MORECAMBE

cobra | FLOTATION ENERGY

Morecambe Offshore Windfarm: Generation Assets

Environmental Statement

Volume 5

Appendix 17.1 Helicopter Access Study

PINS Document Reference: 5.2.17.1

APFP Regulation: 5(2)(a)

Rev 01

MORECAMBE

Document History

Doc No	MOR001-FLO-CON-ENV-RPT-1171	**Rev**	01
Alt Doc No	PC1165-RHD-ES-XX-RP-Z-0017		
Document Status	Approved for Use	**Doc Date**	May 2024
PINS Doc Ref	5.2.17.1	**APFP Ref**	5(2)(a)

Rev	Date	Doc Status	Originator	Reviewer	Approver	Modifications
01	May 2024	Approved for Use	Anatec Limited	Morecambe Offshore Windfarm Ltd	Morecambe Offshore Windfarm Ltd	n/a

Morecambe Offshore Windfarm

Helicopter Access Report

Prepared by	Anatec Limited
Presented to	Morecambe Offshore Windfarm Ltd
Date	28 May 2024
Revision Number	04
Document Reference	A5035-FLO-HAR-01

	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	20 December 2023	First Issue
01	18 April 2024	Updated including Vantage Data Analysis
02	25 April 2024	Updated to provide further information on separation distances
03	13 May 2024	Updated based on client comments
04	28 May 2024	Updated based on client comments

Table of Contents

Abbreviations Table

Abbreviation	Definition
°	Degrees Magnetic
°C	Degrees Celsius
AW139	AgustaWestland 139
ARA	Airborne Radar Approach
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAT	Commercial Air Transport
DCO	Development Consent Order
ft	Foot
GPS	Global Positioning System
HCA	Helicopter Certification Agency
IMC	Instrument Meteorological Conditions
ISAR	Integrated Search and Rescue
kt	Knot
m	Metre
MAP	Missed Approach Point
MCA	Maritime and Coastguard Agency
MDH	Minimum Descent Height
MGN	Marine Guidance Notice
NaN	Not a number
nm	Nautical Mile
NOGEPA	Nederlandse Olie en Gas Exploratie en Productie Associatie
NPI	Non Production Installation
NUI	Normally Unmanned Installation
OEI	One Engine Inoperative
PBN	Performance Based Navigation
POB	Person On Board
Radar	Radio Detection and Ranging
SAR	Search and Rescue

Abbreviation	Definition
SERA	Standard European Rules of the Air
SPA HOFO	Specific Approval for Helicopter Offshore Operations
TEMPSC	Totally Enclosed Motor Propelled Survival Craft
UK	United Kingdom
VMC	Visual Meteorological Conditions
WTG	Wind Turbine Generator

1 Executive Summary

1. This report assesses the impact that the Morecambe Offshore Windfarm will have on adjacent gas infrastructure. It will identify the baseline helicopter access and then any changes to the access with Morecambe Offshore Windfarm once constructed. The report considers the impact of the proposed generation infrastructure that will be located within the windfarm site, i.e. the wind turbine generators, offshore substation platforms and associated inter-array and platform link cables.

2. Commercial Air Transport (CAT) Regulations have been applied to identify the current helicopter access. The access is then updated to take account of Morecambe Offshore Windfarm. The report applies a worse case assumption that wind turbines are built up to the proposed boundaries of the Unconstrained Areas, i.e. areas within the windfarm site where turbines may be built.

1.1 Data

3. Meteorological data from the South Morecambe AP 1 Platform, covering the period 19 December 2017 to 19 December 2022, was provided. The data was sampled at a 10-minute frequency, resulting in 262,007 data points over the period.

4. Vantage POB (Person on Board) ('Vantage') data was supplied by Spirit Energy. Vantage is a personnel tracking and flight scheduling system. It is used by the oil and gas industry to control and monitor the movements of personnel to, from and between offshore and onshore facilities. Data supplied was analysed over the same period as the meteorological data which consisted of circa 6,000 flights during the same period.

1.2 Analysis

5. The impact on helicopter CAT access to the installations within 9 nautical miles (nm) have been assessed. Sufficient space must be available to turn onto the final approach track to arrive at the stabilisation point and to take off in the case of one engine being inoperative. For Day VMC (Visual Meteorological Conditions), a distance of 1.26nm is considered to be sufficient for both scenarios, noting that an obstacle free distance of 1.26nm has been stated in a recent Development Consent Order (DCO). For an Airborne Radar Approach (ARA), an obstacle free approach sector of 9nm is assumed. In poor weather, sufficient distance must be available for a single engine continued take-off; for recent offshore windfarm projects an IMC (Instrument Meteorological Conditions) take-off distance of 2.8nm has been agreed.

6. It is noted that there are ongoing discussions regarding a proposed change in CAA (Civil Aviation Authority) Regulations which could mean day VMC only access is permitted to an offshore installation (helideck) located within 3nm of a wind turbine. Whilst the timescale for this proposed rule change is unclear, helicopter operators have adopted the principle into industry guidance, such as the HeliOffshore Wind Farm Recommended Practices. The assessment is therefore based on an assumption that the new regulations are in place.

7. The analysis of Vantage flight data over the same period as the meteorological data provides an assessment of the impact from a historical perspective as to the number of flights which would have had to be re-scheduled if the windfarm had been in situ at that time.

1.2.1 Calder Platform

8. As Calder will be located 1.5nm from the Morecambe Offshore Windfarm Unconstrained Areas its future access will be restricted to day only VMC under proposed new CAA Regulations. That will provide an average access of 94.2% of daylight conditions.

9. Analysis of the Vantage data showed that flights to the Calder Platform occurred predominantly under day VMC. There were 26 (12.3%) night flights conducted in 2018 and 16 (10.3%) conducted in 2022, with minimal night flying during the intervening years. The low number of night flights from 2019 to 2021 cannot be explained by a reduction caused by the Covid Pandemic, as the number of flights increased during this period.

1.2.2 South Morecambe CPC-1, AP-1, FL-1 and DP-1 Platforms

10. South Morecambe CPC-1, AP-1, FL-1 and DP-1 Platforms are manned installations. The current access is both day and night in VMC and IMC. The current access is an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

11. Due to the proximity of the Morecambe Offshore Windfarm, no night or IMC would be available for CAT flights under the proposed new CAA Regulations. Only day VMC access would be available, providing an average access of 94.2% of daylight conditions.

12. Based on the analysis of the Vantage data, 85.8% of the flights in 2018 would have been unaffected, i.e. those conducted under day VMC. From 2019 to 2022 at least 93% of the flights would have been unaffected. The difference between 2018 and the following years can largely be accounted for by the larger number of night flights in 2018, typically over three times those in subsequent years. The data confirms that most flights occur under day VMC.

13. Night access was assessed for CPC-1 on a monthly basis, as it is part of a manned cluster. It was identified that the loss of night access would have been worst in January, with an average of 25.9% (202 of 779) of flights being impacted. The number of night flights to CPC-1 varied over the years assessed, with the number and percentage of night flights falling in more recent years. For example 7 out of 83 (8.4%) flights in January 2021 were conducted at night and 4 out of 148 (2.7%) were night flights in January 2022.

1.2.3 South Morecambe DP-6

14. Due to the distance of 2.2 nm, the platform would be restricted to day VMC only under the new CAA Regulations.

15. The Vantage data shows that a limited number of night flights occur to the DP-6 NUI (Normally Unmanned Installation), with a maximum of four-night flights (1.3%) occurring in 2022. The percentage of unaffected flights, i.e. day VMC, is between 91.3% and 97.0%.

1.2.4 DP-8 Platform

16. Due to the distance and orientation from the Morecambe Offshore Windfarm, helicopter access will be unaffected and remain at the current level of 99% by day and 98.4% at night.

1.2.5 OSI

17. Due to the distance and orientation from the Morecambe Offshore Windfarm, helicopter access will be unaffected and remain at the current level of 99% by day and 98.4% at night.

1.2.6 Dalton Wellheads

18. Due to the distance and orientation from the Morecambe Offshore Windfarm, helicopter access will be unaffected and remain at the current level of 99% by day and 98.4% at night.

1.2.7 Hamilton North Platform

19. Due to the distance and orientation from the Morecambe Offshore Windfarm, helicopter access will be unaffected and remain at the current level of 99% by day for the Hamilton North Platform, with an additional 98.4%-night access for an NPI (Non Production Installation).

1.2.8 North Morecambe DPPA

20. Due to the distance and orientation from the Morecambe Offshore Windfarm, helicopter access will be unaffected and remain at the current level of 99% by day and 98.4% at night.

1.2.9 Conwy Platform

21. Due to the distance and orientation from the Morecambe Offshore Windfarm, helicopter access will be unaffected and remain at the current level of 99% by day and 98.4% at night.

1.3 Safety Considerations

22. The Search and Rescue (SAR) helicopters operated on behalf of the Maritime and Coastguard Agency (MCA) are not constrained by CAT meteorological limits. The windfarm will require to be compliant with Marine Guidance Notice 654, and so SAR access to installations inside and adjacent to the windfarm will still be available even when CAT flights are constrained by the meteorological conditions. SAR helicopters will be tasked for major incidents, accidents, and urgent medivacs, rather than CAT helicopters. Therefore, any reduction in CAT helicopter access will result in a logistic impact on the installation operator, and SAR access would remain unaffected.

1.4 Potential Mitigation

23. Under the current CAA regulations, instrument approaches to CPC-1 would still be permitted when a clear approach and go-around was available, and the helicopter remained laterally displaced from the windfarm by at least 1nm. If the proposed change to the CAA regulations was not implemented, or the helicopter operator flying to CPC-1 could obtain an alleviation from the rule change (based on a safety case being accepted by CAA) then instrument approaches into the prevailing south-westerly wind, or a proportion of night flights, could still occur. An ARA could be conducted on an approach axis of 255°. To provide a wider operating envelope, a Performance Based Navigation (PBN) approach with vertical guidance could be approved for the CPC-1. Helicopters operating in Morecambe Bay are equipped for PBN operations. These approaches would also be suitable for use at night under both VMC and IMC. Although these mitigations would not provide the current level of access, they would restore some of the usable 4.8% day IMC and night access.

24. For DP6, if the proposed change was not implemented or if the operator could obtain an alleviation, helicopter access would be an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 90.5% (80.5% VMC and 10.0% usable IMC) for night conditions.

2 Introduction

25. This report was produced as part of the Applicant's (Morecambe Offshore Windfarm Ltd) obligations under Civil Aviation Publication (CAP) 764 (Ref i), where the operator of any offshore helicopter destination within 9nm of a windfarm must be consulted at the planning stage of a windfarm.

26. The location of the Morecambe Offshore Windfarm will potentially impose operational restrictions on some of the nearby gas installations. These restrictions could adversely impact on the ability to fly routine crew change flights to support crewed platforms, NUIs, drilling rigs and other vessels working over well heads. In this report any restrictions are identified and quantified.

2.1 Background

27. The methodology used to assess the operational impact has been accepted by helicopter operators and oil and gas operators on previous windfarm projects. Meteorological data from the South Morecambe AP 1 Platform, covering the period 19 December 2017 to 19 December 2022, was provided. The data was sampled at a 10-minute frequency, resulting in 262,007 data points over the period.

2.2 Commercial Air Transport Regulations (CAT)

28. CAT flights, such as crew change flights to gas platforms, are regulated under the following requirements.

2.2.1 Offshore Approval

29. Offshore operations are regulated under Specific Approval for Helicopter Offshore Operations (SPA.HOFO) (Ref ii):

30. "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.*

2.2.2 Meteorological Limits

31. The limitations presented within this section, based on CAT Regulations, have been applied to the meteorological data to identify when Morecambe Offshore Windfarm will affect helicopter access to the infrastructure presented in Table 3.1.

2.2.3 En-Route Descent

32. An en-route descent, where a helicopter may descend from IMC into VMC, and so make a visual approach to the platform, is permitted when:

    - **Day** – cloud base ≥600ft and visibility ≥4,000m.
    - **Night** – cloud base ≥1,200ft and visibility ≥5,000m.

2.2.4 Proposed New CAA Limits

33. The CAA is consulting on limiting take-off and landing on helidecks within 3nm of a windfarm to Day VMC only. In addition, the Day limits shown in 2.2.3 will be increased:

    - cloud base increased from ≥ 600ft to ≥700ft
    - visibility increased from ≥4,000m to ≥5,000m

At present there is no indication if and when these new limitations will be imposed. As a worse case assumption, these increased limits have been applied in this report.

2.2.5 Instrument Meteorological Conditions

34. IMC conditions are assumed to exist when the weather limits are below those for flight under VMC.

2.2.6 Airborne Radar Approach

35. An ARA is flown to a platform when the weather conditions are below the VMC limits. The minima for an ARA are:

    - A descent to a Minimum Descent Height (MDH) of 200ft by day or 300ft by night (or deck height plus 50ft if higher); and
    - A Missed Approach Point (MAP) no closer than 0.75nm (1,390m) from the installation; this distance is based on the limitations of the Radio Detection and Ranging (Radar) in mapping mode and how it is displayed to the crew.

36. As the helicopter has to be below cloud and in sight of the installation before proceeding visually beyond the MAP, in practical terms this results in the following minimum weather conditions:

    - Day – cloud base ≥300ft and visibility ≥1390m
    - Night – cloud base ≥400ft and visibility ≥1390m

2.2.6.1 ARA Profile

37. The ARA profile is shown in Figure 2.1 and Figure 2.2. The helicopter's Radar is used as the primary means of navigation and obstacle avoidance, supported by Global Positioning System (GPS).

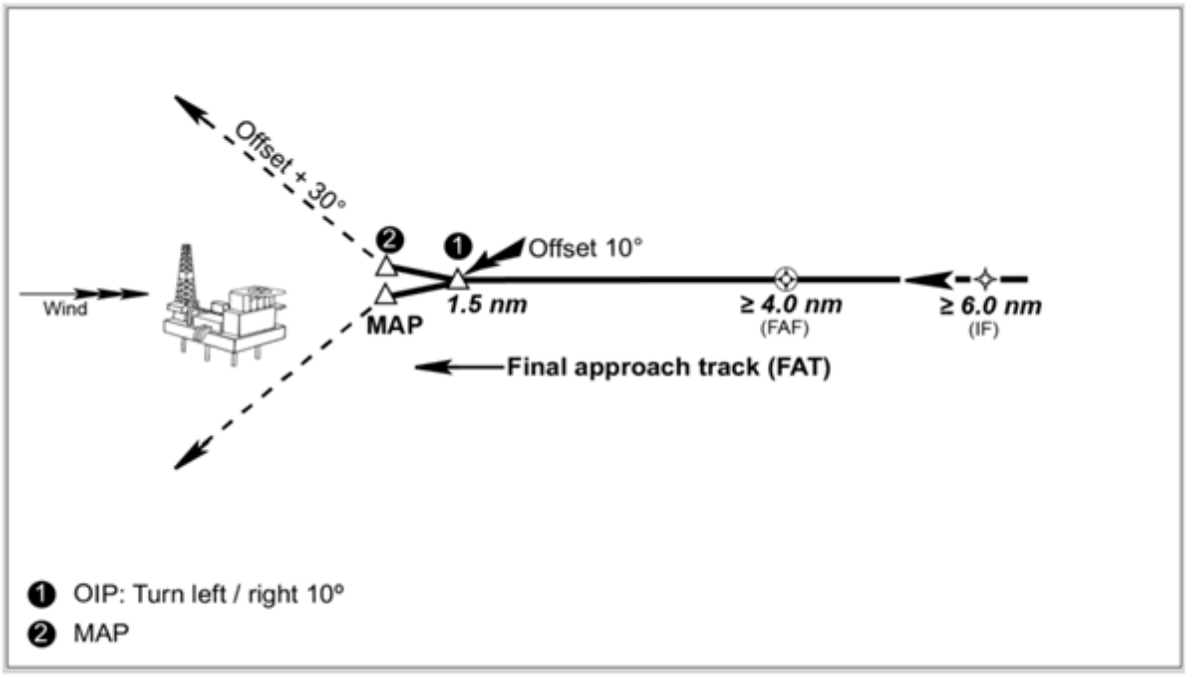


Figure 2.1: ARA Horizontal Profile

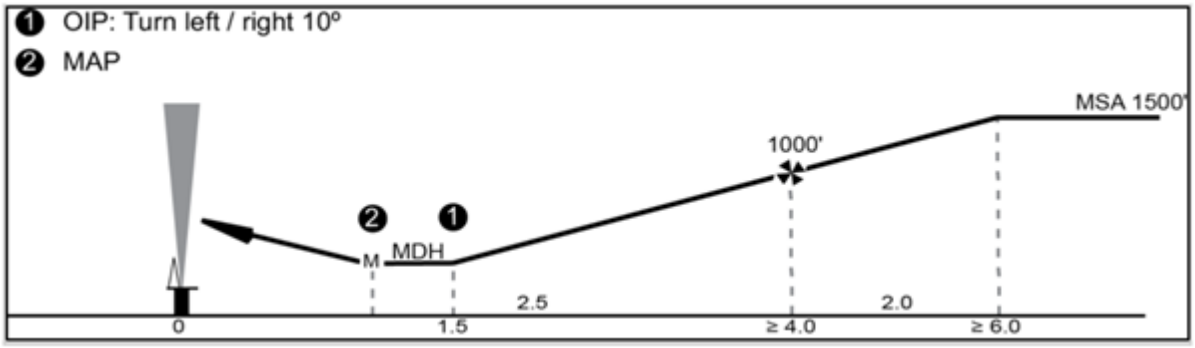


Figure 2.2: ARA Vertical Profile

38. For the purposes of this assessment, it is assumed a 9nm approach sector clear of obstructions is required for an ARA. This distance will allow a helicopter to conduct a direct approach, descending from the Minimum Safe Altitude overhead the Wind Turbine Generators (WTGs) to achieve the Initial Approach Fix at 1,500ft, or to conduct an arc approach maintaining a 1nm lateral separation distance from the WTGs.

2.2.7 Required Separation Distances Between Wind Turbines and Gas Installations

39. For safe helicopter operations to an offshore installation, sufficient space must be available for an approach and take-off. The distance selected should be the most stringent of the approach and take-off requirements.

2.2.7.1 Day VMC Approach Distance Required

40. It is an industry requirement to stabilise the approach, i.e. be flying into wind, in level flight at the required airspeed and power, with the aircraft configured for landing, at a defined point in space. The CAA requires operators to define their offshore approach profiles (Ref. iii), but the CAA does not set any parameters.

41. For day VMC the minimum distance from the landing point at which the approach must be stabilised is 0.5nm, as detailed in the industry guidance material (Ref. iv), but one UK operator applies 0.75nm. As a reasonable worst case, a stabilisation distance of 0.75nm is applied in this assessment.

42. Sufficient space must be available to turn onto the final approach track to arrive at the stabilisation point, with a 180° turn being a reasonable worst case. All turns will be flown using the industry norm of "Rate One", which results in a rate of turn of 3° per second. The radius of turn is proportional to the airspeed flown. At an airspeed of 80 knots, the radius of turn required to complete a 180° turn is 0.43 nm (786m).

43. Under the Standard European Rules of the Air (SERA) (Ref. v) all obstacles must be avoided by 150m (0.08nm) laterally. Summing the three requirements of the stabilisation distance, radius of turn and lateral avoidance criteria results in a distance of 1.26nm (2334m) for a stabilisation point of 0.75nm or 1.01nm for the standard 0.5nm stabilisation point.

2.2.7.2 Day VMC Take-Off Distance Required

44. The helicopter operator is required to take account of the possibility of an engine failure. Although the regulations set a target probability of 5 x 10^{-8} or lower per take-off or landing, it is regarded as a foreseeable event. Applying performance data from current offshore helicopter types results in a distance of 1nm to recover from an engine failure occurring on rotation from the helideck, climbing at the applicable one engine inoperative power rating to 500ft above mean sea level, before commencing a 30° turn to avoid a wind turbine directly in the flight path.

45. A distance of 1.26nm was identified in the Sheringham and Dudgeon Extension Projects DCO as being sufficient for both approach and take-off for day VMC operations. This project has applied a minimum obstacle free distance of 1.5nm which is in excess of that available to other installations being safely operated under the same CAT Regulations.

2.2.8 No-Fly Conditions

46. Any of the following conditions would result in flights being cancelled, or being unable to land at an offshore installation:

    - Sea State (significant wave height) ≥6m;
    - wind speed ≥60 knots (kt); this is a general limit, but it should be noted that some NUIs have values as low as 30kt due to reduced deck friction;
    - unable to land from an ARA – cloud base <200ft by day or <300ft at night or visibility <1,390m;

- forecast Triggered Lightning;
- for a helicopter lacking an approval for flight in icing conditions, icing conditions occurring at 500ft by day and 1,000ft at night are assessed.

47. It is noted that icing conditions are defined as an air temperature below 0 degrees Celsius (°C), with an inflight visibility less than 1,000m and visible moisture present.

48. Forecasts of Triggered Lightning[1] are not recorded in the data, and so the actual percentage of no-fly conditions will be higher than calculated.

[1] https://publicapps.caa.co.uk/docs/33/CAA%20PAPER%202000-2%20A%20FURTHER%20STUDY%20OF%20LIGHTING%20STRIKES%20TO%20HELICOPTERS%20OVER%20THE%20NORTH%20SEA.pdf

3 Methodology

49. This assessment has applied the CAT weather limits, as a series of filters, to the meteorological data provided in order to understand the potential operational impact on the gas infrastructure within 9nm of the windfarm. Initially it will assess the baseline access restrictions from operational windfarms and windfarms currently under construction. It will then assess the additional impact of windfarms at the planning stage.

50. Any obstructions within a radius of 9nm are taken into account in this assessment.

51. The assessment is focused on identifying any reduced access when operating under CAT Regulations, but access under SAR Regulations is also considered.

3.1 Assumptions

52. The following assumptions were used:

- as the exact locations and height of the turbines is not yet known, it is assumed that the boundaries of the Unconstrained Areas form a solid wall of turbines and they are greater than 1,000ft high;
- for an ARA, an approach arc clear of obstacles out to 9nm is required. This will allow a circling approach to a Final Approach Fix at 6nm;
- an approach up to 30° out of wind may be made providing the resulting angle of drift is no more than 10°.

3.2 Infrastructure Assessed

53. The infrastructure assessed is shown in Table 3.1. Some of the installations are undergoing decommissioning but their exact operational status is not known. Until the operational status of an installation is known it will be assumed to be functioning. Table 3.1 provides the distance from the installation to the Unconstrained Areas, i.e. where turbines may be built, and to the Windfarm site: both are illustrated in Figure 6.1. The helicopter assessment will take account of the Unconstrained Areas, i.e. where turbines will be located.

Table 3.1: Details of Assessed Infrastructure

Installation Name	Type	Status	Operator	Distance to Morecambe Unconstrained Areas (nm)	Distance to Morecambe Windfarm Site (nm)
Calder Platform NUI	Platform	Active	Harbour Energy	1.5	0.5

Installation Name	Type	Status	Operator	Distance to Morecambe Unconstrained Areas (nm)	Distance to Morecambe Windfarm Site (nm)
South Morecambe AP1	Platform	Active	Spirit Energy	1.5	0.8
South Morecambe CPC 1	Platform	Active	Spirit Energy	1.5	0.8
South Morecambe DP1	Platform	Active	Spirit Energy	1.5	0.9
South Morecambe FL1	Platform	Active	Spirit Energy	1.5	0.9
South Morecambe DP6	Platform	Active	Spirit Energy	2.2	1.7
South Morecambe DP8	Platform	Active	Spirit Energy	3.8	3.3
OSI (Offshore Storage Installation)	FPSO	Active	Eni UK	4.3	4.2
Dalton Well R2	Wellhead	Plugged	Harbour Energy	5.6	5.4
Dalton Well R1	Wellhead	Plugged	Harbour Energy	6.0	5.7
Hamilton North	Platform	Active	Eni UK	6.7	6.5
North Morecambe DPPA	Platform	Active	Spirit Energy	8.2	7.7
Conwy Platform NUI	Platform	Active	Eni UK	8.1	7.9

3.3 Meteorological Data Provided

54. Meteorological data from the South Morecambe AP 1 Platform, covering the period 1st Jan 2018 to 19 December 2022, was provided. The data was sampled at a 10-minute frequency, resulting in 262,007 data points over the period. It is noted that as only 13 days of data was provided for 2017, this has been excluded from the analysis.

3.3.1 Meteorological Parameters

55. The following parameters were used:

- Timestamp – year/month/day/hour/minute/second
- Visibility – m
- Cloud base – ft
- Wind direction (10-minute average) – °
- Wind speed (10-minute peak) – m/s converted to kt
- Air temperature - °C
- Maximum wave height (Hmax) - m

3.3.2 Data Anomalies

56. It was noted that the 10 minute cloud base data contained a number of samples recorded as NaN (not a number). This is common when there is no cloud or a very high cloud base, as the cloud base recorder has nothing to record. There were also samples where NaN was recorded between low cloud events; for example, 20/1/2021 at 07:30 and 07:40 where NaN was recorded between samples showing a cloud base of 300 ft at 07:20 and 400 ft at 07:50. To ensure that low cloud events are captured, for each 10 minute sample, if NaN was recorded and the Dew Point was within 1 °C of the ambient temperature, the data point was recorded as being IMC. This is a conservative and worse case assessment. Applying this extra limitation resulted in a total of 0.7% more IMC events.

3.4 Meteorological Analysis

57. The meteorological limits, defined in the Regulations and shown in Sections 2.2.3 – 2.2.6, were applied as a series of filters to the data. The filters identified when the conditions were:

- Day VMC
- Night VMC
- Day IMC
- Night IMC
- No-fly, when the conditions were below offshore limits and so an ARA could not be flown.

58. The data was then summarised in a series of tables and graphs to identify if and when CAT flights might have reduced access.

4 Operational Restrictions

59. This section will use the methodology described in Section 3 and apply it to the operational helicopter environment. Following this, Section 6 onwards will identify any restrictions on helicopter access specific to the facilities shown in Table 3.1.

4.1 Approach Limitations

60. Applying the meteorological limits described in Section 2.2.3 – 2.2.6 to the meteorological data provides the percentage of occasions when each approach type is permitted or required.

61. Table 4.1 shows the percentage of day and night VMC access, i.e., when an en-route descent into visual conditions can be made, and a visual approach and take-off to/from a platform is available. This takes no account of any obstructions within 9nm.

Table 4.1: Morecambe Area - Day and Night VMC Access

Year	Day VMC	Day IMC	Night VMC+ Blackpool Airport Open	Night IMC+ Blackpool Airport Open
2018	92.8%	7.2%	91.0%	9.0%
2019	95.2%	4.8%	90.5%	9.5%
2020	93.7%	6.3%	85.4%	14.6%
2021	93.5%	6.5%	84.0%	16.0%
2022	95.9%	4.1%	91.2%	8.8%
Mean	**94.2%**	**5.8%**	**88.4%**	**11.6%**

62. Table 4.1 does not consider when the conditions did not permit flying, i.e., the conditions identified in Section 2.2.7. Table 4.2 shows an average of 1.0% of daylight IMC did not permit flying, so leaving an average of 4.8% (5.8% minus 1.0%) of usable IMC. For night conditions, an average of 1.6% were unusable, leaving 10.0% (11.6% minus 1.6%) usable. The night figures take account of the opening hours of Blackpool Airport (07:00 to 21:00). When considering the loss of access, the usable IMC figures should be applied and not all IMC periods. The implication is that even if only VMC access was available, the loss of access compared to today would be an average loss of 4.8% by day and 10.0% at night.

Table 4.2: Morecambe - Usable IMC Access

Year	Usable IMC Day	Day IMC	Day No Fly	Usable IMC Night	Night IMC (Airport open)	Night No Fly
2018	5.9%	7.2%	1.3%	7.1%	9.0%	1.9%
2019	3.9%	4.8%	0.9%	8.0%	9.5%	1.5%
2020	5.7%	6.3%	0.6%	13.3%	14.6%	1.3%
2021	5.3%	6.5%	1.2%	13.8%	16.0%	2.2%
2022	3.4%	4.1%	0.7%	7.6%	8.8%	1.2%
Mean	**4.8%**	**5.8%**	**1.0%**	**10.0%**	**11.6%**	**1.6%**

5 Emergency Conditions

63. The methodology used so far in this Report addresses helicopter access under CAT Regulations. Emergency down manning of any installation, critical Medivacs and SAR are not constrained by CAT Regulations as these flights are generally flown by the Coastguard SAR aircraft operating under CAP 999 (Ref vi). The Coastguard helicopters are operated as State Aircraft under National Regulations and are not constrained by the higher weather limits in CAT Regulations. Also, commercial SAR can be flown with some alleviations from CAT Regulations. Such SAR arrangements have existed in the United Kingdom, Norway and the Netherlands for decades and include SAR coverage provided by the Integrated Search and Rescue (ISAR) Consortium in Aberdeen (formerly Jigsaw Aviation), SAR helicopters based in the Ekofisk Field, and SAR helicopters under contract to Nederlandse Olie en Gas Exploratie en Productie Associatie (NOGEPA), the Dutch equivalent of Oil & Gas UK.

64. CAP 999 defines the SAR operating minima as:

> *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.*

65. Due to the SAR autopilot modes and enhanced sensors fitted to the Coastguard SAR helicopters, a shorter distance is required to enter the field and manoeuvre to land on platforms, even in poor weather. The Morecambe Offshore Windfarm will be designed in accordance with MGN (Marine Guidance Note) 654, which permits helicopter SAR operations within a turbine array, and so SAR access will also be available to platforms adjacent to the windfarm.

66. Furthermore, in the event of an emergency on the platform resulting in an explosion, fire or release of hydrocarbons, helicopters will be unable to land and so other means of escape, such as Totally Enclosed Motor Propelled Survival Craft (TEMPSC) and/or Seascape systems will be required. Although helicopters are usually the preferred means of down manning an installation, they cannot be the primary means of down manning in all cases.

67. Icing conditions will not affect the Coastguard SAR helicopters are they are certified and equipped for flight in icing conditions.

68. In summary, although a reduction in helicopter access under CAT Regulations will impose a logistic restriction on a gas installation, it will not result in a reduced level of SAR access, as SAR helicopters will still be able to access an installation.

6 Infrastructure Specific Access

69. This section will now identify if helicopter operations will be constrained by the Morecambe Offshore Windfarm.

70. Figure 6.1 shows the proposed boundaries of the Morecambe Offshore Windfarm, and the nearby gas infrastructure. The boundary of the Morecambe Windfarm Site is presented, along with the Unconstrained Areas, which shows the areas where turbines may be built. The helicopter assessment is based on the Unconstrained Areas.

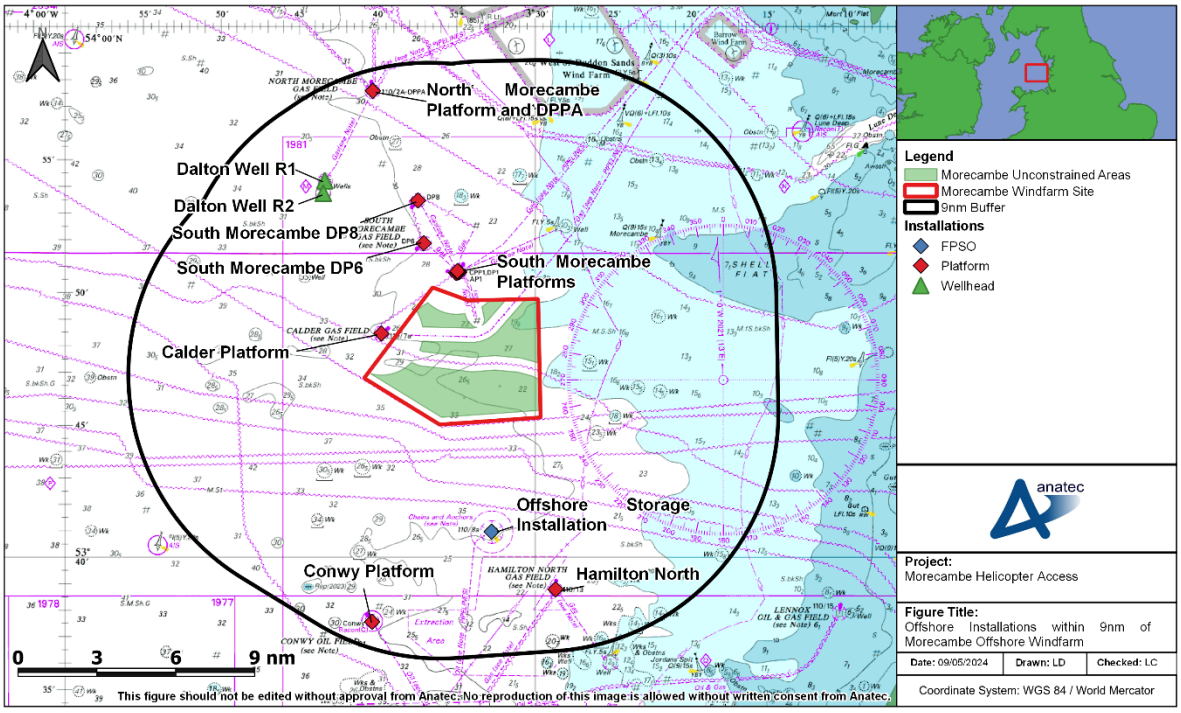


Figure 6.1: Offshore Installations within 9nm of Morecambe Offshore Windfarm

71. Due to performance and handling requirements, helicopters will normally approach to land and take-off facing into the prevailing wind. Approaching with a slight crosswind when at a safe speed is acceptable, but at speeds below 50kts the helicopter should be orientated into wind. The requirement to approach and depart a platform into wind results in restrictions if either is obstructed by obstacles, such as a wind turbine.

72. Another factor which must be considered is the take-off distance required in the event of an engine failure during take-off, known as a One Engine Inoperative (OEI) take-off. Under VMC a distance of approximately 1nm to the closest object is sufficient to climb to 500ft and then turn away from obstacles whilst continuing the climb. Under IMC, the climb will be continued to 1,000ft before turning. Additionally, in IMC a 1nm buffer between the flight path and any obstacle must be included, and so the total distance required will be larger, with a minimum distance of 2.5nm for current types, such as the AW139 helicopter.

73. Figure 6.2 shows the wind direction, and hours per wind direction, when IMC conditions occurred during the period of the data supplied.

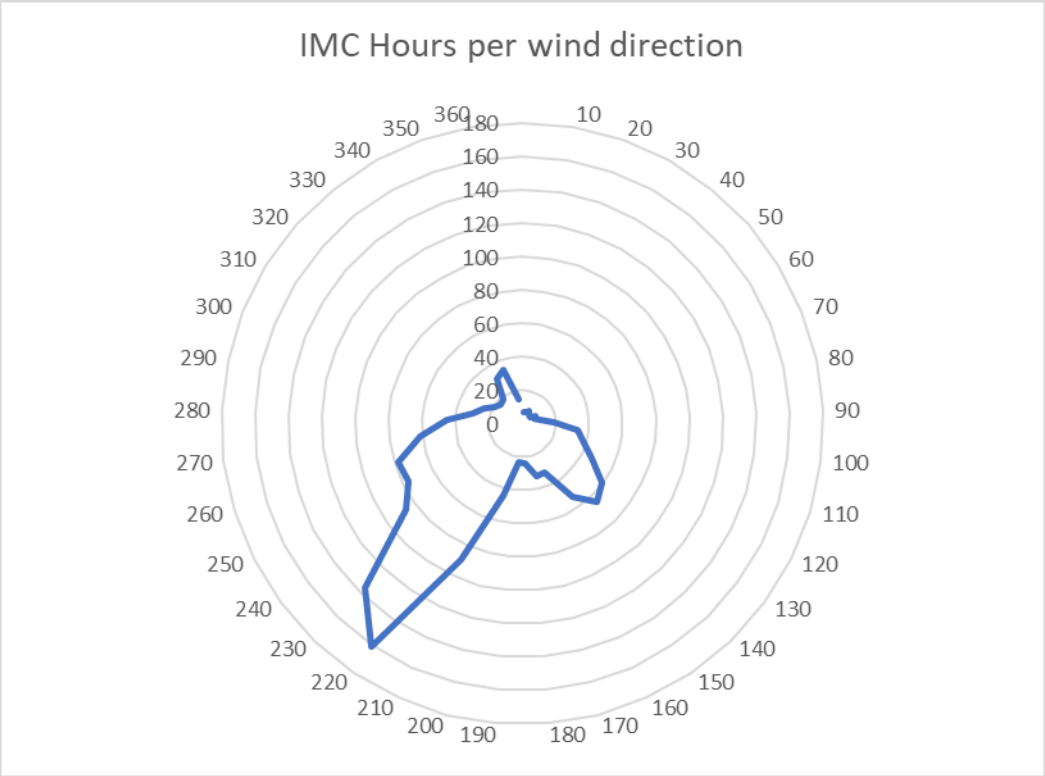
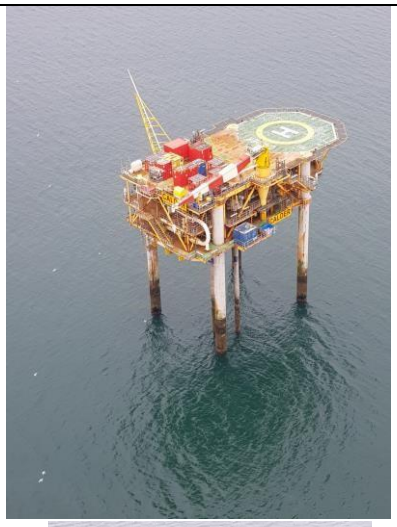


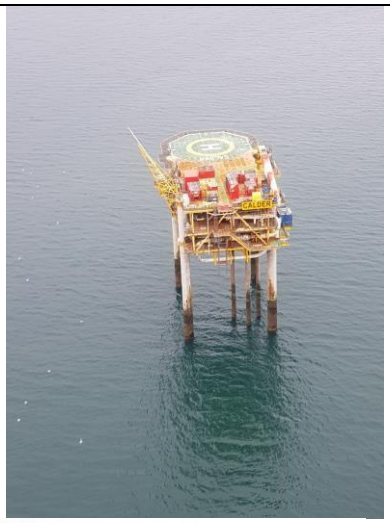
Figure 6.2: IMC Hours per Wind Direction

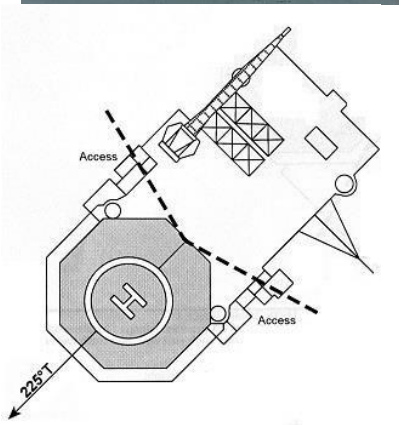
6.1 Calder Platform

74. The Calder Platform details are shown below. The Platform is approved for day and night operations. Calder is located 1.5nm from the Unconstrained Areas.

HELIDECK CERTIFICATION AGENCY		HELIDECK INFORMATION PLATE			
HELIDECK Elev **105 ft**	VAR **2** **W**	POSITION **N53 48.5 W003 39.8**	EGCE **Calder**		
HEIGHT OF INSTALLATION: **133ft** HIGHEST OBSTACLE WITHIN 5NM: **Check**			VHF **122.380**	NDB **Nil**	Issue Date **13 Apr 2023**
FUELLING INSTALLATION: **No** STARTING EQUIPMENT: **No**			Operating Company		Issued By
HELIDECK D value: **16.66** P/R/H Category: F Max Weight: **7.0** Circle & H Lights: **Yes**			**Spirit Energy**		**Helideck Certification Agency**







Wind (T°)	Kts	Limitation /Comment
		NUI • Table 1(T) if overflight of 5:1 item unavoidable
		Non-Compliance
5:1		Perimeter frame at both access points 2.7m from SLA

Figure 6.2: Calder Platform Information Plate

6.1.1 Baseline Access

75. Currently access to the Calder Platform can occur by day and night under both VMC and IMC. The current access is an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

6.1.2 Future Access

6.1.2.1 Flight Under Visual Meteorological Conditions

76. Calder is located 1.5nm from the Unconstrained Areas. This will only permit CAT access under day VMC. Therefore, the VMC figures in Table 4.1 will apply, giving an average day VMC access of 94.2% of daylight conditions.

6.1.2.2 Flight Under Night or Instrument Meteorological Condition

77. As Calder will be located 1.5nm from the Unconstrained Areas, no night or IMC access will be available.

6.1.3 Calder Summary

78. Due to Calder's location, only day VMC access will be available. The average day VMC access is 94.2% of daylight conditions.

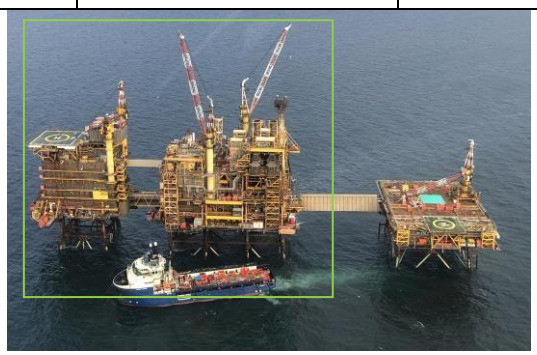
6.2 South Morecambe CPC-1, AP-1, FL-1 and DP-1 Platforms

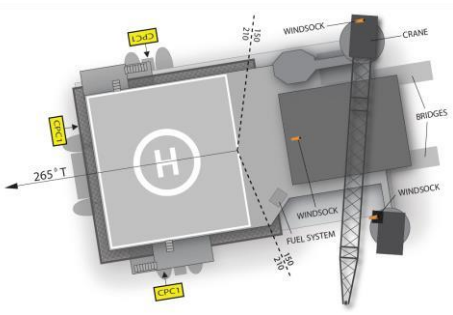
79. The CPC-1, AP-1, FL-1 and DP-1 are three bridge linked platforms, with a flare structure. They have two helidecks, shown in the two information plates below. For the purposes of this assessment, they will be considered as one location.

HELIDECK INFORMATION PLATE

Certificate Expiry Date: 12th October 2024

HELIDECK Elev **184 ft**	VAR **2 W**	POSITION **N53 50.7 W003 35.0**	EGMM **CPC-1**		
HEIGHT OF INSTALLATION: **397ft** HIGHEST OBSTACLE WITHIN 5NM: **Check**			VHF **122.380**	NDB **N/A**	Issue Date **21 Jun 2023**
FUELLING INSTALLATION: **No** STARTING EQUIPMENT: **Yes**			Operating Company **Spirit Energy**		Issued By **Helideck Certification Agency**
HELIDECK D value: **22.2m** P/R/H Category: F Max Weight: **12.6** Circle & H Lights: Yes					



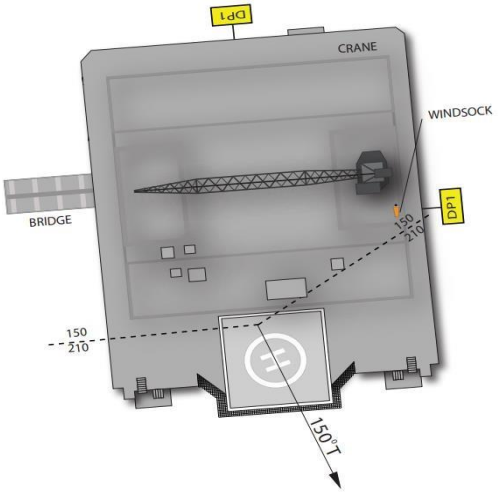


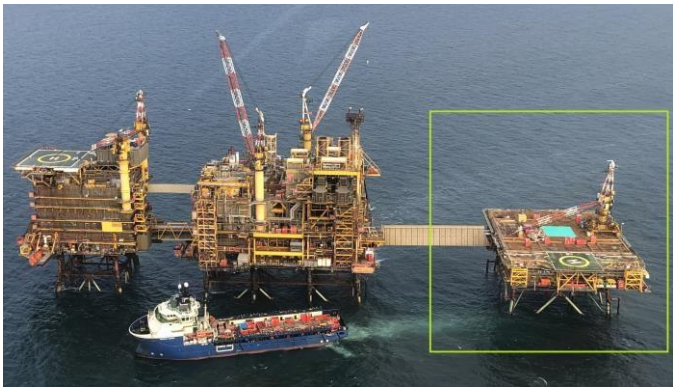
Wind (T°)	Kts	Limitation /Comment
		Manned platform
• 045-135	• 0-20	• Use zero wind for performance calculations
• 045-135	• 21-30	• Extreme caution due to possible turbulence
• 045-135	• 31 plus	• Emergency only
• 135-160	• 21 plus	• Extreme caution due to possible turbulence
• 060-100	All	• Main generators running without head recovery add 12 to ambient temperature for performance calculations
• 010-060		• CPC-1 helideck closed when wind is above 7kts and flare is unlit. No restriction when topside is depressurised (Assume topside pressurised unless advised)
		• Aircraft hangar - may cause turbulence
		• Table 1 (T) if overflight of 5:1 infringements unavoidable
		Non-Compliance

150°	Refuelling unit marginal infringement in second sector of LOS
5:1	North & south access platforms 4m from SLA
Misc	Inboard perimeter lights are not co-incident with perimeter line Approved for S92 (MTOW 11861Kg) Callsign CPC-1

Figure 6.3: CPC-1 Platform Information Plate

HCA HELIDECK CERTIFICATION AGENCY		HELIDECK INFORMATION PLATE **Certificate Expiry Date: 12th October 2024**			
HELIDECK Elev **94 ft**	VAR **2** **W**	POSITION **N53 50.8 W003 34.8**	EGMN **DP-1**		
HEIGHT OF INSTALLATION: **397ft** HIGHEST OBSTACLE WITHIN 5NM: **Check**			VHF **122.380**	NDB -	Issue Date **20 Sept 2023**
FUELLING INSTALLATION: **No** STARTING EQUIPMENT: **Available from CPC-1**			Operating Company **Spirit Energy**		Issued By **Helideck Certification Agency**
HELIDECK D value: **17.1m** P/R/H Category: **F** Max Weight: **6.8t** Circle & H Lights: **No**					





Wind (T°)	Kts	Limitation /Comment
270-340	≥20	Platform • Deck closed • Deck normally only used when CPC-1 deck is out of limits (045 - 135 above 30 Kts) • Daylight Operations only - Circle & "H" lights not fitted • Table 1 if overflight of 5:1 infringements unavoidable
		Non-Compliance
5:1		Platform structure to east and west

Figure 6.4: DP-1 Platform Information Plate

6.2.1 Baseline Access

80. Currently access to the CPC-1 can occur by day and night under both VMC and IMC. The current access is an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions. There are a number of restrictions on the helideck, as listed on the Plate and in the Helideck Landing Limitations. The helideck restrictions, based on wind direction and strength, result in

approximately 0.8% of the year being unusable. The helideck restrictions would occur both during VMC and IMC, so are noted but not considered further. Access to the DP-1 is day only and normally only used when the CPC-1 is out of wind limits.

6.2.2 Future Access

6.2.2.1 Flight Under Visual Meteorological Conditions

81. The helidecks are located 1.5nm from the Unconstrained Areas. Evidence from current operations shows that 1,200m (0.65nm) is sufficient for safe day VMC access to a helideck. A distance of 1.5nm would permit day VMC operations, providing an average access of 94.2% of daylight conditions. No night access would be possible.

6.2.2.2 Flight Under Night or Instrument Meteorological Condition

82. Due to the proximity of the Morecambe Offshore Windfarm, no night or IMC would be available for CAT flights.

6.2.3 CPC-1, AP-1, FL-1 and DP-1 Summary

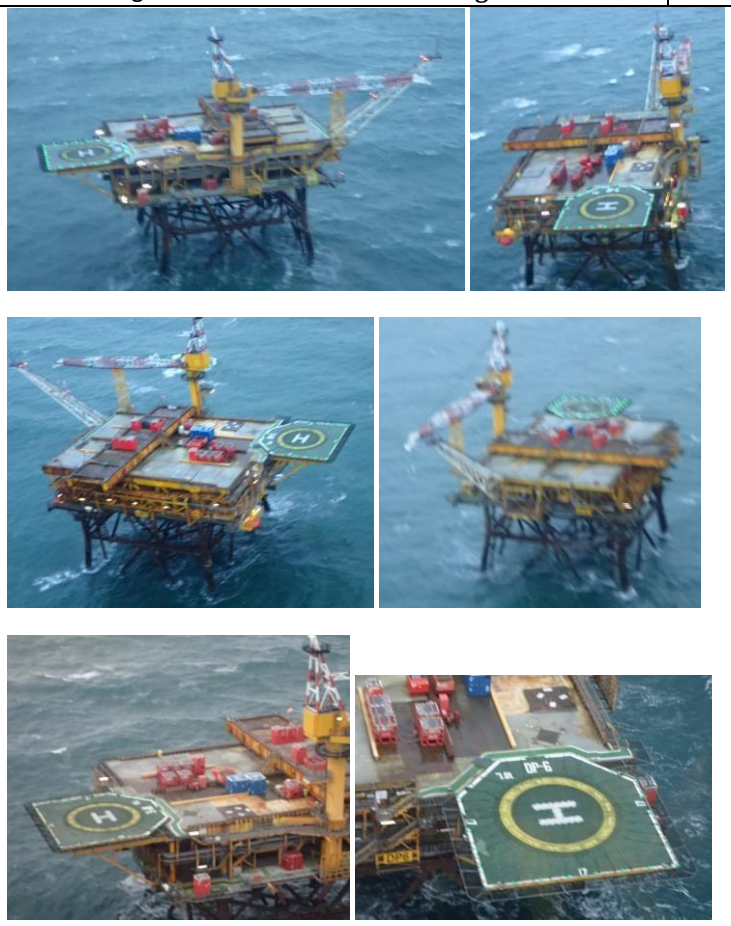
83. The four structures are located 1.5nm from the Unconstrained Areas. Only day VMC access will be available, providing an average access of 94.2% of daylight conditions. It should be noted that this will impose a logistical impact on CAT flights but will not reduce SAR access, as MCA SAR helicopters operate to less restrictive limitations. The MCA routinely conducts medivac flights and down manning operations when CAT helicopters are not available, the local airport (operating base) is closed or the meteorological conditions outside CAT limits.

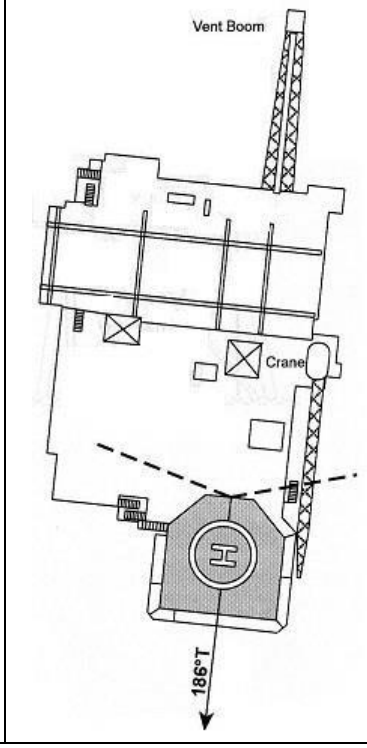
6.3 South Morecambe DP 6

84. The DP 6 Platform is a NUI located 2.2nm from the boundary of the Unconstrained Areas. It is approved for night operations due to the fitting of a temporary lighting system (Frictape night lights).

<table>
<tr><td colspan="2">  </td><td colspan="4">HELIDECK INFORMATION PLATE
Certificate Expiry Date: 13 March 2024</td></tr>
<tr><td>HELIDECK
Elev. 106 ft</td><td>VAR 2
W</td><td colspan="2">POSITION N53 51.83
W003 37.07</td><td colspan="2">EGMQ DP-6</td></tr>
<tr><td colspan="3">HEIGHT OF INSTALLATION: 262 HIGHEST
OBSTACLE WITHIN 5NM: Check</td><td>VHF
122.380</td><td>NDB</td><td>Issue Date 24
Oct 2023</td></tr>
<tr><td colspan="3">FUELLING INSTALLATION: No STARTING
EQUIPMENT: No</td><td colspan="2">Operating Company</td><td>Issued By</td></tr>
</table>

HELIDECK D value:	**17.46**	**Spirit Energy**	**Helideck Certification Agency**
P/R/H Category:	**F**		
Max Weight:	**7.0t**		
Circle & H Lights:	**Netlights**		





Wind (T°)	Kts	Limitation /Comment
		NUI - H2 compliant - Not automatic • Table 1(T) if overflight of 5:1 items unavoidable • Wireline gantry operations may infringe 210 sector • Local restrictions apply • Frictape Netlights fitted
		Non Compliance
	5:1	Platform structure East and West

Figure 6.5: DP-6 Platform Information Plate

6.3.1 Baseline Access

85. Currently access to the DP-6 can occur by day and night under both VMC and IMC. The current access is an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

6.3.2 Future Access

6.3.2.1 Flight Under Visual Meteorological Conditions

86. The DP-6 helideck is located 2.2 nm from the boundary of the Unconstrained Areas. Under the proposed CAA Regulations, this distance of 2.2nm would permit day VMC operations only, providing an average access of 94.2% of daylight conditions.

6.3.2.2 Flight Under Night or Instrument Meteorological Condition

87. Under the proposed CAA Regulations, due to the proximity of the Morecambe Offshore Windfarm, no night or IMC would be available for CAT flights.

6.3.3 DP-6 Summary

88. Due to the distance of 2.2 nm, only day VMC access will be available. The average day VMC access is 94.2% of daylight conditions.

6.3.4 Comment on Proposed CAA Regulations

89. The assessment assumes that the proposed CAA Regulations will be in place. Under current regulations (or if the Operator were to obtain alleviation from the regulations), night VMC access would be available, except when there is a wind from the north-west. Night VMC with a wind direction from 300° to 330° degrees occurs for 7.9% of the night data. Therefore the night VMC access would be 80.5%. Taking into account the prevailing wind direction for IMC, the IMC access should remain unchanged. Therefore, it is anticipated that helicopter access could be increased to an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 90.5% (80.5% VMC and 10.0% usable IMC) of night conditions.

6.4 DP-8

90. The DP-8 Platform is a NUI located 3.8 nm from the boundary of the Unconstrained Areas. The platform is equipped and approved for night operations. Details of the platform are shown in the Plate.

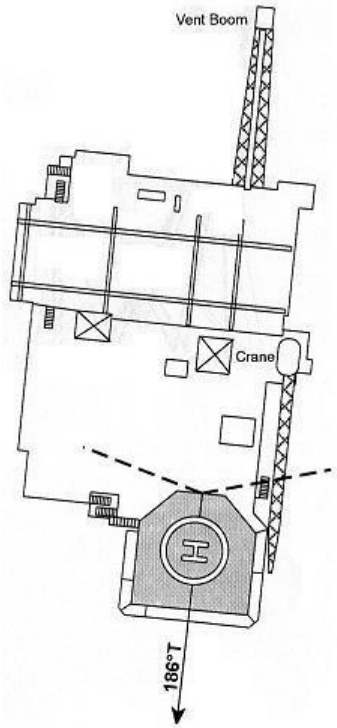
HELIDECK CERTIFICATION AGENCY

HELIDECK INFORMATION PLATE

Certificate Expiry Date: 01 November 2024

HELIDECK Elev **110 ft**	VAR **2** **W**	POSITION **N53 53.50** **W003 37.50**	EGMR **DP-8**		
HEIGHT OF INSTALLATION: **183ft** HIGHEST OBSTACLE WITHIN 5NM: **Check**			VHF **122.380**	NDB	Issue Date **26** **Sept 2023**
FUELLING INSTALLATION: **No** STARTING EQUIPMENT: **No**			Operating Company		Issued By **Helideck**

HELIDECK D value:	**17.46**	**Spirit Energy**	**Certification Agency**
P/R/H Category:	F		
Max Weight:	**6.8**		
Circle & H Lights:	Yes		



Wind (T°)	Kts	Limitation /Comment
		NUI • Table 1(T) if overflight of 5:1 items unavoidable • Wireline gantry operations may infringe 210 sector - Local restrictions apply • Automatic self-oscillating monitors - H2- Large compliant
		Non Compliance
5:1		Platform structure on east and west sides

Figure 6.6: DP-8 Platform Information Plate

6.4.1 Baseline Access

91. Currently access to the DP-8 can occur by day and night under both VMC and IMC. The current access is an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

6.4.2 Future Access

6.4.2.1 Flight Under Visual Meteorological Conditions

92. The DP-8 helideck is located 3.8 nm from the boundary of the Unconstrained Areas. A distance of 3.8 nm would permit day VMC operations, providing an average access of

94.2% of daylight conditions. Under the current regulations, due to the distance and orientation from the Morecambe Offshore Windfarm, night operations would also be possible.

6.4.2.2 Flight Under Instrument Meteorological Condition

93. Due to the distance and orientation from the Morecambe Offshore Windfarm, instrument approaches into the prevailing winds could be conducted. As shown in Figure 6.2, the prevailing wind direction for IMC is south westerly, with additional periods of north westerly and south easterly winds. As helicopter operators have previously agreed that approaches may be made up to 30° out of wind, providing the drift angle remains less than 10°, it is assessed that the Morecambe Offshore Windfarm will have a minimal impact on IMC operations. Therefore, it is anticipated that helicopter access will remain at an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

6.4.3 DP-8 Summary

94. Due to the distance and orientation from the Morecambe Offshore Windfarm, helicopter access will be unaffected and remain at the current level of 99% by day and 98.4% at night.

6.5 OSI

95. The OSI is a manned installation located 4.3nm from the boundary of the Unconstrained Areas. It is equipped and certified for night operations.

<table>
<tr><td colspan="2">  </td><td colspan="4">HELIDECK INFORMATION PLATE</td></tr>
<tr><td>HELIDECK
Elev 87 ft</td><td>VAR
2 W</td><td>POSITION
N53 41.0 W003 32.7</td><td colspan="3">EGOI OSI</td></tr>
<tr><td colspan="3">HEIGHT OF INSTALLATION: 129 HIGHEST OBSTACLE
WITHIN 5NM:</td><td>VHF
122.380</td><td>NDB DBG
391</td><td>Issue Date 27
Apr 2023</td></tr>
<tr><td colspan="3">FUELLING INSTALLATION: No
STARTING EQUIPMENT: No</td><td colspan="2" rowspan="2">Operating Company

ENI</td><td rowspan="2">Issued By

Helideck Certification Agency</td></tr>
<tr><td colspan="3">(Norway 1.25D - ‘Dh’ = SLA=13.68)
HELIDECK D value: 13.68
P/R/H Category: 1
Max Weight: 4.3t
Circle & H Lights: Yes</td></tr>
</table>




Wind (T°)	Kts	Limitation /Comment
		Tanker (FPSO) Category 1 • Table 1 to be used if overflight of 5:1 items unavoidable • Approved for AW169 operations • PLHS in place for AW169 operations due to LOS obstruction • HMS Rev.9B fitted. CAA Dispensation for ATEX lights
		Non Compliance
210°		Perimeter lights 140mm Perimeter net frame up to 250mm Access handrail 150mm Forward monitor - 250mm
150°		Access handrail 150mm Perimeter lights 140mm Radar tower obstruction
5:1		Mooring buoy and arm forward Perimeter net frame at outboard emergency access

Figure 6.7: OSI Platform Information Plate

6.5.1 Baseline Access

96. Currently access to the OSI can occur by day and night under both VMC and IMC. The current access is an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

6.5.2 Future Access

6.5.2.1 Flight Under Visual Meteorological Conditions

97. The OSI helideck is located 4.3 nm from the boundary of the Unconstrained Areas. A distance of 4.3 nm would permit day VMC operations, providing an average access of 94.2% of daylight conditions. Night VMC operations would also be possible, providing an average of 88.4% of night conditions.

6.5.2.2 Flight Under Instrument Meteorological Condition

98. Due to the distance and orientation from the Morecambe Offshore Windfarm, instrument approaches into the prevailing winds could be conducted. As shown in Figure 6.2, the prevailing wind direction for IMC is south westerly, with additional periods of north westerly and south easterly winds. As helicopter operators have previously agreed that approaches may be made up to 30^{o} out of wind, providing the drift angle remains less than 10^{o}, it is assessed that the Morecambe Offshore Windfarm will have a minimal impact on IMC operations to the OSI. Therefore, it is anticipated that helicopter access will remain at an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

6.5.3 OSI Summary

99. Due to the distance and orientation from the Morecambe Offshore Windfarm, helicopter access will be unaffected and remain at the current level of 99% by day and 98.4% at night.

6.6 Dalton Wellheads

100. The Dalton Wells R1 and R2 are both plugged. The R2 wellhead is located 5.6nm from the boundary of the Unconstrained Areas, with R1 located 6.0nm away from the boundary. An NPI might be required to work over these sites.

6.6.1 Baseline Access

101. Currently access to the Dalton Wellheads can occur by day and night under both VMC and IMC. The current access is an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

6.6.2 Future Access

6.6.2.1 Flight Under Visual Meteorological Conditions

102. A NPI located at R2 would be located 5.6 nm from the boundary of the Unconstrained Areas. A distance of 5.6 nm would permit day VMC operations, providing an average access of 94.2% of daylight conditions. Night VMC operations would also be possible, providing an average of 88.4% of night conditions.

6.6.2.2 Flight Under Instrument Meteorological Condition

103. Due to the distance and orientation from the Morecambe Offshore Windfarm, instrument approaches into the prevailing winds could be conducted. As shown in Figure 6.2, the prevailing wind direction for IMC is south westerly, with additional periods of north westerly and south easterly winds. As helicopter operators have previously agreed that approaches may be made up to 30° out of wind, providing the drift angle remains less than 10°, it is assessed that the Morecambe Offshore Windfarm will have a minimal impact on IMC operations to the OSI. Therefore, it is anticipated that helicopter access will remain at an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

6.6.3 Dalton Wellheads Summary

104. Due to the distance and orientation from the Morecambe Offshore Windfarm, helicopter access will be unaffected and remain at the current level of 99% by day and 98.4% at night.

6.7 Hamilton North Platform

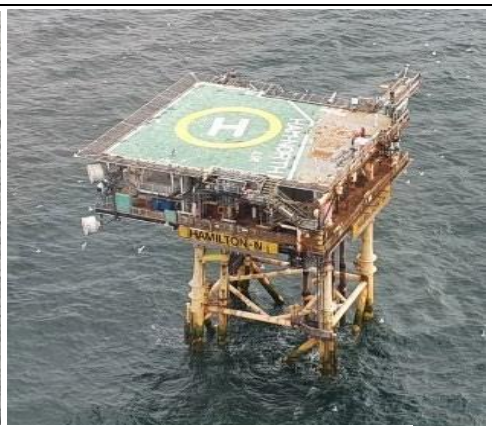
105. The Hamilton North Platform is a NUI located 6.7nm from the boundary of the Unconstrained Areas. It is certified for day only operations.

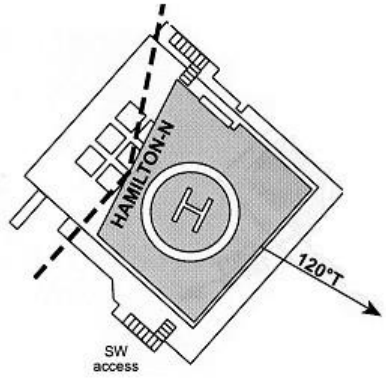
<table>
<tr><td colspan="2"> 
</td><td colspan="4">HELIDECK INFORMATION PLATE

Certificate Expiry Date: 9th November 2024</td></tr>
<tr><td>HELIDECK
Elev 112 ft</td><td>VAR
2 W</td><td>POSITION N53 38.77
W003 28.67</td><td colspan="3">EGGZ Hamilton North</td></tr>
<tr><td colspan="3">HEIGHT OF INSTALLATION: 116ft
HIGHEST OBSTACLE WITHIN 5NM: OSI 121ft</td><td>VHF
122.380</td><td>NDB
-</td><td>Issue Date 16 Jun 2023</td></tr>
<tr><td colspan="3">FUELLING INSTALLATION: No STARTING EQUIPMENT: No</td><td colspan="2" rowspan="2">Operating Company

ENI Liverpool Bay</td><td rowspan="2">Issued By

Helideck Certification Agency</td></tr>
<tr><td colspan="3">HELIDECK D value: 14.65m
P/R/H Category: F
Max Weight: 4.9t
Circle & H Lights: Not Fitted</td></tr>
</table>





Wind (T°)	Kts	Limitation /Comment
		NUI - No automatic fire-fighting facilities • Daylight operations only - Circle & "H" lights not fitted • Table 1 (T) if overflight of 5:1 items unavoidable • Approved Friction Surface - No net • Deck closed when Jack-up alongside • Name abbreviated on deck to HAM-NORTH
		Non-Compliance
210°		Outside edge of perimeter net frame up to 300mm adl
5:1		NE & SW access points
Misc		Height limitation in 210 OFS & 1st sector of LOS is 150mm

Figure 6.8: Hamilton North Platform Information Plate

6.7.1 Baseline Access

106. Although the Platform is limited to day only operations, a NPI working over the site would normally be certified for night operations. Using a NPI as a worse case example, currently access to the Hamilton North site can occur by day only under both VMC and IMC. The current access is an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions.

6.7.2 Future Access

6.7.2.1 Flight Under Visual Meteorological Conditions

107. The Hamilton North is located 6.7 nm from the boundary of the Unconstrained Areas. A distance of 6.7 nm would permit day VMC operations, providing an average access of 94.2% of daylight conditions.

6.7.2.2 Flight Under Instrument Meteorological Condition

108. Due to the distance and orientation from the Unconstrained Areas, instrument approaches could be conducted. As shown in Figure 6.2, the prevailing wind direction for IMC is south westerly, with additional periods of north westerly and south easterly winds. As helicopter operators have previously agreed that approaches may be made up to 30° out of wind, providing the drift angle remains less than 10°, it is assessed that the Morecambe Offshore Windfarm will have no impact on IMC operations to the Hamilton North Platform. Therefore, it is anticipated that helicopter access will remain at an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions. If a NPI was required to work over the location, both day and night operations would be possible.

6.7.3 Hamilton North Summary

109. Due to the distance and orientation from the Morecambe Offshore Windfarm, helicopter access will be unaffected and remain at the current level of 99% by day for the Hamilton North Platform, with an additional 98.4% night access for an NPI.

6.8 North Morecambe Platform DPPA

110. The DPPA is a NUI certified for night operations. It is located 8.2 nm from the boundary of the Unconstrained Areas.

HELIDECK CERTIFICATION AGENCY

HELIDECK INFORMATION PLATE

HELIDECK Elev **153 ft**	VAR **2** **W**	POSITION **N53 57.57** **W003 40.35**	EGMS **DPPA**		
HEIGHT OF INSTALLATION: **210ft** HIGHEST OBSTACLE WITHIN 5NM: **Check**			VHF **122.380**	NDB **N/A**	Issue Date **26th Oct 2022**
FUELLING INSTALLATION: **No** STARTING EQUIPMENT: **No**			Operating Company **Spirit Energy**		Issued By **Helideck Certification Agency**
HELIDECK D value: **18.7m** P/R/H Category: **F** Max Weight: **8.6t** Circle & H Lights: **Yes**					




Wind (T°)	Kts	Limitation /Comment
		NUI • Table 1(T) if overflight of 5:1 items unavoidable • Call sign DPP-Alpha • H2 RFFS Large Compliant (Automated)
		Non Compliance
5:1		West emergency access & platform structure north and south

Figure 6.9: DPPA Platform Information Plate

6.8.1 Baseline Access

111. Currently access to the DPPA can occur by day and night under both VMC and IMC. The current access is an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

6.8.2 Future Access

6.8.2.1 Flight Under Visual Meteorological Conditions

112. The DPPA Platform is located 8.2 nm from the boundary of the Morecambe Offshore Windfarm. A distance of 8.2 nm would permit day and night VMC operations, providing an average access of 94.2% of daylight conditions and 88.4% of night conditions.

6.8.2.2 Flight Under Instrument Meteorological Condition

113. Due to the distance and orientation from the Morecambe Offshore Windfarm, instrument approaches into the prevailing winds could be conducted. As shown in Figure 6.2, the prevailing wind direction for IMC is south westerly, with additional periods of north westerly and south easterly winds. As helicopter operators have previously agreed that approaches may be made up to 30^{o} out of wind, providing the drift angle remains less than 10^{o}, it is assessed that the Morecambe Offshore Windfarm will have a minimal impact on IMC operations to the DPPA. Therefore, it is anticipated that helicopter access will remain at an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

6.8.3 DPPA Platform Summary

114. Due to the distance and orientation from the Morecambe Offshore Windfarm, helicopter access will be unaffected and remain at the current level of 99% by day and 98.4% at night.

6.9 Conwy Platform

115. The Conwy Platform is a NUI certified for night operations. It is located 8.1nm from the boundary of the Unconstrained Areas.

<table>
<tr><td colspan="2"> 
</td><td colspan="4">HELIDECK INFORMATION PLATE</td></tr>
<tr><td>HELIDECK
Elev 116 ft</td><td>VAR 2
W</td><td>POSITION
N53 37.55 W003.40.36</td><td colspan="3">EGJY Conwy</td></tr>
<tr><td colspan="3">HEIGHT OF INSTALLATION: 132ft HIGHEST
OBSTACLE WITHIN 5NM: Check</td><td>VHF
122.380</td><td>NDB N/A</td><td>Issue Date 04 Jan 2023</td></tr>
<tr><td colspan="3">FUELLING INSTALLATION: No STARTING
EQUIPMENT: No</td><td rowspan="2">Operating Company

ENI</td><td rowspan="2">Issued By

Helideck Certification Agency</td></tr>
<tr><td colspan="3">HELIDECK D value: 17.0m
P/R/H Category: F
Max Weight: 6.8t
Circle & H Lights: Fitted</td></tr>
</table>

Wind (T°)	Kts	Limitation /Comment
		NUI • Table 1(T) if overflight of 5:1 infringements is unavoidable. • Approved friction surface • Automatic DIFFS fitted
		Non Compliance
5:1		NE, SW & NW access platforms

Figure 6.10: Conwy Platform Information Plate

6.9.1 Baseline Access

116. Currently access to the Conwy Platform can occur by day and night under both VMC and IMC. The current access is an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

6.9.2 Future Access

6.9.2.1 Flight Under Visual Meteorological Conditions

117. The Conwy Platform is located 8.1 nm from the boundary of the Morecambe Offshore Windfarm. A distance of 8.1 nm would permit day and night VMC operations, providing an average access of 94.2% of daylight conditions and 88.4% of night conditions.

6.9.2.2 Flight Under Instrument Meteorological Condition

118. Due to the distance and orientation from the Morecambe Offshore Windfarm, instrument approaches into the prevailing winds could be conducted. As shown in Figure 6.2, the prevailing wind direction for IMC is south westerly, with additional periods of north westerly and south easterly winds. As helicopter operators have previously agreed that approaches may be made up to 30^{o} out of wind, providing the drift angle remains less than 10^{o}, it is assessed that the Morecambe Offshore Windfarm will have a minimal impact on IMC operations to the Conwy. Therefore, it is anticipated that helicopter access will remain at an average of 99% (94.2% VMC and 4.8% usable IMC) of daylight conditions and 98.4% (88.4% VMC and 10.0% usable IMC) of night conditions.

6.9.3 Conwy Platform Summary

119. Due to the distance and orientation from the Morecambe Offshore Windfarm, helicopter access will be unaffected and remain at the current level of 99% by day and 98.4% at night.

7 Cumulative Assessment

120. The cumulative assessment considers whether installations already affected by the Morecambe Offshore Windfarm will have additional impacts imposed by the Mona Offshore Wind Project or Morgan Offshore Wind Project Generation Assets.

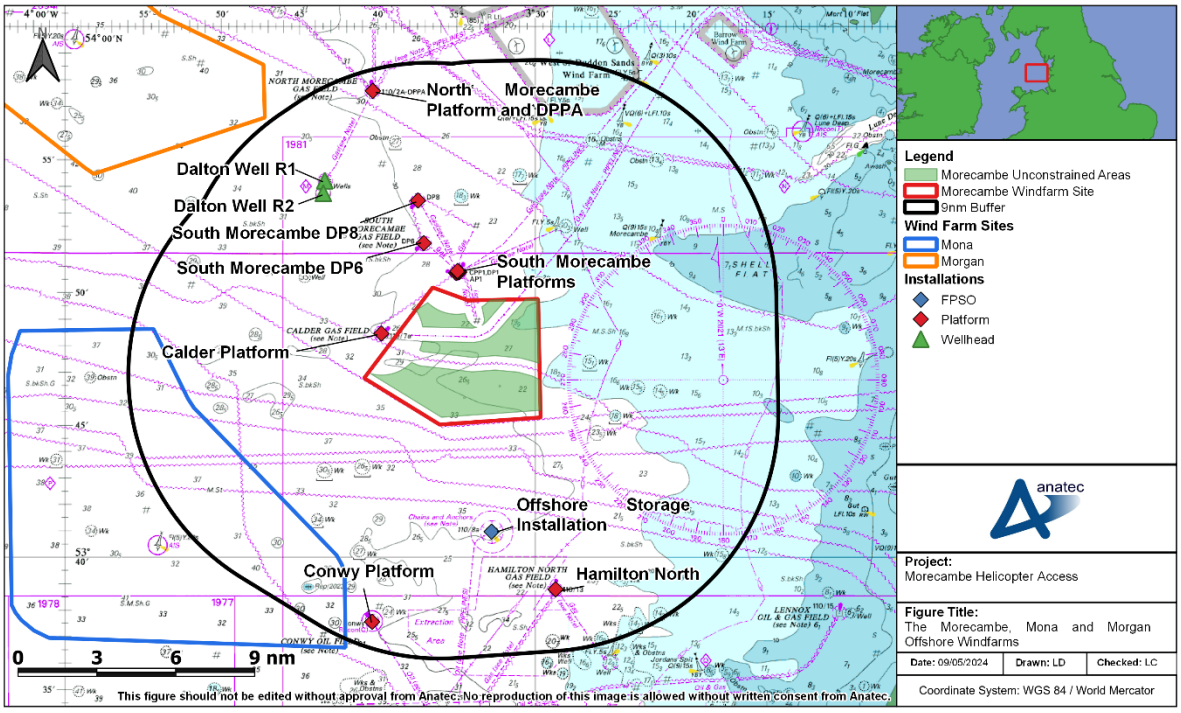


Figure 7.1: The Morecambe, Mona and Morgan Offshore Windfarms

121. Figure 7.1 shows the boundaries of the Morgan, Mona and Morecambe Offshore Windfarms.

7.1 Cumulative Impact of the Mona Offshore Wind Project

122. The Mona Offshore Wind Project boundary is 1.0nm from the Conwy Platform. Due to this distance, helicopter access to the Conwy Platform will be restricted to day VMC only. It is assessed that the Mona Offshore Wind Project will have no cumulative impact on any of the other installations assessed in this Report.

7.2 Cumulative Impact of Morgan Offshore Wind Project Generation Assets

123. The Dalton R1 and R2 Wellheads are located 3.3nm, or more, from the Morgan Offshore Wind Project Generation Assets ('Morgan'). Due to the distance and orientation from Morgan, taking into account the prevailing wind direction for IMC shown in Figure 6.2, and flying approaches up to 30^{o} out of wind, it is assessed that Morgan will have no cumulative impact on access to the Dalton Wellheads.

124. The other location to consider is North Morecambe DPPA. The DPPA is located 4.1nm from the Morgan boundary. Due to the distance and orientation from Morgan, taking into account the prevailing wind direction for IMC shown in Figure 6.2, and flying approaches up to 30^{o} out of wind, it is assessed that Morgan will have no cumulative impact on access to the DPPA.

125. It is assessed that the Morgan Offshore Wind Project Generation Assets will have no cumulative impact on any of the other installations assessed in this report.

Appendix A Assessment of Vantage Flight Data

A.1 Introduction

126. Vantage POB ('Vantage') data was supplied by Spirit Energy. Vantage is a personnel tracking and flight scheduling system. It is used by the oil and gas industry to control and monitor the movements of personnel to, from and between offshore and onshore facilities.

A.2 Vantage Data

127. The Vantage data was provided in an Excel worksheet. It showed the flight date, actual time of departure from Blackpool Airport, the actual landing time back at Blackpool Airport and the flight routing. A typical flight consisted of several sectors, where each sector is the flight between a take-off point and the next landing point. So, the majority of flights landed at multiple offshore gas installations before returning to Blackpool Airport. There were also some single destination flights, typically between Blackpool Airport to CPC-1 and return. There were 6,719 flights listed in the data, covering a period between 2nd January 2018 and 30th September 2023. The meteorological data supplied by Spirit Energy covered the period 19th December 2017 to 19th December 2022. In total 5,910 of the flights coincided with the meteorological data provided. It is this sample of 5,910 flights that was analysed.

128. The Vantage data supplied to the Applicant lacked information on the number and mass of passengers carried. This would have assisted the analysis, for example in determining the take-off distance required following a single engine failure occurring to the helicopter on take-off.

129. In order to assess the impact on specific platforms, the 5,910 flights were broken down into individual sectors. This resulted in a total of 23,821 flight sectors being identified during the period of the meteorological data supplied.

130. Some locations, including Hamilton North (1 flight), OSI (2 flights) and Conwy (8 flights) had a limited number of flights recorded. It is probable that these locations had more flights than were recorded in the Vantage data provided for this assessment, as these installations are operated by a different operator. Data for DP-3 and DP-4 was also discarded as these installations have been decommissioned.

A.3 Analysis

131. The arrival time at each installation was compared to the meteorological conditions recorded and broken down into three categories; day VMC, day IMC, night VMC and night IMC.

A.3.1 CPC-1, AP-1, FL-1 and DP-1

132. CPC-1, AP-1, FL-1 and DP-1 are three bridge linked platforms, with a flare structure. They are located 1.5nm from the Unconstrained Areas. They have two helidecks, one installed on CPC-1 and the other on DP-1. CPC-1 has the primary helideck, with DP-1 having a secondary helideck, which is not equipped for night flying and restricted by a number of environmental limitations: see Figure 6.4.

A.3.1.1 CPC-1

133. The number and percentage of flights to CPC-1 that would have been under day VMC, day IMC or night conditions are presented in Table A.1, Table A.2, Table A.3 and Table A.4, respectively.

Table A.1 CPC-1 Day VMC

Year	Count of Day VMC	Count of all CPC 1 Flights	% Day VMC
2018	2470	2879	85.8%
2019	2282	2440	93.5%
2020	1021	1094	93.3%
2021	1399	1491	93.8%
2022	2003	2118	94.6%

Table A.2 CPC-1 Day IMC

Year	Count of Day IMC	Count of all CPC 1 Flights	% Day IMC
2018	142	2879	4.9%
2019	85	2440	3.5%
2020	52	1094	4.8%
2021	71	1491	4.8%
2022	54	2118	2.5%

Table A.3 CPC-1 Night VMC

Year	Count of Night VMC	Count of all CPC 1 Flights	% Night VMC
2018	245	2879	8.5%
2019	68	2440	2.8%
2020	21	1094	1.9%
2021	20	1491	1.3%
2022	54	2118	2.5%

Table A.4 CPC-1 Night IMC

Year	Count of Night IMC	Count of all CPC 1 Flights	% Night IMC
2018	19	2879	0.7%
2019	4	2440	0.2%
2020	0	1094	0.0%
2021	1	1491	0.1%
2022	7	2118	0.3%

134. Under a proposed revision to CAA Regulations, helicopter flights within 3nm of a windfarm may only be conducted under day VMC. If this draft CAA rule change is implemented, with no alleviations, then 85.8% of the flights in 2018 would have been unaffected, i.e. those conducted under day VMC. From 2019 to 2022 at least 93% of the flights would have been unaffected. The difference between 2018 and the following years can largely be accounted for by the larger number of night flights in 2018, typically over three times those in subsequent years. The average monthly available access is similar to that forecast in Table 4.1. The data confirms that most flights occur under day VMC.

Potential Mitigation

135. Under the current CAA regulations, instrument approaches to CPC-1 would still be permitted when a clear approach and go-around was available, and the helicopter remained laterally displaced from the windfarm by at least 1nm. If the proposed change to the CAA regulations was not implemented, or the helicopter operator flying to CPC-1 could obtain an alleviation from the rule change (based on a safety case being accepted by CAA) then instrument approaches into the prevailing south-westerly wind, or a proportion of night flights, could still occur. An ARA could be conducted on an approach axis of 255°. To provide a wider operating envelope, a PBN approach with vertical guidance could be approved for the CPC-1. Helicopters operating in Morecambe Bay are equipped for PBN operations. These approaches would also be suitable for use at night under both VMC and IMC. Although these mitigations would not provide the current level of access, they would restore some of the usable 4.8% day IMC and night access.

Frequency and Distribution of Night Flights to CPC-1

136. In order to understand the impact that potential loss of night flying will have on the manned South Morecambe cluster, the frequency and distribution of flights to CPC-1 during the winter months was investigated.

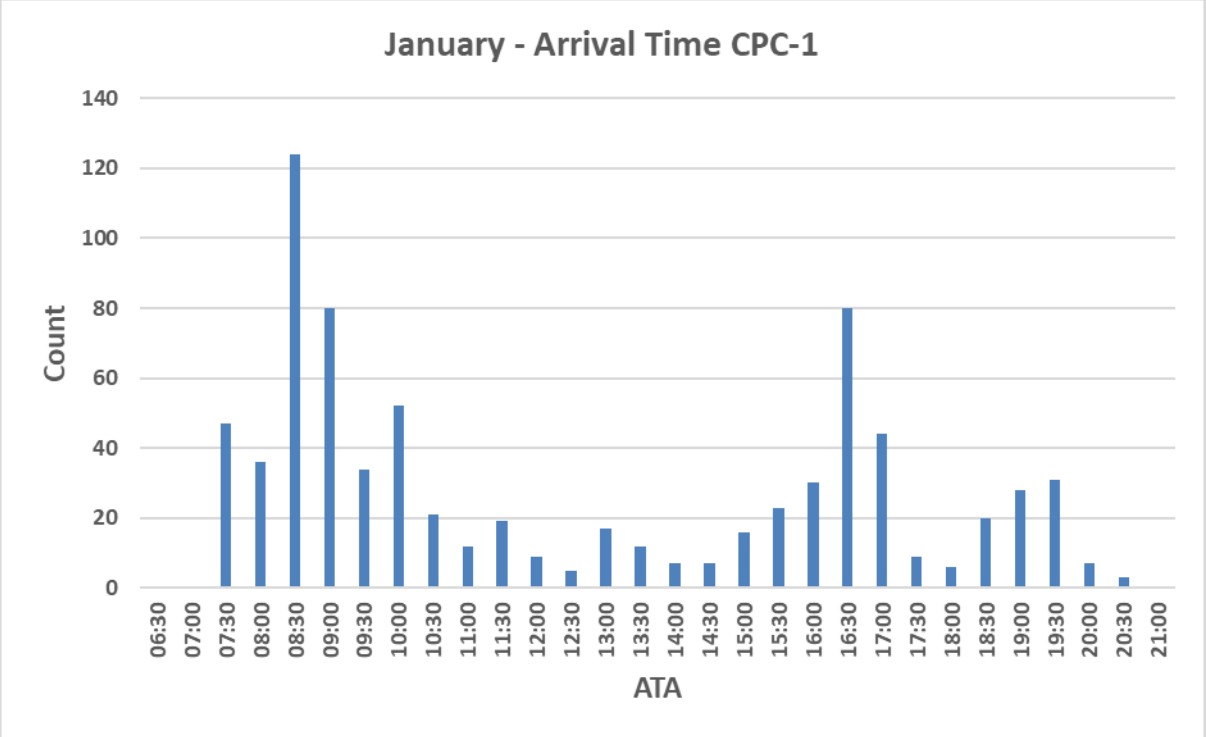


Figure A.1 Distribution and Frequency of Flights to CPC-1-January

137. Daylight on January 15th extends between 07:43 and 17:09. Applying these daylight hours to the data indicates that historically 25.9% (202 of 779) of flights would have been night flights in January. The number of night flights varied over the years assessed, with the number and percentage of night flights falling over more recent years. For example 7 out of 83 (8.4%) flights in January 2021 were conducted at night and 4 out of 148 (2.7%) were night flights in January 2022.

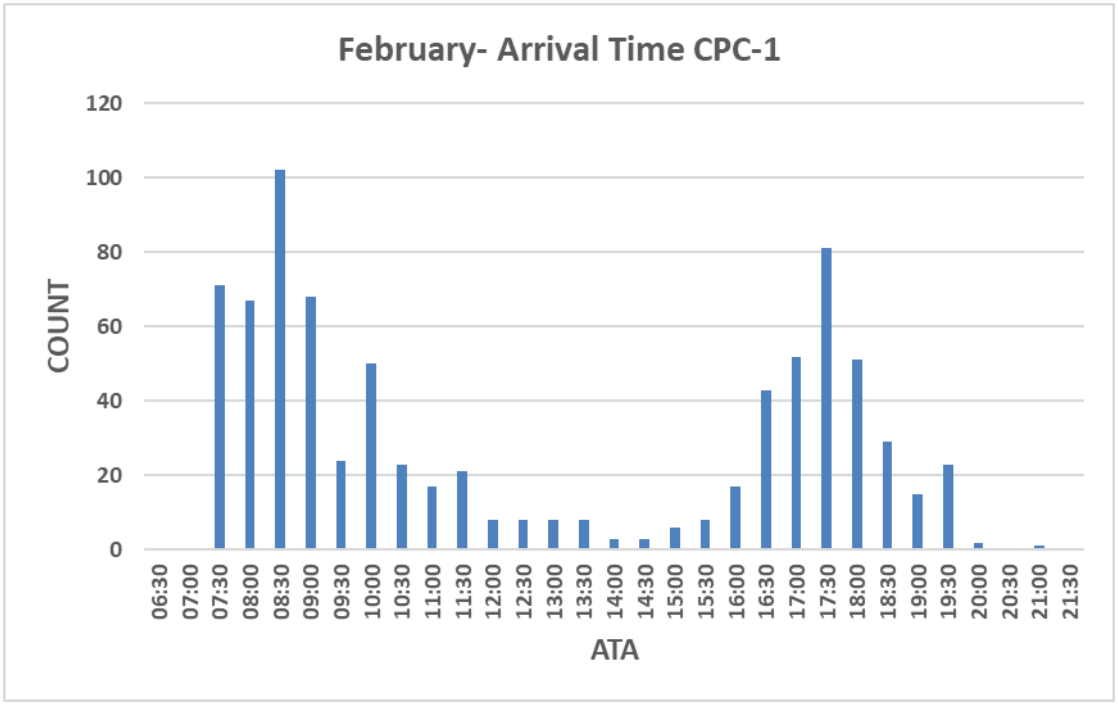


Figure A.2 Distribution and Frequency of Flights to CPC-1-February

138. Daylight on February 15th extends between 06:59 and 18:03. Applying these daylight hours to the data indicates that historically 12.7% (103 of 809) of flights would have been night flights in February.

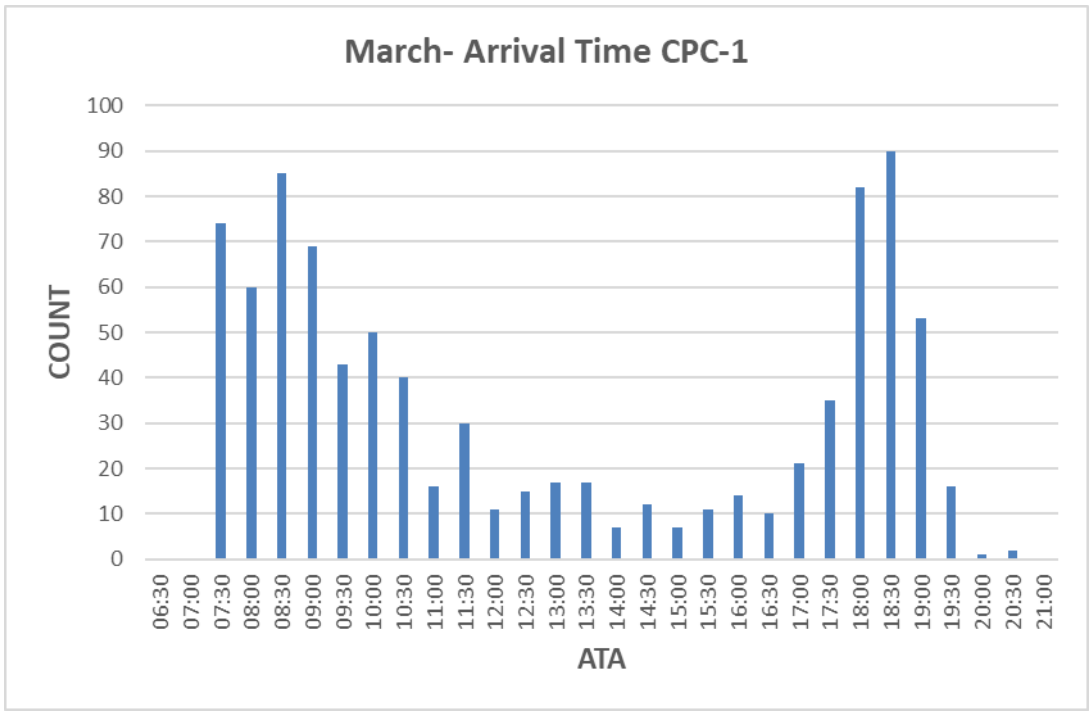


Figure A.3 Distribution and Frequency of Flights to CPC-1-March

139. Daylight on March 15th extends between 05:58 and 18:55. Applying these daylight hours to the data indicates that historically 4.7% (42 of 888) of flights would have been night flights in March.

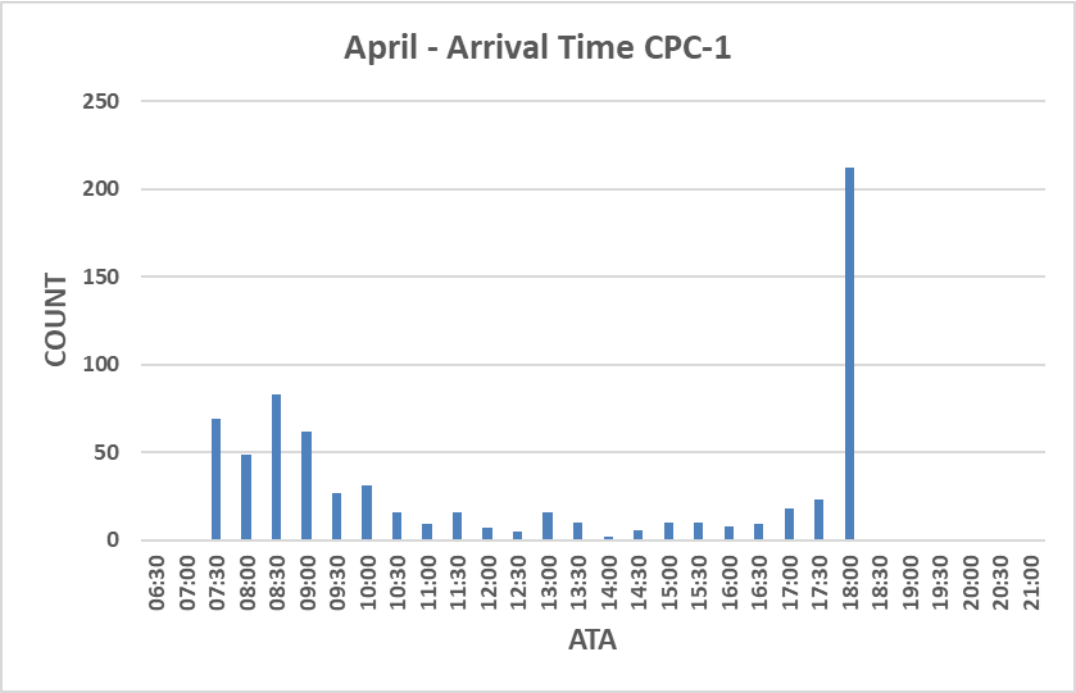


Figure A.4 Distribution and Frequency of Flights to CPC-1-April

140. Daylight on April 15th extends between 05:41 and 20:54. Applying these daylight hours to the data indicates that historically 0.7% of flights would have been impacted (5 of 698).

141. Due to a lengthening period of daylight, and the constraints of Blackpool Airport opening times, no routine night flights would have been conducted over the summer period until the Autumn.

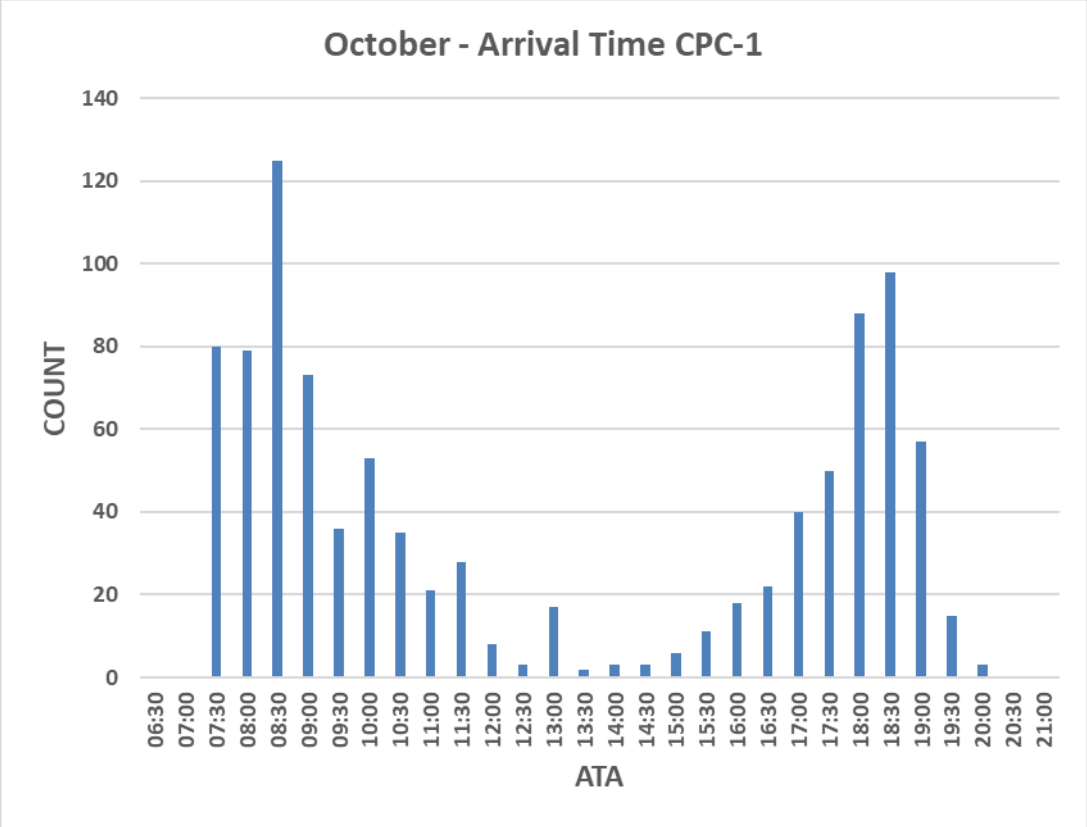


Figure A.5 Distribution and Frequency of Flights to CPC-1-October

142. Daylight on October 15th extends between 07:08 and 18:56. Applying these daylight hours to the data indicates that historically 7.8% (76 of 975) of flights would have been night flights in October.

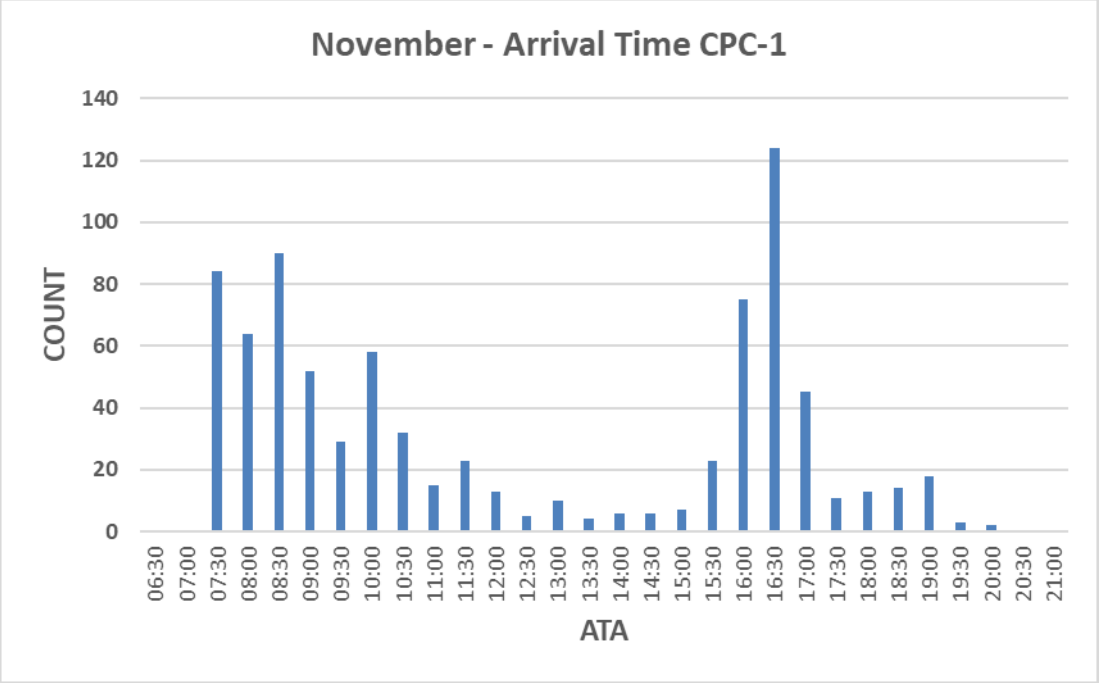


Figure A.6 Distribution and Frequency of Flights to CPC-1-November

143. Daylight on November 15th extends between 07:03 and 17:00. Applying these daylight hours to the data indicates that historically 9.7% (80 of 826) of flights would have been night flights in November.

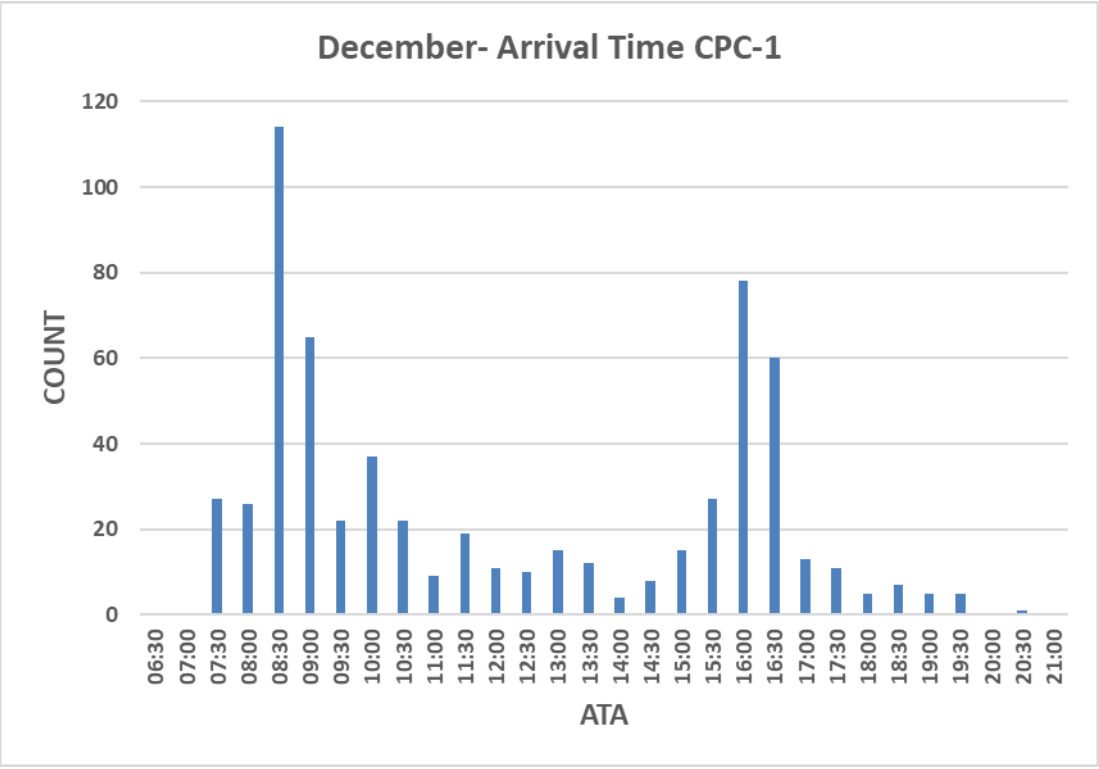


Figure A.7 Distribution and Frequency of Flights to CPC-1-December

144. Daylight on December 15th extends between 07:43 and 16:41. Applying these daylight hours to the data indicates that historically 17.0% (107 of 628) of flights would have been night flights in December.

A.3.1.2 DP-1

145. The Vantage data identifies that one flight to DP-1 occurred in 2018 and four flights occurred in 2022. All of the flights were conducted under day VMC. As unrestricted helicopter access will be available under day VMC, none of these flights would have been affected.

A.3.2 Calder

146. The Platform is approved for day and night operations. Calder is located 1.5nm from the Unconstrained Areas. Under the proposed CAA rule change, day VMC only operations would be permitted. The number and percentage of flights to Calder that would have been under day VMC, day IMC, night VMC and night IMC are presented in Table A.5, Table A.6, Table A.7 and Table A.8 respectively.

Table A.5 Calder Day VMC

Year	Count of Day VMC	Count of all Calder Flights	% Day VMC
2018	173	212	81.6%
2019	330	349	94.6%
2020	243	260	93.5%
2021	168	177	94.9%
2022	134	156	85.9%

Table A.6 Calder Day IMC

Year	Count of Day IMC	Count of all Calder Flights	% Day IMC
2018	13	212	6.1%
2019	19	349	5.4%
2020	16	260	6.2%
2021	9	177	5.1%
2022	6	156	3.8%

Table A.7 Calder Night VMC

Year	Count of Night VMC	Count of all Calder Flights	% Night VMC
2018	26	212	12.3%
2019	0	349	0.0%
2020	1	260	0.4%
2021	0	177	0.0%
2022	13	156	8.3%

Table A.8 Calder Night IMC

Year	Count of Night IMC	Count of all Calder Flights	% Night IMC
2018	0	212	0.0%
2019	0	349	0.0%
2020	0	260	0.0%
2021	0	177	0.0%
2022	3	156	1.9%

147. Flights to the Calder Platform occurred predominantly under day VMC. There were 26 (12.3%) night flights conducted in 2018 and 16 (10.3%) conducted in 2022, with minimal night flying during the intervening years. The low number of night flights from 2019 to 2021 cannot be explained by a reduction caused by the Covid Pandemic, as the number of flights increased during this period.

148. Interrogating the data shows that except for one morning flight on 8th December 2022 (landing at 07:40 just before daylight), the night flights occur during the winter months between 17:00 and 19:30. Scheduling slightly earlier flights would permit these flights to be done under day VMC, albeit with a shortened working day on the Calder Platform. Shortening the working day would have operational and cost implications.

A.3.3 DP-6

149. The DP-6 Platform is a NUI located 2.2nm from the boundary of the Unconstrained Areas. It is approved for night operations due to the fitting of a temporary lighting system (Frictape night lights). The number and percentage of flights to DP-6 that would have been under day VMC, day IMC, night VMC and night IMC are presented in Table A.9, Table A.10, Table A.11 and Table A.12, respectively.

Table A.9 DP-6 Day VMC

Year	Count of Day VMC	Count of all DP-6 Flights	% Day VMC
2018	104	109	95.4%
2019	148	157	94.3%
2020	162	167	97.0%
2021	179	196	91.3%
2022	303	320	94.7%

Table A.10 DP-6 Day IMC

Year	Count of Day IMC	Count of all DP-6 Flights	% Day IMC
2018	5	109	4.6%
2019	9	157	5.7%
2020	5	167	3.0%
2021	14	196	7.1%
2022	13	320	4.1%

Table A.11 DP-6 Night VMC

Year	Count of Night VMC	Count of all DP-6 Flights	% Night VMC
2018	0	109	0.0%
2019	0	157	0.0%
2020	0	167	0.0%
2021	3	196	1.5%
2022	4	320	1.3%

Table A.12 DP-6 NIGHT IMC

Year	Count of Night IMC	Count of all DP-6 Flights	% Night IMC
2018	0	109	0.0%
2019	0	157	0.0%
2020	0	167	0.0%
2021	0	196	0.0%
2022	0	320	0.0%

150. The Vantage data shows that a limited number of night flights occur to the DP-6 NUI, with a maximum of four-night flights (1.3%) occurring in 2022. The percentage of

unaffected flights, i.e. day VMC, is between 91.3% and 97.0%. This is consistent with the forecast shown in Table 4.1.

A.3.4 DP-8

151. The DP-8 Platform is a NUI located 3.8nm from the boundary of the Unconstrained Areas. The platform is equipped and approved for night operations. The number and percentage of flights to DP-8 that would have been under day VMC, day IMC, day VMC or night IMC are presented in Table A.13, Table A.14, Table A.15 and Table A.16, respectively.

Table A.13 DP-8 Day VMC

Year	Count of Day VMC	Count of all DP-8 Flights	% Day VMC
2018	286	327	87.5%
2019	206	222	92.8%
2020	160	175	91.4%
2021	287	302	95.0%
2022	342	357	95.8%

Table A.14 DP-8 Day IMC

Year	Count of Day IMC	Count of all DP-8 Flights	% Day IMC
2018	27	327	8.3%
2019	11	222	5.0%
2020	11	175	6.3%
2021	13	302	4.3%
2022	10	357	2.8%

Table A.15 DP-8 Night VMC

Year	Count of Night VMC	Count of all DP-8 Flights	% Night VMC
2018	14	327	4.3%
2019	5	222	2.3%
2020	4	175	2.3%
2021	2	302	0.7%
2022	5	357	1.4%

Table A.16 DP-8 Night IMC

Year	Count of Night IMC	Count of all DP-8 Flights	% Night IMC
2018	0	327	0.0%
2019	0	222	0.0%
2020	0	175	0.0%
2021	0	302	0.0%
2022	0	357	0.0%

152. Due to the distance to the Unconstrained Areas, and orientation to the windfarm, day IMC and night flights to this NUI will still be permitted.

A.3.5 DPPA (North Morecambe)

153. The DPPA is a NUI certified for night operations. It is located 8.2 nm from the boundary of the Unconstrained Areas.

Table A.17 DPPA Day VMC

Year	Count of Day VMC	Count of all DPPA Flights	% Day VMC
2018	525	621	84.5%
2019	552	590	93.6%
2020	309	324	95.4%
2021	408	419	97.4%
2022	620	646	96.0%

Table A.18 DPPA Day IMC

Year	Count of Day IMC	Count of all DPPA Flights	% Day IMC
2018	33	621	5.3%
2019	7	590	1.2%
2020	15	324	4.6%
2021	9	419	2.1%
2022	7	646	1.1%

Table A.19 DPPA Night VMC

Year	Count of Night VMC	Count of all DPPA Flights	% Night VMC
2018	59	621	9.5%
2019	29	590	4.9%
2020	0	324	0.0%
2021	2	419	0.5%
2022	19	646	2.9%

Table A.20 DPPA NIGHT IMC

Year	Count of Night IMC	Count of all DPPA Flights	% Night IMC
2018	3	621	0.5%
2019	1	590	0.2%
2020	0	324	0.0%
2021	0	419	0.0%
2022	0	646	0.0%

154. Due to the distance to the Unconstrained Areas, and orientation to the windfarm, day IMC and night flights to this NUI will still be permitted.

A.4 Conclusion

155. The Vantage data confirms that the majority of flights occur under day VMC. For installations within 3nm of the constrained area, the monthly average historic helicopter access is similar to the day VMC occurrence identified from the analysis of meteorological data as presented in Table 4.1.

156. Night access was assessed for CPC-1 on a monthly basis, as it is part of a manned cluster. It was identified that the loss of night access would have been worst in January, with an average of 25.9% (202 of 779) of flights being impacted. The number of night flights to CPC-1 varied over the years assessed, with the number and percentage of night flights falling in more recent years. For example 7 out of 83 (8.4%) flights in January 2021 were conducted at night and 4 out of 148 (2.7%) were night flights in January 2022.

157. This assessment assumes that the proposed CAA rule change, limiting all CAT helicopter flights within 3nm of a windfarm to day VMC only, will be implemented in full with no alleviations. Due to the approach and departure distances available, orientated into the prevailing south-westerly wind, both IMC and Night flights would be permitted under the current regulations. The helicopter operator flying to the platforms may seek an alleviation from the CAA, permitting some of the current IMC and night operations to

continue. It is only the helicopter operator that can seek this alleviation, and if granted would be a specific alleviation issued to each Air Operator Certificate holder.

8 References

i CAA (2016). CAP 764 Policy and Guidelines on Wind Turbines. Sixth Edition. Gatwick: CAA.

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

iii SPA.HOFO.100 Operating Procedures

iv HeliOffshore (2023). Flightpath Management (FPM) Recommended Practice for Offshore Helicopter Operations

v CAA (2023). UK Reg (EU) No 923/2012 (the UK Standardised Rules of the Air Regulation)

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