Cenos Offshore Windfarm Limited

Cenos EIA

Appendix 29 – Helicopter Access Report

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Cenos Offshore Windfarm Helicopter Access Report

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Abbreviations Table

Abbreviation	Definition
°	Degrees Magnetic
°C	Degrees Celsius
ARA	Airborne Radar Approach
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAT	Commercial Air Transport
CATS	Central Area Transmission System
DCO	Development Consent Order
ETAP	Eastern Trough Area Project
ft	Foot
FTU	Floating Turbine Unit
GPS	Global Positioning System
HCA	Helicopter Certification Agency
Hs	Significant Wave Height
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
NPI	Non-Productive Installation
OEI	One Engine Inoperative
OSCP	Offshore Substation and Convertor Platform
PLEM	Pipeline End Manifold
Radar	Radio Detection and Ranging

Abbreviation	Definition
SAR	Search and Rescue
SERA	Standard European Rules of the Air
SPA HOFO	Specific Approval for Helicopter Offshore Operations
SSIV	Subsea Isolation Valve
TEMPSC	Totally Enclosed Motor Propelled Survival Craft
UK	United Kingdom
VMC	Visual Meteorological Conditions
VSS	Valve Support Structure
WTG	Wind Turbine Generator

1 Executive Summary

1. This report assesses the impact that the Cenos Offshore Windfarm will have on adjacent hydrocarbon infrastructures. It will identify the baseline helicopter access and then any changes to the access post construction of the windfarm. The report considers the impact of the proposed generation infrastructure that will be located within the windfarm site, i.e. the Floating Turbine Units (FTUs) and Offshore Substation and Converter Platforms (OSCPs).

2. Commercial Air Transport (CAT) Regulations have been applied to identify the current helicopter access. The access is then updated to take account of the changes to the obstacle environment caused by the windfarms. The report applies a worse case assumption that FTUs are built up to the proposed boundaries of the windfarm.

1.1 Data

3. Meteorological data from the ETAP (Eastern Trough Area Project) Platform, covering the period 1 January 2019 to 31 March 2024, was provided. The data was sampled at a 10-minute frequency, resulting in 275,986 data points over the period. There were periods of missing and erroneous data which are discussed in the main report. Due to missing and erroneous data in 2023 and only three months of available data for 2024, these two years were discarded. Four years of data, 2019-2022, have been utilised in this analysis.

1.2 Analysis

4. The impact on helicopter CAT access to the installations within 9 nautical miles (nm) has been assessed.

5. 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. The Hornsea Four Protected Provisions for the Johnston Wellheads include an aviation corridor 1,400 metres (m) wide, turbine tip-to-tip, with an obstacle free radius of 1,600m around each wellhead. These distances are only suitable for day Visual Meteorological Conditions (VMC) operations.

6. 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.

7. It is noted that there are ongoing discussions regarding a proposed change in Civil Aviation Authority (CAA) Regulations which could mean day VMC only access is permitted to an offshore installation (helideck) located within 3nm of an FTU (comprising a Wind Turbine Generator (WTG) mounted to its floating substructure connected to its mooring system). Whilst the timescale for this proposed rule change is unclear, helicopter operators have adopted the principle into industry guidance, such as the HeliOffshore Windfarm

Recommended Practices. The assessment is therefore based on an assumption that the new regulations are in place.

1.3 Safety Considerations

8. 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 (MGN) 654, and so SAR access to installations adjacent to the windfarm will normally be available even when CAT flights are constrained by the meteorological conditions. SAR helicopters tend to be tasked for major incidents, accidents, and urgent medevacs, rather than CAT helicopters. CAT helicopters may have a supporting role to play but are constrained by regulations, weather limitations and operating hours. In the case of a precautionary down manning, for example due to a loss of installation power and consequent welfare issues, CAT helicopters may have a role to play where the weather permits and helicopters are available during their standard operating hours. These events are not time critical. Therefore, any reduction in CAT helicopter access will result in a logistic impact on the installation operator, rather than an impact on SAR helicopter access.

1.4 Helicopter Access

9. In this report the CAT helicopter access for each of the manned installations is assessed. The potential helicopter access for a Non-Productive Installation (NPI) working over a subsea installation, such as a wellhead or manifold is also considered. The impact on a manned platform will be higher than any similar restrictions on an NPI, as the NPI will only be in situ for a relatively short period of time.

1.4.1 Manned Installations – ETAP, Elgin and Arbroath Platforms

10. Day and night VMC access will remain unaffected due to the distance from the Cenos Offshore Windfarm. Due to the combination of distances from the windfarm and narrow approach arcs obstructed, it is assessed that the impact on IMC access will be minimal.

1.4.2 NPI Operations

11. The access to an NPI working over the wellheads, manifolds and pipe junctions within 9nm of the windfarm is assessed. Sites within 3nm of the windfarm will have day VMC only access. Beyond 3nm, night VMC access becomes available. The amount of IMC access available to NPIs located further than 3nm from the windfarm will depend on a combination of the distance and the angle of approach obstructed by the windfarm.

1.4.3 Icing

12. For helicopters equipped with a Full or Limited icing system, they will be able to transit over the windfarm to installations to the East and so the impact will be minimal. For helicopters not equipped with an icing system, when icing is present they might have to transit around the windfarm adding to their flight time. Examples of helicopters with a Full or Limited Icing Clearance include the S92, AW189 and H175 helicopters; the

commonly used AW139 is not normally equipped for flight in icing conditions due to weight considerations.

2 Introduction

13. This report was produced as part of the Applicant's 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.

14. The location of the Cenos Offshore Windfarm has the potential to affect helicopter access to nearby permanent hydrocarbon installations, and any temporary installations or vessels working in the area. These restrictions could adversely impact on the ability to fly routine crew change flights to support crewed platforms, drilling rigs and other vessels working over well heads. In this report any restrictions are identified and quantified.

2.1 Background

15. 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 ETAP Platform, 1 January 2019 to 31 March 2024, was provided. The data was sampled at a 10-minute frequency, resulting in 275,986 data points over the period. There were periods of missing and erroneous data which are discussed later in the report.

2.2 Commercial Air Transport Regulations (CAT)

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

2.2.1 Offshore Approval

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

18. "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

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

2.2.3 En-Route Descent

20. Currently 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 ≥600 feet (ft) and visibility ≥4,000m.
- Night – cloud base ≥1,200ft and visibility ≥5,000m.

2.2.4 Proposed New CAA Limits

21. 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

22. Whilst the timescale for this proposed rule change is unclear, helicopter operators have adopted the principle into industry guidance, such as the HeliOffshore Windfarm Recommended Practices. The assessment is therefore based on an assumption that the new regulations are in place.

2.2.5 Instrument Meteorological Conditions

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

2.2.6 Airborne Radar Approach

24. 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.

25. 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

26. 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).

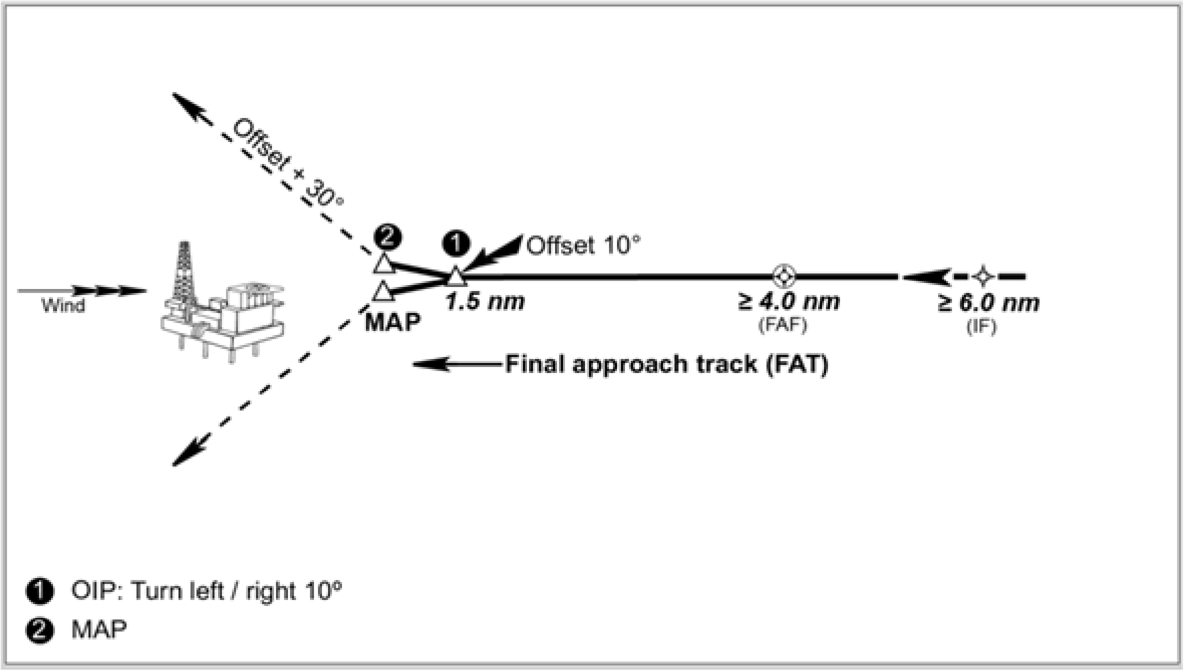


Figure 2.1: ARA Horizontal Profile

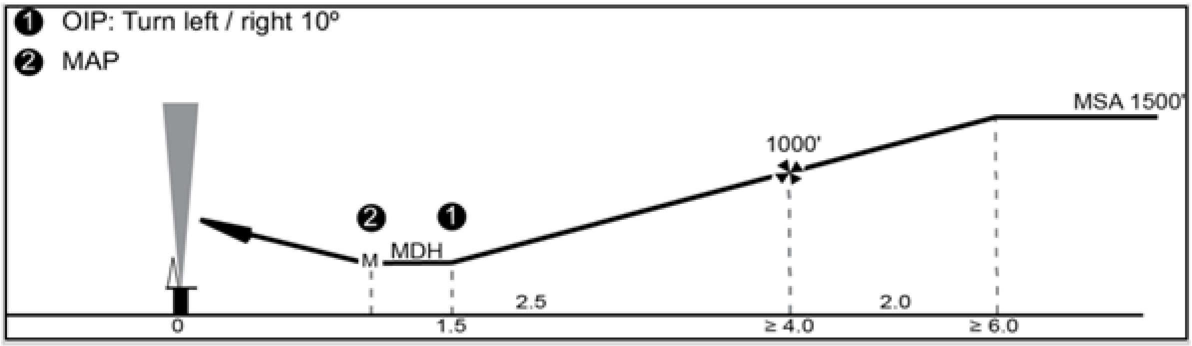


Figure 2.2: ARA Vertical Profile

27. 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 FTUs to achieve the Initial Approach Fix at 1,500ft, or to conduct an arc approach maintaining a 1nm lateral separation distance from the FTUs.

2.2.7 Required Separation Distances Between Floating Turbine Units and Hydrocarbon Installations

28. For safe helicopter operations to an offshore installation, sufficient space must be available for an approach and take-off.

2.2.7.1 Day VMC Approach Distance Required

29. 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.

30. 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 (United Kingdom) operator applies 0.75nm. As a reasonable worst case, a stabilisation distance of 0.75nm is applied in this assessment.

31. 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).

32. 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 Take-Off Distance Required

33. The helicopter operator is required to take account of the possibility of an engine failure. Although the regulations set a target probability of 5×10^{-8} or lower per take-off or landing, it is regarded as a foreseeable event.

Day VMC

34. 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 an FTU directly in the flight path. The Hornsea Project Four Development Consent Order (DCO) contains Protected Provisions for the Johnston Wellheads. The Protected Provisions include an aviation corridor 1,400m wide, measured turbine tip-to-tip, with an obstacle free radius of 1,600m around each wellhead.

Night and IMC

35. Night and IMC will require sufficient distance to climb at the applicable one engine inoperative rating to 1,000ft above mean sea level before turning. In addition, a buffer of 1nm between the aircraft’s flightpath and the closest obstacle must be applied. This will require a greater distance than day VMC, typically 2.8nm but dependent on the helicopter’s take-off mass. The proposed CAA regulatory change will increase the night and IMC minimum distance to 3nm.

2.2.8 No Fly Conditions

36. 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 helidecks have lower values due to mechanical and thermal turbulence impacting aircraft handling or causing engine surges;
- 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;
- For moving decks, helideck motion outside prescribed pitch, roll and heave limits.

37. Forecasts of Triggered Lightning[1] and helideck motion are not recorded in the data provided, 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

38. 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 oil and 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.

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

40. 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

41. 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 site boundary forms 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

42. The infrastructure assessed is shown in Table 3.1. There are three permanent manned installations within 9nm of the windfarm. It is assumed that FTUs will be built up to the boundary and so the distances shown are a worst case. Non-productive installations, such as semi-submersible drilling rigs, may be used in the area on a temporary basis.

Table 3.1 Details of Assessed Infrastructure

Name	Type	Operator	Distance from Array Area Boundary (nm)
Madoes	Manifold / Wellhead	BP	0.7
Seagull	Manifold / Wellhead	BP	2.5
Shaw 22/22A-R1	Manifold / Wellhead	Repsol	2.5
Shaw 22/22A-N1 & N2	Manifold / Wellhead	Repsol	3.0
Culzean Pipeline End Manifold (PLEM)	Manifold / Wellhead	TotalEnergies	3.0
Starling	Manifold / Wellhead	Shell	4.6

Name	Type	Operator	Distance from Array Area Boundary (nm)
Egret	Manifold / Wellhead	BP	4.9
Arkwright	Manifold / Wellhead	Repsol	5.1
Heron	Manifold / Wellhead	BP	6.7
Wood	Manifold / Wellhead	Repsol	6.7
CATS (Central Area Transmission System) VSS (Valve Support Structure) Manifold	Manifold / Wellhead	BP	7.2
Arbroath	Platform	Repsol	7.4
Kyle North	Drill Centre	CNR	7.5
ETAP Junction	Pipe Junction	BP	7.6
ETAP	Platform	BP	7.7
Elgin Wye SSIV	SSIV	TotalEnergies	7.8
Elgin	Platform	TotalEnergies	8.7

3.3 Meteorological Data Provided

43. Installations are required to report and record meteorological data in accordance with CAP 437 Appendix E.

44. Meteorological data from the ETAP Platform, covering the period 1 January 2019 to 31 March 2024, was provided by BP. Data for 2024 has not been used in this assessment as it does not cover a complete year.

45. The data was sampled at a 10-minute frequency, resulting in 275,986 data points over the period.

3.3.1 Meteorological Parameters

46. The following parameters were used:

- Timestamp – year/month/day/hour/minute/second
- Visibility (10 minute average) – m
- Cloud base (10 minute average) – ft
- Wind direction (10 minute average) – °
- Wind speed (10 minute average) – m/s converted to kt
- Air temperature (30 minute average) - °C
- Dew Point (10 minute average) - °C
- Humidity (10 minute average) - %
- Significant wave height (30 minute average) (Hs) – m

3.3.2 Data Anomalies

47. There were periods when some meteorological parameters were not recorded, or erroneous values appear to have been recorded. When the data was provided, it was stated that BP had instructed their 3rd party meteorological data provider to cease quality checks on the cloud base and visibility parameters. The following anomalies were noted:

- Missing data. From 1 June 2023 until 15 June 2023, cloud base and visibility data was blank, other parameters were recorded as NaN (Not a Number). This implied that the automatic weather station was out of order.
- Erroneous data. From 15 June 2023 until 17 June 2023, and then repeatedly afterwards, the cloud base was recorded as -1 and the visibility data was blank. During these periods the Dew Point was frequently recorded as being higher than the ambient air temperature, and yet the humidity was recorded as being significantly less than 100%. This confirms the automatic weather station was out of order, as the air becomes fully saturated (100% humidity) when the Dew Point and ambient temperature are the same.
- From 19 June 2023 until 23 June 2023 there were a significant number of occasions when the cloud base was recorded as -1. Coinciding with many of these points, the visibility was recorded as blank. Similar recordings are made between 20 September 2023 and 8 October 2023. Once again, there appears to be no low cloud or fog as the humidity was recorded as being low.
- In total there were 10,975 10 minute samples in 2023 where visibility was not recorded. This amounted to 20.9% of all data points in 2023.

48. As the data for 2023 lacks reliable data for cloud base and visibility, it has been excluded from this analysis. Therefore, data for four years, 2019-2022, have been utilised in this assessment.

3.4 Meteorological Analysis

49. The meteorological limits, defined in the Regulations and shown in Sections 2.2.2 – 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.

50. 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

51. 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 CAT helicopter access specific to the facilities shown in Table 3.1.

4.1 Approach Limitations

52. Applying the meteorological limits described in Sections 2.2.2 to 2.2.6 to the meteorological data provides the percentage of occasions when each approach type is permitted or required. The tables show the annual average percentages, which vary seasonally within a given year.

53. 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 ETAP Area - Day and Night VMC Access

Year	Day VMC	Day IMC	Night VMC+ Aberdeen Airport Open	Night IMC+ Aberdeen Airport Open
2019	86.3%	13.7%	77.3%	22.7%
2020	92.0%	8.0%	82.3%	17.7%
2021	88.9%	11.1%	81.5%	18.5%
2022	88.0%	12.0%	86.8%	13.2%
Mean	**88.8%**	**11.2%**	**82.0%**	**18.0%**

54. Table 4.1 does not consider when the conditions did not permit flying, i.e., the conditions identified in Section 2.2.8. Table 4.2 shows the average usable IMC conditions, i.e. IMC conditions excluding no fly cases as described in Section 2.2.8. It is noted that there may also be scenarios where the VMC access would be lower than presented in Table 4.1 due to no fly conditions associated with waves, wind speed, triggered lightning, helideck motion and helideck turbulence sectors, but the focus of Table 4.2 is on IMC availability.

55. Table 4.2 shows that an average of 3.7% of daylight IMC did not permit flying, so leaving an average of 7.5% (11.2% minus 3.7%) of usable day IMC. For night IMC, an average of 2.5% of IMC conditions were unusable, leaving 15.5% (18.0% minus 2.5%) usable night IMC. The night figures take account of the standard opening hours of Aberdeen Airport (06:00-22:00), plus transit time between the Airport and the area.

Table 4.2 ETAP Area - Day and Night Usable IMC Access

	Usable IMC Day	Day IMC	Day IMC No Fly	Usable IMC Night +Aberdeen Airport open	Night IMC +Aberdeen Airport open	Night IMC No Fly +Aberdeen Airport open
2019	10.3%	13.7%	3.0%	20.0%	22.7%	2.7%
2020	6.6%	8.0%	1.4%	15.5%	17.7%	2.2%
2021	8.2%	11.1%	2.9%	15.4%	18.5%	3.1%
2022	4.6%	12.0%	7.4%	11.5%	13.2%	1.7%
Mean	**7.5%**	**11.2%**	**3.7%**	**15.5%**	**18.0%**	**2.5%**

5 Emergency Conditions

56. The methodology used so far in this report addresses helicopter access under CAT Regulations. Emergency evacuation of any installation, critical Medevacs 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, including the SAR coverage provided by the integrated Search and Rescue (iSAR) Consortium in Aberdeen (formerly Jigsaw Aviation).

57. 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.*

58. Due to the SAR autopilot modes and enhanced sensors fitted to the Coastguard SAR helicopters and taking into account the distances between installations and the closest FTUs, it is assessed that SAR access will not be impaired.

59. Although SAR and CAT helicopters are usually the preferred means for an emergency evacuation, they cannot be the primary means of an emergency evacuation in all cases. For example, helicopters cannot be used when the approach, take-off, or helideck are affected by a hydrocarbon release, fire or explosion. In the event of an emergency on the platform resulting in an explosion, fire or release of hydrocarbons, helicopters would be unable to land and so other means of evacuation, such as Totally Enclosed Motor Propelled Survival Craft (TEMPSC) or Seascape escape systems would be required.

60. CAT helicopters may have a role to play in non-emergency situations, such as precautionary down manning of an installation following a loss of power. However, these incidents are usually for crew comfort and welfare reasons and not for urgent safety requirements.

61. Medevacs are frequently conducted by Coastguard SAR helicopters, or the iSAR specialist helicopter based in Aberdeen. For example, Coastguard SAR helicopters conducted 261 medevacs in 2021 and 337 medevacs in 2022 (Ref iv). Medevacs may be conducted by CAT helicopters. CAT helicopters do not carry stretcher patients or those requiring a medical attendant. Impaired, non-stable or infectious patients, or those who cannot wear standard survival equipment, require a risk assessment and senior management approval: if approved these flights are restricted to day only.

62. In summary, although a reduction in helicopter access under CAT Regulations may impose a logistic restriction on a nearby installation, it would not result in a reduced level of SAR helicopter access.

6 Infrastructure Specific Access

63. This section will now identify if helicopter operations will be constrained by the Cenos Offshore Windfarm. Figure 6.1 shows the proposed boundary of the Cenos Offshore Windfarm, and the nearby hydrocarbon infrastructure.

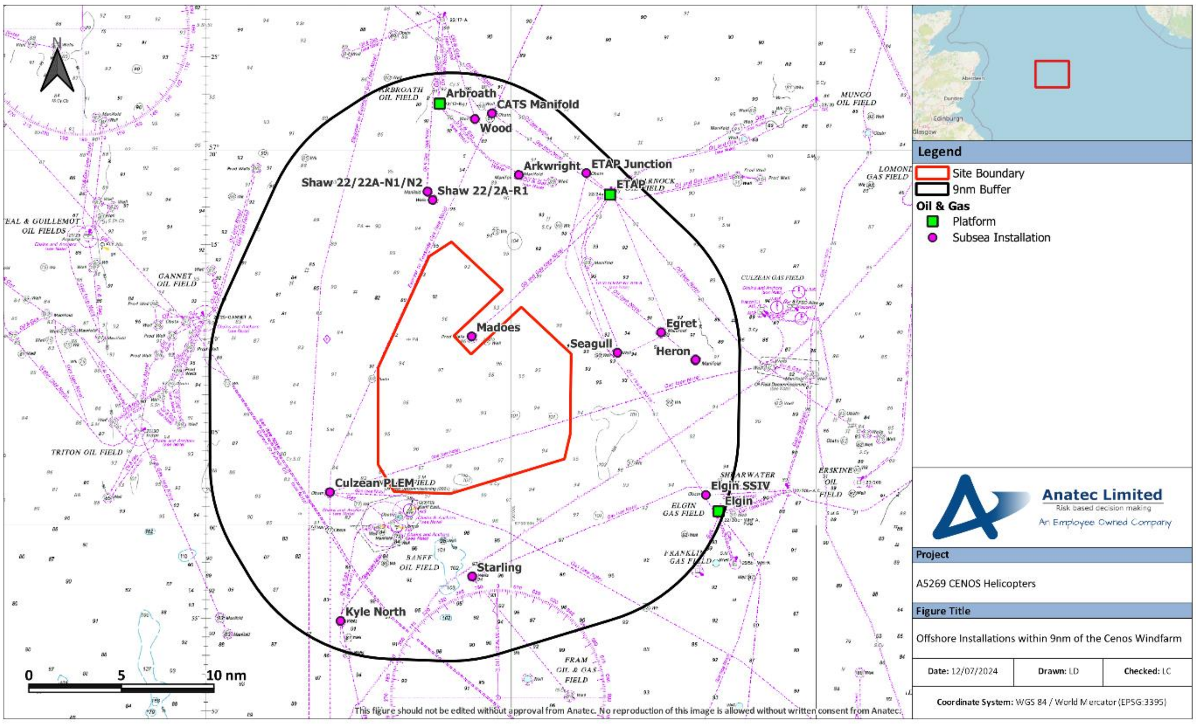


Figure 6.1 Offshore Installations within 9nm of the Cenos Offshore Windfarm

64. 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 an FTU. When assessing if an approach will be obstructed, it is assumed that FTUs will be built up to the boundary shown.

65. 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. Helicopter operations regularly take place to helidecks located within windfarms, or adjacent to windfarms, with distances as low as 900m from the closest turbine tip. The Hornsea Four Protected Provisions for the Johnston Wellheads include an aviation corridor 1,400m wide, turbine tip-to-tip, with an obstacle free radius of 1,600m around each wellhead. These distances are only suitable for day VMC operations.

66. A night or IMC take-off will require sufficient distance to climb at the applicable one engine inoperative rating to 1,000ft above mean sea level before turning. In addition, a

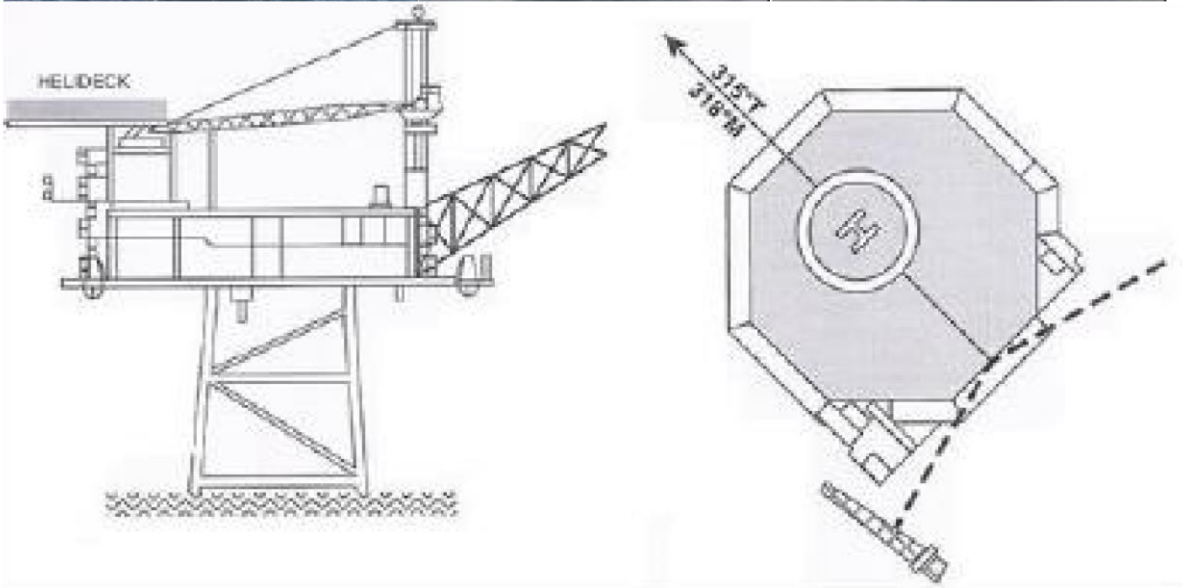
buffer of 1nm between the aircraft's flightpath and the closest obstacle must be applied. This will require a greater distance than day VMC, typically 2.8nm but dependent on the helicopter's take-off mass. This distance for night and IMC operations will expand to 3nm due to the change to CAA Regulations.

6.1 Permanent Installations Within 9 Nautical Miles of the Cenos Offshore Windfarm

6.1.1 Arbroath Platform

67. The Arbroath Platform is located 7.4nm to the North of the Cenos Offshore Windfarm. It is a manned platform approved for day and night operations.

HCA HELIDECK CERTIFICATION AGENCY		HELIDECK INFORMATION PLATE **Certificate Expiry Date: 7 September 2025**			
HELIDECK Elev **141 ft**	VAR **0**	POSITION **N57 22.5 E001 22.9**	EGAQ **Arbroath**		
HEIGHT OF INSTALLATION: **183** HIGHEST OBSTACLE WITHIN 5NM: **Montrose A 295**			VHF **Traf 122.325** **Log 129.700**	NDB **No**	Issue Date **08 Nov 2023**
FUELLING INSTALLATION: **No** STARTING EQUIPMENT: **Yes**			Operating Company **Repsol Sinopec**		Issued By **Helideck Certification Agency**
HELIDECK D value: **22.2m** P/R/H Category: **F** Max Weight: **9.3t** Circle & H Lights: **Yes**					



Wind (T°)	Kts	Limitation /Comment
		Platform • Cleared for S92 & EC225 • Approved Friction Surface. No Net
		Non-Compliance
		Nil

6.1.2 ETAP Platform

68. The ETAP Platform is located 7.7nm to the North East of the Cenos Offshore Windfarm. It is a manned platform approved for day and night operations.

HCA HELIDECK CERTIFICATION AGENCY		HELIDECK INFORMATION PLATE **Certificate Expiry Date: 27 Sept 2024**	
HELIDECK Elev **166 ft**	VAR **0**	POSITION **N57 25.5 E001.39.7**	EGEM **ETAP**

HEIGHT OF INSTALLATION: **515ft** HIGHEST OBSTACLE WITHIN 5NM: **Top of Rig**	VHF **Tr: 122.330** **Log:129.705**	NDB **None**	Issue Date **18 Dec 2023**
FUELLING INSTALLATION: **Yes** STARTING EQUIPMENT: **Yes**	Operating Company **BP**		Issued By **Helideck Certification Agency**
HELIDECK D value: **22.8m** P/R/H Category: **F** Max Weight: **14.6t** Circle & H Lights: **Yes**			

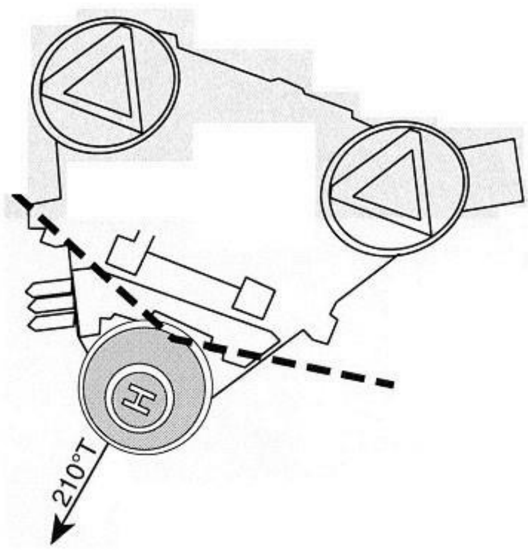



Wind (T°)	**Kts**	**Limitation /Comment**
		Platform • Status Light not fitted – in the event of a detected gas release Platform will alert crew by radio communication
		Non Compliance
210°		Antenna wave guide support bar - marginal infringement
Misc		Status Light not fitted Approved Friction Surface – No net

6.1.3 Elgin Platform

69. The Elgin Platform is located 8.7nm to the South East of the Cenos Offshore Windfarm. It is a manned platform approved for day and night operations.

HCA HELIDECK CERTIFICATION AGENCY	HELIDECK INFORMATION PLATE				
HELIDECK Elev **166 ft**	VAR **0**	POSITION **N57° 00.44' E01° 50.24'**	EGEJ **Elgin PUQ**		
HEIGHT OF INSTALLATION: **509** HIGHEST OBSTACLE WITHIN 5NM: **Top of Rig**			VHF **Traf 122.330** **Log 129.705**	NDB **N/A**	Issue Date **31 Mar 2023**
FUELLING INSTALLATION: **Yes** STARTING EQUIPMENT: **Yes**			Operating Company **Total Energies**		Issued By **Helideck Certification Agency**
HELIDECK D value: **22.8m** P/R/H Category: **F** Max Weight: **15.0t** Circle & H Lights: **Yes**					



Wind (T°)	**Kts**	**Limitation /Comment**
		Please ensure you obtain accurate wind speed & direction early en route to plan your approach
• 015-055	• 0-15	• Possible turbulence from Turbine Exhaust and Exhaust Stack
All winds	• 0-30	• Table 1 (T) for all operations due to anti turbulence panels.
	• 31+	• No restriction

	Non Compliance
210°	Fixed Handrails and Refuelling Cabinet (south-east) 1.15m, Monitor A (north) 400mm, Monitor B (west) 500mm, Monitor C (south) 450mm, Glass Dome (west) 550mm, Small Dome (west) 300mm
150°	Handrails 1.15m ADL at 1.25m from SLA (run-off north) if not collapsed
5:1	West Foam Monitor Platform 1.8m from SLA Anti Turbulence Panels 2.8m from SLA

6.1.4 Other Helidecks

70. NPIs, such as semi-submersible or jack-up drilling rigs and diving support vessels, may require to work in the area, such as over wellheads or manifolds. Typically, these helidecks are approved for day and night operations. Under the proposed change to CAA Regulations, if they operate within 3nm of an FTU helicopter operations will be limited to day VMC.

6.2 Impact of the Cenos Offshore Windfarm

6.2.1 Current Helicopter Access to All Locations

71. The current percentage of VMC helicopter access is shown in Table 4.1, where the mean VMC access by day is 88.8%. Table 4.2 identifies the usable IMC access. A combination of day VMC and usable day IMC provides current access of circa 96.3% (88.8% VMC + 7.5% Usable IMC). This will vary on a seasonal and annual basis. A combination of night VMC and usable night IMC provides current access of circa 97.5% (82.0% + 15.5%), when Aberdeen Airport is open and transit time is taken into account.

6.2.2 Future Access All Installations and Infrastructure

72. In assessing future access it is assumed that only day VMC operations will be permitted within 3nm of the windfarm.

73. Beyond 3nm night operations will be permitted. The feasibility of IMC operations will be dependent on obstructions within 9nm in the approach arc. Helicopter operators have agreed on previous projects, and is current common practice, that approaches may be made up to 30° out of wind providing the drift angle is less than 10°. By making an approach out of wind, the impact of a narrow obstructed arc can be reduced or negated.

6.2.3 Future Access Arbroath Platform

74. Day and night VMC access to the Arbroath will remain unchanged due to the 7.4nm distance to the windfarm boundary.

75. IMC approaches using an ARA requires a 9nm arc free from obstacles in order to manoeuvre to the Initial Approach Fix and then fly the approach. A 9nm approach track is

not available from 165° clockwise to 190°. As approaches are normally made into wind, this could prevent an ARA being flown when the wind direction was from 345° clockwise to 010°, i.e. the reciprocal of the obstructed arc. It has previously been agreed with the helicopter operators that approaches out of wind may be made providing the drift angle is less than 10°. Due to the combination of the obstructed arc at 9nm only covering an angle of 25°, and the distance to the windfarm boundary being 7.4nm away, it is assessed that the impact on instrument approaches to the Arbroath Platform will be minimal.

6.2.4 Future Access ETAP Platform

76. Day and night VMC access to the ETAP will remain unchanged due to the 7.7nm distance to the windfarm boundary.

77. IMC approaches using an ARA requires a 9nm arc free from obstacles in order to manoeuvre to the Initial Approach Fix and then fly the approach. A 9nm approach track is not available from 190° clockwise to 255°. As approaches are normally made into wind, this could prevent an ARA being flown when the wind direction was from 010° clockwise to 075°, i.e. the reciprocal of the obstructed arc. It has previously been agreed with the helicopter operators that approaches out of wind may be made providing the drift angle is less than 10°. Due to the combination of the obstructed arc at 9nm only covering an angle of 65°, and the distance to the windfarm boundary being 7.7nm away, it is assessed that the impact on instrument approaches to the ETAP Platform will be minimal.

6.2.5 Future Access Elgin Platform

78. Day and night VMC access to the Elgin will remain unchanged due to the 8.7nm distance to the windfarm boundary.

79. IMC approaches using an ARA requires a 9nm arc free from obstacles in order to manoeuvre to the Initial Approach Fix and then fly the approach. A 9nm approach track is not available from 285° clockwise to 300°. As approaches are normally made into wind, this could prevent an ARA being flown when the wind direction was from 105° clockwise to 120°, i.e. the reciprocal of the obstructed arc. It has previously been agreed with the helicopter operators that approaches out of wind may be made providing the drift angle is less than 10°. Due to the combination of the obstructed arc at 9nm only covering an angle of 15°, and the distance to the windfarm boundary being 8.7nm away, it is assessed that the impact on instrument approaches to the Elgin Platform will be minimal.

6.2.6 Subsea Infrastructures

80. The following subsea infrastructures may require NPI access for maintenance or decommissioning. The access required will be on a temporary basis, ranging from a few days for a diving operation, using a diving support vessel, to several months for a drilling rig.

6.2.6.1 Madoes Manifold

81. Access to the Madoes Manifold will be required for routine maintenance and ultimate decommissioning. The Madoes Manifold will be located inside the windfarm. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on the Madoes Manifold will be conducted by NPIs equipped with a helideck, which are normally approved for night operations. Due to the proximity of the FTUs, only day VMC operations will be permitted.

82. Table 4.1 identifies a mean day VMC access of 88.8% compared to the current access of 96.3% of daylight conditions, although this will vary annually and by season.

6.2.6.2 Seagull Wellhead

83. The Seagull Wellhead is located 2.5nm from the windfarm boundary. Access to the Seagull Wellhead will be required for routine maintenance and ultimate decommissioning. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on the Seagull Wellhead will be conducted by NPIs equipped with a helideck, which are normally approved for night operations. Due to the proximity of the FTUs, only day VMC operations will be permitted.

84. Table 4.1 identifies a mean day VMC access of 88.8% compared to the current day access of 96.3% of daylight conditions, although this will vary annually and by season.

6.2.6.3 Shaw Wellheads

85. The Shaw Wellheads are located 2.5nm from the windfarm boundary. Access to the Shaw Wellheads will be required for routine maintenance and ultimate decommissioning. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on the Shaw Wellheads will be conducted by NPIs equipped with a helideck, which are normally approved for night operations. Due to the proximity of the FTUs, only day VMC operations will be permitted.

86. Table 4.1 identifies a mean day VMC access of 88.8% compared to the current day access of 96.3% of daylight conditions, although this will vary annually and by season.

6.2.6.4 Culzean PLEM Manifold

87. The Culzean Manifold is located 3.0nm from the windfarm boundary. Access to the Culzean manifold will be required for routine maintenance and ultimate decommissioning. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on the Culzean will be conducted by NPIs equipped with a helideck, which are normally approved for night operations. Due to the proximity of theFTUs, only day VMC operations will be permitted.

88. Table 4.1 identifies a mean day VMC access of 88.8% compared to the current day access of 96.3% of daylight conditions, although this will vary annually and by season.

6.2.6.5 Starling Manifold

89. The Starling Manifold is located 4.6nm from the windfarm boundary. Access to the Starling manifold will be required for routine maintenance and ultimate decommissioning. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on the Starling Manifold will be conducted by NPIs equipped with a helideck, which are normally approved for night operations. As the manifold is located 4.6 nm from the windfarm boundary day and night VMC will be permitted. This will provide a mean annual day VMC access of 88.8% and 82.0% at night.

90. IMC approaches from 320º to 040º will be obstructed. As approaches are normally made into wind, this could prevent an ARA being flown when the wind direction was from 140º clockwise to 220º, i.e. the reciprocal of the obstructed arc. All other approach directions will be available. As the manifold is located only 4.6nm from the windfarm boundary, and due to the angle of the obstructed arc, IMC access will be reduced when there is a Southerly wind.

6.2.6.6 Egret Manifold

91. The Egret Manifold is located 4.9nm from the windfarm boundary. Access to the Egret manifold will be required for routine maintenance and ultimate decommissioning. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on the Egret Manifold will be conducted by NPIs equipped with a helideck, which are normally approved for night operations. As the manifold is located 4.9nm from the windfarm boundary day and night VMC will be permitted. This will provide a mean annual day VMC access of 88.8% and 82.0% at night.

92. IMC approaches from 215º clockwise to 290º will be obstructed. As approaches are normally made into wind, this could prevent an ARA being flown when the wind direction was from 035º clockwise to 110º, i.e. the reciprocal of the obstructed arc. All other approach directions will be available. As the manifold is located only 4.9nm from the windfarm boundary, IMC access will be reduced when there is an Easterly wind.

6.2.6.7 Arkwright Wellhead

93. The Arkwright Wellhead is located 5.1nm from the windfarm boundary. Access to the Arkwright wellhead will be required for routine maintenance and ultimate decommissioning. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on the wellhead will be conducted by NPIs equipped with a helideck, which are normally approved for night operations. As the wellhead is located 5.1nm from the windfarm boundary day and night VMC will be permitted. This will provide a mean annual day VMC access of 88.8% and 82.0% at night.

94. IMC approaches from 160º clockwise to 225º will be obstructed. As approaches are normally made into wind, this could prevent an ARA being flown when the wind direction was from 340º clockwise to 045º, i.e. the reciprocal of the obstructed arc. All other

approach directions will be available. As the wellhead is located only 5.1nm from the windfarm boundary, IMC access will be reduced when there is a Northerly wind.

6.2.6.8 Heron Manifold

95. The Heron Manifold is located 6.7nm from the windfarm boundary. Access to the Heron manifold will be required for routine maintenance and ultimate decommissioning. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on the Heron Manifold will be conducted by NPIs equipped with a helideck, which are normally approved for night operations. As the manifold is located 6.7nm from the windfarm boundary day and night VMC will be permitted. This will provide a mean annual day VMC access of 88.8% and 82.0% at night.

96. IMC approaches from 230^o clockwise to 285^o will be obstructed. As approaches are normally made into wind, this could prevent an ARA being flown when the wind direction was from 050^o clockwise to 105^o, i.e. the reciprocal of the obstructed arc. All other approach directions will be available. As the manifold is located only 6.7nm from the windfarm boundary, IMC access will be reduced when there is an Easterly wind.

6.2.6.9 Wood Wellhead

97. The Wood Wellhead is located 6.7nm from the windfarm boundary. Access to the Wood wellhead will be required for routine maintenance and ultimate decommissioning. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on the wellhead will be conducted by NPIs equipped with a helideck, which are normally approved for night operations. As the wellhead is located 6.7nm from the windfarm boundary day and night VMC will be permitted. This will provide a mean annual day VMC access of 88.8% and 82.0% at night.

98. IMC approaches from 170^o clockwise to 200^o will be obstructed. As approaches are normally made into wind, this could prevent an ARA being flown when the wind direction was from 350^o clockwise to 020^o, i.e. the reciprocal of the obstructed arc. All other approach directions will be available. It has previously been agreed with the helicopter operators that approaches out of wind may be made providing the drift angle is less than 10^o. Due to the combination of the obstructed arc at 9nm only covering an angle of 30^o, and the distance to the windfarm boundary being 6.7nm away, it is assessed that the impact on instrument approaches to the Wood Wellhead will be minimal.

6.2.6.10 CATS VSS Manifold

99. The CATS Manifold is located 7.2nm from the windfarm boundary. Access to the CATS manifold will be required for routine maintenance and ultimate decommissioning. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on the CATS Manifold will be conducted by NPIs equipped with a helideck, which are normally approved for night operations. As the manifold is located 7.2nm from the windfarm boundary day and night VMC will be permitted. This will provide a mean annual day VMC access of 88.8% and 82.0% at night.

100. IMC approaches from 175° clockwise to 205° will be obstructed. As approaches are normally made into wind, this could prevent an ARA being flown when the wind direction was from 355° clockwise to 025°, i.e. the reciprocal of the obstructed arc. All other approach directions will be available. As the manifold is located 7.2nm from the windfarm boundary, and the obstructed arc is only 30°, it is assessed that the impact on IMC operations will be minimal.

6.2.6.11 Kyle North Drill Centre

101. Kyle North is located 7.5nm from the windfarm boundary. Access to the site will be required for routine maintenance and ultimate decommissioning. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on Kyle North will be conducted by NPIs equipped with a helideck, which are normally approved for night operations. As the site is located 7.5nm from the windfarm boundary day and night VMC will be permitted. This will provide a mean annual day VMC access of 88.8% and 82.0% at night.

102. IMC approaches from 010° clockwise to 040° will be obstructed. As approaches are normally made into wind, this could prevent an ARA being flown when the wind direction was from 190° clockwise to 220°, i.e. the reciprocal of the obstructed arc. All other approach directions will be available. As the site is located 7.5nm from the windfarm boundary, and the obstructed arc is only 30°, it is assessed that the impact on IMC operations will be minimal.

6.2.6.12 ETAP Junction

103. The ETAP Junction is located 7.6nm from the windfarm boundary. Access to the site will be required for routine maintenance and ultimate decommissioning. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on site will be conducted by NPIs equipped with a helideck, which are normally approved for night operations. As the ETAP Junction is located 7.6nm from the windfarm boundary day and night VMC will be permitted. This will provide a mean annual day VMC access of 88.8% and 82.0% at night.

104. IMC approaches from 185° clockwise to 240° will be obstructed. As approaches are normally made into wind, this could prevent an ARA being flown when the wind direction was from 005° clockwise to 060°, i.e. the reciprocal of the obstructed arc. All other approach directions will be available. As the site is located 7.6nm from the windfarm boundary, and the obstructed arc is only 55°, it is assessed that the impact on IMC operations will be minimal.

6.2.6.13 Elgin Wye SSIV

105. The Elgin Wye SSIV is located 7.8nm from the windfarm boundary. Access to the site will be required for routine maintenance and ultimate decommissioning. Section 2.2.7 identifies the obstacle free distances required for an approach and take-off. Work on site will be conducted by NPIs equipped with a helideck, which are normally approved for

night operations. As the site is located 7.8nm from the windfarm boundary day and night VMC will be permitted. This will provide a mean annual day VMC access of 88.8% and 82.0% at night.

106. IMC approaches from 280⁰ clockwise to 305⁰ will be obstructed. As approaches are normally made into wind, this could prevent an ARA being flown when the wind direction was from 100⁰ clockwise to 125⁰, i.e. the reciprocal of the obstructed arc. All other approach directions will be available. As the site is located 7.8nm from the windfarm boundary, and the obstructed arc is only 25⁰, it is assessed that the impact on IMC operations will be minimal.

6.3 Helicopter Icing

107. In IMC helicopters will transit at or above the Minimum Safe Altitude, which is 1,000ft above the highest obstacle in the area. The current Minimum Safe Altitude is 1,500ft above Mean Sea Level, based on the highest platform structures being 500ft high. When the Cenos Offshore Windfarm is built, the Minimum Safe Altitude will be increased from 1,500ft to the turbine height plus 1,000ft. For helicopters equipped with a Full or Limited Icing system this is unlikely to prevent a direct transit over the windfarm. For helicopters not fitted with any icing system, such as the AW139, a detour around the windfarm may be required to access some installations.

7 Conclusion

108. Due to the distances from the windfarms, day and night VMC access to the permanently manned installations within 9nm will remain unchanged.

109. Due to the distances of the manned installations from the Cenos Offshore Windfarm, and the narrow obstructed approach arcs, the impact on IMC access will be minimal.

110. NPIs working over subsea infrastructures within 3nm of the windfarm will be restricted to day VMC only operations. NPIs outside 3nm from the windfarm will have unobstructed day and night VMC access. The IMC access for each subsea facility will depend on the distance from the windfarm and the angle of any obstructed arc.

111. It is noted that there was an NPI operating at the Madoes well between 28th May and 29th September 2023. It is recommended that Vantage data from this operation is requested in order to carry out a quantitative assessment of the impact that the presence of the wind farm would have on helicopter access to NPIs.

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.