Sheringham and Dudgeon (Windfarm) Extension Projects

Perenco UK Limited Summary of Oral Submission at ISH6

1.0 Introduction

At ISH6 Perenco representatives answered specific questions posed by the Examiners relating to the impact of the Applicant's proposal to be able to place turbines within the Site to within a 1nm radius around the Waveney Platform. In order to fully address these questions, it is necessary (i) to clarify the current position with respect to helicopter operations and (ii) to understand the space requirements within which Perenco's helicopter operator is obliged to work. This written summary seeks succinctly to address each of these two areas.

2.0 Current Helicopter Operations

The Waveney platform is a normally unattended installation (NUI). It has a helideck that is currently only certified for flights during daylight hours. From time to time, typically for periods of 1 to 2 months and for around 3 months during decommissioning, a drilling rig will be stationed over the field to undertake work on the Waveney wells. The rigs utilised would have a helideck certified for day and night flights. In practice, Norwich airport is normally operational from 06:00 to 21:30. Taking into account a flying time from Norwich of about 30 minutes, flights can arrive at and depart from the field between 06:30 and 21:00.

2.1 Waveney Platform

As the Waveney platform does not have accommodation facilities other than for emergency use, for work to be undertaken at the Waveney platform two flights for normal maintenance operations (i.e. excluding "rotors running" production restart visits) are required within the same day with sufficient time between the flights to enable work to be undertaken. If the forecast indicates that a second flight is unlikely to be possible, the first flight will not be undertaken. Based on operational experience to date, such work only occurs approximately weekly. Both flights need to occur within daylight hours. Flights are possible as long as the minimum conditions for daylight operations under Instrument Flight Rules (IFR) are met.

2.2 Rig at the Waveney Field

A rig has accommodation for personnel. Rigs are currently brought alongside the Waveney platform for a significant maintenance campaign and, in the future, will be used to support decommissioning operations. During rig operations, two flights per day are typically required, however these flights are independent of one another so an inability to make one of the flights will not impact the other. Flights are possible whenever the minimum conditions for day or night operations under Instrument Flight Rules are met.

3.0 Space Requirements

3.1 Background

Safe flight operations rely on processes driven by a mixture of regulation, safety recommendations arising from occurrence investigations, and risk assessment; the latter two elements themselves being required by regulation.

Two sets of regulatory frameworks apply to offshore helicopter operations, UK Aviation Law (primarily UK Reg (EU) No. 965/2012 (Air Operations) and UK Reg (EU) No. 923/2012 (UK Standardised Rules of the Air), and The Health and Safety At Work Act 1974, except for those elements amended by the Civil Aviation (Working Time) Regulations (CAWTR). The HSE has delegated enforcement in air operations to the CAA through a memorandum of understanding, last updated in 2017. Therefore, responsibilities in terms of risk exposure, and reduction of risk to "As low as reasonably practicable" whilst not required by aviation regulation, do apply to aviation operations through The Health and Safety At Work Act 1974.

3.2 Commercial Air Transport to Offshore Installations

Commercial operators are required to hold an Air Operator's Certificate issued by the CAA in compliance with Part CAT (Commercial Air Transport) and a specific approval for offshore compliant with Part SPA:HOFO (Specific Approval: Helicopter Offshore Operations).

3.3 Obstacle Avoidance

The Standardised Rules of the Air require aircraft to avoid an obstacle by a minimum of 500 feet (150m) laterally or vertically when operating visually. Where the destination is the offshore installation, the windfarm is treated as an obstruction. for a turbine with a rotor of radius 150m that means avoiding the base of the structure by 300m (1000 ft / 0.17nm) laterally. In instrument conditions or for overflight as CAT we would operate with a defined minimum safe altitude 1000ft above the height of the obstacle rounded up to the nearest 100 feet; in the case of a 330m high turbine, the minimum safe altitude would be 2100 ft.

3.4 **Operational Approvals**

The CAA has many expectations defined in the rules, guidance, and internal approval materials before a HOFO approval is granted and when a HOFO operator is audited.

First and foremost, as commercial air transport, the safety levels are expected to be the same as any commercial flight operating from any airport, an offshore flight should be as safe as an airline flight out of Heathrow. This has demonstrably not been the case in the past and the CAA has applied restrictions and expectation in terms of: law; guidance material; approvals; and best practice.

3.5 Airborne Radar Approach

The airborne radar approach (ARA) rules (Part HOFO.125 GM1 (b)) require an obstacle environment such that each segment of the ARA is located in an overwater area that has a flat surface at sea level. In practice, if there is a windfarm within 7nm on the approach heading or 3 nm beyond, then a radar approach will not be possible – this depends on the wind of the day.

3.6 Windfarm Working Group Recommendations

It is reported that the following limitations will be recommended to the CAA by the Windfarm Working Group and adopted into UK regulation:

For any Installation with a windfarm within 3 nm, flights will be restricted to:

- day only;
- at least 5 km Visibility;
- at least 700 ft Cloud Base; and
- operator to risk assess and publish specific limitations and routing guidance via the Helideck Certification Agency Technical Committee (Note: Committee is co-chaired with CAA).

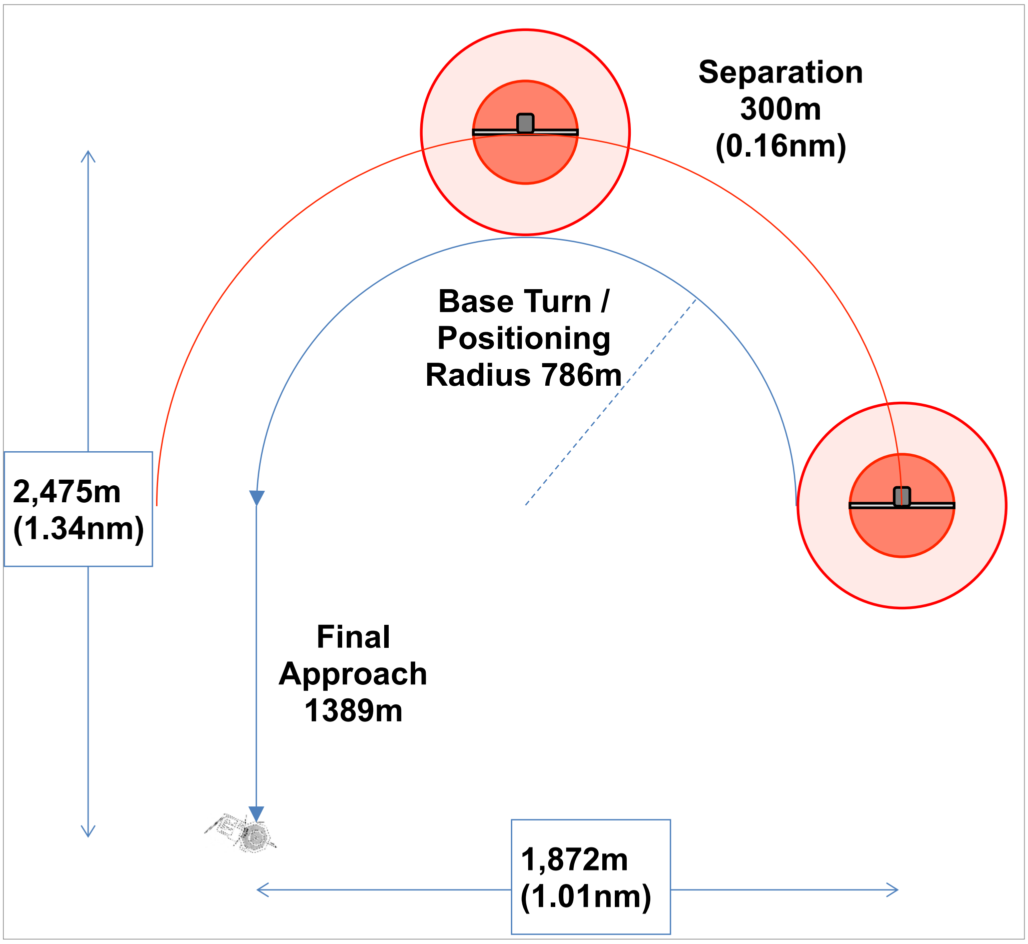
3.7 Turn Rate

Part SPA.HOFO.110(b)(5) requires operators to ensure that their crews make optimum use of autopilot, following best practice and helicopter manufacturer guidance. This means that all turns are completed at rate 1, the normal rate of turn for commercial air transport operations equal to a turn through 180 degrees of heading in 60 seconds, or 3^{o}/s. This fixes the minimum radius of turn at our normal final approach speed and initial climb out speed of 80knots, in still air, as 786 metres (0.43 nm). Whilst it is true that the helicopter can be turned more quickly, these offshore operations are commercial air transport, not search and rescue or military operations, and expecting a tighter radius of turn would preclude compliance with the expectations of Part HOFO.

3.8 Stabilised Approach

Part SPA.HOFO.110(b)(6) requires operators to publish specific offshore approach profiles, including stable approach parameters. Current UK practice requires the helicopter to be on a stable final approach by between 0.75nm and 0.5nm from offshore destination, depending on the operator. The Bond

Helicopters Operations Manual requires 0.75nm. Any turn to final approach must be complete by stabilised approach minima.



This would require 1.34nm along the approach path and up to 1.01nm laterally to achieve a normal approach compliant with the AOC Operations Manual, depending on the arrangement of turbines.

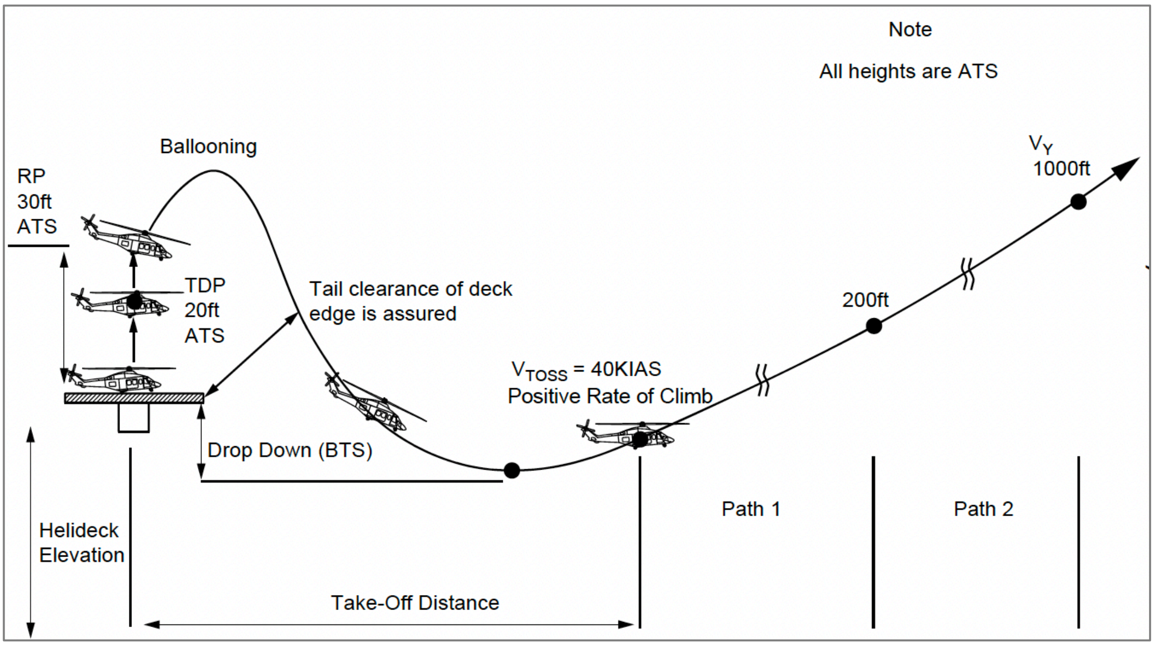
3.9 Engine Failure Planning

Under Part CAT.POL.H.300 an operator is legally required to take into account the possibility of an engine failure at any point during the flight and ensure that such an event will not result in an accident. The operator is required to ensure that enhanced engine monitoring programme is in place, that the helicopter is operated within the exposed region for the minimum time, and that simple but effective procedures are followed to minimise the consequence, should an engine failure occur. The most critical points are the committal point on arrival or the take-off decision point (or equivalent) on departure.

In the event of an engine failure prior to landing, or just after take-off, the crew will have to react quickly. They must accelerate the helicopter to achieve a speed at which flight can be continued, while using the maximum available power (Maximum Contingency Single Engine Power "the 30 second rating"), so avoiding a forced landing (ditching). The helicopter will initially descend toward the sea and may get as low as 15 feet. This is a very high workload. This phase of the emergency is known as the continued take-off segment and is complete once the take-off safety speed has been achieved. The take-off distance can be calculated from manufacturer supplied data.

The workload continues as the helicopter power must be reduced to the Intermediate Contingency Single Engine Power "2 ½ minute rating" and the helicopter is climbed to 200 ft above the surface, this is known as path 1. The Path 1 distance can be calculated from manufacturer supplied data.

At 200 feet the power is reduced again, the undercarriage is retracted, the helicopter is accelerated to 80 knots and the climb is continued to 1000 feet, this is known as path 2. The Path 2 distance can be calculated from manufacturer supplied data.



AW139 Rotorcraft Flight Manual: Section 12 Fig 3-E2

At this point the full Emergency Check List actions are commenced, and if required the climb continued to Minimum En-route Altitude, 2100 feet to clear the windfarm for example.

A relatively simple set of calculations can provide an idea of the distances required to achieve this manoeuvre, these figures will vary dependant on the type of the helicopter, mass of the helicopter fuel load, cargo, passengers, the air temperature, the barometric pressure and the height of the helideck.

For example, on a summer's day, +20°C, with low pressure, 993 hPa, with a light 10 knot wind an AW139 operating with a full load, the climb to an MSA of 2100 feet would require 6963m, 3.76 nm. This is the normal procedure. The AWC139 is one of the best performing airframes available to operators and other airframes used in the SNS require longer distances.

For other windfarms, calculations have been made assuming that the published engine failure after take-off procedure is flown to the end of Path 2, then a turn is made away from any obstructions.

In this case it is normal to add a 1nm buffer to account for possible climb into instrument conditions. On the same light 10 knot day operating with a full load, the climb to 1000 feet and turn to a safe heading with a 1nm buffer would require 5876m, 3.17 nm.

If the manoeuvre can be executed entirely under visual flight rules (VFR), the 1nm buffer can be replaced by a 150m buffer to provide clearance from the (300m diameter) turbine blades in accordance with the rules of the air, and the required distance would be 4324m, 2.33nm.

It has been suggested by the Applicant that a turn at 500 ft is acceptable. It should be pointed out that it is normal practice to climb to 1000 feet following a single engine failure as in event of a further emergency it can take up to 1000 feet to turn the aircraft if an emergency descent is required. However, on the same light 10 knot day as above, operating with a full load, the climb to 500 feet and turn to a safe heading would require 2631m, 1.42nm.

The Applicant has further suggested that in the event of a failure the crew could follow a turbine lane, flying at 500 feet with one engine. It is not normal practice for commercial offshore helicopters to transit through a wind turbine field to reach a destination beyond it, therefore it is unreasonable to suggest that such a transit should be normal practice on a single engine.

4.0 Conclusions

Currently, there are relatively few restrictions to helicopter flights supporting operations at the Waveney field.

It is evident that the proximity of windfarms has an effect on the ability of crews to follow normal procedure and the effect on any flight is highly dependent on the wind direction and actual position of wind turbines within the field.

It is, however, for the Air Operator Certificate (AOC) holder, not the windfarm operator, to assess the risk and the absolute performance numbers, and then take account of the likely real performance of flight crews, who will be:

- suffering initial startle effect;
- flying a profile that is only practised twice a year in the simulator;
- visually judging the separation from the wind turbines as the radar cannot be used due to its minimum range of 0.7nm;
- taking into account wind drift – which can be as much as 900m a minute on a 30 knot day;
- dealing with an unusual situation;
- completing the emergency checklist; and
- liaising with air traffic controllers.

Taking all of those factors into account, the helicopter operator is required to ensure that there is effective guidance that allows the management, customer and the crews to understand the limitations and procedures for operations to every deck that they might be expected to fly to. Ideally all procedures will be the same. However, it has been established that where there is a windfarm within 7nm there will be an effect on Airborne Radar Approaches. Where there is a windfarm within 3nm safe operations can only be ensured through operational restrictions, with no night flying, increased weather minima and changes to emergency procedures, with associated increased training requirements, and reduced availability for the customer. Where the separation is below 1.42nm, there will be payload restrictions, operational limitations, and in some cases, no flying, as operation within the CAT / HOFO regulation cannot be achieved.

In summary,

- Wind turbines located within 7nm downwind of Waveney would limit Airborne Radar Approaches;
- Wind turbines located within 3nm of Waveney in any direction would, under anticipated new rules agreed by all of the North Sea Helicopter operators and the CAA, restrict flights to daylight and when visibility exceeds 5km and the cloudbase is at least 700';
- Wind turbines located within 2.33nm upwind of Waveney would require a change from standard procedures should an engine fail during take-off;
- Wind turbines located within 1.42nm upwind of Waveney would preclude a take-off in the event of one engine being inoperable (OEI);

- Wind turbines located within 1.34nm downwind of Waveney or within 1.01nm perpendicular to the approach direction would prevent helicopter access to Waveney.