Morecambe Offshore Windfarm: Generation Assets

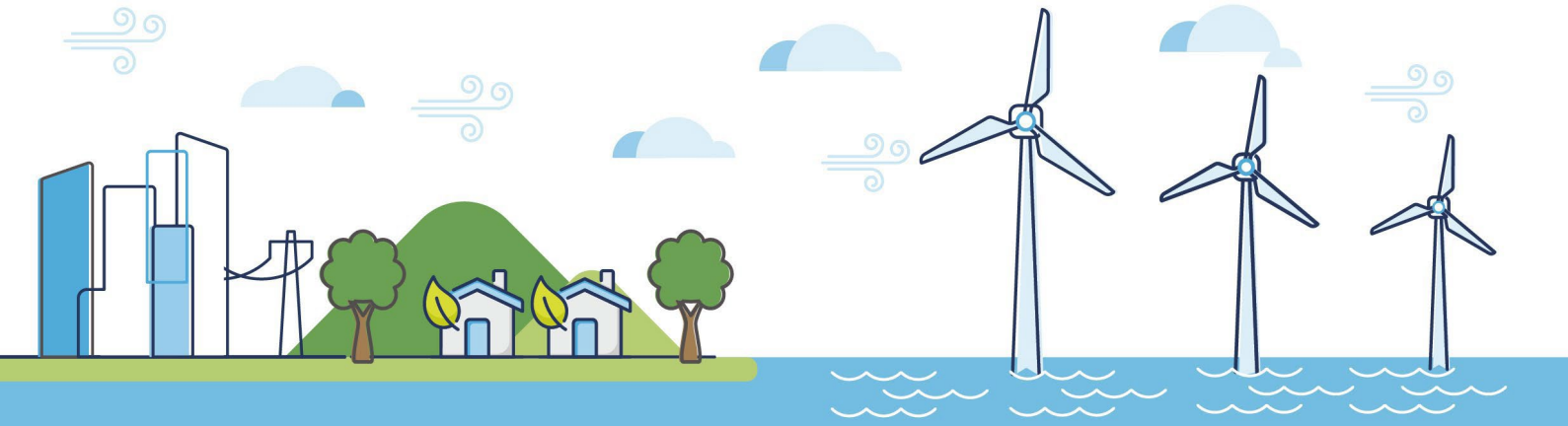
Examination Documents

Volume 9

Responses from the Applicant's to Spirit Energy Deadline 1 Submissions Appendix A: Report on Impact to Helicopter Flights

Document Reference: 9.43.1

Rev 01



Document History

Doc No	MOR001-FLO-CON-ENV-NOT-0029	**Rev**	01
Alt Doc No	A5035-FLO-TN-06		
Document Status	Approved for Use	**Doc Date**	22 January 2025
PINS Doc Ref	9.43.2	**APFP Ref**	5(2)(a)

Rev	Date	Doc Status	Originator	Reviewer	Approver	Modifications
01	22 January 2025	Approved for Use	Anatec	Morecambe Offshore Windfarm Ltd	Morecambe Offshore Windfarm Ltd	n/a

Appendix A: Report on Impact to Helicopter Flights (Vantage Data and CAA Rule Change)

Prepared by	Anatec Limited
Presented to	Morecambe Offshore Windfarm Ltd
Date	21 January 2025
Revision Number	00
Document Reference	A5035-FLO-TN-06

	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	08 January 2025	First Issue
01	21 January 2025	Update based on client comments

Table of Contents

Abbreviations Table

Abbreviation	Definition
AltMoC	Alternative Means of Compliance
AMC	Acceptable Means of Compliance
ARA	Airborne Radar Approach
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
DCO	Development Consent Order
ExA	Examining Authority
IMC	Instrument Meteorological Conditions
nm	Nautical Mile
NUI	Normally Unmanned Installation
OEI	One Engine Inoperative
OWF	Offshore Wind Farm
POB	Person on Board
SPA HOFO	Specific Approval for Helicopter Offshore Operations
VMC	Visual Meteorological Conditions

1 Introduction

1. This Technical Note provides a discussion on the impact to helicopter flights due to the Morecambe Offshore Wind Farm, including:

   - Helicopter Traffic Patterns
     - Variability in flights and visit frequencies based on Vantage POB (Person on Board) flight data
   - Landing and Take-off Distances
     - Buffer distances required for take-off and landings in various conditions
   - Civil Aviation Authority (CAA) Rule Change and Acceptable Means of Compliance (AMC)
     - Discussion of the proposed CAA rule change
     - Information on obtaining an Alternative Means of Compliance (AltMoC) should the rule change come into effect
   - Sectoring
   - Analysis of loss of flights due to the Offshore Wind Farm (OWF)

2. In particular, this note will provide an overview of the schedules of helicopter flights to Spirit Energy assets in Morecambe Bay, in particular the frequency and length of visits to Normally Unmanned Installations (NUIs).

3. Secondly, a further explanation will be provided on the helicopter approach and take-off distances required and why the Applicant differs from the analysis shown in the AviateQ Report submitted by Spirit Energy as Appendix A to their Written representation (REP1-116) at deadline 1.

4. Further information will be provided on how helicopter operators can gain an alleviation from aviation regulations promulgated as AMC and how an AltMoC is applied.

5. In response to the Examining Authority's Question 1CAR17, a comparison will be made between the Applicant's methodology for assessing helicopter access and that used by Spirit Energy. The Applicant will demonstrate they are making a reasonable worst-case assessment of the impact on helicopter operations.

1.1 Authors

6. The Applicant's helicopter access documents have been prepared by Mark Prior and Dr Lucy Campbell. Their qualifications and experience are listed below.

1.1.1 Mark Prior

7. Mark Prior has 45 years of aviation experience. After three operational tours and a staff tour in the RAF, he was selected for training as an Experimental Test Pilot. As part of an exchange programme, he graduated from the French Test Pilot School (Ecole du personnel navigant d'essai et de reception – EPNER) in 1993. He then spent

five years as the Certification Flight Commander on the Rotary Wing Test Squadron at RAF Boscombe Down. This involved running and participating in flight trials on new helicopter types, aircraft systems and research flying.

8. In 1998 he left the RAF and joined Bristow Helicopters ltd. From 2000 until 2016 he was the Bristow Group Chief Test Pilot. Alongside this role he was an industry representative on a number of rulemaking bodies, including the European Joint Aviation Authority (JAA), The European Aviation Safety Agency (EASA), International Civil Aviation Organisation (ICAO), CAA working groups and the Helideck Certification Agency's Technical Committee.

9. In 2016 he left the Bristow Group and became an independent consultant. His clients have included: the Scottish Crown and Procurator Fiscal Service, as an advisor and expert witness for two helicopter accidents; the Ministry of Defence, as lead author on handling and performance aspects during the rewrite of Def Stan 00-970 (Requirements for the Design and Airworthiness of Military Aircraft); the UK Civil Aviation Authority, including a safety assessment of helicopter automated offshore approaches and representing the CAA as Secretary to the European Committee on Aviation Equipment (EUROCAE) working group 110/RTCA Special Committee 237; numerous commissions for oil companies and offshore renewable projects. He was co-author of the HeliOffshore Approach Path Guidance and has been a contributor to the HeliOffshore work on Helicopter Terrain Awareness Warning Systems. Mark is a Fellow of the Royal Aeronautical Society and past Chair of the RAeS Rotorcraft Specialist Group.

1.1.2 Dr Lucy Campbell

10. Lucy is a Director and Principal Risk Analyst with Anatec with over 14 years of technical experience in marine risk assessment for the oil & gas, offshore renewables and marine industries.

11. Lucy has a BSc (Hons 1st) Mathematics-Physics, and PhD in Mathematics from the University of Aberdeen, U.K as well as eight years of research in Mathematics including developing theorems and algorithms. She was also employed as a research scientist at the world leading Max Planck Institute in Germany.

12. She heads up the subsea risk assessment team at Anatec and has been project manager on a large number of Cable Burial Risk Assessments and Navigational Risk Assessments for subsea cables within the renewable energy and marine sectors, as well as pipeline risk assessments for the oil and gas industry, including pipeline decommissioning studies.

13. Lucy has been heavily involved in the research and development of models used to calculate risk related to subsea infrastructure, such as subsea cables and pipelines, including anchor dragging, emergency anchoring, foundering, dropped objects and fishing gear interaction and has had extensive experience in producing cable and pipeline risk assessments in UK and international waters.

14. In the last few years, Lucy has been involved in supporting analysis of the impacts to helicopter access from offshore wind farms, along with Anatec's helicopter specialist, Mark Prior, for a number of offshore wind projects in the North Sea and East Irish Sea.

2 Helicopter Traffic Patterns (2018 to 2024)

2.1 Updated Vantage Data Set

15. The Vantage POB system is a tracking tool that is widely used by oil companies, drilling companies, renewable energy contractors and helicopter operators in UK waters.

16. Spirit Energy has provided additional Vantage POB data, showing flight times and routings for their operations in Morecambe Bay. The additional data supplements the original data set used in the Helicopter Access Study (APP-081), which analysed flights, and the concurrent meteorological data, from 2nd January 2018 to 19th December 2022. The additional Vantage data now extends from 19th December 2022 to 31st October 2024, but no associated meteorological data is yet available.

17. Along with flight times and routings, the Vantage system records the passenger numbers, passenger and baggage weights. The Applicant has requested the passenger and freight data covering the period from 2018 to 2024 from Spirit Energy, as this additional evidence will assist in measuring the actual impact on helicopter operations. For example, taking account of the passengers carried will permit realistic aircraft weights to be used when calculating the One Engine Inoperative (OEI) take-off distances required. It is noted that the AviateQ Report submitted by Spirit Energy (REP1-116) only calculates the OEI distances required using the AW169 helicopter's maximum take-off mass of 4,800kg, which is not a reasonable worst-case assumption; given that there is no offshore refuelling available. As explained in paragraph 3.2.1, the heaviest take-off is likely to be from Blackpool Airport, with the aircraft mass reducing throughout the flight This additional data has not been provided.

2.2 Analysis

18. The updated Vantage POB data covers 7888 flights between 2nd January 2018 and 31st October 2024. For each flight, the date of the flight, take-off time from Blackpool Airport, routing and landing time back at Blackpool Airport were shown. The timings for the total flight were provided and not a breakdown of timings for individual landings.

19. During meetings with Spirit Energy and Harbour Energy, the frequency and length of shift patterns on NUIs were discussed. The frequency of flights, shown by month and year, to individual NUIs were identified from the data. A breakdown of the number of landings on each NUI by month and year is shown.

20. As individual landing times were not provided, the elapsed time between landing back at Blackpool Airport was used to measure the timespan between the initial flight landing staff on a NUI and the second flight recovering them at the end of their shift. The length of visits, using 15-minute bin values, is shown for each NUI.

21. The AW169 helicopter is the main type used in Morecambe Bay. It has only 8 passenger seats and so some deployments to some NUIs require more than one flight.

2.3 Routing

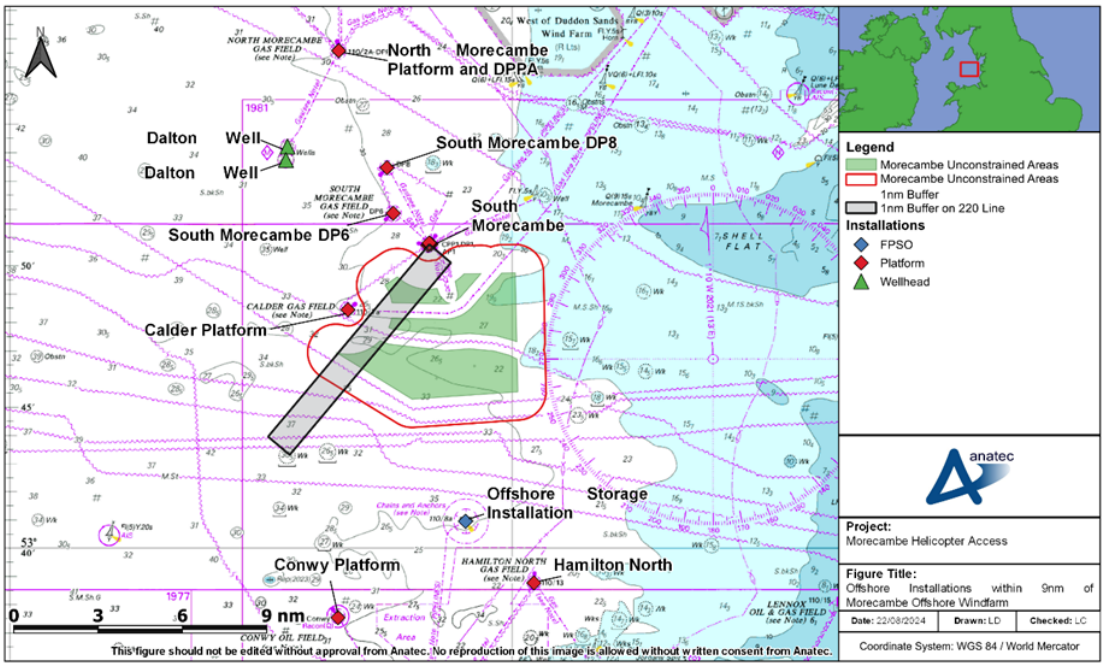


Figure 2.1 Morecambe Unconstrained Area with Nearby Installations, Including Proposed Take-Off Corridor

22. Figure 2.1 shows the Morecambe Unconstrained Area with nearby gas installations. Blackpool Airport is located approximately 20nm to the north east of South Morecambe (CPC-1) Platform

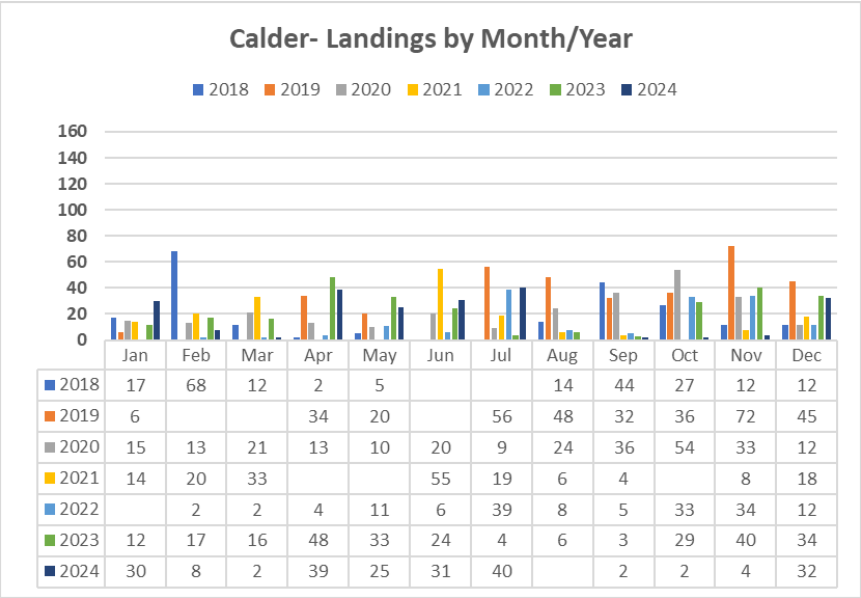
23. The majority of flights flew from Blackpool Airport direct to the CPC-1 helideck located on the South Morecambe Platform. From CPC-1, flights would either return direct to Blackpool Airport, or shuttle to and from other helidecks before returning to Blackpool Airport.

2.3.1 South Morecambe CPC-1 Helideck

24. The South Morecambe is a manned platform, with the CPC-1 helideck located on one of the platform modules. Of the 7888 flights recorded, 5850 (74.2%) routed direct from Blackpool Airport to CPC-1. When flights did not route direct to CPC-1 they typically routed to a NUI before then flying to CPC-1. This pattern confirms that the CPC-1 helideck located on the South Morecambe Platform is used for “hub and spoke” shuttling to the nearby NUIs. The active NUIs are the Calder, DP6, DP8 and North Morecambe platforms.

2.3.2 Calder Platform

25. The Calder Platform is a NUI. The visits per month and year are shown in Figure 2.2. The length of visits is shown in Figure 2.3.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	17	68	12	2	5			14	44	27	12	12
2019	6			34	20		56	48	32	36	72	45
2020	15	13	21	13	10	20	9	24	36	54	33	12
2021	14	20	33			55	19	6	4		8	18
2022		2	2	4	11	6	39	8	5	33	34	12
2023	12	17	16	48	33	24	4	6	3	29	40	34
2024	30	8	2	39	25	31	40		2	2	4	32

Figure 2.2 Landing on the Calder Platform by Month and Year

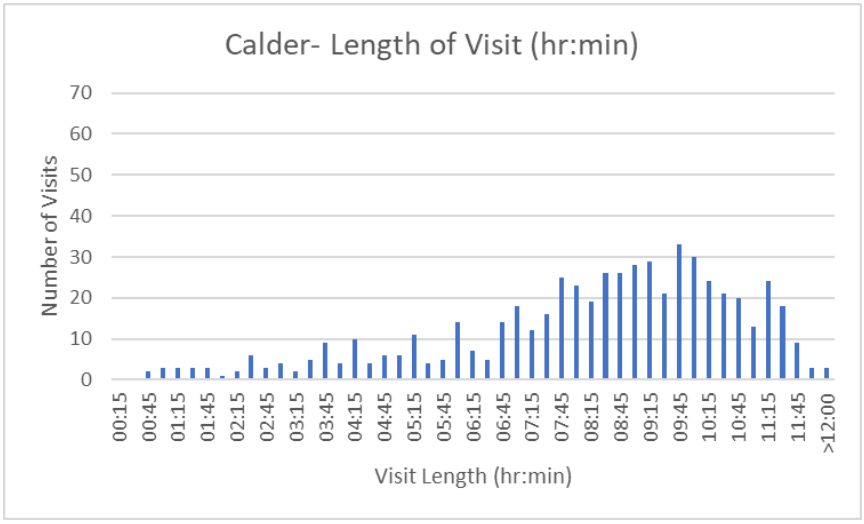
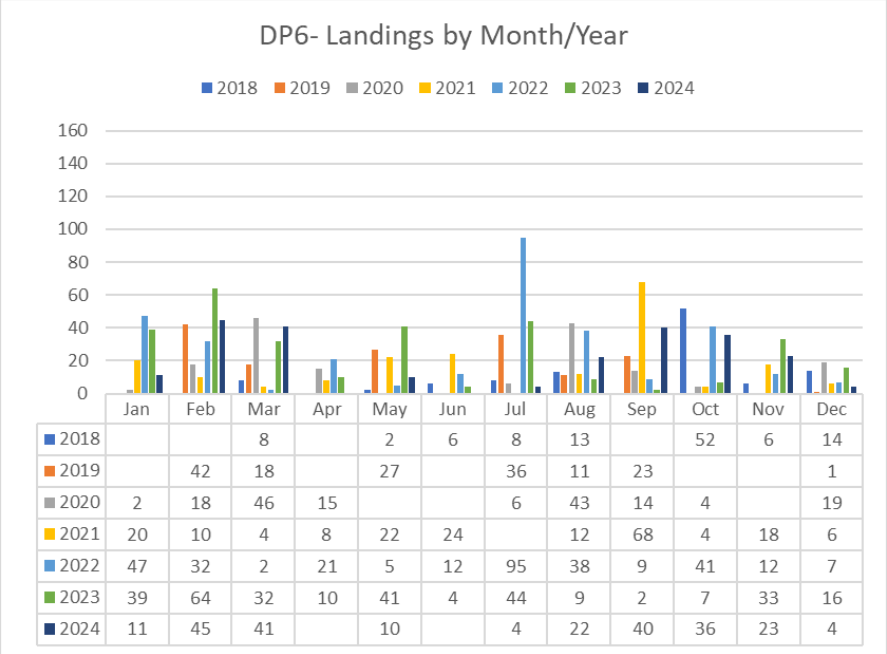


Figure 2.3 Length of Visits to the Calder Platform

2.3.3 DP6 Platform

26. The DP6 Platform is a NUI. The visits per month and year are shown in Figure 2.4. The length of visits is shown in Figure 2.5.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018			8		2	6	8	13		52	6	14
2019		42	18		27		36	11	23			1
2020	2	18	46	15			6	43	14	4		19
2021	20	10	4	8	22	24		12	68	4	18	6
2022	47	32	2	21	5	12	95	38	9	41	12	7
2023	39	64	32	10	41	4	44	9	2	7	33	16
2024	11	45	41		10		4	22	40	36	23	4

Figure 2.4 Landing on the DP6 Platform by Month and Year

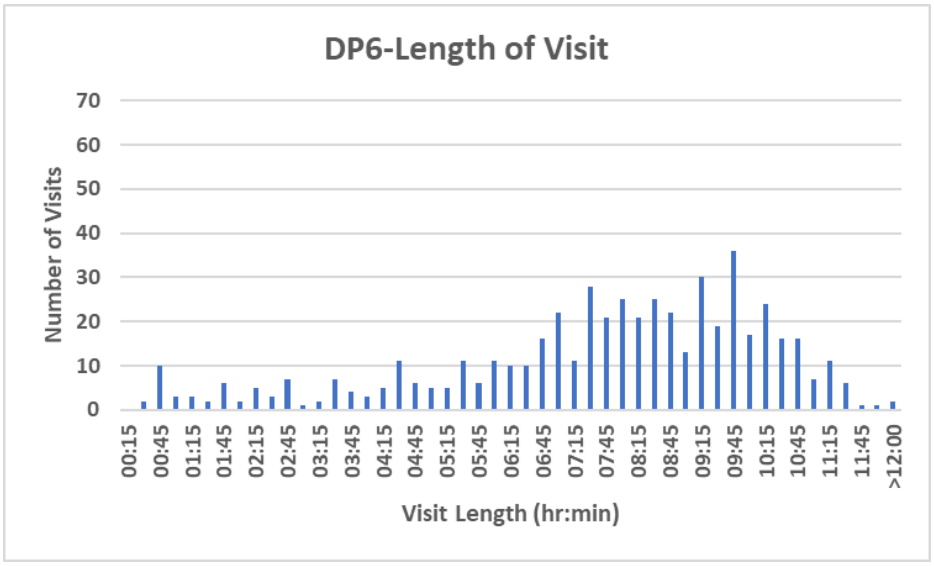
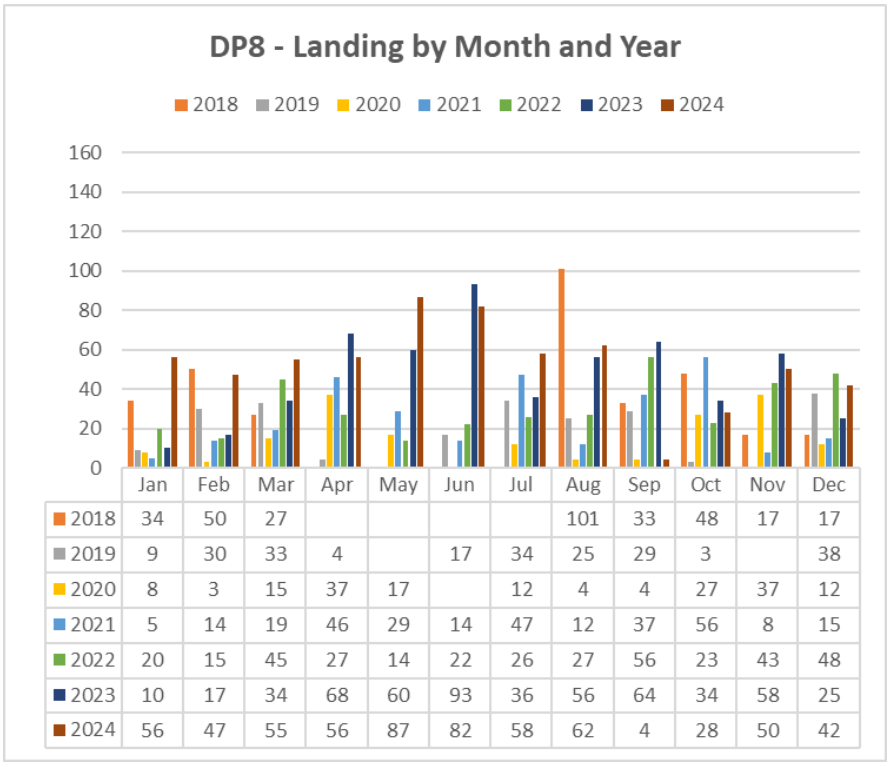


Figure 2.5 Length of Visits to the DP6 Platform

2.3.4 DP8 Platform

The DP 8 platform is a NUI. The visits per month and year are shown in Figure 2.6. The length of visits is shown in Figure 2.7.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	34	50	27					101	33	48	17	17
2019	9	30	33	4		17	34	25	29	3		38
2020	8	3	15	37	17		12	4	4	27	37	12
2021	5	14	19	46	29	14	47	12	37	56	8	15
2022	20	15	45	27	14	22	26	27	56	23	43	48
2023	10	17	34	68	60	93	36	56	64	34	58	25
2024	56	47	55	56	87	82	58	62	4	28	50	42

Figure 2.6 Landing on the DP8 Platform by Month and Year

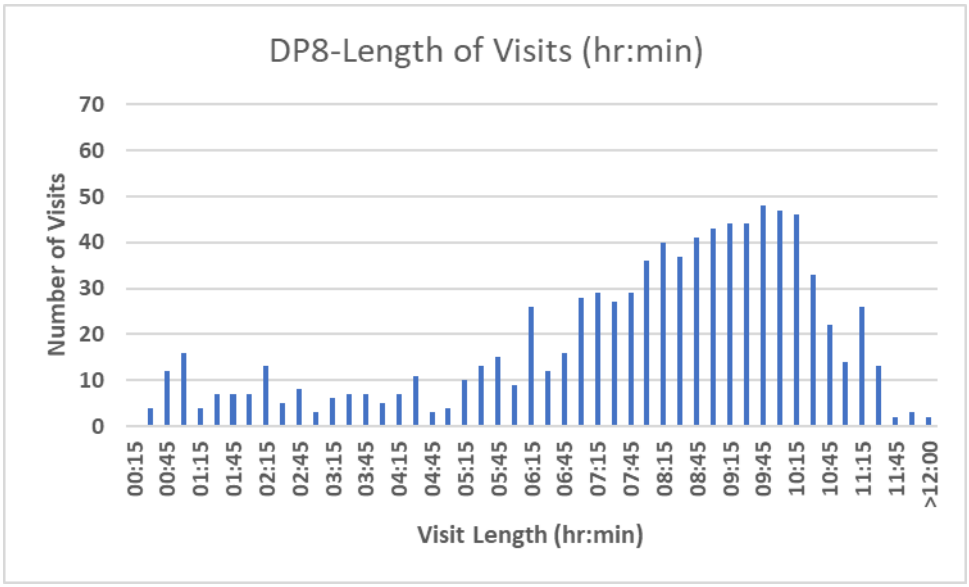
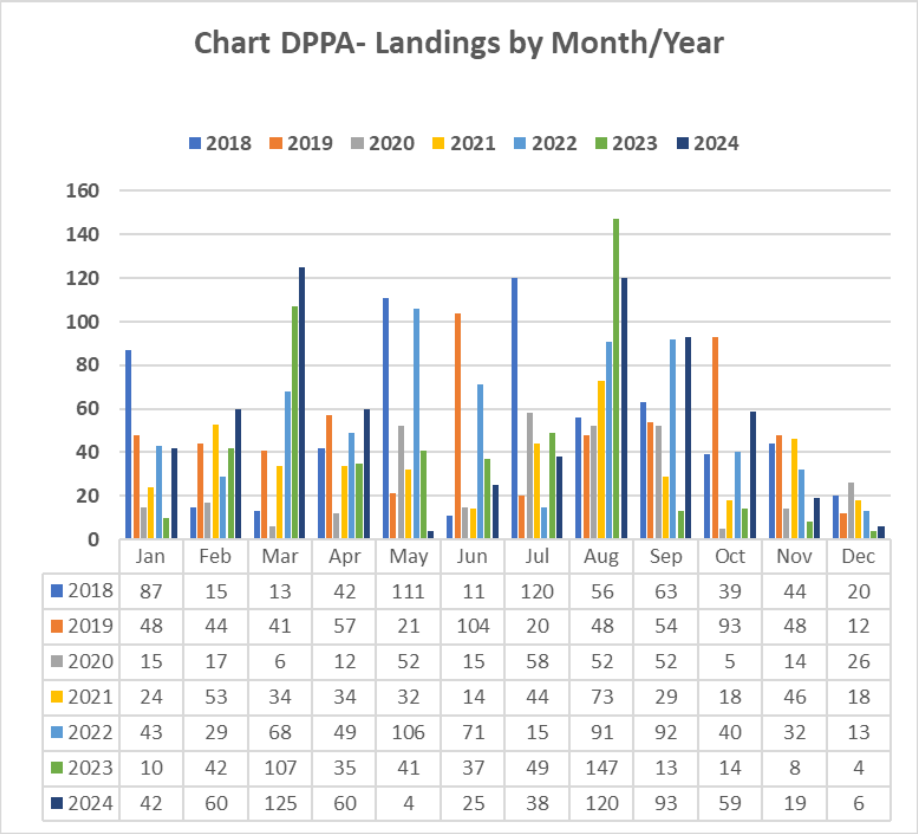


Figure 2.7 Length of Visits to the DP8 Platform

2.3.5 North Morecambe DPPA Platform

27. The North Morecambe - DPPA platform is a NUI. The visits per month and year are shown in Figure 2.8. The length of visits is shown in Figure 2.9.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	87	15	13	42	111	11	120	56	63	39	44	20
2019	48	44	41	57	21	104	20	48	54	93	48	12
2020	15	17	6	12	52	15	58	52	52	5	14	26
2021	24	53	34	34	32	14	44	73	29	18	46	18
2022	43	29	68	49	106	71	15	91	92	40	32	13
2023	10	42	107	35	41	37	49	147	13	14	8	4
2024	42	60	125	60	4	25	38	120	93	59	19	6

Figure 2.8 Landing on the DPPA Platform by Month and Year

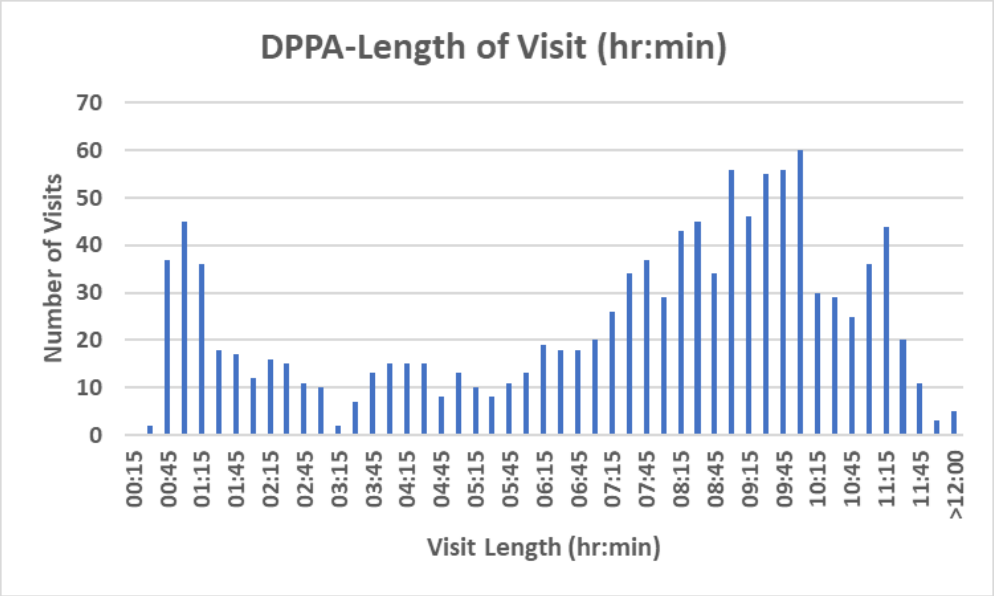


Figure 2.9 Length of Visits to the DPPA Platform

2.4 Discussion

28. The DNV Report, Effect of Proposed Morecambe Offshore Windfarm on Offshore Oil and Gas Operations (10530687-11), considers the operational and safety impacts of reduced helicopter access.

29. The Helicopter Access Study (APP-081) Appendix A used Spirit Energy's Vantage flight data and synchronized meteorological data from the South Morecambe Platform. Section A.1.1.1 shows that from 2019 until 2022 more than 93% of flights were conducted in day Visual Meteorological Conditions (VMC). 2018 had 85.8% of flights conducted in day VMC with a higher proportion of night flights (8.5%) compared to the following years (2.8% or lower). Between 2018 and 2022 between 4.9% and 2.5% of flights were conducted under day Instrument Meteorological Conditions (IMC). This methodology measures the historic impact on Spirit Energy's helicopter operations and demonstrates that regular access under day VMC will be sufficient to permit the number and frequency of flights historically flown between CPC-1 and the adjacent NUIs. In reality flights to NUIs are normally conducted in good weather as leaving staff stranded due to poor weather is undesirable, as most NUIs only have emergency overnight accommodation. So, although Spirit Energy can currently transfer personnel between the South Morecambe Platform and NUIs in IMC, in reality this is not common practice.

30. The data indicates that the true impact on access to the CPC-1 helideck will be low. Mitigations, such as the proposed south-westerly take-off corridor will permit a large proportion of the IMC flight to CPC-1 to take place, as demonstrated in the Applicant's REP2-032 and REP-033. By providing a day and night take-off corridor,

into the prevailing wind, will further improve helicopter access to the CPC-1 helideck.

3 Landing and Take-off Distances

3.1 Landing Distances

3.1.1 Day VMC

31. The AviateQ Report submitted by Spirit Energy (REP1-116) states that a day VMC approach requires an obstacle free radius of 1.9nm around a helideck. This is not supported by current helicopter operations, recent Development Consent Orders (DCOs) or regulations.

32. Other schemes have agreed a day VMC obstacle free radius of 1.26nm, or less, for example the Protective Provisions for the Waveney Platform in the Dudgeon and Sheringham Shoals Extension Project DCO. The Protective Provisions for the Waveney Platform are shown in Section 7. Paragraph 2 of the Protective Provisions requires:

    " "facilities proximity area" means an obstacle-free area comprising a cylinder with a horizontal radius of one point two six nautical miles (1.26nm) extending from the centre of the existing Waveney platform located within the Licence and extending vertically from mean sea level".

    Also included in section 7 are the Protective Provisions for the Johnston Wellheads, which require an obstacle free radius of 1,600m (0.86nm).

33. The distances have been agreed with helicopter operators during previous consultations, and take account of the HeliOffshore Approach Path Guidance, including stabilised approach criteria. The HeliOffshore Approach Path Guidance identifies a day VMC stabilisation point at 0.5nm from the landing point; this distance is also being incorporated into the updated CAA Civil Aviation Publication (CAP) 764, Policy and Guidelines on Wind Turbines, at paragraph 5.24.c. The VMC approach distance proposed by the Applicant takes account of this industry standard, and applies a stabilisation point at 0.5nm.

34. The Applicant's REP2-033 section 4.2.1 provides a full explanation why an obstacle free radius of 1.5nm around the South Morecambe Platform is safe for day VMC operations and complies with industry best practice. It is noted that the AviateQ Report (REP1-116) includes a distance of 1nm, in addition to the stabilisation point at 0.5nm and radius of turn to position into wind. The current CAP 764 was published in 2016. It is in the process of being updated to take account of industry best practice, such as applying a stabilised approach point 0.5nm before landing. The additional 1nm is not supported by the draft CAP 764 which states:

    "*When a helideck is within a windfarm there may be operational difficulties when manoeuvring for a stabilised approach. Obstacle clearance around a*

helideck within a windfarm should allow aircraft to achieve Final Approach Track (FAT) and 0.5 NM stabilised approach Visual Meteorological Conditions (VMC) gate. For operations in a Degraded Visual Environment (DVE) a second stabilised approach gate is introduced at 1 NM. Note: this is 1nm from the landing point and not an additional 1nm beyond the stabilisation point. DVE is determined to exist when visibility is below 4000m. The minimum visibility of 5000m gives a margin above DVE ensuring there is no requirement for the extended FAT."

35. The Applicant has applied day VMC limits of 5,000m visibility and a cloud base of 700ft, with these limits being higher than those defining a Degraded Visual Environment. So, the additional 1nm applied in the AviateQ Report is not consistent with current industry guidance, or the future CAA CAP 764. The Helicopter Access Report uses a conservative stabilisation distance of 0.75nm, i.e. 50% more than stated in industry guidance (HeliOffshore Flight Path Guidance document) and draft CAP 764. Applying a stabilised approach point at 0.75nm results in a day VMC approach distance of **1.26nm**.

3.1.2 Landing Distance Day IMC

36. An IMC approach by day or night will normally use an Airborne Radar Approach (ARA). An ARA will require an approach distance of 9nm with no obstacles within 1nm laterally of the approach track. The ARA profile is shown in REP-033 section 4.2.2.

37. The prevailing wind for IMC is a south westerly wind direction (REP-033 Figure 4.4). As approaches are normally flown into wind, the approach direction will be from the north east towards the south west. Figure 2.1 shows that an ARA into the prevailing wind is available for the South Morecambe, Noth Morecambe, DP6 and DP8 platforms.

3.1.3 Landing Distance Night VMC

38. Night approaches in VMC require a longer stabilisation distance, typically 2nm or more compared to the 0.5nm for day VMC. Although night VMC approaches and take-offs are permitted to infringe the 1nm buffer around the wind farm, applying the same 1nm lateral avoidance criteria to night VMC and IMC would be a reasonable worst-case assumption. The predominant wind direction for night approaches is from the south west and so any mitigation for day IMC flights will also be relevant for night VMC and IMC flights.

3.2 Take-off Distances

39. Aviation regulations adopt a prescriptive approach, with rigorous requirements. The Applicant's REP2 – 033 paragraph 4.3 identifies that one requirement is to take account of an engine failure occurring at a critical point in the take-off. The most

critical time is as the helicopter commences a transition into forward flight as it clears the helideck.

40. The Applicant's REP2-032 and REP2-033 show the take-off distances required under Day VMC and IMC, taking account of an engine failure on rotation from a helideck. A take-off following a single engine failure is known as a One Engine Inoperative (OEI) continued take-off. The AviateQ Report submitted by Spirit Energy (REP1-116) identifies their interpretation of the take-off distances required in VMC and IMC. The Applicant's Comments on Spirit Energy and Harbour Energy Aviation Access Study Report (REP2-031) identifies why the Applicant considers that Spirit Energy has overestimated the distances required. To aid the reader, the main areas of disagreement are stated below.

3.2.1 Helicopter Take-off Mass

41. The helicopter's take-off mass affects the take-off distance required, as the higher the mass the lower the rate of climb, and the consequent distance to reach a given height is therefore longer. Spirit Energy's assessment only takes account of the AW169 helicopter taking off at the maximum certified mass of 4,800kg.

42. The Applicant has requested payload data in order to verify the likely take-off mass of the helicopter and so authenticate the take-off distance required under normal conditions. The payload data is recorded in the Vantage POB system but has not been provided by Spirit Energy.

43. The normal flight schedule is for the helicopter to fly from Blackpool Airport to the South Morecambe (CPC-1) Platform before shuttling to NUIs or returning direct to Blackpool Airport. The flights between South Morecambe and Blackpool Airport will usually be crew change flights, rotating personnel working offshore. As the South Morecambe Platform has approximately 170 personnel onboard and they will typically work for two weeks offshore, then it is likely that the AW169 helicopter will have to carry 8 passengers outbound and inbound. As there is no offshore fuel available in the gas fields, departing Blackpool Airport with 8 passengers onboard will be the heaviest the helicopter will be for the whole flight. If the AW169 helicopter departs Blackpool Airport at the maximum of 4,800kg, by the time it has burned fuel to fly to CPC-1 and changed over the 8 passengers on the helideck, it will be at a mass of 4,650kg or lower. Every subsequent landing and take-off will then be at a lower mass as fuel will continue to be burned.

44. Spirit Energy has assumed the AW169 helicopter will always take-off at 4,800kg. This is not a reasonable worst-case assumption as it takes no account of the flight schedules and fuel burned during their operations. If Spirit Energy could provide Vantage payload data then this point of disagreement could be resolved.

3.2.2 Drag Penalties

45. Form drag caused by the AW169 helicopter's landing gear and externally mounted life rafts will reduce the OEI rate of climb and hence require a greater take-off distance. The Spirit Energy assessment takes account of additional drag caused by the landing gear being lowered during the initial phase (Flightpath 1) of the take-off. The AW169 Rotorcraft Flight Manual has already taken account of the drag as the landing gear is not raised until later in the take-off profile, at Flightpath 2. This results in a slight overestimation of the lateral distance required during Flightpath 1.

46. The Applicant agrees with the other Form Drag penalties applied and has taken those into account when calculating the OEI take-off distances required.

3.2.3 Climb to 500ft VMC

47. As has been agreed with the helicopter operators on other projects, in VMC sufficient distance has to be available to climb to 500ft above sea level before commencing a turn away from the wind farm. During offshore operations, all vertical distances are referenced against the datum of Sea Level, i.e. altitude. The Spirit Energy assessment applies a climb to 500ft above the helideck height, which is higher. Climbing to 500ft above helideck height has a number of implications:

    - a climb to 500ft above helideck height will result in a different OEI take-off distance depending on the helideck height. In the case of the South Morecambe Platform this will require a climb to 684 ft for the CPC-1 helideck (500ft + height of the helideck, 184ft) whilst a take-off from the DP-1 helideck, at the other end of the South Morecambe platform, will only require a climb to 594ft (500ft + height of the helideck, 94ft).
    - as the current day VMC limits permit a cloud base as low as 600ft above sea level, a climb from CPC-1 to 684ft would result in a climb into IMC. Even applying the proposed CAA rule change of a minimum cloud base of 700ft would result in the helicopter climbing within 100ft of the cloud base and so being IMC. The Spirit Energy Report 4.3 c) states: "when remaining clear of cloud and in sight of the surface in accordance with VFR requirements, the minimum vertical distance between the helicopter and the cloud base has been set to 100ft".

48. For consistency with other projects, and in accordance with standard practice, all heights used in the report should be above sea level and not above helideck height. The Applicant's calculations use a climb to 500ft above sea level, and so is consistent with consented projects, such as the Dudgeon and Sheringham Shoals Extension

3.2.4 DCO. Climb to 1,000ft IMC

49. For an IMC take-off a climb to 1,000ft above sea level should be made before commencing a turn away from the wind farm. The additional height is required as the pilot workload in IMC, especially following an engine failure, is higher than in

VMC and so additional time is required to fly the aircraft and complete the aircraft checks.

50. As with VMC, the Spirit Energy assessment applies a climb to 1,000ft above helideck height (1,184ft for the CPC-1 helideck), rather than 1,000 ft above sea level. This results in a different take-off distance required for each helideck in the area, as they all have different helideck heights above sea level. The Hornsea Project Three Wind Farm Written Submissions included Appendix 4 to Spirit Energy Position Statement for ISH 8. On slide 23 of the Spirit Energy submission it can be clearly seen that the OEI profile shows a climb to 1,000 ft above sea level[1], which is consistent with industry practice.

51. For consistency with other projects, and in accordance with standard practice, all heights used in the report should be above sea level and not above individual helideck height. The Applicant's take-off distance calculations utilise a climb to 1,000ft above sea level before a turn is commenced, as is standard practice.

3.2.5 Summary

52. By only considering the AW169's maximum take-off mass of 4,800kg, the Spirit Energy assessment does not apply a reasonable worst-case assessment but an absolute worst-case, which is unlikely to occur in practice. The Applicant has considered a range of more realistic values of take-off mass, resulting in a shorter OEI take-off distance required. At a more representative take-of mass of 4,600kg, the resulting take-off distance would be 3.01 nm, rather than 3.9nm stated by Spirit Energy. It would be helpful if Spirit Energy could provide Vantage POB payload data to resolve this issue.

53. The Spirit Energy assessment applies a climb requirement, and consequent OEI take-off distance required, which varies depending on the helideck height. For consistency with other projects, and in accordance with standard practice, all heights used in the report should be above sea level and not above individual helideck height. For the OEI VMC take-off distance the climb should be to 500ft above sea level before a turn is commenced; for the OEI IMC take-off distance the climb should be to 1,000ft above sea level before the turn is commenced.

54. There are other minor differences in the calculation of the take-off distances required.

[1] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-001827-Brodies%20LLP%20on%20behalf%20of%20Spirit%20Energy-%20Appendix%204%20-%20Aviation%20Slides.pdf

3.2.6 Summary of Take-off Distance Calculations

55. The Spirit Energy (REP1-116) and Applicant's (REP2-033) take-off distances are repeated below.

3.2.6.1 Applicant's Take-off Distances Day VMC

56. The OEI distance required to climb to 500ft above sea level and then make a Rate 1 turn through 90° (VMC Case) is presented in Table 3.1 for an air pressure of 1013 hPa and air temperature of 15°C, and for various take-off mass and windspeed cases.

Table 3.1 Applicant Take-Off Distances Day VMC

Take-off Mass (kg)	Distance (nm) 10kt Factored Windspeed	Distance (nm) 15kt Factored Windspeed
4400	1.21	1.14
4600	1.29	1.21
4800	1.38	1.28

3.2.6.2 Spirit Energy Take-off Distance Day VMC

57. In REP1-116 Spirit Energy has identified a single day VMC take-off distance of 1.9nm. The Spirit Energy calculations use a take-off mass of 4,800kg, 1013 hPa, 15°C and a wind speed of 15kt. N.B. the climb is calculated on the basis of climbing to 500ft above helideck heigh, rather than sea level.

3.2.6.3 Applicant's Take-off Distance IMC

58. The OEI distance required to climb to 1000ft above sea level and then make a Rate 1 turn through 90° maintaining 1nm clear of obstacles (IMC Case) is presented in Table 3.2 for an air pressure of 1013 hPa and air temperature of 15°C, and for various take-off mass and windspeed cases.

Table 3.2 Applicant Take-Off Distances IMC

Take-off Mass (kg)	Distance (nm) -10kt Factored Windspeed	Distance (nm) - 15kt Factored Windspeed
4400	2.82	2.73
4600	3.02	3.01
4800	3.26	3.26

3.2.6.4 Spirit Energy's Take-off Distance IMC

59. In REP1-116 Spirit Energy has identified a single IMC take-off distance of 3.9nm. The Spirit Energy calculations use a take-off mass of 4,800kg, 1013 hPa, 15°C and a wind speed of 15kt. N.B. the climb is calculated on the basis of climbing to 1,000ft above helideck heigh, rather than sea level.

4 CAA Rule Change and Acceptable Means of Compliance

60. The Applicant agrees that it is probable that the CAA will update the current Special Approval for Helicopter Offshore Operations (SPA HOFO) to place restrictions on take-off and landings within 3nm of an offshore wind farm. It is anticipated that the change will restrict landings within 3nm of a wind turbine to day VMC, with concomitant increases in the VMC cloud base and visibility limits. This change will be at the level of Acceptable Means of Compliance (AMC).

61. AMCs are non-binding standards to illustrate means to establish compliance with the Basic Regulations and its Implementing Rules. AMC adopted by the CAA are means by which the requirements in the UK Regulation (EU) 2018/1139 (UK Basic Regulation) and it's Implementing Rules can be met. For example, AMC1 SPA.HOFO. 125 covers airborne radar approaches to offshore locations. An AMC cannot create additional obligations on the regulated persons, who may decide to show compliance with the applicable requirements using other means. Since AMCs are non-binding, regulated persons may choose alternative means to comply with the rule. In this case, however, they lose the presumption of compliance provided by the CAA AMC and need to demonstrate to competent authorities that they do comply with the law.

62. Since requirements can be met by other means, regulated persons and organisations may apply for permission to use alternative procedures to comply with the law by the use of Alternative Means of Compliance (AltMoC). For the CAA to accept an AltMoC the helicopter operator will need to demonstrate that the alternative approach nonetheless maintains compliance with the law. Applicants may also apply for AltMoCs as a means to establish compliance with the UK Basic Regulation and its Implementing Rules for which no associated AMC has been adopted. Where regulated persons or organisations wish to utilise their own alternative means of compliance, they must first obtain the approval of the CAA.

4.1 AltMoC Process

63. Following the issue of the revised AMC, a helicopter operator flying to helidecks within 3nm of a wind farm could apply for an AltMoC.

64. The AltMoC would need to demonstrate compliance with the Basic Regulation and its Implementing Rules, these will remain unchanged from those currently applying to offshore flights. As the revised AMC will not place any additional obligations on the helicopter operator, the AltMoC will need to demonstrate that any operations in IMC or at night will have an equivalent level of safety with current operations.

65. As part of the AltMoC process, the helicopter operator would be expected to conduct a Risk Assessment and then identify any mitigations required. One of the authors was responsible for obtained the CAA approval for continued Night and IMC operations to the Beatrice Alpha Platform, post two 500ft high wind turbines being

installed 0.75nm from the helideck: see paragraph 4.2. Based on his experience, the following areas for mitigation would be considered during an AltMoc Application:

- identify departure and take-off arcs for day VMC, night VMC and IMC approach and departures to all affected helidecks, including CPC-1;
- use of the take-off corridor and how to ensure it remained clear of obstacles, such as supply vessels and wind farm construction traffic;
- identify any additional meteorological limits for the operation, such as minimum or maximum wind speeds.
- identify any additional crew training requirements;
- identify any restrictions on aircraft mass;
- conduct a risk assessment. Quantitative risk data for an ARA is available in CAA Report 2010/01 Table 4.11 *et seq*[2];
- identify any additional mitigations required to maintain an equivalent level of safety to the current operation.

4.2 Example AltMoC

66. Civil Aviation Publication 1721 lists current AltMoCs. There are currently no AltMoCs for SPA HOFO as operators have not requested any. However, there are AltMoCs for helicopter operations and training, such as how to conduct flight training in simulators in lieu of in-flight training (AltMOC ORO.FC.230(b)(1)(ii) Operator Proficiency Checks) and the use of single piston engine helicopters over terrain without an assured safe landing capability (AltMOC CAT.POL.H.305(b)).

67. Prior to the AltMoC process, the CAA approved a helicopter operator to conduct day, night and IMC approaches and take-offs from the Beatrice Alpha Platform, which had two 500ft wind turbines located 0.75nm away. The helicopter operator identified take-off and landing arcs for day VMC, night VMC and IMC. The arcs, and associated procedures, were recorded in the operator's Operations Manual, which is a CAA approved document. Production ceased at the Beatrice Alpha Platform in 2015, with plug and abandonment work planned to take place between 2022 and 2026, based on the decommissioning programme. Therefore, this approval is no longer required.

[2] https://www.caa.co.uk/publication/download/13926

Figure 4.1 Photograph of Beatrice Alpha Platform with Adjacent Wind Turbines

68. Aviation regulations adopt a prescriptive approach, which frequently lag advances in technology or operational procedures. However, to prevent innovation being stifled, variations from the regulations are permitted where an equivalent or better level of safety can be demonstrated. An AltMoc is an instance of this approach to permit innovation whilst maintaining an acceptable level of safety. An example is the AW169 helicopter used by IPs in the Morecambe Bay gas fields. The AW169's Type Certificate Data Sheet shows that six Special Conditions were applied during certification and 11 Equivalent Safety Findings were applied. A Special Condition is applied when the certifying authority finds that the airworthiness regulations for an aircraft or aircraft engine do not contain adequate or appropriate safety standards, because of a novel or unusual design feature. An Equivalent Safety Finding is another way to meet the certification requirements, usually through an AltMoc. In summary, applying an AltMoc for approaches in IMC to CPC-1 post any CAA rule change is consistent with aviation practice, aimed at maintaining safety levels whilst providing flexibility.

4.3 Feasibility of Obtaining an AltMoc

69. As a change to any AMC cannot impose additional requirements on an operator (see paragraph 60 above), then identifying safe approach and departure arcs compliant with the Basic Regulations and Implementing Rules will meet the requirements of an AltMoc. The principal difference between current and future operations will be a reduction in the size of the take-off arc, from currently having no restricted take-off directions, to take-offs only being permitted over a 130° arc. The 130° arc from 220° clockwise to 090° is identified in REP2-032 Section 3. As the 130° arc will comply with all the required lateral and vertical avoidance criteria, and take account of OEI

conditions, it will be fully compliant with the Basic Regulations and their Implementing Rules.

70. Based on precedent and professional experience, it is considered that obtaining an AltMoc for continued IMC and Night VMC approaches and take-offs from helidecks adjacent to the Morecambe Wind Farm is feasible.

5 Comparison of Helicopter Access Assessment Methodology

71. Spirit Energy identifies a number of concerns regarding the siting of the Morecambe Wind Farm in their RR-077. Differences between the Spirit Energy calculations of the approach and take-off distances and those calculated by the Applicant are presented in Section 3 of this document. Differences also exist in how the impact of meteorological conditions have been determined. The Examining Authority's (ExA) 1st Set of Written Questions I CAR17 requested Spirit Energy to expand and explain their concerns regarding routing changes. To assist the ExA, the Applicant will identify their position and how helicopter operations will be impacted in the future.

72. The Vantage data provided by Spirit Energy only shows the actual times of the flights, no information was available on when they were actually scheduled. It is probable that a high proportion of the flights departed later than their scheduled time, due to weather conditions or for logistical reasons. Offshore flight schedules are flexible and respond to changing weather, aircraft serviceability and logistical requirements. The Spirit Energy assessment of the impact (RR-077 Appendix D) breaks down the impact into two categories, delayed flights and cancelled flights. Delayed flights are normal in offshore operations, indeed the flight times shown in Vantage might already have been delayed due to various factors. The DNV Report ((10530687-11) identifies the implications of delayed flights shortening the available intervention times on NUIs. The Applicants APP-081 Appendix A provides an assessment of cancelled flights, using Vantage and meteorological data provided by Spirit Energy. A high-level comparison of cancelled flights calculated by both parties is shown in Table 5.1. When seasonal effects are removed, the impact of cancelled flights is a similar. Seasonal effects are important with night access being a factor during the winter months, but APP-081 Appendix A Tables A.3 and A.4 show that the percentage of night flights has reduced from a peak of 9.2% in 2018 to 2.8% in 2022(combined night VMC and night IMC). If Spirit Energy could provide meteorological data for 2023 and 2024, then it could be confirmed if the reduced number of night VMC and IMC flights has been sustained.

Table 5.1: Comparison of Cancelled Flights – Spirit Energy: Applicant

	Spirit Energy	Applicant
Reference	RR-077 Appendix D Slide 23	APP-081 Appendix A Tables A1-A4
% Cancelled Flights CPC-1	9.0%	7.8%

73. Spirit Energy's RR-077 Appendix D provides an outline of the methodology used to calculate the impact on flight schedules. The Applicant's Helicopter Access Study APP-081 Appendix A provides an equivalent assessment. The two assessment methodologies differ in the following areas.

5.1 Scope of the CAA Rule Change.

74. In APP-081 Appendix A, the Applicant applies the meteorological conditions to the time of landing and take-off, shown in the Vantage data, from helidecks within 3nm of the wind farm. The transit to and from Blackpool Airport is unaffected by the proposed CAA changes. In RR-077 Appendix D slide 12, Spirit Energy appears to apply the proposed CAA change to all the phases of a flight. For example, in their RR-077 Appendix D slide 20, they assess "*flights that were airborne during night conditions which would no longer be allowed, therefore being delayed or cancelled".* The restrictions (without an AltMoc) would only apply within 3nm of the wind farm, and not to the complete flight, so the Spirit Energy criterion can be regarded as overly conservative.

5.2 Flight Schedules

75. As shown in Section 2.3 of this report, the shift periods on NUIs vary between 45 minutes and in excess of 11 hours. The Spirit Energy assessment appears to require the complete period of a shift pattern, from the initial take-off from Blackpool Airport until the final landing back at Blackpool Airport to remain day VMC, to be considered an unaffected flight. Spirit Energy's RR-077 Appendix D slide 13 appears to show flights being determined as "cancelled", even though there are sufficient periods of day VMC to transport personnel to and from NUIs, albeit with short periods of IMC throughout the day.

76. In reality the meteorological conditions will vary throughout a day and flights will be sequenced accordingly. Due to the proximity of Blackpool Airport to the offshore installations, circa 10 minutes flying time, more flexibility is possible than with installations based further offshore.

77. The Applicant's APP-081 Appendix A Tables A1 – A3 demonstrates that flights to and from CPC-1 are conducted predominantly under day VMC. The proportion of day IMC flights is lower than 5%. Apart from 2018, the percentage of night VMC flights annually is 2.8% or lower. Only 31 night IMC landings were made on CPC-1 between 2018 and 2022, out of a total of 10,022 landings. It is accepted that restrictions on night flights will have a larger impact during the winter months. The proportion of night flights to CPC-1 appears to have reduced in recent years, although this is variable. For example, 7 out of 83 (8.4%) flights were at night in January 2021 and 4 out of 148 (2.7%) were at night in 2022. As CPC-1 is the hub for flights to NUIs, a similar pattern will also apply to those NUIs.

5.2.1 Compounded Flights

78. In RR-077 Appendix D slide 17 the Spirit Energy assessment discusses the compounding effect if one flight is delayed or cancelled. It is agreed that both an inbound and return flight must occur to deliver and then collect a working party from a NUI. However, by taking an overly pessimistic case and not allowing for the

flexibility of helicopter operations, the Spirit Energy assessment has overestimated the impact on helicopter operations. As the impact on individual flights is overestimated, then the compound effect is also overestimated. In reality, a delayed flight, or flight brought forward, will result in a shortened shift pattern. The DNV Report comments on the operational implications for NUIs.

79. In APP-081, the Applicant believes that it has made a reasonable worst-case assessment of the impact of the Morecambe Wind Farm on helicopter operations to adjacent helidecks. This assessment has taken account of the inherent flexibility of helicopter operations and the historic flight schedules in the area. The Spirit Energy assessment does not appear to apply any flexibility to their operations or the required shift periods on NUIs.

80. As shown in Table 5.1, the total percentage of cancelled flights calculated by both parties is similar, with Spirit Energy stating a figure of 9.0% and the Applicant 7.8%. Differences exist how the impact on night flights has been calculated, with the Applicant taking account of flights within 3nm of the wind farm, whilst Spirit Energy has considered the impact on the whole flight.

6 Example Protective Provisions

The Protective Provisions for the Waveney Platform, adjacent to the Dudgeon Extension Wind Farm and for the Johnston Wellheads, located inside the Hornsea Four Project, are shown below. These show obstacle free distances around installations which have been consented for previous projects. The Waveney is NUI visited on a regular basis. The Johnston Wellheads will require a jack-up rig to work over them for maintenance work or to decommission the assets. To aid the reader, the relevant distances are shown in bold.

6.1 Protective Provisions for the Waveney Platform

PART 14

For the protection of Perenco North Sea Limited

Application

1. For the protection of Licensee the following provisions have effect, unless otherwise agreed in writing between the undertaker and Licensee.

Interpretation

2. In this Part of this Schedule— **"facilities proximity area" means an obstacle-free area comprising a cylinder with a horizontal radius of one point two six nautical miles (1.26nm) extending from the centre of the existing Waveney platform located within the Licence and extending vertically from mean sea level**;

   "Licence" means United Kingdom Petroleum Production Licence P.780 Block 48/17c;

   "Licensee" means the licensee from time to time of the Licence, who at the date hereof is Perenco;
   "line of sight" the line of sight communications link from the existing Waveney platform located within the Licence to/from any other installation and/or to/from any onshore control room together with any associated infrastructure, equipment, software, systems, circuits, channels and licenses;
   "Perenco" means Perenco North Sea Limited (company number SC293676) registered at C/O Dwf Llp, 2 Semple Street, Edinburgh, Scotland, EH3 8BL;
   "pipeline" means the 8-inch (8") diameter gas pipeline with pipeline reference number PL- 2555 connecting the Durango well to the Waveney platform located within the Licence, together with any associated umbilicals, plant and equipment serving that pipeline;
   "pipeline proximity area" means the area five hundred (500) metres either side and directly above the pipeline; and

"specified works" means any works comprised within the authorised development, including temporary surface infrastructure, which are:
(a) within the pipeline proximity area;
(b) relate to any part of the authorised development;
and (c) which would or may in any way adversely affect the pipeline or Licensee's access to the pipeline, but excluding works for the construction of wind turbine generators or offshore substation platforms.

Works affecting the facilities

3.—(1) The undertaker must not construct, or carry out any works to install any wind turbine generators or offshore substation platforms within the pipeline proximity area or within the facilities proximity area or to adversely affect the line of sight.
(2) No specified works are to be commenced until the undertaker and the Licensee have entered into a pipeline proximity agreement substantially in the form published by Offshore Energies UK (October 2015 edition).

Cooperation

3. The undertaker and the Licensee must each act in good faith and use reasonable endeavours to cooperate with, and provide assistance to, each other as may be required to give effect to the provisions of this Schedule.

6.2 Protective Provisions for the Johnston Wellheads

PART 11 FOR THE PROTECTION OF HARBOUR ENERGY LIMITED, PERENCO UK LIMITED, PREMIER OIL E&P UK EU LIMITED, DANA PETROLEUM (E&P) LIMITED AND DANA PETROLEUM LIMITED

Application

1. For the protection of the licensee from time to time of United Kingdom Petroleum Production Licences P686 and P380, unless otherwise agreed in writing between the undertaker and the licensee the provisions of this Part of this Schedule shall have effect for so long as the licence shall remain in full force and effect.

Interpretation

2. In this Part of this Schedule—
"additional costs" means any costs incurred by the licensee in carrying out decommissioning of the Johnston Assets which would not have been incurred had such decommissioning works been carried out prior to commencement of the undertaker's works, and relating to any of the following:

(a) the direct cost of any rig brought into the marine corridor for the purposes of undertaking decommissioning of the six producer wells comprised in the Johnston Assets, to the extent such cost is directly related to the rig being required for a longer period as a direct result of the presence of the undertaker's works. For the avoidance of doubt the direct cost of any rig excludes any and all ancillary cost associated with the use of the rig;

(b) impaired helicopter operations during the period from the commencement of the licensee's works to the completion of the licensee's works, to the extent such operations can be reasonably demonstrated to have been necessary, to have resulted in abandonment of a planned flight and resulted in a subsequent delay to operational activity related to the Johnston Assets;

(c) only to the extent not included in the calculation of costs under sub-paragraphs (a) or (b). any use of vessels in substitution for impaired helicopter flights subject to the use of vessels being approved in advance by the undertaker; but in each case only to the extent that:
(i) such costs have been reasonably and properly incurred by the licensee as a direct result of the presence of the undertaker's works;
(ii) the licensee provides evidence of costs incurred in a form and manner to the reasonable satisfaction of the undertaker;
(iii) the licensee and each relevant contractor, sub-contractor or agent have at all times used best endeavours to minimise and mitigate the costs; and
(iv) such costs were not incurred directly or indirectly in the decommissioning of the exploration well comprised in the Johnston Assets.

"aviation corridor" means an 1400m [0.76nm] **aviation corridor of clear airspace measured tip to tip from any wind turbine generator shown coloured blue and annotated and shown as the aviation corridor (along the route of the Johnston pipeline) on the Johnston protective provisions plan;**

"block" means a block of the United Kingdom Continental Shelf designated as such on the map deposited at the principal office of the North Sea Transition Authority;

"coexistence and proximity agreement" means an agreement entered on reasonable terms between the undertaker and the licensee in respect of the undertaker's works and licensee's works to reconcile and protect the interests of the parties as are known at the time to secure the implementation of the undertaker's works and the licensee's works;

"licences" means United Kingdom Petroleum Production Licences P686 block 43/27a and P380 block 43/26a;

"licensee" means the licensee from time to time of the licence; "licensee's works" means the decommissioning of the Johnston Field in accordance with the Johnston Decommissioning Programme (Rev B01, March 2022) as approved by the Offshore Petroleum Regulator for Environment and Decommissioning and as amended from time to time, but excluding any post-decommissioning monitoring and evaluation;

"marine corridor" means a 1000m corridor measured from centre to centre from any wind turbine generator (along the route of the Johnston pipeline);

"ministerial statement" means the written statement given by the Secretary of State for Energy and Climate Change to the UK Parliament regarding Crown Estate Leases for Offshore Renewables Projects on 12 July 2011, or any similar supplementary or replacement policy;

"Johnston Assets" means any and all facilities and infrastructure owned, operated, leased and/or otherwise contracted to the licensee from time to time for the purposes of the licences including but not limited to one exploration well, six producer wells, four pipelines and 15 umbilicals located in the Johnston Field;

"Johnston Field" means the area to which the licensee's rights granted by the licences relate, being at the date hereof, that area shown on the Johnston protective provisions plan;

"the Johnston protective provisions plan" means the plan entitled Johnston protective provisions plan (Harbour) and certified as the Johnston protective provisions plan for the purposes of this Part of this Schedule;

"OPRED notice" means a letter or notice from the Offshore Petroleum Regulator for Environment and Decommissioning ("OPRED") confirming the acceptance of the close-out report submitted by or on behalf of the relevant licensee indicating that OPRED is satisfied that the permanent decommissioning of the Johnston Assets has been completed;

"relevant activities" means all development activity relating to the carrying on of the undertaker's and licensee's businesses within, or adjacent to the aviation corridor or a WTG exclusion zone, including (but not limited to) the preparation of development proposals, the submission of applications for statutory consents associated with those proposals and consultation in respect thereof, the acquisition of or application for new licence oil or gas blocks;

"undertaker's works" means the offshore works permitted by this Order;

"WTG exclusion zone" means an area of 1,600m [0.86nm] **radius of clear airspace measured from the centre of each of the Johnston production wellheads and coloured yellow and annotated and shown as a WTG exclusion zone on the Johnston protective provisions plan.**

Restriction on authorised development

3. Prior to the completion of the licensee's works, no wind turbine generator shall be erected in the marine corridor, the aviation corridor, or in any WTG exclusion zone, unless otherwise agreed in writing between the licensee and the undertaker.

4. In the event the licensee's works commence prior to the undertaker's works, the undertaker must not build, construct, erect or lay any temporary infrastructure and/or carry out any activities within the marine corridor, the aviation corridor, or in any WTG exclusion zone that would interfere with the licensee's works causing a delay. Coexistence and proximity agreement

5. If, at any time the undertaker plans to undertake the undertaker's works and/or any other work which is within five hundred metres (500m) of the Johnston Assets, the undertaker shall notify the licensee and the undertaker and the licensee must, unless agreed otherwise, acting reasonably, agree and enter into a crossing and proximity agreement as soon as reasonably practicable. Provision of information

6. Without prejudice to any other rights or obligations under this Part of this Schedule the licensee and the undertaker shall from time to time keep each other informed of relevant activities such that the licensee and the undertaker may seek to agree solutions to allow those activities to successfully co-exist as far as reasonably practicable until completion of activities required under any statutory decommissioning plan required under the Petroleum Act 1998 in relation to the licence and taking place within the areas subject to the licence. Compensation

7. Subject to paragraph 8, the undertaker shall pay any additional costs to the licensee within three months of receipt of the OPRED notice.

8. Nothing in this Part of this Schedule shall affect any rights or obligations or assessment of compensation in accordance with the ministerial statement and the associated guidance