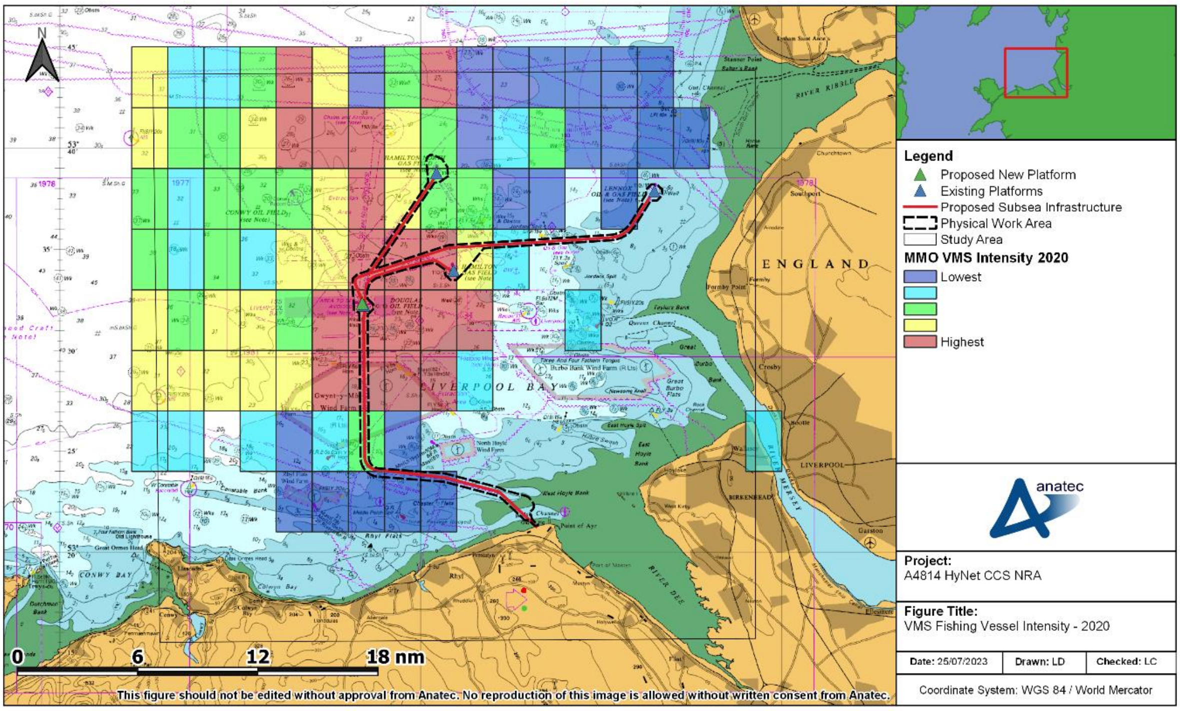

Figure 9.23: Fishing Vessel Intensity – 2020

It can be seen that the VMS corelates well with the activity patterns recorded on AIS, with the majority of fishing vessel activity concentrated in the centre and northwest of the study area. The highest levels of activity were recorded close to the Douglas field and the Gwynt y Môr wind farm, with very little activity recorded inshore of the oil and gas fields within the Liverpool Bay. Areas of high fishing activity in proximity to the Douglas field were mainly associated with dredging activity. Potting was also recorded throughout the study area.

9.9 Future Baseline

The key impact on vessel routeing in the area is expected to be the construction of a number of wind farms in the area. In particular, Mona, Morgan and Morecambe wind farms, if consented, have the potential to significantly alter routes visiting the Mersey ports, particularly routes (including ferry routes) to Ireland. It is noted that all of these wind farms are in the pre-planning phase and will be subject to their own consenting process and boundaries therefore have the potential to differ significantly from any finally constructed projects. The Awel y Môr wind farm, located to the west of the Gwynt y Môr, may also displace existing traffic into the Liverpool Bay TSS. It was noted during consultation that these may also lead to an increase in wind farm vessels utilising the Port of Mostyn, including construction vessels. In line with industry experience, commercial vessels are expected to maintain a minimum mean distance of 1nm from wind farm structures. There is potential for smaller vessels, such as fishing vessels and recreational vessels to pass within wind farms.

Decommissioning of existing oil and gas infrastructure may also lead to changes to traffic patterns. As part of the Project, the existing Douglas complex will be decommissioned, while a number of other assets within the study area, are likely to be decommissioned during the lifetime of the Project. Therefore oil and gas support traffic may reduce or change significantly, while additional sea room may be available to all vessels as installations and related safety zones.

Port arrival statistics from the Department for Transport (DfT, 2022) covering the period from 2017 to 2021 for key ports within or accessed via the Mersey (Liverpool, Manchester and Garston) to determine trends in shipping in the recent years. Vessel arrivals for the three ports are shown in Figure 9.24.

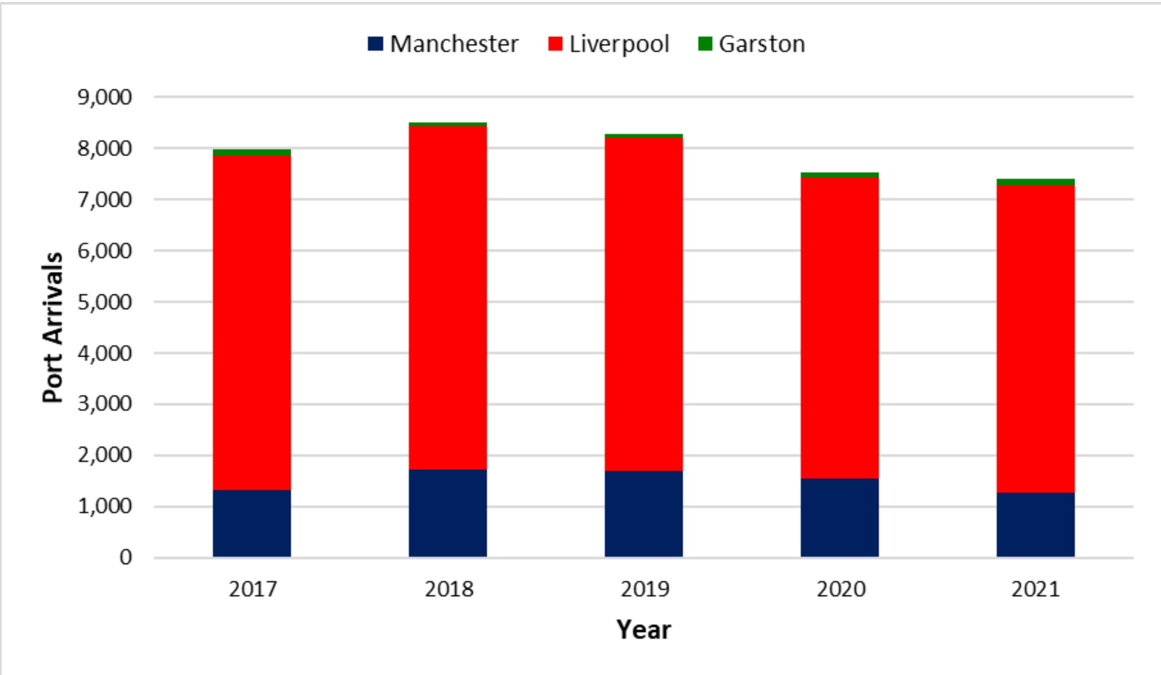

Figure 9.24: Port Arrivals 2017 – 2021

Port arrivals at all three ports has declined by 8% since 2017, noting that there is potential for this to have bene impacted by Brexit and the COVID-19 pandemic. Manchester arrivals have declined by 3%, with Liverpool and Garston seeing a 9% and 16% decline respectively. Overall, this decline equates to approximately 600 fewer arrivals in 2021 compared with 2017. Vessel arrivals peaked in 2018, with approximately 8,500 arrivals between the three ports.

The Port of Liverpool and the Manchester Ship Canal are operated by Peel Ports, who have plans to invest £200m in sustainable port infrastructure projects by Summer 2024 (Ref. xvi). There are currently no detailed plans on expansion at either of the Liverpool or Manchester. In 2016, Liverpool saw the completion of the Liverpool2 container terminal, which increased the port's ability to handle the largest container ships. Garston is operated by Associated British Ports, and recently underwent enhancement to the dry bulk storage offering at the port.

Fishing trends are difficult to project into the future, noting that trends are dependent on numerous factors including fish stocks and quotas. Changes to legislation following Brexit may also impact the size and make-up of the fishing fleet in UK waters.

Recreational activity can be similarly difficult to predict, but is assumed to remain similar or slightly increase in future years. Similarly the make-up of recreational traffic may vary, with sail and electric-powered vessels expected to become more prominent in place of diesel-fuelled craft. The locations of recreational activity may also vary, while volume of activity may be dependent on other factors such as the weather, climate change and the economy.

10 Impact Assessment

10.1 Introduction

This section provides a qualitative and quantitative risk assessment (using FSA) for the hazards identified due to the proposed development, based on baseline data, expert opinion, stakeholder concerns and lessons learnt from existing offshore developments. The hazards assessed are as follows:

- deviations to commercial routes leading to increased vessel to vessel collision risk between third-party vessels;
- increased vessel to vessel collision risk between a third-party vessel and a project vessel;
- creation of vessel to structure allision risk;
- reduced access to local ports;
- anchor interaction with subsea cable;
- fishing gear interaction with subsea cable;
- vessel grounding due to reduced under keel clearance; and
- interference with magnetic position fixing equipment; and
- reduction of emergency response capability due to increased incident rates for SAR responders and increased demand on the available resources.

Within each component of an overarching hazard, embedded mitigation measures which have been identified as relevant to reducing risk are listed, with full descriptions provided in Section 13 This is followed by statements defining the frequency of occurrence and severity of consequence for each component of the hazard in **bold** text, as defined in Section 4.2.

At the end of the assessment of each hazard, these frequency of occurrence and severity of consequence rankings are summarised in tabular form (if there are multiple components), with the resulting significance of risk given in **highlighted bold** text, as defined in Section 4.2.

The risk control log (see Section 12) summarises the risk assessment and a concluding risk statement is provided (see Section 15.4).

10.2 Assessment of Impacts

10.2.1 Vessel Displacement Leading to Increased Vessel to Vessel Collision Risk Between Third-Party Vessels

10.2.1.1 Construction Phase

Installation of the offshore Douglas CCS platform and cables may cause displacement of vessels around the areas of installation, which could lead to an increased risk of a collision between two third-party vessels during the construction phase. In particular vessels may be required to deviate around cable installation vessels, which are large, slow moving vessels which will be Restricted in Manoeuvrability (RAM). In addition, jack up vessels used for landfall works may also lead to vessel displacement close to the shore. As the offshore platform is located within the existing Safety Zone for the Douglas Complex and an Area To Be Avoided (ATBA), and Liverpool Bay TSS lanes pass at least 0.4nm from the proposed location, there is not expected to be any additional displacement associated with the construction of the new Douglas CCS platform within the existing Safety Zone. Works within the existing Hamilton, Hamilton North and Lennox Safety Zones are not covered in this NRA.

Vessel displacement will be more likely in busier areas of shipping. From the baseline assessment, passing vessel activity was significant across the Proposed Development, with higher density associated with the Liverpool Bay TSS lanes, vessels working at the Gwynt y Môr Offshore Wind Farm (OWF) and NW-SE routes used by the regular ferries running from Liverpool to Ireland.

Regular fishing and recreational activity was observed within the vicinity of the Proposed Development. Construction vessels may therefore cause a disruption to both local fishers and recreational boaters. Fishing activity was mostly recorded further offshore and was frequently recorded in the vicinity of the Physical Work Area to the north west of the proposed Douglas CCS platform. Recreational activity was recorded throughout the shipping and navigation study area, mainly passing out of the Queen’s Channel, and are recorded crossing the Physical Work Area at various locations, including in near shore areas. It is noted that recreational craft and small fishing vessels close to shore will be under-represented by the AIS data.

The installation of the proposed Douglas CCS platform and new cables are expected to be carried out in Q1 to Q2 2026. Preparations for the shore approach of the power cables from Douglas to Point of Ayr are proposed to commence in Q2 2025. Installation works for the new platform are expected to take up to five months, while cable laying works are expected to take up to two months. The spatial extent of construction areas where vessels may be required to deviate around vessels which are RAM is expected to be small at any given time.

Details of construction activities, including any advisory safe passing zones, will be suitably promulgated via NtMs, Kingfisher, Radio Navigational Warnings, NAVTEX and/or broadcast warnings to maximise awareness of ongoing construction activities. Guard vessels will be used where required to raise awareness of construction works to passing vessels and communication with the Ports of Liverpool and Mostyn will help to minimise collision risk associated with vessels using the port.

The appointment of a Fisheries Liaison Office (FLO) will aid in ensuring local fishers are made aware of construction works. Local Notices to Mariners will help to inform recreational users. All vessels will be expected to comply with international marine legislation, including the COLREGs and SOLAS.

Severity of Consequence

In the event of a collision incident between third-party vessels, the most likely consequences 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 one of the vessels involved was a small craft which may have weaker structural integrity than a commercial vessel.

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

Frequency of Occurrence

The impact will be present throughout the construction phase which will last for up to six months. Given that third-party vessels are expected to be compliant with relevant Flag State regulations including the COLREGs, 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 which will maximise awareness of ongoing construction activities, thus allowing third-party vessels to passage plan in advance, if considered appropriate.

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

Significance of Risk

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.

10.2.1.2 Operation and maintenance phase

Once the Proposed Development is operational, vessel displacement associated with the new cables is limited to any repair or maintenance work required, which is expected to be minimal and localised in nature. As the new Douglas CCS platform will be located within an existing Safety Zone and ATBA, there is not expected to be any additional displacement associated with the platform during the operational phase.

10.2.1.3 Decommissioning phase

There may also be a risk of vessel displacement leading to increased vessel to vessel collision risk between third-party vessels created during the decommissioning phase.

Severity of Consequence

Since the numbers and types of vessel used to remove the cables and platform 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.

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

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

Frequency of Occurrence

The impact will be present throughout the decommissioning phase which is assumed to last for a similar timeframe as the construction period. 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 which will maximise awareness of ongoing decommissioning activities, thus allowing third-party vessels to passage plan in advance.

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

Significance of Risk

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.

10.2.2 Increased Vessel to Vessel Collision Risk Between a Third-Party Vessel and a Project Vessel

10.2.2.1 Construction Phase

There is an increased collision risk created during the construction phase for all passing traffic due to the presence of vessels associated with the construction of the offshore platform and cables, and decommissioning and repurposing of the existing Hamilton Main, Hamilton North and Lennox satellite platforms. This includes vessels involved in surveys, seabed preparation, cable installation, platform installation, topside removal and installation, cable burial and/or protection installation, drilling of wells, commissioning of CO_2 pipelines and Landfall works. The nature of certain construction works, such as cable installation and other activities, requires large, slow moving vessels which will be RAM. Therefore, these vessels may have limited capability in taking avoidance action from a passing vessel on a collision course, should such a situation arise. In addition, there may be an increased collision risk between third-party vessels and jack ups used during Landfall works, and between third-party vessels and HLVs used for the platform installation. Due to their reduced size and increased mobility in comparison, smaller vessels associated with the construction phase, e.g. tugs, guard vessels, support vessels, Crew Transfer Vessels (CTVs), are considered to pose a lesser risk of collision than that of the larger cable installation vessels, jack ups or HLVs.

The collision risk is likely to be greater in higher density shipping areas. Passing vessel activity was significant across the Proposed Development, with higher density associated with the Liverpool Bay TSS lanes, vessels working at the Gwynt y Môr OWF and NW-SE routes used by the regular ferries running from Liverpool to Ireland.

Up to four cable installation vessels which are RAM will be on site at any one time and a jack up vessel is expected to be used for Landfall works. Additional support vessels include one seabed preparation vessel, one trench support vessel, one cable protection installation vessel and one cable burial installation vessel, as well as survey vessels, crew/work boats and multicats. For the new Douglas CCS platform, there will be one HLV vessel and additional support vessels including tugs, cargo barges, survey vessels and crew boats. The installation of the proposed Douglas CCS platform and new cables are expected to be carried out in Q1 and Q2 2026. Preparations for the shore approach of the power cables from Douglas to Point of Ayr are proposed to commence in Q2 2025. Installation works for the new platform are expected to take up to five months, while cable laying works are expected to take up to two months. The spatial extent of construction areas where vessels which are RAM are working is expected to be small at any given time. There will also be additional vessel movements associated with works to repurpose existing assets at the Hamilton Main, Hamilton North and Lennox platforms between Q4 2024 and Q3 2028, although these vessels are not expected to be RAM. Up to 128 return trips are anticipated during this time, the majority of which are associated with CTVs.

Project vessels will be managed by marine coordination, will display suitable marks and lights, will broadcast on AIS (where appropriate) and will be compliant with relevant Flag State regulations including the COLREGs and SOLAS.

Details of construction activities, including any advisory safe passing distances will be suitably promulgated via NtM, Kingfisher, Radio Navigational Warnings, NAVTEX and/or broadcast warnings to maximise awareness of ongoing construction activities. Communication with the Ports of Liverpool and Mostyn about the construction work activities and appointment of an FLO will also help to raise awareness of the works and minimise collision risk. Where required, guard vessels and/or temporary AtoNs will be used to raise awareness of construction work to passing vessels and to guide vessels around any areas of construction activities, and platform installation works will be located within the existing Safety Zone and ATBA at the Douglas Complex.

Severity of Consequence

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 severity of consequence is therefore considered to be **moderate**.

Frequency of Occurrence

The impact will be present throughout the construction phase which will last for up to four years, with cable laying works anticipated to take up to two months. The number of vessel movements to and from the Douglas Complex and satellite platforms is relatively low, the majority of which are associated with CTVs. 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, including Rule 18 which governs responsibilities between vessels if one is RAM, thus ensuring that the likelihood of the encounter developing into a collision incident is very low.

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

Significance of Risk

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.

10.2.2.2 Operation and Maintenance phase

During the operation and maintenance phase, there will be up to 15 return trips by jack-up vessels and 15 return trips by other vessels visiting the new Douglas CCS platform, which is significantly fewer visits than currently received by the Douglas Complex. There is therefore not expected to be any additional vessel to vessel collision risk associated with vessels visiting the new Douglas CCS platform.

There will be a requirement to undertake inspection surveys as well as the potential for unplanned repair works on the proposed cables, which could result in an increased collision risk between a third-party vessel and a survey/maintenance vessel.

This risk is described under the construction phase, however maintenance/monitoring work is expected to be less disruptive and span a shorter period than cable construction works.

Routine inspections of the subsea structures are planned to two yearly and five years, with annual surveys on a seven year rolling programme also planned. There may also be requirements for cable repair and/or burial as required. Cable repairs/reburials may include vessels which are RAM. As per the construction phase, project vessels will be managed by marine coordination, will display suitable marks and lights, will broadcast on AIS and be compliant with relevant Flag State and international regulations including the COLREGs and SOLAS.

Similarly to the construction phase, details of major maintenance activities including any advisory clearance zones, as defined by risk assessment, will be suitably promulgated via NtM, Kingfisher, Radio Navigational Warnings, NAVTEX and/or broadcast warnings to maximise awareness of ongoing major maintenance activities.

Severity of Consequence

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 severity of consequence is therefore considered to be **moderate**.

Frequency of Occurrence

The impact will be present throughout the operation and maintenance phase which will last for up to 25 years. With implementation of the embedded mitigation measures outlined in Section 13 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.

The likelihood of an encounter is decreased compared to the construction phase given the smaller scale of maintenance activities, although this is somewhat balanced by the much longer duration of the operation and maintenance phase.

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

Significance of Risk

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.

10.2.2.3 Decommissioning Phase

There may also be an increased collision risk created during the decommissioning phase for all passing traffic due to the presence of vessels associated with decommissioning works.

Severity of Consequence

Since the numbers and types of vessel used to remove the cables and CCS platform 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.

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

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

Frequency of Occurrence

The impact will be present throughout the decommissioning phase which is assumed to last for a similar timeframe as the construction period. With the embedded mitigation 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.

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

Significance of Risk

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.

10.2.3 Vessel to Platform Allision Risk

10.2.3.1 Operation and Maintenance Phase

Once the new Douglas CCS platform has been installed, there may be a risk of vessel to structure allision. This could be a powered allision (i.e. vessels under power alliding with the platform due to watchkeeper failure) or a drifting allision (i.e. due to machinery or engine failure, causing the vessel to drift into the platform).

Should an allision occur, the consequences will depend on multiple factors including the energy of the impact, structural integrity of the vessel and sea state at the time of the impact. In general powered allisions are expected to generate higher impact energies than drifting allisions. The most likely consequences will be minor damage with the vessel able to resume passage and undertake a full inspection at the next port. As an unlikely worst case, the vessel could founder resulting in a PLL and pollution.

Additionally, commercial vessels are expected to comply with international and flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan in advance given the promulgation of information relating to the Proposed Development.

This risk is mitigated by the location of the proposed new Douglas CCS platform within an existing Area to be Avoided, which restricts vessels from transiting close to the platform. It is also assumed that a 500m Safety Zone will be in place and that the platform has suitable operational lighting and marking in accordance with the Standard Marking Schedule for offshore installations.

Severity of Consequence

The most likely consequences in the event of an allision incident between a third-party vessel and the new Douglas CCS platform are minor contact and damage to property and minor reputational effects on business, but no perceptible effect on people. The maximum adverse scenario could involve the vessel foundering resulting in PLL and the environmental consequence of pollution. Such a scenario would be more likely if the vessel involved was a small craft which may have weaker structural integrity than a commercial vessel.

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

Frequency of Occurrence

The impact will be present throughout the operation and maintenance phase which will last for up to 25 years. With implementation of the embedded mitigation measures outlined in Section 13, including the 500 m Safety Zone and ATBA, and the familiarity of vessels with the existing structures in the Douglas Complex, an allision incident is considered to be unlikely.

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

Significance of Risk

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.

10.2.4 Reduced Access to Local Ports

10.2.4.1 Construction Phase

There is the potential for reduced access to local ports due to construction works associated with the cable construction works, in particular close to the Landfall. Vessels visiting the Port of Mostyn access this port via the Welsh Channel, which is intersected by the proposed cable routes from Douglas to Point of Ayr.

The majority of vessels using the Welsh Channel to enter the Port of Mostyn are wind farm support vessels transiting to the Gwynt-y-Môr, North Hoyle and Rhyl Flats OWFs.

The installation of the proposed new cables are expected to be carried out in Q1 and Q2 2026. Preparations for the shore approach of the power cables from Douglas to Point of Ayr are proposed to commence in Q2 2025. Cable laying works are expected to take up to two months. The spatial extent of construction areas where vessels may be required to deviate around vessels which are RAM is expected to be small at any given time.

Project vessels will be managed by marine coordination, will display appropriate marks and lights, broadcast on AIS and will be compliant with relevant Flag State regulations including the COLREGs, including rule 18 which applies to vessels which are RAM. Liaison with the Port of Mostyn will help to manage disruption. This impact was discussed during consultation with the Harbour Master of the Port of Mostyn and no issues were raised.

Severity of Consequence

Cable installation and Landfall construction works may result in some disruption to vessels using the Port of Mostyn, due to the presence of vessels which may be RAM, such as a cable laying vessel.

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

Frequency of Occurrence

The impact will be present during installation of the cables within the Welsh Channel. Cable laying is estimated to take up to two months, with works in the Welsh Channel lasting for a small proportion of this period.

An average of 6 vessels per day accessed the Port of Mostyn based on the AIS data, the majority of which were wind farm support vessels. It is noted that there may be additional small craft not broadcasting on AIS also requiring access to the Port of Mostyn.

However, due to the localised and temporary nature of cable installation works in the Welsh Channel, the disruption to port access is reduced. This impact will be mitigated by good communication with the Port of Mostyn during the construction phase.

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

Significance of Risk

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

10.2.4.2 Operation and maintenance phase

There is the potential for reduced access to local ports due to cable maintenance and repair works.

Severity of Consequence

The overall timescale for any maintenance/repair works is expected to be less than for construction works. Similarly to the construction phase, details of major maintenance activities including any advisory clearance zones, as defined by risk assessment, will be suitably promulgated to maximise awareness of ongoing major maintenance activities.

Such works may result in limited disruption to vessels accessing the Port of Mostyn via the Welsh Channel. However, any required maintenance in this area is expected to be temporary in nature.

In addition, maintenance vessels will be managed by marine coordination, will display appropriate marks and lights, broadcast on AIS and will be compliant with relevant Flag State regulations including the COLREGs, including rule 18 which applies to vessels which are RAM. Liaison with the Port of Mostyn will help to manage disruption.

The severity of consequence is therefore considered to be **negligible**.

Frequency of Occurrence

The reduction in access is decreased compared to the construction phase given the smaller scale of maintenance activities, although this is somewhat balanced by the much longer duration of the operation and maintenance phase.

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

Significance of Risk

Overall, the severity of consequence is deemed to be negligible 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.

10.2.4.3 Decommissioning phase

There may be potential for reduced access to local ports due to decommissioning works.

Severity of Consequence

Since the numbers and types of vessels used to remove the cables 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.

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

Frequency of Occurrence

The impact will be present throughout the decommissioning phase which is assumed to last for a similar timeframe as the construction period. Since the anticipated reduction in access to local ports and the volumes of vessel traffic accessing the ports are assumed to be the same as for the equivalent construction phase impact, and the appropriate embedded mitigation measures are in place, it is anticipated that the frequency of occurrence is similar to the construction phase.

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

Significance of Risk

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

10.2.5 Anchor Interaction with Subsea Cable

10.2.5.1 Construction Phase

The preferred approach for cable burial is that the cable is laid on the seabed and then buried using a plough. Therefore, there may be a period of time after laying when the cables are exposed and not protected through burial or other means such as rock placement. This period represents a potentially higher risk of interaction from vessel anchors with the surface-laid cables.

There is a risk that a nearby anchored vessel will lose its holding ground and subsequently drag anchor over the cables. Vessels at anchor were mainly located within the charted anchorage areas located between the Gwynt y Môr and Burbo Bank wind farms, and around the boundaries of the two wind farms.

If a passing vessel suffers engine failure, there is a possibility that it may drop anchor to avoid drifting into an emergency situation such as a collision, allision or grounding. This is more likely to occur in areas closer to the coast or to other hazards (e.g. offshore developments). In open waters where depths are deeper and anchoring may not be feasible, the vessel is more likely to attempt to either fix the problem or await assistance.

Severity of Consequence

While exposed any vessel anchor could interact with the cables. If an anchor becomes snagged on the cable, there could be a risk of injury in trying to free it. If the anchor cannot be freed the safest action is to slip it, and not attempt to raise or cut the cable.

The most likely consequences are limited damage to property (anchoring vessel or subsea cable). The maximum adverse scenario may include damage to property including to the vessel's anchor or subsea cable.

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

Frequency of Occurrence

From the vessel traffic survey data, the majority of anchoring activity took place within the charted anchorage areas located between the Gwynt y Môr and Burbo Bank wind farms, and around the boundaries of the two wind farms. The deep water anchorage east of the Hamilton Gas Field is located 0.4nm to the south of the Douglas to Lennox cable and may pose a higher risk from a vessel dragging anchor.

Areas where emergency anchoring risk is expected to be higher are where vessel density was highest, e.g. within the TSS lanes, within the Gwynt y Môr wind farm and where there were high densities of traffic associated with ferry route. The maritime incident data showed that the most frequent incident type to be recorded was machinery failure, which could lead to emergency anchoring.

Mitigation includes circulation of information to make mariners aware of the exposed cable and use of guard vessels where cable exposures are considered to present significant risk to navigation.

The frequency of occurrence is considered to be **extremely unlikely.**

Significance of Risk

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.

10.2.5.2 Operation and maintenance phase

There is a risk that a vessel anchor interacts with the cables due to an anchor dragging or emergency anchoring incident during the operation and maintenance phase.

High risk areas for an anchor dragging incident are where vessels routinely anchor close to the cable, e.g. within the charted anchorage areas located between the Gwynt y Môr and Burbo Bank wind farms, and around the boundaries of the two wind farms. The deep water anchorage east of the Hamilton Gas Field is located 0.4 nm to the south of the Douglas to Lennox cable and may pose a higher risk from a vessel dragging anchor.

For emergency anchoring, higher risk areas include areas where the density of vessels crossing the cables is higher and areas closer to the coast or to other hazards (e.g. offshore developments), which increases the likelihood of dropping anchor in an emergency. From the baseline assessment, passing vessel activity was significant across the Proposed Development, with higher density associated with the Liverpool Bay TSS lanes, vessels working at the Gwynt y Môr wind farm and NW-SE routes used by the regular ferries running from Liverpool to Ireland.

During the operation and maintenance phase the cables will be marked on UKHO Admiralty Charts with associated note/warning about anchoring, trawling or seabed operations.

A CBRA will be undertaken to identify high risk areas along the cable routes and to determine suitable burial depths for the cables during the operation and maintenance phase. Burial is the preferred method for protecting the cables from vessel anchors. The cables are anticipated to be buried to between 2m and 3m for the whole length of the route, with external protection, i.e. freshly quarried rock and concrete mattresses, used at the ten crossings. Target burial depths will be confirmed by the CBRA. Cable protection will be regularly monitored to confirm its integrity.

Severity of Consequence

Once the cables are protected, either through burial and/or other protection measures, larger vessels (e.g. cargo vessels and tankers) are more likely to threaten the cables as their anchors are able to penetrate deeper into the seabed and can cause greater damage than smaller anchors (fishing and recreational vessels) if contact is made. The anchors of smaller vessels (e.g. fishing and recreational craft) are unlikely to penetrate as deeply. Suitable target burial depths, defined in a CBRA, will mitigate the risk from vessel anchors. Periodic monitoring will be undertaken to confirm cable protection remains suitable.

The most likely consequences are limited damage to property (anchoring vessel or subsea cable). The maximum adverse scenario may include damage to property including to the vessel’s anchor or subsea cable.

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

Frequency of Occurrence

Protection of the cables via burial and/or external protection will reduce the frequency of occurrence of anchor interaction.

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.

The frequency of occurrence is considered to be **extremely unlikely**.

Significance of Risk

Overall, the severity of consequence is deemed to be minor 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.

10.2.6 Fishing Gear Interaction with Subsea Cable

10.2.6.1 Construction Phase

Similar to the impact associated with vessel anchors, there is the potential for risk of interaction from fishing gear with surface-laid cables prior to burial by plough, as this may result in a period of time during which the cables are exposed (prior to burial or placement of external protection).

Severity of Consequence

Although fishers are advised to follow the current maritime industry guidance (MGN 661, the Mariner's and all Admiralty charts) and avoid demersal trawling (and anchoring) in the immediate vicinity of the cables, it is acknowledged that fishing may still occur over the cables either inadvertently, or at the discretion of fishing vessel operators.

There is higher risk of snagging from demersal gear if the cable is exposed. The response from the crew includes reducing/reversing the propulsive force, attempting to unfasten the equipment, or releasing the gear and therefore in the majority of snagging incidents, it should be possible to recover the situation without any serious consequences (e.g. injury or fatality to crew members). However, accident data from the MAIB indicates that safe recovery from a snagging incident is not always the outcome. Consequences of snagging therefore range from damage to gear and the cable, loss of stability due to lines being put under strain and in the worst case, capsize of the vessel, men overboard and risk of injury or fatality. For example, a risk of capsize could occur if the vessel attempted to free its gear by raising the cable rather than releasing the gear.

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

Frequency of Occurrence

Fishing vessels carrying demersal gear that interacts with the seabed when deployed present the greatest risk of snagging on subsea cables. Static gear types (e.g. potters/whelkers and gill netters) are not considered to present a safety risk from snagging as they are able to carefully select the position of their gear, avoiding any subsea cables. Demersal gear types identified in the baseline assessment relative to the Proposed Development were mainly dredgers, which contributed 40% of gear types recorded on AIS in the area. The highest risk area of snagging is where vessels engaged in fishing with demersal gears are most active, mainly to the east and north of the Douglas Field. It is also noted that there is likely to be significant activity from small fishing vessels in coastal waters, which may be under-represented in the AIS data, although these are most likely to be using static gear which has lower snagging risk.

It is expected that mitigation including having a FLO in place and circulation of information (e.g. via Kingfisher and local communications) will help ensure fishers are aware of the exposed cable and avoid fishing directly over it. In addition, guard vessels will be used in any areas where cable exposures are considered to present significant risk to fishing gear snagging.

The frequency of occurrence during the period that the cables are surface-laid is considered to be **remote**.

Significance of Risk

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

Additional mitigation to reduce this impact to ALARP is to minimise the amount of time between cable lying and installation of cable protection, e.g. burial.

10.2.6.2 Operation and maintenance phase

There is a risk of fishing gear interaction with the cables due to fishing activity, which has been described previously under the description of this impact during the construction phase. High intensity areas for demersal fishing activity occurred mainly to the east and north of the Douglas Field.

During the operation and maintenance phase the cables will be marked on UKHO Admiralty Charts and KIS-ORCA with associated note/warning about anchoring, trawling or seabed operations.

A CBRA will be undertaken to provide a detailed assessment of fishing activity along the proposed cables and fishing gear penetration depths for the various soil conditions in order to determine suitable burial depths for the cables during the operation and maintenance phase. Burial is the preferred method for protecting the cables from fishing gear. The cables are anticipated to be buried to between 2 m and 3 m for the whole length of the route, with external protection, i.e. freshly quarried rock and concrete mattresses, used at the ten crossings. Target burial depths will be confirmed by the CBRA. Cable protection will be regularly monitored to confirm its integrity.

Severity of Consequence

The planned cable protection is assumed to provide effective mitigation from fishing gear snagging, reducing the risk of serious consequences such as snagging, capsize of the vessel and potential loss of life (PLL).

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

Frequency of Occurrence

Once the cables are installed, the depiction of the cables on nautical and Kingfisher charts may discourage fishing in the vicinity of the cables; however evidence shows this is not always the case with installed cables as often it is assumed they are adequately protected against fishing gear interaction. The planned cable protection (through burial) is assumed to provide effective mitigation against the risk of demersal gear making contact with the installed cables. As discussed, it is the responsibility of the fishers to dynamically risk assess whether it is safe to undertake fishing activities in proximity to subsea cables and to make a decision as to whether or not to fish. Fishing activity is considered further in volume 2, chapter 10 of the ES.

The frequency of occurrence is considered to be **extremely unlikely**.

Significance of Risk

Overall, the severity of consequence is deemed to be minor 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.

10.2.7 Vessel Grounding Due to Reduced Under Keel Clearance

10.2.7.1 Operation and Maintenance Phase

This impact refers to a vessel grounding due to reduced under keel clearance associated with external protection measures such as rock berms, in areas where cable burial is not feasible (e.g. due to cable crossings). This could lead to subsequent capsize, injury, loss of life, oil spill, etc. In general, the higher risk areas are coastal waters where existing water depths are shallower.

Cable burial is the preferred option of safeguarding the cables, and no external protection is planned, with the exception of the 42 anticipated cable crossings as outlined in Section 2.

Severity of Consequence

Should a vessel grounding 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 severity of consequence is therefore considered to be **moderate**.

Frequency of Occurrence

The likelihood of a grounding is greater for large commercial vessels with deeper draughts, noting that only a minority of vessels recorded in the vessel traffic survey data were deep draught. Areas where water depth is shallower, e.g., close to the Landfall, also present a higher risk of vessels grounding.

The maximum height of cable protection will be 0.8 m. The average draught of vessels crossing the Physical Work Area was 5.1 m, with a maximum draught of 14 m, recorded crossing the cable route within the Liverpool Bay TSS in approximately 25 m of water depth.

Cable protection is expected to be implemented only at the cable crossings. Water depth at crossings located in shallow water (less than 10 m) are most likely to be significantly altered, with these typically associated with the wind farm export cables crossing the Douglas to Point of Ayr cable route. Vessels crossing the cable route in these areas tended to be shallower draught vessels such as wind farm crew transfer vessels, while deep draught vessels were typically recorded further offshore using the Liverpool Bay TSS.

AS part of the Scoping Opinion, the MCA noted the requirements of MGN 654 (Ref. i). Where possible, the Applicant intends to follow the guidance provided in MGN 654, and in particular cable protection will not change the charted water depth by more than 5%. If rock protection at crossings are likely to lead to a water depth reduction exceeding 5%, a detailed draught assessment will be carried out post-consent to determine any safety risk to navigation, which will be discussed and agreed with the MCA and Trinity House post consent and prior to cable installation as per MGN 654.

When considered with the embedded mitigation of compliance with the requirements in MGN 654 and any change to water depth of more than 5% chart datum requiring further consultation and agreement with the MCA, the frequency is considered to be reduced to low for all vessel types.

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

Significance of Risk

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.

10.2.8 Interference with Magnetic Compasses

10.2.8.1 Operation and Maintenance Phase

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. The majority of commercial vessels use a non-magnetic gyrocompass as the primary means of navigation, which is unaffected by the earth’s magnetic field. However, as the magnetic 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 threatened.

The proposed cables will consist of an HVDC power cable with a bundled fibre optic cable. The HVDC cable may result in localised static Electromagnetic Fields (EMF), with the potential to affect magnetic compasses.

The important mitigating factors to reduce EMF effects on magnetic compasses are listed below:

- Cable spacing;
- Water depth; and
- Burial depth.

The cables will be laid at approximately 30 m spacing and approximately 72% of the cables will be located in water depths greater than 10 m below Chart Datum (CD). Therefore, there will be significant vertical distance between the cables and surface vessels along the majority of the cables. The strength of the magnetic fields decreases exponentially with distance from the cables, and as such compass deviation will reduce with increasing water depth. Similarly, increasing burial depth also increases the vertical separation between a surface vessel and the cables in a given water depth.

Severity of Consequence

The majority of commercial vessel traffic uses non-magnetic gyrocompasses as the primary means of navigation, which are unaffected by EMF. Therefore, in general it is considered unlikely that any EMF interference created by the proposed cables will have a significant impact on vessel navigation near the Proposed Development. 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 (noting that many smaller craft may use Global Positioning System (GPS), chart plotters, etc. as a further source), it has been assessed within this ES chapter. Vessels in shallower water should also be able to navigate visually using coastal features when conditions are suitable.

The most likely consequences associated with the maximum adverse scenario are anticipated to be limited, noting that 72% of the proposed cables are anticipated to be in water depths greater than 20 m.

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

Frequency of Occurrence

Along the proposed cable routes vessel traffic is assumed to mainly transit perpendicular to the direction of the cables. For vessels transiting over the cables, time spent directly above the cables will be limited given the limited width of the cable corridor.

Given HVDC cables produce static magnetic fields which decrease with the horizontal distance from the cables, magnetic compass interference should only be experienced directly above or in direct proximity to the cables, noting again that effects decrease quickly with horizontal distance as the vessel moves away from the location of the cables.

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

Significance of the Effect

Overall, the severity of consequence is deemed to be minor 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.

10.2.9 Reduction of Emergency Response Capability Due to Increased Incident Rates for SAR Responders and Increased Demand on the Available Resources

10.2.9.1 All Phases

Increased vessel activity during the construction phase may reduce emergency response capability by increasing the number of incidents, or reducing access for the responders. As an unlikely worst case, the consequences of such a situation could include a failure of emergency response to an incident, resulting in a PLL and pollution.

However, with project vessels to be managed through marine coordination and compliant with Flag State regulations, the likelihood of an incident is minimised. Additionally, should an incident occur, project vessels will be well equipped to assist, either through self-help capability or, for an incident involving a nearby third-party vessel, through SOLAS obligations (IMO, 1974), all in liaison with the MCA.

During the operation and maintenance phase, there is not expected to be a notable increase in vessel numbers, however there may be a period of time when the new Douglas CCS platform and the existing Douglas Complex are in operation simultaneously, which could increase the likelihood of an incident occurring at the Douglas Complex. As the new Douglas CCS platform will be unmanned, any impact is considered to be minimal.

Severity of Consequence

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

Frequency of Occurrence

Due to the limited number of vessels involved and temporary nature of the construction phase works, and given that the proposed new Douglas CCS platform will be unmanned and within the existing Douglas Complex, the frequency of occurrence is considered to be **negligible.**

Significance of Risk

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.

11 Cumulative Impacts

11.1 Methodology

The Cumulative Impact Assessment takes into account the impact associated with the Proposed Development, together with other relevant projects. Cumulative impacts are therefore the impacts arising from the Proposed Development together with the impacts from a number of different developments, on the same receptor or resource. Further detail on the cumulative effects assessment (CEA) methodology is presented in volume 3, Cumulative Effects Assessment – Screening Report (Ref. xvii).

The developments selected as relevant to the cumulative impact assessment presented within this assessment are based upon the results of a screening exercise and the development of a 'long list' of cumulative developments relevant to the Proposed Development (Ref. xvii). Each development has been considered on a case-by-case basis for screening in or out of the cumulative assessment for shipping and navigation based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved, to create a short list of considered impacts, summarised in Table 11.1.

Table 11.1: Cumulative Projects considered within the CEA for shipping and navigation

Development	Status	Distance from Proposed Development (km)	Spatial/temporal overlap with Proposed Development			Start date	End date
			Spatial	Temporal (construction)	Temporal (Operation)		
Morecambe Offshore Windfarm Generation Assets	Pre-application	12	x	✓	✓	01/01/2026	Unknown
Morgan and Morecambe Offshore Windfarms Transmission Assets	Pre-application	3	x	✓	✓	Unknown	Unknown
Morgan Offshore Wind Project Generation Assets	Pre-application	39	x	✓	✓	Unknown	Unknown
Awel y Môr	Application submitted	2.1	✓	✓	✓	01/01/2020	01/01/2055
Mona Offshore Wind Farm	Pre-application	9.3	x	✓	✓	01/01/2028	31/12/2065
Prestatyn Coastal Defence	Consented/ licensed	2	x	✓	x	31/07/2021	31/05/2025
Central Rhyl Coastal Defence Scheme	Consented/ licensed	4	x	✓	x	31/03/2023	30/03/2024

Development	**Status**	**Distance from Proposed Development (km)**	**Spatial/temporal overlap with Proposed Development**			**Start date**	**End date**
			Spatial	**Temporal (construction)**	**Temporal (Operation)**		
Removal of Met Mast at Gwynt y Môr	Unknown	0	✓	✓	x	21/11/2022	30/11/2027
MaresConnect Interconnector	Permitted	0	✓	Unknown	✓	Unknown	Unknown

11.2 Cumulative Impacts Assessment

An assessment of the likely significance of the cumulative impacts of the Proposed Development together with other projects upon shipping and navigation receptors arising from each identified impact is given in this section.

11.2.1 Vessel Displacement Leading to Increased Vessel to Vessel Collision Risk Between Third-Party Vessels

11.2.1.1 Construction Phase

There is the potential for increased collision risk if cumulative developments encourage third party vessels to deviate towards the areas of construction for the Proposed Development. Vessel movements in the area are expected to be impacted by the construction of the Mona, Morgan and Morecambe OWFs, however given the location of the Proposed Development relative to the OWFs, and the current vessel routeing in the area, any change in vessel routeing relative to the Proposed Development is expected to be minimal. Additional vessel movements in the area due to the construction of the OWFs or transmission assets may cause an increase in vessel to vessel collision risk, depending on the location of the transmission assets and routes taken by construction vessels and whether there is an overlap in construction phases.

There may also be an increase in vessel to vessel collision risk due to construction vessel movements associated with Awel y Môr OWF and construction of the MaresConnect interconnector if construction periods were to overlap and works were to take place in a similar geographical area at a similar time.

Details of construction activities, including any advisory safe passing distances, as defined by risk assessment, will be suitably promulgated via NtM, Kingfisher, Radio Navigational Warnings, NAVTEX and/or broadcast warnings to maximise awareness of ongoing construction activities. Guard vessels and temporary aids to navigation will be used to raise awareness of construction work to passing vessels (if required) to guide vessels around any areas of construction activities.

The appointment of an FLO will aid in ensuring local fishermen are made aware of construction works. Local Notices to Mariners as well as notifying local marinas and sailing clubs of the works will help to inform recreational users. All vessels will be expected to comply with international marine legislation, including the COLREGs and SOLAS.

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 and the cumulative developments, the temporary nature of the construction works and noting that there is a low likelihood that construction works for the Proposed Development and cumulative developments will be required within the same geographical area at the same time, the impact is as per the equivalent construction phase impact for the Proposed Development in isolation.

Severity of Consequence

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 worst case 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 severity of consequence is therefore considered to be **moderate**.

Frequency of Occurrence

The impact will be present throughout the construction phase which will last up to six months. Given that third-party vessels are expected to be compliant with relevant Flag State regulations including the COLREGs, 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 which will maximise awareness of ongoing construction activities, thus allowing third-party vessels to passage plan in advance, if considered appropriate.

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

Significance of effect

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.

11.2.1.2 Decommissioning phase

There may also be a risk of vessel displacement leading to increased vessel to vessel collision risk between third-party vessels created during the decommissioning phase if cumulative developments lead to further displacement of vessels around the developments.

Severity of consequence

Since the numbers and types of vessel used to remove the platform and cables are expected to be similar to those used for construction, this impact is expected to be similar in nature to the equivalent construction phase impact.

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

Frequency of Occurrence

The impact will be present throughout the decommissioning phase which is assumed to last for a similar timeframe as the construction period. 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 which will maximise awareness of ongoing decommissioning activities, thus allowing third-party vessels to passage plan in advance.

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

Significance of the effect

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 for the Proposed Development, which is not significant in EIA terms.

11.2.2 Increased Vessel to Vessel Collision Risk Between a Third-Party Vessel and a Project Vessel

11.2.2.1 Construction phase

There is the potential for increased collision risk if cumulative developments encourage third party vessels to deviate towards the project vessels. Vessel movements in the area are expected to be impacted by the construction of the Mona, Morgan and Morecambe OWFs, however given the location of the Proposed Development relative to the OWFs, and the current vessel routeing in the area, any change in vessel routeing relative to the Proposed Development is expected to be minimal. Additional vessel movements in the area due to the construction of the OWFs or transmission assets may cause an increase in vessel to vessel collision risk, depending on the location of the transmission assets and routes taken by construction vessels and whether there is an overlap in construction phases.

There may also be an increase in vessel to vessel collision risk between a third-party vessel and a project vessel due to construction vessel movements associated with Awel y Môr OWF and construction of the MaresConnect interconnector if construction periods were to overlap and works were to take place in a similar geographical area at a similar time.

Project vessels, as managed by marine coordination, will display suitable marks and lights, will broadcast on AIS (where appropriate) and will be compliant with relevant Flag State regulations including the COLREGs and SOLAS.

Details of construction activities, including any advisory safe passing distances, as defined by risk assessment, will be suitably promulgated via NtM, Kingfisher, Radio Navigational Warnings, NAVTEX and/or broadcast warnings to maximise awareness of ongoing construction activities. Communication with the Port of Liverpool and Port of Mostyn about the construction work activities and appointment of an FLO will also help to raise awareness of the works and minimise collision risk. Guard vessels and temporary aids to navigation will be used to raise awareness of construction work to passing vessels (if required) to guide vessels around any areas of construction activities.

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 and the cumulative developments, the temporary nature of the construction works and noting that there is a low likelihood that construction works for the Proposed Development and cumulative developments will be required within the same geographical area at the same time, the impact is as per the equivalent construction phase impact for the Proposed Development in isolation.

Severity of Consequence

In the event of a collision incident between third-party vessels, the most likely consequences 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 worst case 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 severity of consequence is therefore considered to be **moderate**.

Frequency of Occurrence

The impact will be present throughout the construction phase which will last up to four years, with cable laying works anticipated to take up to two months. The number of vessels movements to and from the Douglas Complex and satellite platforms is relatively low, the majority of which are associated with CTVs. With the embedded mitigation 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.

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

Significance of effect

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.

11.2.2.2 Operation and maintenance phase

As per the equivalent construction phase impact, there is the potential for increased collision risk if cumulative developments encourage third party vessels to deviate towards project vessels. During the operation and maintenance phase, there will be up to 15 return trips by jack-up vessels and 15 return trips by other vessels visiting the new Douglas CCS platform, which is significantly fewer visits than currently received by the Douglas Complex. There is therefore not expected to be any additional vessel to vessel collision risk associated with vessels visiting the new Douglas CCS platform.

There will be a requirement to undertake inspection surveys as well as the potential for unplanned repair works on the proposed cables, which could result in an increased collision risk between a third-party vessel and a survey/maintenance vessel. Similar to the construction phase, if inspection or maintenance works were to coincide with construction works on cumulative projects, there could be an increase in vessel to vessel collision risk with survey/maintenance vessels, however any inspection or maintenance works are expected to be smaller in scale than construction works.

As per the construction phase, project vessels will be managed by marine coordination, will display suitable marks and lights, will broadcast on AIS and be compliant with relevant Flag State and international regulations including the COLREGs and SOLAS.

Similar to the construction phase, details of major maintenance activities including any advisory safe passing distances, as defined by risk assessment, will be suitably promulgated via NtM, Kingfisher, Radio Navigational Warnings, NAVTEX and/or broadcast warnings to maximise awareness of ongoing major maintenance activities.

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.

Severity of Consequence

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 severity of consequence is therefore considered to be **moderate**.

Frequency of Occurrence

The impact will be present throughout the operation and maintenance phase which will last for up to 25 years. With implementation of the embedded measures noted above, 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.

The likelihood of an encounter is decreased compared to the construction phase given the smaller scale of maintenance activities, although this is somewhat balanced by the much longer duration of the operation and maintenance phase.

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

Significance of effect

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.

11.2.2.3 Decommissioning phase

There may also be an increased collision risk created during the decommissioning phase if decommissioning works were to overlap temporally with maintenance or decommissioning works associated with the cumulative developments.

Severity of Consequence

Since the numbers and types of vessel used to remove the platform and cables are expected to be similar to those used for construction, this impact is expected to be similar in nature to the equivalent construction phase impact.

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

Frequency of Occurrence

The impact will be present throughout the decommissioning phase which is assumed to last for a similar timeframe as the construction period. With the embedded mitigation 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.

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

Significance of the effect

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 for the Proposed Development, which is not significant in EIA terms.

11.2.3 Vessel to Platform Allision Risk

11.2.3.1 Operation and Maintenance Phase

There is the potential for increased vessel to structure allision risk if cumulative developments encourage third party vessels to deviate towards the new Douglas CCS platform. Vessel movements in the area are expected to be impacted by the construction of the Mona, Morgan and Morecambe OWFs, however given the location of the Proposed Development relative to the OWFs, and the current vessel routeing in the area, any change in vessel routeing relative to the new Douglas CCS platform is expected to be minimal. Additional vessel movements in the area due to the construction of the OWFs or transmission assets may cause an increase in vessel to vessel collision risk, depending on the location of the transmission assets and routes taken by construction vessels and whether there is an overlap in construction phases.

However, due to the location of the platform within a 500 m Safety Zone and ATBA, any deviated vessels are expected to maintain a minimum distance from the new platform and therefore the impact is as per the equivalent operation and maintenance phase impact for the Proposed Development in isolation.

Severity of Consequence

The most likely consequences in the event of an allision incident between a third-party vessel and the new Douglas CCS platform are minor contact and damage to property and minor reputational effects on business, but no perceptible effect on people. The maximum adverse scenario could involve the vessel foundering resulting in PLL and the environmental consequence of pollution. Such a scenario would be more likely if the vessel involved was a small craft which may have weaker structural integrity than a commercial vessel.

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

Frequency of Occurrence

The impact will be present throughout the operation and maintenance phase which will last for up to 25 years. With implementation of the embedded mitigation measures outlined in Section 13, including the 500m Safety Zone and ATBA, and the familiarity of vessels with the existing structures in the Douglas Complex, an allision incident is considered to be unlikely.

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

Significance of Risk

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.

11.2.4 Reduced Access to Local Ports

11.2.4.1 Construction Phase

There is the potential for increased disruption to port access due to cumulative developments, particularly if the coastal defence works at Prestatyn and Rhyl were to overlap temporally with the construction works on the cables or if any of the cumulative developments were to increase vessels movements in and out of the Port of Mostyn.

Project vessels will be managed by marine coordination, will display appropriate marks and lights, broadcast on AIS and will be compliant with relevant Flag State regulations including the COLREGs, including rule 18 which applies to vessels which are RAM. Liaison with the Port of Mostyn and wind farm operators will help to manage disruption.

With the designed in measures listed above, the effect due to the presence of cumulative developments is anticipated to be manageable.

Severity of Consequence

Construction of the cables within the Welsh Channel may result in some disruption to vessels accessing the Port of Mostyn, due to the presence of vessels which may be RAM, such as a cable laying vessel. Cable installation is estimated to take up to two months, with works in the Welsh Channel lasting for a small proportion of this period.

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

Frequency of Occurrence

The impact will be present throughout the construction phase which will last for up to two months, with works in the Welsh Channel lasting for a small proportion of this period. An average of 6 vessels per day accessed the Port of Mostyn based on the AIS data, the majority of which were wind farm support vessels. It is noted that there may be additional small craft not broadcasting on AIS also requiring access to the Port of Mostyn. Cumulative developments may lead to an increase in the number of vessels accessing the Port of Mostyn.

However, due to the localised and temporary nature of cable installation works in the Welsh Channel, the disruption to port access is reduced. This impact will be mitigated by good communication with the Port of Mostyn during the construction phase.

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

Significance of effect

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

11.2.4.2 Operation and maintenance phase

There is the potential for increased disruption to port access during the operational phase due to cumulative developments, for example if surveys or repairs within the Welsh Channel overlap temporally with other cumulative developments.

Similar to the construction phase, details of major maintenance activities including any advisory safe passing distances, as defined by risk assessment, will be suitably promulgated to maximise awareness of ongoing major maintenance activities.

Maintenance/repair vessels will be managed by marine coordination, will display appropriate marks and lights, broadcast on AIS and will be compliant with relevant Flag State regulations including the COLREGs, including rule 18 which applies to vessels which are RAM. Liaison with the Port of Mostyn and FLO will help to manage disruption. Therefore the impact is as per the equivalent operation and maintenance phase impact for the Proposed Development in isolation.

Severity of Consequence

The overall timescale for any maintenance/repair works is expected to be less than for construction works. Such works may result in limited disruption to vessels crossing the offshore cables within the Welsh Channel to access the Port of Mostyn. Any required maintenance is expected to be localised in one area of the Proposed Development and temporary in nature.

The severity of consequence is therefore considered to be **negligible**.

Frequency of Occurrence

The reduction in access is decreased compared to the construction phase given the smaller scale of maintenance activities, although this is somewhat balanced by the much longer duration of the operation and maintenance phase.

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

Significance of the effect

Overall, the severity of consequence is deemed to be negligible 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.

11.2.4.3 Decommissioning phase

There may be potential for further reduced access to local ports during the decommissioning phase if maintenance or decommissioning works associated with cumulative developments were to overlap temporally with the decommissioning of the Proposed Development.

Project vessels will be managed by marine coordination, will display appropriate marks and lights, broadcast on AIS (where available) and will be compliant with relevant Flag State regulations including the COLREGs, including rule 18 which applies to vessels which are RAM. Liaison with the Port of Mostyn and FLO will help to manage disruption.

With the embedded mitigation measures listed above, the effect due to the presence of cumulative developments is anticipated to be manageable.

Severity of Consequence

Since the numbers and types of vessels used to remove the platform and cables are expected to be similar to those used for construction, this impact is expected to be similar in nature to the equivalent construction phase impact.

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

Frequency of Occurrence

The impact will be present throughout the decommissioning phase which is assumed to last for a similar timeframe as the construction period. Cumulative developments may lead to an increase in the number of vessels crossing the offshore cables within the Welsh Channel.

However, due to the localised and temporary nature of decommissioning works, the disruption to port access is reduced.

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

Significance of the effect

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

11.2.5 Anchor Interaction with Subsea Cable

11.2.5.1 Construction Phase

The risk of anchor interaction with the proposed cables during the construction phase could be increased if cumulative developments are expected to lead to increased traffic across the cables. Vessel movements in the area are expected to be impacted by the construction of the Mona, Morgan and Morecambe OWFs, which could lead to a change in traffic across the cables if the construction periods were to overlap. However, given the location of the offshore cables relative to the OWFs, and the current vessel routeing in the area, any change in vessel routeing across the cables is expected to be minimal. Depending on the ports utilised by construction vessels, there may also be a slight increase in vessel numbers if construction phases were to overlap, however the overall impact is expected to be similar.

Severity of Consequence

While exposed any vessel anchor could interact with the cables. If an anchor becomes snagged on the cables, there could be a risk of injury in trying to free it. If the anchor cannot be freed the safest action is to slip it, and not attempt to raise or cut the cable.

The most likely consequences are limited damage to property (anchoring vessel or subsea cable). The maximum adverse scenario may include damage to property including to the vessel's anchor or subsea cable.

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

Frequency of Occurrence

Mitigation includes circulation of information to make mariners aware of the exposed cable and use of guard vessels where cable exposures are considered to present significant risk to navigation.

The frequency of occurrence is considered to be **extremely unlikely**.

Significance of effect

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.

11.2.5.2 Operation and maintenance phase

The risk of anchor interaction with the proposed cables during the operational phase could be increased if cumulative developments are expected to lead to increased traffic across the cables. In particular, there may be deviations in vessel movements and increase in vessel numbers caused by the construction of the mona, Morgan and Morecambe OWFs, depending on the preferred ports used during the construction and/or operational phases of these OWFs.

During the operation and maintenance phase the cables will be marked on UKHO Admiralty Charts with associated note/warning about anchoring, trawling or seabed operations.

Severity of Consequence

Once the cables are protected, either through burial and/or other protection measures, larger vessels (e.g. cargo vessels and tankers) are more likely to threaten the cables as their anchors are able to penetrate deeper into the seabed and can cause greater damage than smaller anchors (fishing and recreational vessels) if contact is made. The anchors of smaller vessels (e.g. fishing and recreational craft) are unlikely to penetrate as deeply. Suitable target burial depths, defined in a CBRA, will mitigate the risk from vessel anchors. Periodic monitoring will be undertaken to confirm cable protection remains suitable.

The most likely consequences are limited damage to property (anchoring vessel or subsea cable). The maximum adverse scenario may include damage to property including to the vessel's anchor or subsea cable.

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

Frequency of Occurrence

Protection of the cables via burial will reduce the frequency of occurrence of anchor interaction.

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).

The frequency of occurrence is considered to be **extremely unlikely**.

Significance of effect

Overall, the severity of consequence is deemed to be minor 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.

11.2.6 Fishing Gear Interaction with Subsea Cable

11.2.6.1 Construction Phase

The risk of fishing gear interaction with the cables during the construction phase could be increased if cumulative developments are expected to lead to increased fishing activity across the cables. Construction of the Mona OWF could cause vessels to be displaced towards the proposed cables, however any displacement is expected to be minimal compared to the current fishing levels across the cables.

Therefore, the impact is as per the equivalent construction phase impact for the Proposed Development in isolation.

Mitigation measures including having an FLO in place and circulation of information (e.g. via Kingfisher and local communications) will help ensure any displaced fishermen are aware of the exposed cable and avoid fishing directly over it. In addition, guard vessels will be used in any areas where cable exposures are considered to present significant risk to fishing gear snagging.

Severity of Consequence

The most likely consequences are as per the equivalent impact for the Proposed Development in isolation.

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

Frequency of Occurrence

The frequency of occurrence during the period that the cables are surface-laid is considered to be **remote**.

Significance of effect

Overall, the severity of consequence is deemed to be serious 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.

Additional mitigation to reduce this impact to ALARP is to minimise the amount of time between cable lying and installation of cable protection, e.g. burial.

11.2.6.2 Operation and maintenance phase

The risk of fishing gear interaction with the proposed cables during the operational phase could be increased if cumulative developments are expected to lead to increased fishing activity across the cables. Any displacement is expected to be minimal compared to the current fishing levels across the cables.

Therefore, the impact is as per the equivalent operational phase impact for the Proposed Development in isolation.

During the operation and maintenance phase the cables will be marked on UKHO Admiralty Charts and KIS-ORCA charts with associated note/warning about anchoring, trawling or seabed operations.

A CBRA will be undertaken to provide a detailed assessment of fishing activity along the Proposed Development and fishing gear penetration depths for the various soil conditions in order to determine suitable protection measures for the cables during the operation and maintenance phase.

Severity of Consequence

The planned cable protection is assumed to provide effective mitigation from fishing gear snagging, reducing the risk of serious consequences such as snagging, capsize of the vessel and PLL.

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

Frequency of Occurrence

The frequency of occurrence is considered to be **extremely unlikely**.

Significance of effect

Overall, the severity of consequence is deemed to be minor 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.

11.2.7 Vessel Grounding Due to Reduced Under Keel Clearance

11.2.7.1 Operation and Maintenance Phase

There could be an increased risk of vessel grounding due to reduced under keel clearance if cumulative projects were to lead to additional vessel movements over the proposed cables, particularly in areas where water depths are shallow.

This is particularly relevant if there is an increase in wind farm crew transfer vessels using the Port of Mostyn.

Severity of Consequence

Should a vessel grounding 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 severity of consequence is therefore considered to be **moderate**.

Frequency of Occurrence

When considered with the embedded mitigation of compliance with the requirements in MGN 654 and any change to water depth of more than 5% chart datum requiring further consultation and agreement with the MCA, the frequency is considered to be reduced to low for all vessel types.

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

Significance of the Effect

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.

11.2.8 Interference with Magnetic Compasses

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 cables and the cumulative developments, it is not anticipated that the presence of the cumulative developments will result in any change to this impact.

Severity of Consequence

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

Frequency of Occurrence

The frequency of occurrence is considered to be **extremely unlikely**.

Significance of the Effect

Overall, the severity of consequence is deemed to be minor, 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.

11.2.9 Reduction of Emergency Response Capability Due to Increased Incident Rates for SAR Responders and Increased Demand on the Available Resources

11.2.9.1 All Phases

If construction works for the Proposed Development were to overlap with construction or operational phases of the cumulative developments, there could be increased reduction in emergency response capability. However, due to the temporary nature of the construction works, this impact is expected to be minimised.

Project vessels will be managed through marine coordination and compliant with Flag State regulations. Additionally, should an incident occur, project vessels will be well equipped to assist, either through self-help capability or – for an incident involving a nearby third-party vessel – through SOLAS obligations (Ref. xi), all in liaison with the MCA.

During the operation and maintenance phase of the Proposed Development, there is not expected to be a notable increase in vessel numbers, however there may be a period of time when the new Douglas CCS platform and the existing Douglas Complex are in operation simultaneously. If this coincides with the construction or operational phases of cumulative projects, this could further reduce emergency response capability. As the new Douglas CCS platform will be unmanned, any impact is considered to be minimal.

Severity of Consequence

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

Frequency of Occurrence

Due to the limited number of vessels involved and temporary nature of the construction phase works, and given that the proposed new Douglas CCS platform will be unmanned and within the existing Douglas Complex, the frequency of occurrence is considered to be **negligible.**

Significance of Risk

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.

12 Risk Control Log

This section presents a summary of the assessment of shipping and navigation impacts scoped into the risk assessment. The impacts, together with proposed mitigation measures, frequency of occurrence, severity of consequence and significance of risk, are presented in Table 12.1.

Table 12.1: Risk Control Log

Phase	Impact	Relevant Mitigation Measure	Frequency of Occurrence	Severity of Consequence	Significance of Risk
Construction	Vessel displacement leading to increased vessel to vessel collision risk between third-party vessels	Promulgation of Information Advisory safe passing distances and safety zones Guard vessels and/or temporary AtoNs Liaison with ports and harbours Fishing liaison Compliance with COLREGs and SOLAS	Extremely Unlikely	Moderate	Broadly Acceptable
	Increased vessel to vessel collision risk between third-party vessels and project vessels	Promulgation of Information Lighting and marking of project vessels Advisory safe passing distances and safety zones Guard vessels and/or temporary AtoNs Marine coordination	Extremely Unlikely	Moderate	Broadly Acceptable

Phase	Impact	Relevant Mitigation Measure	Frequency of Occurrence	Severity of Consequence	Significance of Risk
		Compliance with COLREGs and SOLAS Liaison with ports and harbours Fishing liaison			
	Reduced access to local ports	Promulgation of Information Marine coordination Lighting and marking of project vessels Compliance with COLREGs and SOLAS Liaison with ports and harbours Fishing liaison	Remote	Minor	Broadly Acceptable
	Anchor interaction with subsea cable	Promulgation of information Guard vessels and/or temporary AtoNs	Extremely Unlikely	Moderate	Broadly Acceptable
	Fishing gear interaction with subsea cable	Promulgation of information	Remote	Serious	Tolerable

Phase	Impact	Relevant Mitigation Measure	Frequency of Occurrence	Severity of Consequence	Significance of Risk
		Guard vessels and/or temporary AtoNs			
	Reduction of emergency response capability due to increased incident rates for SAR responders and increased demand on the available resources	Promulgation of Information	Negligible	Moderate	Broadly Acceptable
		Marine coordination			
		Compliance with COLREGs and SOLAS			
Operation and Maintenance	Increased vessel to vessel collision risk between third-party vessels and project vessels	Promulgation of Information	Extremely Unlikely	Moderate	Broadly Acceptable
		Lighting and marking of project vessels			
		Advisory safe passing distances and safety zones			
		Guard vessels and/or temporary AtoNs			
		Marine coordination			
		Compliance with COLREGs and SOLAS			
		Liaison with ports and harbours			
	Vessel to platform allision risk	Promulgation of Information	Extremely Unlikely	Moderate	Broadly Acceptable

Phase	Impact	Relevant Mitigation Measure	Frequency of Occurrence	Severity of Consequence	Significance of Risk
		Lighting and marking Advisory safe passing distances and safety zones Marine coordination Compliance with COLREGs and SOLAS			
	Reduced access to local ports	Promulgation of Information Marine coordination Lighting and marking of project vessels Compliance with COLREGs and SOLAS Liaison with ports and harbours	Extremely Unlikely	Negligible	Broadly Acceptable
	Anchor interaction with subsea cable	Cable Protection Lighting and marking	Extremely Unlikely	Minor	Broadly Acceptable
	Fishing gear interaction with subsea cable	Cable Protection Lighting and marking	Extremely Unlikely	Minor	Broadly Acceptable
	Vessel grounding due to reduced under keel clearance	Compliance with MGN 654	Remote	Moderate	Tolerable

Phase	Impact	Relevant Mitigation Measure	Frequency of Occurrence	Severity of Consequence	Significance of Risk
	Interference with magnetic compasses		Extremely Unlikely	Minor	Broadly Acceptable
	Reduction of emergency response capability due to increased incident rates for SAR responders and increased demand on the available resources	Promulgation of Information Marine coordination Compliance with COLREGs and SOLAS	Negligible	Moderate	Broadly Acceptable
Decommissioning	Vessel displacement leading to increased vessel to vessel collision risk between third-party vessels	Promulgation of Information Advisory safe passing distances and safety zones Guard vessels and/or temporary AtoNs Liaison with ports and harbours Fishing liaison Compliance with COLREGs and SOLAS	Extremely Unlikely	Moderate	Broadly Acceptable
	Increased vessel to vessel collision risk between third-party vessels and project vessels	Promulgation of Information Lighting and marking of project vessels	Extremely Unlikely	Moderate	Broadly Acceptable

Phase	Impact	Relevant Mitigation Measure	Frequency of Occurrence	Severity of Consequence	Significance of Risk
		Advisory safe passing distances and safety zones			
		Guard vessels and/or temporary AtoNs			
		Marine coordination			
		Compliance with COLREGs and SOLAS			
		Liaison with ports and harbours			
		Fishing liaison			
	Reduced access to local ports	Promulgation of Information	Remote	Minor	Broadly Acceptable
		Marine coordination			
		Lighting and marking of project vessels			
		Compliance with COLREGs and SOLAS			
		Liaison with ports and harbours			
		Fishing liaison			

Phase	Impact	Relevant Mitigation Measure	Frequency of Occurrence	Severity of Consequence	Significance of Risk
	Reduction of emergency response capability due to increased incident rates for SAR responders and increased demand on the available resources	Promulgation of Information Marine coordination Compliance with COLREGs and SOLAS	Negligible	Moderate	Broadly Acceptable

13 Embedded Mitigation Measures

As part of the Proposed Development design process, a number of embedded mitigation measures have been adopted to reduce the potential for risk to shipping and navigation. These measures have and will continue to evolve over the development process as the EIA progresses and in response to consultation.

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

The embedded mitigation measures relevant to shipping and navigation are outlined in Table 13.1.

Table 13.1: Embedded Mitigation Measures

Embedded Mitigation Measure	Description
Promulgation of information advising on the nature, timing and location of activities, Safety Zones and advisory safe passing distances, including through Notices to Mariners	Timely circulation of information via Notices to Mariners (NtM), Kingfisher/KIS-ORCA notifications, Radio Navigational Warnings, Navigational Telex (NAVTEX), and/or other navigational broadcast warnings as soon as reasonably practicable in advance of and during the works.
Lighting and marking of project vessels	Cable Lay Vessels (CLVs) and other vessels involved in cable installation will display appropriate marks and lights, and broadcast their status on AIS at all times, to indicate the nature of the work in progress, and highlight their restricted manoeuvrability.
Guard vessel and/or temporary AtoNs	Where required based on risk assessment, guard vessels and/or temporary AtoNs may be deployed to guide vessels around any areas of construction activity.

Embedded Mitigation Measure	Description
Use of guard vessels at cable exposures	Where cable exposures exist that would result in significant risk (e.g. if cable burial is carried out post cable lay), guard vessels will be used where appropriate until the risk has been mitigated by burial and/or other protection methods.
Advisory safe passing distances and safety zones	Passing vessels will be requested to maintain an advisory safe passing distance around project vessels (e.g. cable installation vessels) restricted in manoeuvrability. It is assumed that a 500m Safety Zone for the new Douglas CCS platform will be in place.
Marine coordination	Marine coordination and communication to manage project vessel movements.
Vessel Management Plan	A Vessel Management Plan (VMP) will be developed which will determine vessel routeing to and from construction areas and ports to avoid areas of high risk to marine mammals.
Development of and adherence to an Environmental Management Plan (EMP) that will be prepared and implemented during the construction, operational and maintenance and decommissioning phases of the Project. The EMP will include appendices detailing actions to minimise Invasive Non-Native Species (INNS) (the INNSMP), and a Marine Pollution Contingency Plan (MPCP) will be developed which will include planning for accidental spills, address all potential contaminant releases and include key emergency contact details (e.g. Environmental Protection Agency (EPA)).	Measures will be adopted to ensure that the potential for release of pollutants from construction, operational and maintenance and decommissioning plant is minimised. These will likely include: designated areas for refuelling where spillages can be easily contained, storage of chemicals in secure designated areas in line with appropriate regulations and guidelines, double skinning of pipes and takes containing hazardous substances, and storage of these substances in impenetrable bunds. All vessels will be required to comply with the standards set out in the International Convention for the Prevention of Pollution from Ships (MARPOL).

Embedded Mitigation Measure	Description
Compliance with COLREGs and SOLAS	Compliance of all project vessels with international marine regulations as adopted by the Flag State, notably the COLREGs (IMO, 1972/78) and SOLAS (IMO, 1974).
Liaison with ports and harbours	Liaison with local ports and harbours, particularly the Port of Mostyn, during the construction phase.
Fishing liaison	Ongoing liaison with fishing fleets will be maintained via an appointed FLO and Fishing Industry Representative. Prior to construction, a Fisheries Liaison and Coexistence Plan (FLCP) will be developed, setting out in detail the planned approach to fisheries liaison and means of delivering any other relevant mitigation measures.
The Applicant is committed to marking and lighting the project in accordance with relevant industry guidance and as advised by relevant stakeholders including the MCA, Civil Aviation Authority (CAA) and Trinity House. This will include appropriate lighting and marking of Offshore Platforms (OPs). The Applicant will also ensure the project is adequately marked on nautical charts. A lighting and marking plan will be secured.	The new CCS platform will exhibit lights, marks, sounds, signals and other aids to navigation as required by the Standard Marking Schedule, and in consultation with Trinity House. The platform and cables will be suitably marked on Admiralty Charts, with associated note.
Scour Protection	Scour protection (e.g. rock berms) will only be used at third-party cable crossings and monitored as per below.
Suitable Implementation and Monitoring of Cable Protection	Suitable implementation and monitoring of cable protection informed by a CBRA. Cables will be buried to a target depth of 2-3m and only be protected using external protection (e.g., rock berms) at third-party crossings.
Development and adherence to a Cable Specification and Installation Plan (CSIP) post consent which will include cable burial where possible (in accordance with the specific policies set out in the North West	The CSIP will set out appropriate cable burial depth in accordance with industry good practice, minimising the risk of cable exposure. The CSIP will also ensure that cable crossings are appropriately designed to mitigate environmental effects, these crossings will be agreed with relevant parties in

Embedded Mitigation Measure	Description
Inshore and North West Offshore Coast Marine Plans (Ref. vi) and cable protection, as necessary.	advance of CSIP submission. The CSIP will include a detailed CBRA to enable informed judgements regarding burial depth to maximise the chance of cables remaining buried whilst limiting the amount of sediment disturbance to that which is necessary. Measures will seek to reduce the amount of EMF which benthic and fish and shellfish receptors are exposed to during the operations and maintenance phase by increasing the distance between the seabed surface and the surface of the cables.
Where practicable any requirements for cable protection will be compliant with MGN 654	Following further survey and detailed engineering, if areas are identified where external protection is required and the MCA condition of no more than 5% reduction in water depth is not achievable, a location specific review of impacts to shipping and consultation with the MCA will be carried out and additional mitigations agreed as required.

14 Proposed Mitigation and Monitoring

14.1 Additional Mitigation

Proposed additional mitigation measures to ensure tolerable risks are ALARP are as follows:

- The period during which the cables are surface laid and not yet buried or protected should be reduced so far as practicable. This reduces the risk of vessel anchors and fishing gear snagging on surface-laid cables.

14.2 Monitoring

14.2.1 Cable Protection

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

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

14.2.2 Compass Deviation

A compass deviation study will be undertaken post-consent, once the detailed design and cable configuration is available. This will determine whether the compass deviation limits set by the MCA can be met. If it cannot be demonstrated that MCA deviation requirements can be met pre-construction, a post-construction compass deviation survey of the 'as laid' cables will be undertaken.

15 Summary

Using baseline data, expert opinion and the outputs of consultation, impacts relating to shipping and navigation have been identified for the Proposed Development for all phases of the development (construction, operation and maintenance and decommissioning). This has been fed into the FSA undertaken in Section 10.

15.1 Consultation

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

- MCA;
- Trinity House;
- RYA;
- UK Chamber of Shipping;
- Port of Liverpool; and
- Port of Mostyn.

15.2 Baseline Environment

15.2.1 Navigational Features

The proposed Douglas CCS platform which forms part of the Proposed Development is located within the existing safety zone at the existing Douglas complex, which lies within an Area to be Avoided inside the separation zone of the Liverpool Bay TSS.

Ports in the area include the Port of Liverpool, located within the River Mersey, which houses a number of smaller ports and harbours as well as the entrance to the Manchester Ship Canal. The Welsh Channel, used to access the Port of Mostyn in the River Dee, is crossed by the cable routes associated with the Proposed Development.

There are charted anchorages, including deep water berths located within the Port of Liverpool limits, as well as a prohibited anchoring zone.

Operational wind farms in the area include the Gwynt y Môr wind farm, which is intersected by the Proposed Development, as well as the North Hoyle, Rhyl Flats and Burbo Bank wind farms. Awel y Môr and Mona wind farms are also proposed to be constructed in proximity to the Proposed Development.

The Proposed Development crosses the export cables for the Gwynt y Môr, Burbo Bank and North Hoyle wind farms, as well as the inter-array cables for Gwynt-y- Môr. The Proposed Development also crosses the Western Link power cable. The cable route coincides with the pipelines which are intended to be repurposed as part of the Proposed Development. In addition to existing cables, the proposed MaresConnect interconnector is expected to make landfall to the west of the Proposed Development, on the north coast of Wales.

15.2.2 Maritime Incidents

Between 2013 and 2022, there were an average of 158 RNLI callouts per year within the shipping and navigation study area, with these largely concentrated along the coastline. The most common incident type responded to by the RNLI was “Person in Danger”, which accounted for 37%, followed by machinery failures (16%). Common casualty types, alongside “Person in Danger” incidents, were recreational vessels (25%) and personal craft (10%). Six incidents were recorded within the Physical Work Area, with three “person in danger” incidents and three machinery failures.

Over the ten year period, there was an average of 12 to 13 incidents per year recorded within the study area. The most common incident types were machinery failures (22%), “Accident to Person” (19%) and grounding/stranding incidents (18%). The most common type of vessel involved in incidents was “other commercial”, which includes vessels such as workboats, dredgers, SAR craft and tugs, and accounted for 35% of incidents recorded by the MAIB. Cargo vessels (22%), service ships (15%) and recreational craft (11%) also accounted for a significant number of incidents within the study area.

15.2.3 Vessel Traffic Movements

Based on a year of AIS vessel traffic data, there was an average of 54 unique vessels per day within the study area and 31 per day within the Physical Work Area. The most common vessel types recorded were cargo vessels, wind farm vessels and tankers. Cargo vessels and tankers were generally recorded utilising the Liverpool Bay TSS and the Queen’s Channel while visiting Liverpool, while wind farm vessels were recorded visiting the various wind farms in the area, with operational bases at Liverpool and Mostyn. Vessels utilising the TSS cross the cable routes associated with the Proposed Development to the north and south of the Douglas CCS platform, while vessels entering Mostyn cross the cable route close to the landfall at Point of Ayr.

The largest vessels recorded were the cargo vessels and tankers using the TSS, while large passenger ferries and cruise ships were also present. The smallest vessels in the study area tended to be those associated with the wind farms and pilot vessels, generally recorded close to shore and on routes to and from the wind farms. Fishing vessels and recreational vessels were also recorded throughout the study area, with fishing activity generally concentrated in the north of the study area, with many recorded fishing around the cable route to the north of the proposed Douglas CCS platform.

The majority of anchoring activity took place within the charted anchorages in the Port of Liverpool limits, inshore of the cable routes connecting the Douglas CCS platform to the satellite platforms. Anchoring was also recorded on the periphery of the wind farms, particularly Gwynt y Môr. Vessels anchoring around Gwynt y Môr may anchor in close proximity to the Proposed Development cable route, which passes through the wind farm.

15.3 Future Case Vessel Traffic

There are a number of wind farms projects in the area, including those outside the study area, which are anticipated to alter traffic patterns within the area. These include the Awel y Môr, Mona, Morgan and Morecambe sites. There is potential for significant displacement of traffic, including alterations to ferry routes, due to the presence of these sites in the future. The projects may also lead to an increase in the number of wind farm support vessels in the area, particularly using the ports of Mostyn and Liverpool.

Port arrival statistics show a slight decrease in traffic arriving at the local ports of Liverpool, Manchester and Garston since 2017. It is noted that significant investment is expected in the future to support sustainable port infrastructure at both Manchester and Liverpool.

Fishing trends are difficult to project into the future, noting that trends are dependent on numerous factors including fish stocks and quotas. Changes to legislation following Brexit may also impact the size and make-up of the fishing fleet in UK waters.

Recreational activity can be similarly difficult to predict, but is assumed to remain similar or slightly increase in future years. Similarly the make-up of recreational traffic may vary, with sail and electric-powered vessels expected to become more prominent in place of diesel-fuelled craft. The locations of recreational activity may also vary, while volume of activity may be dependent on other factors such as the weather, climate change and the economy.

15.4 Risk Statement

Using the baseline data, expert opinion, stakeholder concerns and lessons learnt from existing offshore developments, various shipping and navigation hazards have been risk assessed in line with the FSA approach. The full risk control log including details of hazards, proposed embedded mitigation measures and significance of risk is presented in Section 12.

The significance of risk has been determined as either **Broadly Acceptable** or **Tolerable** for all hazards assessed. Proposed additional mitigation measures to ensure tolerable risks are ALARP are as follows:

- The period during which the subsea cables are surface laid and not yet buried or protected, and thus exposed to the impact, should be reduced so far as practicable. This reduces the risk of vessel anchors and fishing gear snagging on surface-laid cable should there be a period of time between cable lay and protection when the cable is surface-laid.

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