Liverpool Bay CCS Ltd

HYNET CARBON DIOXIDE TRANSPORTATION AND STORAGE PROJECT - OFFSHORE

Environmental Statement
Volume 3: Aviation and Radar Technical Report

EHE7228B
Liverpool Bay CCS Limited
Final
February 2024
Offshore ES
Aviation and Radar
Technical Report

rpsgroup.com

Document status					
Version	**Purpose of document**	**Authored by**	**Reviewed by**	**Approved by**	**Date**
FINAL	Final	RPS/Anatec	Eni UK Ltd	Eni UK Ltd	February 2024

Prepared by:

RPS

Prepared for:

Liverpool Bay CCS Limited

HyNet Carbon Capture and Storage Aviation and Radar Technical Report

Prepared by	Anatec Limited
Presented to	RPS Group on behalf of Eni UK
Date	2 August 2023
Revision Number	01
Document Reference	A4814-RPS-A&R-1

	Aberdeen Office	**Cambridge Office**
Address	10 Exchange Street, Aberdeen, AB11 6PH, UK	Braemoor, No. 4 The Warren, Witchford Ely, Cambs, CB6 2HN, UK
Tel	01224 253700	01353 661200
Email	aberdeen@anatec.com	cambs@anatec.com

Revision Number	Date	Summary of Change
00	12 July 2023	First Issue
01	2 August 2023	Updated based on client's comments

Table of Contents

Table of Figures

Table of Tables

Glossary

Term	Definition
Allision	An incident in which a vessel comes into contact with a stationary object such as an offshore platform.
Environmental Impact Assessment	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Impact Assessment (EIA) Report.
Helideck	A final approach and take off area located on a floating or fixed offshore structure. The term includes take-off and landing operations on ships and vessels and covers shipboard final approach and take off areas.
Project	The HyNet Carbon Dioxide Transportation and Storage Project.
Proposed Development	The offshore components of the Project which are subject of this Environmental Statement, as described in Chapter 3: Proposed Development Description.
Radar Early Warning System (REWS)	A system based on radar detection of vessels to monitor and track the positions of vessels in proximity to offshore facilities.
Safety Zone	An area extending 500m from any part of an offshore oil and gas installation, automatically established around all installations which project above the sea at any state of the tide. Vessels are not permitted to enter safety zones except under special circumstances.
The Applicant	This is Liverpool Bay CCS Ltd.
Traffic Separation Scheme (TSS)	A routeing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes. Within each lane, one-way traffic is established, with crossing vessels required to cross the traffic lanes at as close to a 90 degree angle as possible.
Vessel Traffic Service (VTS)	A marine traffic monitoring system established by a harbour or port authorities to provide information to vessels, and potentially manage vessel traffic within port limits.

Acronyms Table

Abbreviation	Definition
ANO	Air Navigation Order
AOC	Air Operator Certificate
ATBA	Area To Be Avoided
CAD	Computer Aided Design
CAP	Civil Aviation Publication
CAT	Commercial Air Transport
CCS	Carbon Capture and Storage
FATO	Final Approach and Take-off Area
IMO	International Maritime Organization
LAT	Lowest Astronomical Tide
m	Metre(s)
NAA	National Aviation Authority
RCS	Radar Cross Section
REWS	Radar Early Warning System
SAR	Search and Rescue
SPA-HOFO	Specific Approval Helicopter Offshore Operations
TSS	Traffic Separation Scheme
VTS	Vessel Traffic Service

Units Table

Abbreviation	Unit
°	Degree(s)
ft	Feet
GHz	Gigahertz
km	Kilometre(s)
m	Metre(s)
m^2	Square Metre(s)
nm	Nautical Miles(s)

1 Introduction

This Technical Report provides an overview of the Proposed Development as relevant to aviation and radar, summarises the legislation and guidance, and reviews the aviation and radar implications for the offshore components of the HyNet Carbon Dioxide Transportation and Storage Project (hereafter referred to as "the Proposed Development").

It is noted that any impacts on existing Eni helicopter operations and radar equipment in Liverpool Bay, including at the Douglas Field, are outside the scope of this report, as these are under the management of Eni as the duty holder of the field. Only potential impacts on third parties are considered.

2 Study area

The Proposed Development aviation and radar study area is defined as encompassing a 12 nautical mile (nm) radius buffer of the proposed new platform location. This study area is considered sufficient to appropriately capture any aviation effects of the Proposed Development, as well as capturing the typical operational range of marine radars. The aviation and radar study area is presented in Figure 2.1. It is noted that, for completeness, infrastructure beyond this area is also referenced in the discussion.

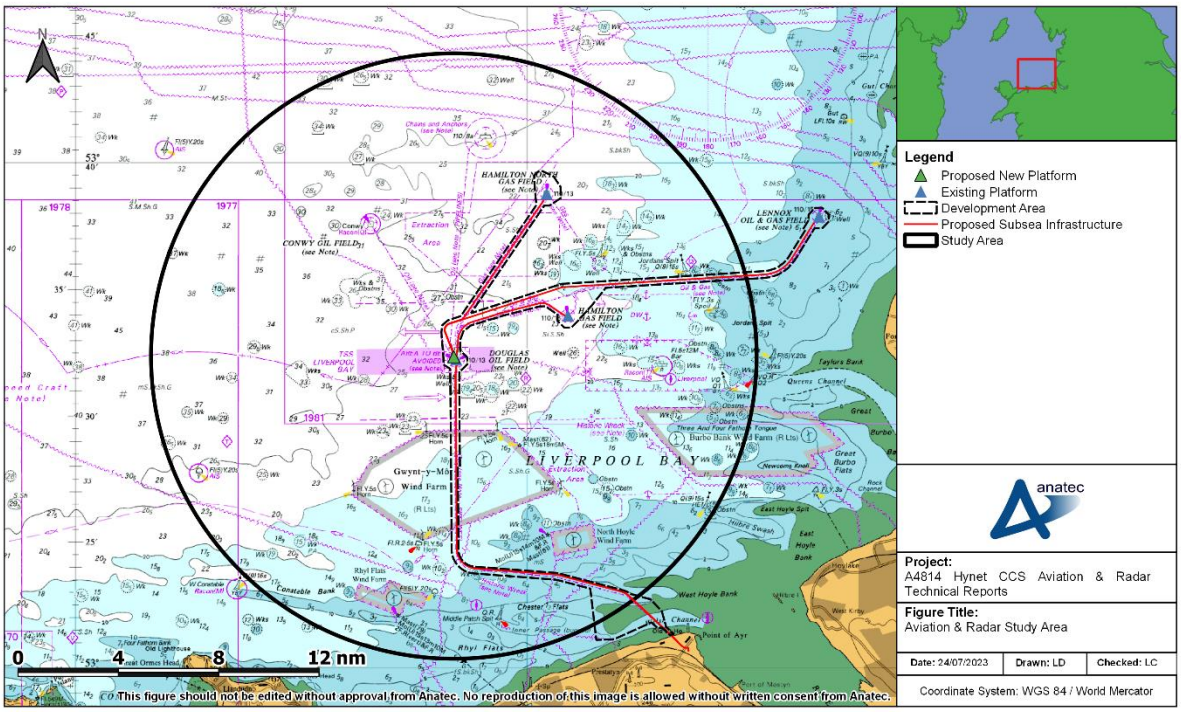

Figure 2.1 Aviation & Radar Study Area

3 Project Overview

This section presents an overview of the Proposed Development. An overview of the project infrastructure is presented in Figure 3.1.

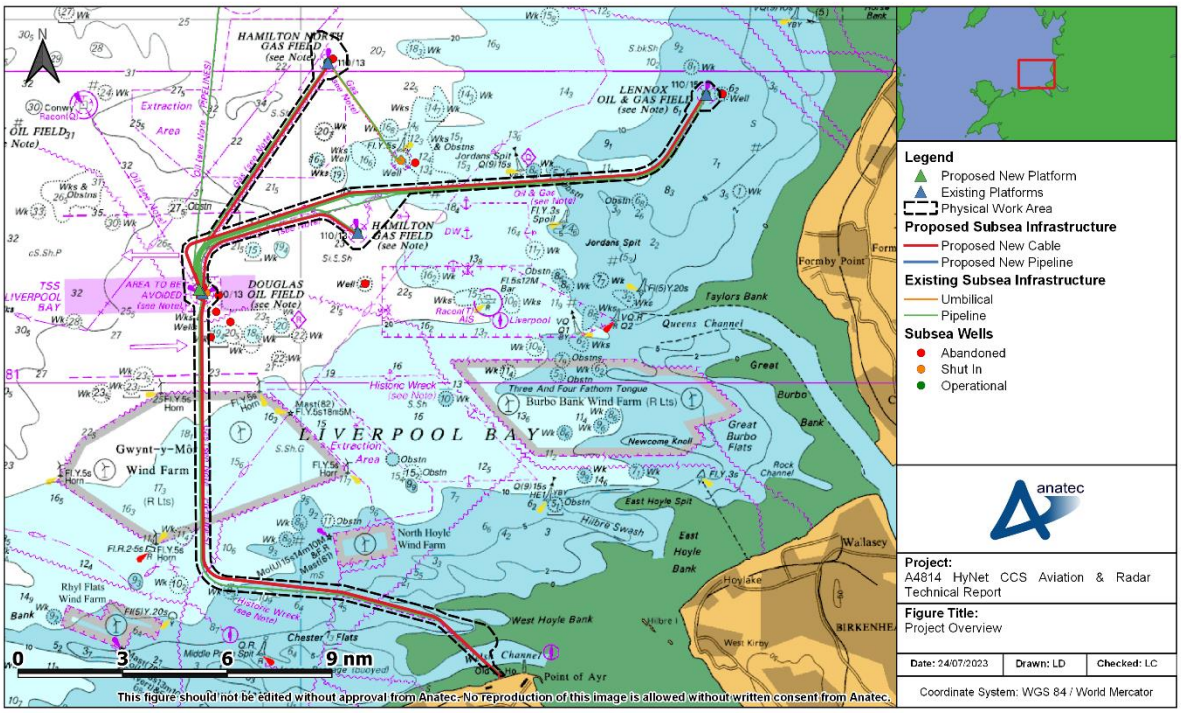

Figure 3.1 Proposed Development Overview

The Proposed Development consists of a single new Douglas CCS platform planned to be constructed within the existing 500 metre (m) safety zone at the Douglas Complex, with new subsea cables to be installed linking to a landfall at Point of Ayr and to the nearby existing platforms at Hamilton, Hamilton North and Lennox. All the cables follow similar routes to existing pipelines, which are also planned to be repurposed as part of the project, with minor re-routeing of pipelines required to connect to the new Douglas CCS platform. The existing Douglas Complex is due to be decommissioned as part of the works (although they could be in place concurrently for a time). The proposed platform is located to the northeast of the existing complex, approximately 150m away from the existing Douglas accommodation platform.

It is noted that Radar Early Warning Systems (REWS) are installed on the South Morecambe AP1 platform, 18.5nm north of the Douglas location, and at Millom west, 30.9nm to the north. The Gwynt y Môr offshore wind farm is located 2.9nm to the south of the proposed Douglas platform, and is set to be extended to the west by the Awel y Môr offshore wind farm. It is likely that these wind farms would have an impact on radar systems in the area.

The location of the proposed Douglas CCS platform is presented in Figure 3.2.

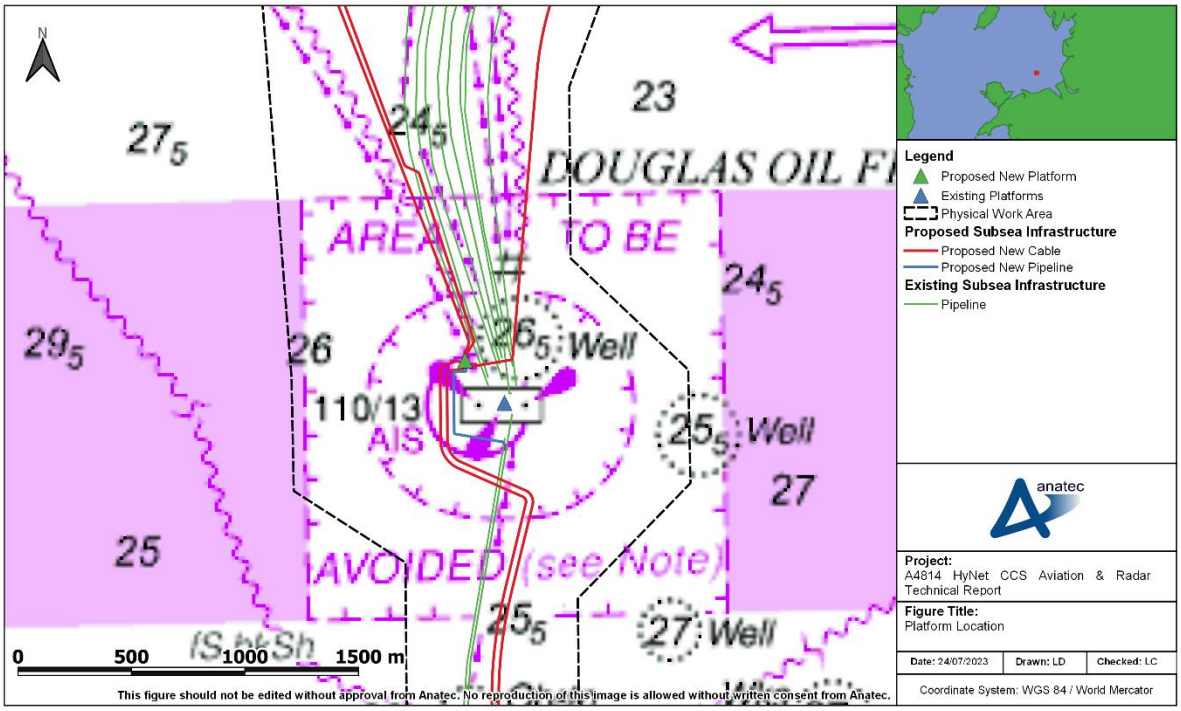

Figure 3.2 Platform Location

The proposed location of the platform is within the 500m safety zone around the existing Douglas complex, which is located within an Area To Be Avoided (ATBA) between the lanes of the IMO-adopted Liverpool Bay Traffic Separation Scheme (TSS).

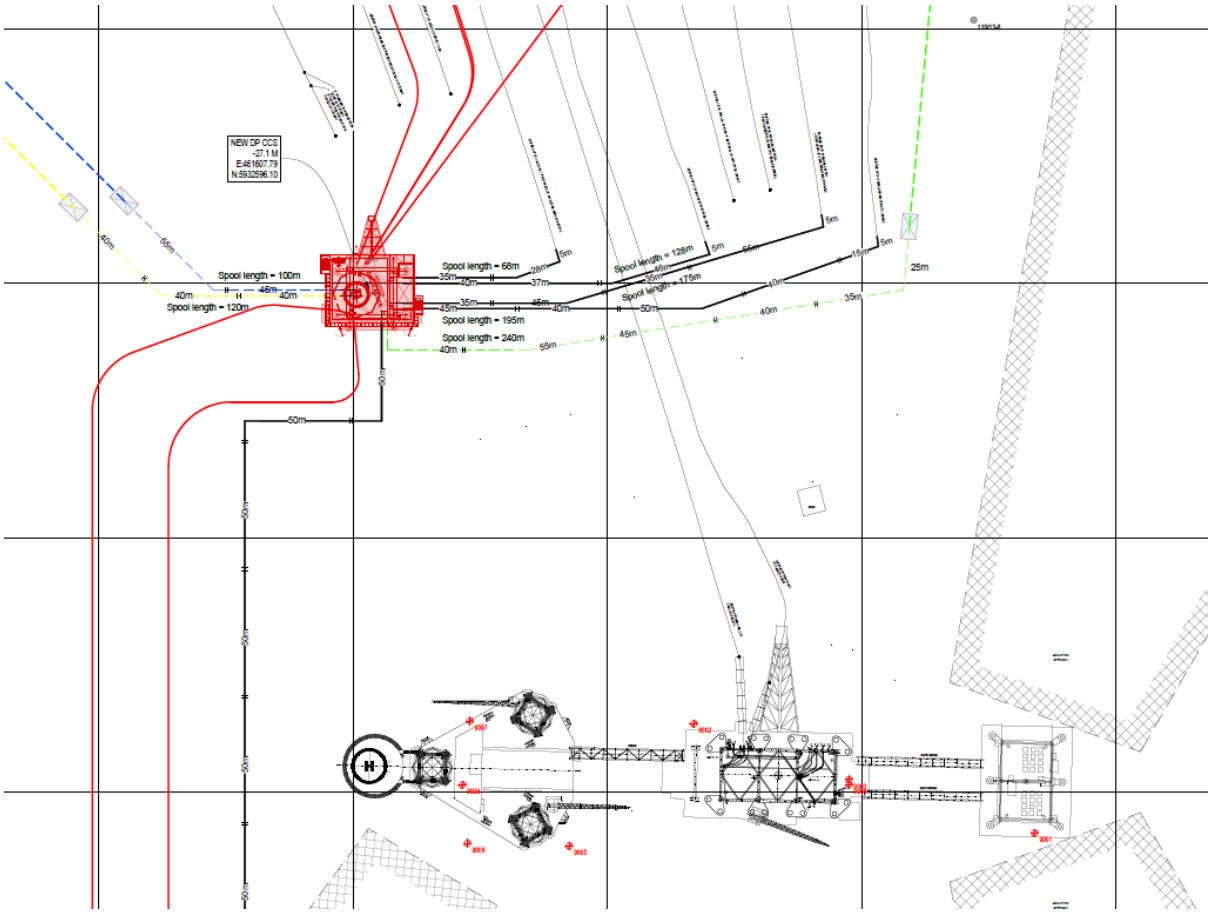

Figure 3.3 Layout of New and Existing Douglas Platforms

The coordinates of the proposed Douglas CCS Platform are presented in Table 3.1

Table 3.1 Coordinates of the Proposed Douglas CCS Platform

Platform	Geographical Coordinates (ED50 UTM Zone 30N)	
	Easting	Northing
Proposed Douglas CCS Platform	461607.79m	5932596.10m

The dimensions of the proposed new Douglas CCS platform are presented in Table 3.2.

Table 3.2 Proposed New Platform Details

Parameter	Proposed Douglas CCS Platform
Height of main structure (weather deck) (above LAT) (m)	35.5
Height of helideck (above LAT) (m)	35.5

Parameter	Proposed Douglas CCS Platform
Maximum height of structure (above LAT) (m)	45m
Topside length (m)	33.0
Topside width (m)	30.0
Orientation (°)	0° (North)

A schematic diagram of the Proposed Douglas CCS Platform is presented in Figure 3.4.

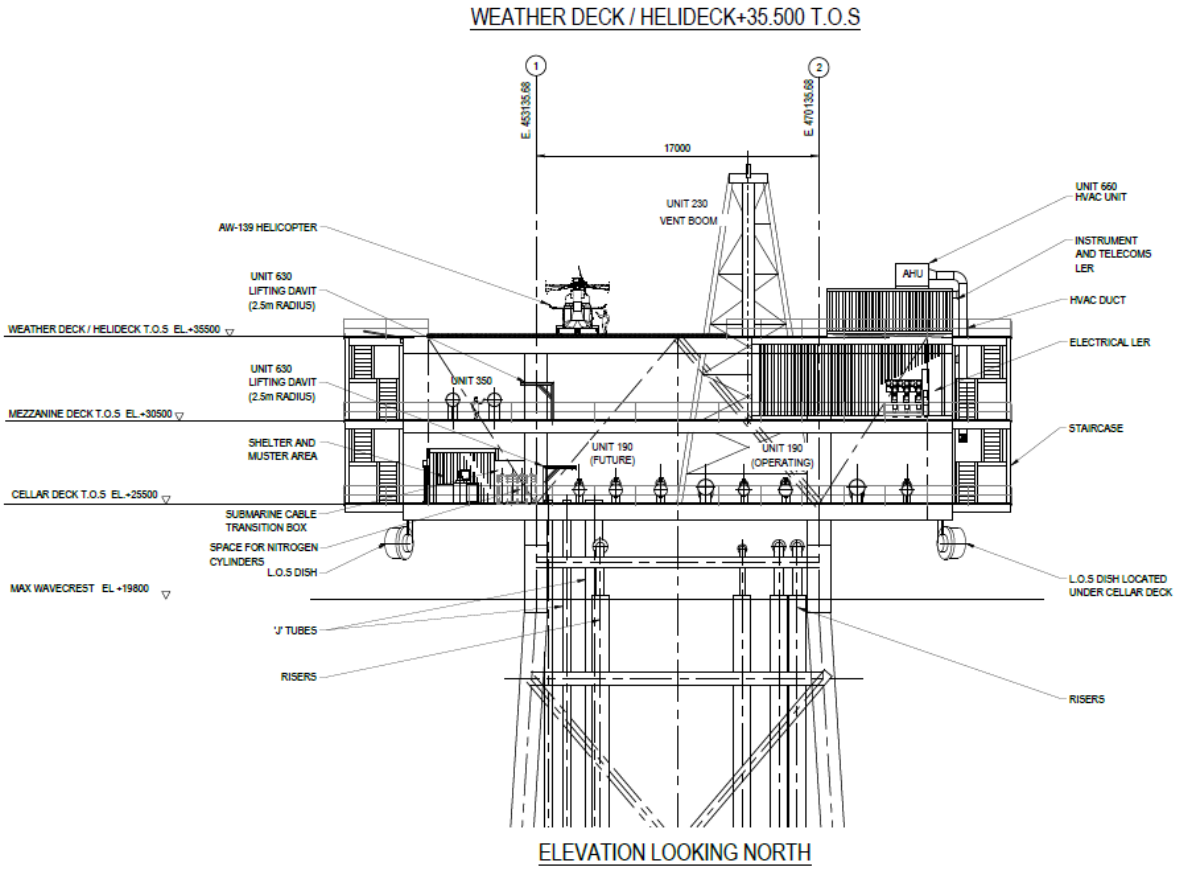

Figure 3.4 Schematic Diagram of the Proposed Douglas Platform

4 Policy and Legislative Context

The policy context for the Proposed Development is set out in Chapter 2: Policy and Legislation. Specific policy relevant to aviation is laid out below.

4.1 Aviation

4.1.1 Search and Rescue (SAR)

Search and Rescue (SAR) is a State activity regulated by National Aviation Authorities (NAAs). In the UK, operation of civil helicopters for SAR is considered to be for the purposes of Public Transport and therefore subject to Article 101 of the Air Navigation Order (ANO) requiring a national Air Operator's Certificate (AOC). In particular, UK SAR is regulated under Civil Aviation Publication (CAP) 999, the UK Helicopter Search and Rescue National Approval Guidance (Ref. i).

A national SAR approval can grant an operator relevant permissions and exemptions, permitting operations in poor weather or more demanding conditions than Commercial Air Transport (CAT) operations. In doing so, the SAR operator will balance the risk to its crew and 3rd parties against the urgency of the task. For example, CAP 999 paragraph 3.10 states:

"Operating minima for the dispatch and continuation of a SAR operational flight are at the discretion of the aircraft commander. However, he is to consider the urgency of the task, crew and aircraft capability and the requirement to recover the aircraft safely."

4.1.2 Commercial Air Transport (CAT)

Offshore CAT flights are subject to additional requirements above the basic regulations for standard CAT flights. These are contained in the Specific Approval for Helicopter Offshore Operations (SPA-HOFO) regulations (Ref. ii). SPA-HOFO covers the following:

"Offshore operation' means a helicopter operation that has a substantial proportion of any flight conducted over open sea areas to or from an offshore location. An offshore operation includes, but is not limited to, a helicopter flight for the purpose of:

- *support of offshore oil, gas and mineral exploration, production, storage and transport;*
- *support of offshore wind turbines and other renewable-energy sources; or*
- *support of ships including sea pilot transfer.*

'Offshore location' means a location or destination on a fixed or floating offshore structure or vessel, and includes helidecks, helicopter hoist operations areas and operating sites. 'Offshore location' includes, but is not limited to:

- *helidecks;*
- *shipboard heliports; and*

- *winching areas on vessels or renewable-energy installations.*

'Helideck' means a (final approach and take off area) FATO located on a floating or fixed offshore structure. The term 'helideck' includes take-off and landing operations on ships and vessels and covers shipboard FATOs."

Flights to any fixed or mobile installations associated with the construction, operation or decommission of the HyNet project will be subject to the requirements of SPA-HOFO. SPA-HOFO imposes additional aircraft equipment, crew and passenger training and operational restrictions on offshore flights.

Flights under Visual Meteorological Conditions require the crew to "see and avoid" obstacles. Flights under Instrument Meteorological Conditions offshore assume a minimum height of 500 ft for all obstacles when calculating the Minimum Safe Altitude for transit.

4.1.3 Installation Lighting and Marking

Obstacles not in the vicinity of licenced aerodromes, like the Douglas CCS Platform, require the lighting shown in the Air Navigation Order (ANO) 2016 (as amended). Lighting is only mandated for obstructions higher than 150m, but as the Platform (including vent) is only 45m above LAT, no lighting is mandated by the ANO.

However, as the Douglas CCS Platform has a helideck, the requirements in CAP 437, Standards for Offshore Helicopter Landing Areas, become applicable. In particular, the lighting requirements in CAP 437 Chapter 4 and Appendix C must be complied with.

4.2 Radar

No specific policy was regarded as relevant to the radar implications of the Proposed Development.

5 Methodology

5.1 Aviation

The summation of the aviation baseline and potential implications for aviation has been primarily based on a review of legislation and guidance and informed by expert opinion.

5.2 Radar

The implications of the Proposed Development for radar have been informed by quantitative modelling and expert opinion. Potential receptors have been identified through desktop review.

The radar systems used within the maritime environment around the proposed project are typically radar systems that are used for navigation, allision risk management and traffic control near the ports. Marine navigational radars are radar systems that are installed onboard vessels to aid in navigation and detection of other vessels, structures and obstacles. These systems are limited by their cost and have limited data processing. Vessel Traffic Service (VTS) radars are used to manage the traffic around the port area to allow vessels to travel in and out of the port in a controlled manner and minimise the risk to the users. Such radars are equipped with a more sophisticated processing software that can detect and track vessels using the radar data and the AIS feed. Radar early warning systems are used onboard offshore oil and gas installation to provide detection and tracking of vessels near the installations. REWS will issue an alarm to the operator if a vessel is on an allision course to one of their assets or if vessels breach the minimum exclusion zone distance around their platforms.

The radar systems mentioned previously all typically operate at 9 GigaHertz (GHz). Therefore, the assessment of the radar impact was conducted at 9GHz in collaboration with Manchester Advanced Radar Services Ltd.

To assess the potential impact of the project, the radar cross-section (RCS) of a platform was modelled at 9GHz. The RCS models used a generic offshore platform geometry that was resized to match the dimensions of the proposed project. The model used is illustrated in Figure 5.1.

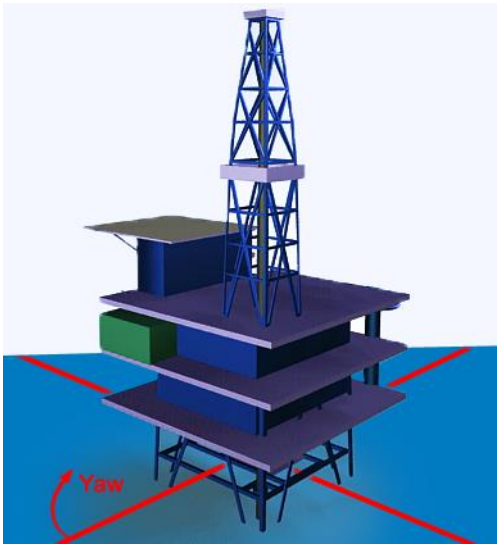

Figure 5.1 The generic platform CAD geometry used for the RCS modelling

Although the RCS models did not use the exact Computer Aided Design (CAD) geometry of the proposed project, the RCS of such structures is expected to be very large and the details of the CAD model are not expected to affect the key features of the RCS profile or the mean RCS levels.

6 Baseline environment

This section details the potential receptors for any implications of the Proposed Development from an aviation and radar perspective. The potential receptors are presented in Figure 6.1.

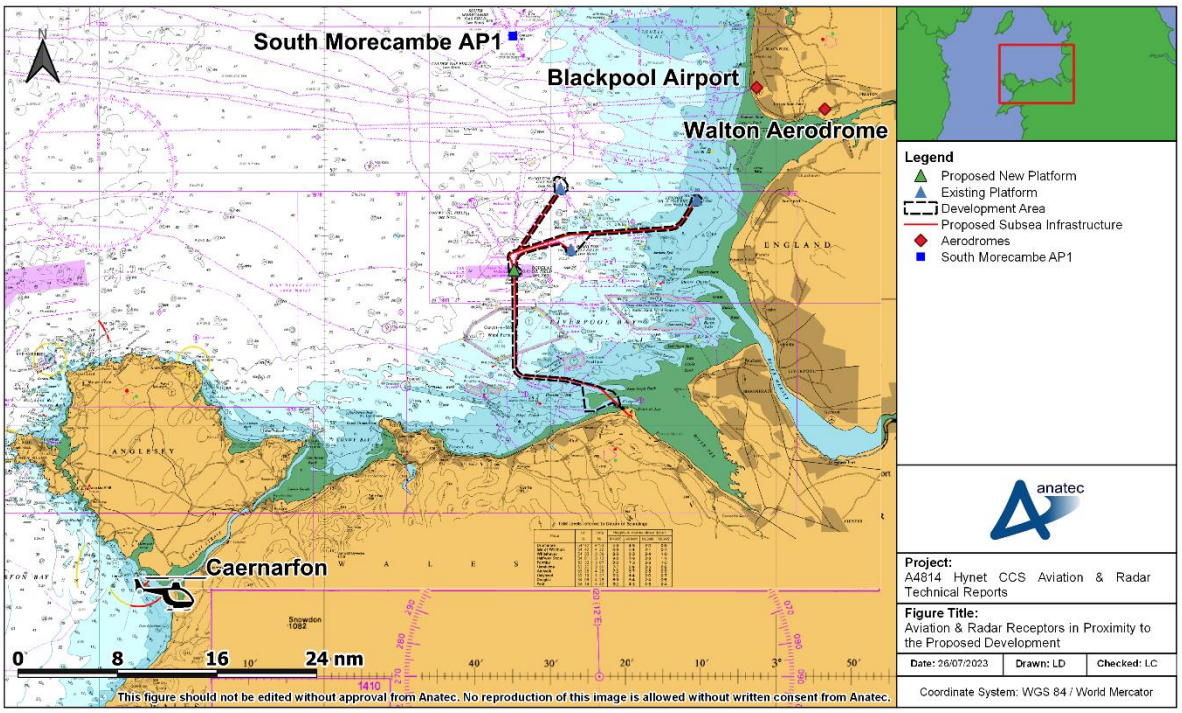

Figure 6.1 Map of Potential Receptors in proximity to the Proposed Development

6.1 Civil and military radar

St Anne's Radar Station operates a NATS air traffic control radar from a base located to the east of Blackpool Airport. Given the distance from the Proposed Development, it is considered unlikely that there will be any adverse implications on the radar station.

6.2 Aerodromes and Airports

The closest airports and aerodromes to the Proposed Development are Blackpool Airport, located 24.0nm from the proposed Douglas CCS platform, and Warton Aerodrome, 27.7nm away, both to the northeast of the platform location. Blackpool airport is of regional importance, housing facilities for business, medevac and general aviation. The airport supports aviation services for the offshore oil and gas industry in the Irish Sea. Warton Aerodrome is a private MOD safeguarded manufacturing and test establishment, operated by BAE Systems.

The Douglas CCS Platform is smaller than the adjacent Douglas gas complex. At 74.5 m (244ft) it is lower than the existing Douglas gas complex that has a maximum height of 77.7m (255ft). Professional experience and knowledge indicate that the Douglas CCS Platform will have no cumulative impact on nearby aerodrome receptors.

6.3 Airborne search and rescue operations

Current SAR helicopter provision is provided by Bristow Group on behalf of HMCG from 10 base stations around the UK. The contract for the next 10-year phase of UK SAR (UKSAR2G) has recently been awarded, with the Bristow Group as the Prime Contractor. The closest station to the Proposed Douglas CCS platform is at Caernarfon, 37nm to the southwest. Other relevant stations included Humberside (114nm to the east), Prestwick (123 nm to the north), St Athan (129nm to the south) and Lee on Solent (189nm) to the southeast. Under UKSAR2G, there will also be a temporary base located near Carlisle. SAR helicopter taskings were primarily in coastal areas, primarily along the Welsh coast to the south of the Proposed Development and are generally located a sufficient distance from the Proposed Development so as not to create significant impact.

6.4 Military practice and exercise areas

The closest military practice and exercise area to the Proposed Development is the X5306: Altcar area, located 17.4nm to the east of the proposed Douglas CCS platform. This area is located largely in the inter-tidal area forming part of Taylor's Bank on the coastline south of Formby.

Defence Communications Services Area (DCSA) Inskip is located 32nm to the northeast of the proposed Douglas CCS platform, at the site of a former airfield. The site now serves as a military radio communications installation.

6.5 REWS Radar Systems

REWS systems are installed on the South Morecambe AP1 platform, 18.5nm north of the Douglas location, and at Millom west, 30.9nm to the north. It is worth noting that REWS is primarily used to detect and track moving vessels and to alert the operator if a risk of allision is detected. The REWS uses the direction and the speed of the moving vessel to estimate the time it will take for an allision to occur. Although the detection range of REWS may reach up to 40nm (depending on the height of the radar antenna and the size of the target), the critical range for REWS is typically 16nm for moving vessels. Ranges beyond the 16nm is often considered to be outside of the coverage of REWS.

6.6 Future baseline scenario

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 require that "*an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge*" is included within an ES. In the event that the Proposed Development does not come forward, an assessment of the future baseline conditions has been carried out and is described within this section.

The future baseline scenario for aviation and radar is considered unlikely to change substantially from that presented in Section 6, in the absence of the Proposed Development. The future baseline scenario for aviation and radar is subject to gradual change as new projects and sites are identified in Liverpool Bay, and/or existing developments are decommissioned.

7 Summary

This section presents a summary of the potential implications for aviation and radar due to the presence of the Proposed Development (it is noted that impacts on Eni operations are outside scope).

7.1 Aviation

The platform must be marked and lit in accordance with CAP 437. Assuming it is correctly marked and lit, the following implications for operations has been assessed.

7.1.1 Search and Rescue Access

Due to the Douglas CCS platform's small size, location and maximum height of 74.5m, SAR operations in the area will be unaffected. This is particularly true given the platform is intended to replace the existing Douglas complex, which is significantly larger.

7.1.2 Commercial Air Transport

Operations under Visual Meteorological Conditions require the helicopter crew to see and avoid all obstacles. Operations under Instrument Meteorological Conditions assume all obstacles have a minimum height of 500ft; as the Douglas CCS Platform is lower (74.5m or 244ft), no change to this criterion is required.

Due to the Douglas CCS platform's small size, location and maximum height of 74.5m, it is assessed that it will not have any cumulative impact on aviation operations.

7.1.3 Conclusions and Recommendations

The Douglas CCS platform must be marked and lit in accordance with CAP 437. Assuming it is correctly marked and lit, it has been assessed that the Douglas CCS platform will not have any additional implications for aviation operations.

7.2 Radar

This section presents a review of the potential Radar implications of the Project, specifically the presence of the Douglas CCS platform (it is noted that impacts on Eni operations are outside scope).

The presence of offshore platforms within the line-of-sight of radar systems is quite a common occurrence and is not expected to introduce significant impact to the radar operators in the region. The radar signature of the platform is expected to be large and it would be visible on the radar at various ranges. This is due the large physical size of the platform along with the typical construction materials used for the platform.

As part of this study the RCS of a platform was modelled at 9 GHz. The results of the study showed that the RCS is expected to be large and the platform will be easily detected even at extended ranges. This can be seen in the RCS results shown in Figure 7.1, which were

modelled from two prospectives (yaw angles of 0 and 90). Although the geometry will appear to be different to the radar from these angles, the overall RCS profile and mean levels remain to be in the same order of magnitude. The RCS modelling also considered the RCS of the platform from different ranges (how far the radar is from the platform).

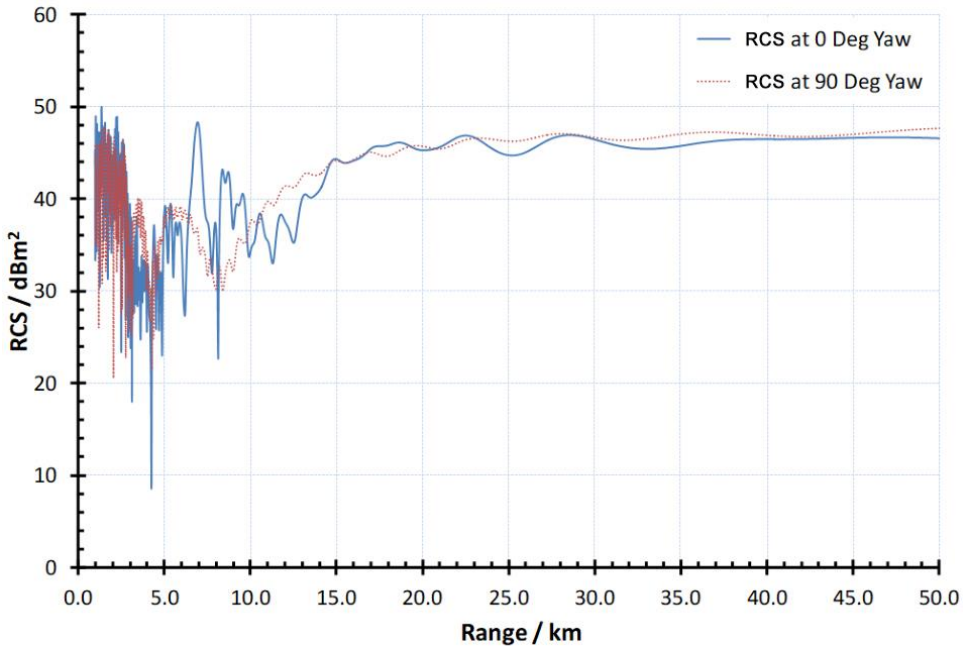

Figure 7.1 RCS modelling results for the simulated platform vs range

The modelling results show that the platform would have RCS values that are very large and would be easily detectable by radars operating in the region. At close ranges (1 – 15 kilometres (km)) the RCS can vary considerably and is shown to be between 200 m^2 and 63,000 m^2 depending on the range. At long ranges, the platform's RCS is approximately 40,000 m^2. The RCS modelling results indicate that the large RCS of the platform will result in large radar returns making the proposed platform identifiable by radar operators.

The REWS installations at South Morecambe AP1 and at Millom West platforms are sufficiently far and their performance is not expected to be affected by the presence of the proposed project. The REWS will be able to detect the returns from the proposed platform and the advanced thresholding algorithms will adjust the detection threshold around the platform. However, 18.5nm is often considered to be outside the critical range of REWS, which is typically considered to be 16nm for moving vessels. Therefore, the proposed project is not expected to have significant implications for the REWS installations and no mitigation measures would be needed.

Vessels operating near the proposed project will also receive a large radar signal. This will result in a clear detection of the platform on the radar screen. However, it is worth noting that due to the large RCS of the platform, marine navigational radar that might operate within 1.5 km of the platform may experience the appearance of a false radar detection due to the multiple reflections of the radar signal between the platform and the vessel's superstructure. It is noted that the two lanes of the TSS pass approximately at a minimum distance of 750m

from the proposed Douglas CCS platform location. These multiple reflections also occur when vessels are generally operating near large objects and structures. Mariners are often aware of such occurrences, and it is not expected to cause any significant detriment to the radar operation. Additionally, the large returns from offshore platforms and the appearance of the false detections can be easily mitigated by manually adjusting the gain of the radar or using the automatic gain adjustment function on the radar display.

7.2.1 Conclusions and Recommendations

The Proposed Development is expected to be within the line-of-sight of several radar users within the region. However, existing experience and data from radar users operating near similar offshore platforms indicate that there are no significant implications for radar performance. The modelling results also indicate that the platform will be easily detected by the radar operators. The proposed platform is not expected to cause any interference to the installations with REWS systems due to their distance from the project. Marine navigational radars will detect the platform and are expected to clearly show the location of the proposed project on the radar screen. When vessels are operating very close to the proposed project, false detections due to multiple reflections from the vessel's superstructure might appear on the radar screen. This is not a unique phenomenon and is not expected to cause significant detriment to the radar's performance or the ability of the operator to navigate safely.

8 References

i CAA (2014) CAP 999 Helicopter Search and Rescue (SAR) in the UK National Approval Guidance. Second Edition. Gatwick: CAA.

ii CAA (2018) Guidance for Specific Approval for Helicopter Offshore Operations (SPA.HOFO). Gatwick: CAA. CAA (2018) Guidance for Specific Approval for Helicopter Offshore Operations (SPA.HOFO). Gatwick: CAA. Available:https://www.caa.co.uk/Commercial-industry/Aircraft/Operations/Types-of-operation/SPA-HOFO---Specific-approval-for-helicopter-offshore-operations/. Accessed January 2023.