NORTH FALLS

Offshore Wind Farm

ENVIRONMENTAL STATEMENT

Appendix 17.2 Southend Airport Instrument Flight Procedure Assessment

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IFP Safeguarding

North Falls Offshore Windfarm

London Southend Airport

02 November 2022

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Change History Record

Issue	Change Reference	Date	Details
1.0	Initial Issue	19 October 2022	Initial Issue
1.1	Textual changes after client comments were received on 01/11/2022	02 November 2022	Second Issue

Executive Summary

Royal Haskoning DHV (RHDHV), the client, are overseeing the Environmental Impact Assessment of the North Falls Offshore Windfarm.

In response to a request from London Southend Airport (LSA), Royal Haskoning DHV engaged Cyrrus to undertake an Instrument Flight Procedure safeguarding assessment against the proposed 40-turbine wind farm. The nearest turbine within the wind farm is located approximately 43.4 Nautical Miles (NM) from the Runway 05 threshold.

The purpose of assessment is to assess if any of the proposed wind turbines infringe the protection areas/surfaces of the IFPs serving the Airport.

The proposed offshore wind farm development does not impact the currently published IFPs for London Southend Airport.

In addition, the proposed RNAV-1 departures and Omni-Directional Departures were assessed, however no impacts to these procedures were observed. The proposed offshore wind farm development also does not impact the proposed IFPs.

Overview

The proposed windfarm is located to the east of Runway (RWY) 23 and South of RWY 05. The nearest wind turbine is approximately 43.4 NM from Threshold (THR) 05 as indicated in Figure 1.

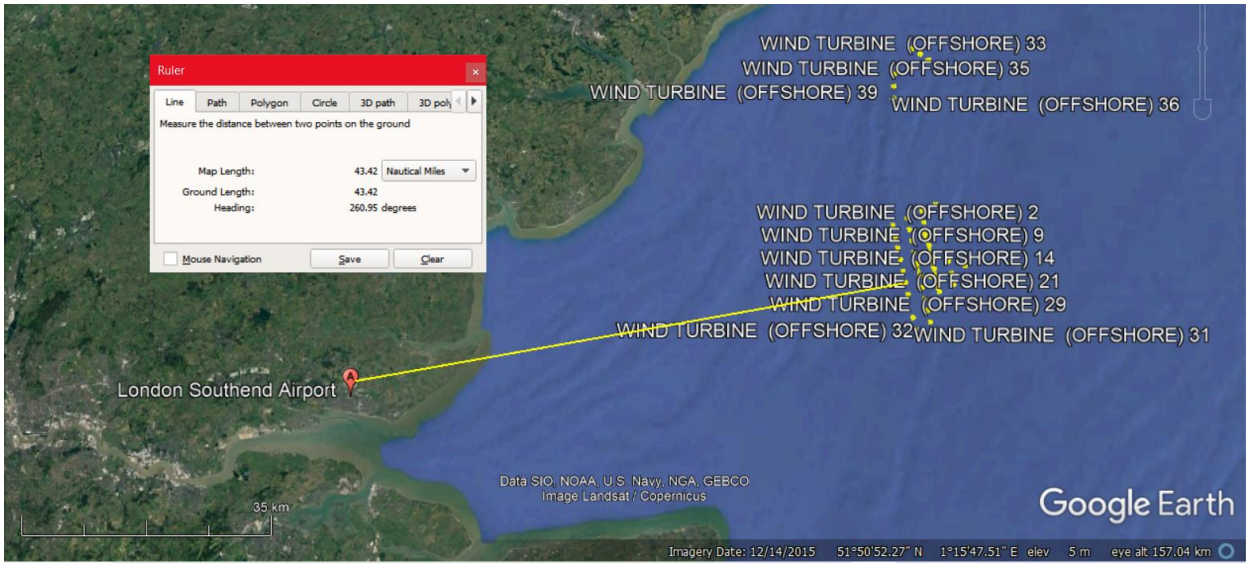

Figure 1: Obstacle Position from Threshold 05

IFP's Assessed

The following IFPs, as published in the UK Aeronautical Information Publication (AIP) were assessed.

- ATC SURVEILLANCE MINIMUM ALTITUDE CHART
- INSTRUMENT APPROACH ILS/DME/NDB(L) RWY 05 (CAT A,B,C)
- INSTRUMENT APPROACH ILS/DME/NDB(L) RWY 05 (ACFT CAT D)
- INSTRUMENT APPROACH LOC/DME/NDB(L) RWY 05 (ACFT CAT A,B,C)
- INSTRUMENT APPROACH LOC/DME/NDB(L) RWY 05 (ACFT CAT D)
- INSTRUMENT APPROACH SRA RTR 2NM RWY 05 (ACFT CAT A,B,C)
- INSTRUMENT APPROACH ILS/DME/NDB(L) RWY 23
- INSTRUMENT APPROACH LOC/DME/NDB(L) RWY 23
- INSTRUMENT APPROACH SRA RTR 2NM RWY 23 (CAT A,B,C)

Data

The following data was received from the Client for the purpose of this assessment:

- Obstacle positions and heights – "IFP-011 V1.3 Safeguarding Client Information Form North Falls Wind Farm_1"; "IFP-011 V1.3 Safeguarding Client Information Form North Falls Wind Farm_2"; "IFP-011 V1.3 Safeguarding Client Information Form North Falls Wind Farm_3"; "IFP-011 V1.3 Safeguarding Client Information Form North Falls Wind Farm_4"
- Technical Information - EN010115-000012-5EST - Scoping Report.pdf

Discrepancies and Assumptions

A value of 0 m as equivalent base elevation was provided on the IFP-011 Safeguarding Client Information forms since the proposed structures are an offshore development and are considered from mean sea level. Geoid undulation was not considered for this assessment, and it is assumed that the development will be constructed to a maximum elevation (above mean sea level) of 400 m as provided. As a result, no vertical tolerance was added to the elevation provided.

The position information supplied was assumed to be in the WGS-84 co-ordinate reference system and as a result no co-ordinate transformation was carried out. The horizontal tolerance equivalent to the radius of the turbine rotor (168.5 m) was applied.

Obstacle (No/Name)	Lat (WGS84)	Long (WGS84)	Obstacle (m)	Tolerance (m)	Ground Level (m AMSL)	Elevation (m AMSL)
WIND TURBINE (OFFSHORE) 1	51° 46' 10.5375" N	1° 49' 47.4020" E	400	0	0	400
WIND TURBINE (OFFSHORE) 2	51° 46' 42.6436" N	1° 51' 38.9254" E	400	0	0	400
WIND TURBINE (OFFSHORE) 3	51° 47' 14.7206" N	1° 53' 30.4932" E	400	0	0	400
WIND TURBINE (OFFSHORE) 4	51° 47' 46.8326" N	1° 55' 22.0515" E	400	0	0	400
WIND TURBINE (OFFSHORE) 5	51° 45' 16.2711" N	1° 50' 02.3136" E	400	0	0	400
WIND TURBINE (OFFSHORE) 6	51° 45' 48.3732" N	1° 51' 53.8030" E	400	0	0	400
WIND TURBINE (OFFSHORE) 7	51° 46' 20.4785" N	1° 53' 45.3359" E	400	0	0	400
WIND TURBINE (OFFSHORE) 8	51° 44' 22.0364" N	1° 50' 17.2141" E	400	0	0	400
WIND TURBINE (OFFSHORE) 9	51° 44' 54.1345" N	1° 52' 08.6695" E	400	0	0	400
WIND TURBINE (OFFSHORE) 10	51° 43' 27.7687" N	1° 50' 32.1052" E	400	0	0	400
WIND TURBINE (OFFSHORE) 11	51° 43' 59.8627" N	1° 52' 23.5268" E	400	0	0	400
WIND TURBINE (OFFSHORE) 12	51° 44' 31.9599" N	1° 54' 14.9917" E	400	0	0	400
WIND TURBINE (OFFSHORE) 13	51° 42' 33.5007" N	1° 50' 47.0382" E	400	0	0	400
WIND TURBINE (OFFSHORE) 14	51° 43' 05.5906" N	1° 52' 38.4259" E	400	0	0	400
WIND TURBINE (OFFSHORE) 15	51° 43' 37.7157" N	1° 54' 29.8041" E	400	0	0	400
WIND TURBINE (OFFSHORE) 16	51° 41' 39.2314" N	1° 51' 01.9090" E	400	0	0	400
WIND TURBINE (OFFSHORE) 17	51° 42' 11.3497" N	1° 52' 53.2620" E	400	0	0	400
WIND TURBINE (OFFSHORE) 18	51° 42' 43.4384" N	1° 54' 44.6071" E	400	0	0	400
WIND TURBINE (OFFSHORE) 19	51° 43' 15.5303" N	1° 56' 35.9955" E	400	0	0	400
WIND TURBINE (OFFSHORE) 20	51° 40' 44.9938" N	1° 51' 16.7688" E	400	0	0	400
WIND TURBINE (OFFSHORE) 21	51° 41' 17.0757" N	1° 53' 08.0888" E	400	0	0	400
WIND TURBINE (OFFSHORE) 22	51° 41' 49.1927" N	1° 54' 59.3992" E	400	0	0	400
WIND TURBINE (OFFSHORE) 23	51° 42' 21.2811" N	1° 56' 50.8058" E	400	0	0	400
WIND TURBINE (OFFSHORE) 24	51° 42' 53.3718" N	1° 58' 42.1516" E	400	0	0	400
WIND TURBINE (OFFSHORE) 25	51° 40' 22.8334" N	1° 53' 22.9046" E	400	0	0	400
WIND TURBINE (OFFSHORE) 26	51° 40' 54.9140" N	1° 55' 14.1820" E	400	0	0	400
WIND TURBINE (OFFSHORE) 27	51° 41' 27.0303" N	1° 57' 05.5019" E	400	0	0	400
WIND TURBINE (OFFSHORE) 28	51° 38' 56.4523" N	1° 51' 46.5116" E	400	0	0	400
WIND TURBINE (OFFSHORE) 29	51° 39' 28.5579" N	1° 53' 37.7112" E	400	0	0	400

Obstacle (No/Name)	Lat (WGS84)	Long (WGS84)	Obstacle (m)	Tolerance (m)	Ground Level (m AMSL)	Elevation (m AMSL)
WIND TURBINE (OFFSHORE) 30	51° 40' 00.6674" N	1° 55' 29.0060" E	400	0	0	400
WIND TURBINE (OFFSHORE) 31	51° 38' 02.1802" N	1° 52' 01.3418" E	400	0	0	400
WIND TURBINE (OFFSHORE) 32	51° 38' 34.2818" N	1° 53' 52.5076" E	400	0	0	400
WIND TURBINE (OFFSHORE) 33	52° 00' 23.9936" N	1° 53' 34.8381" E	400	0	0	400
WIND TURBINE (OFFSHORE) 34	51° 59' 56.0353" N	1° 54' 34.7332" E	400	0	0	400
WIND TURBINE (OFFSHORE) 35	51° 58' 21.4391" N	1° 51' 08.8576" E	400	0	0	400
WIND TURBINE (OFFSHORE) 36	51° 56' 20.3979" N	1° 50' 44.3999" E	400	0	0	400
WIND TURBINE (OFFSHORE) 37	51° 59' 26.6588" N	1° 55' 36.2142" E	400	0	0	400
WIND TURBINE (OFFSHORE) 38	51° 58' 49.4142" N	1° 53' 04.2510" E	400	0	0	400
WIND TURBINE (OFFSHORE) 39	51° 57' 19.6953" N	1° 50' 53.9838" E	400	0	0	400
WIND TURBINE (OFFSHORE) 40	51° 45' 24.1388" N	1° 53' 50.5699" E	400	0	0	400

Table 1: Data used for assessment

IFP Safeguarding Assessment

An IFP Safeguarding assessment was completed against the applicable procedures for Runway 05 / 23 at London Southend Airport.

Due to the technical nature of the information, this report is a distillation of the IFP modelling and subsequent assessment of the obstacles, the full data set is available if required[1]. The purpose of this report is to identify what procedures were assessed and whether there is an impact, in the event of an impact, potential mitigation is provided[2]. Where an impact was identified, only the assessment of the respective segment for said procedure, is provided.

The IFPs were assessed using PHX 18.5.4.8349.

Table 2 provides an impact summary of all the IFPs that were assessed.

Assessed Procedure	RWY	Impact	Comments
Visual Circling	Both	No	Outside Obstacle Protection Areas
ILS/DME/NDB(L) CAT (A,B,C)	05	No	Outside Obstacle Protection Areas
ILS/DME/NDB(L) CAT (D)		No	Outside Obstacle Protection Areas
LOC/DME/NDB(L) CAT (A,B,C)		No	Outside Obstacle Protection Areas
LOC/DME/NDB(L) CAT (D)		No	Outside Obstacle Protection Areas
SRA RTR 2NM CAT (A,B,C)		No	Outside Obstacle Protection Areas
PDR Brookman's Park		No	Not in vicinity & not assessed for obstacle clearance

[1] Please note that the full data set can run into an excess of 20 pages per procedure and can only be decoded by those familiar with the output generation from the IFP Software and trained IFP Designers.

[2] Mitigation for the IFPs is for the Airport (Sponsor) to decide upon as these may have a direct impact on their operations. It is recommended that further discussion and guidance is obtained from the CAA.

Assessed Procedure	RWY	Impact	Comments
PDR Clacton		No	Not in vicinity & not assessed for obstacle clearance
PDR Compton		No	Not in vicinity & not assessed for obstacle clearance
PDR Dover		No	Not in vicinity & not assessed for obstacle clearance
PDR LYDD		No	Not in vicinity & not assessed for obstacle clearance
RNAV 1 SID CLN1G		No	Outside Obstacle Protection Areas
RNAV 1 SID EMKAD1G		No	Outside Obstacle Protection Areas
RNAV 1 SID LAM1G		No	Outside Obstacle Protection Areas
ODD		No	Outside Obstacle Protection Areas
ILS/DME/NDB(L)	23	No	Outside Obstacle Protection Areas
LOC/DME/NDB(L)		No	Outside Obstacle Protection Areas
SRA RTR 2NM CAT (A,B,C)		No	Outside Obstacle Protection Areas
PDR Brookman's Park		N/A	Not in vicinity & not assessed for obstacle clearance
PDR Clacton		N/A	Not in vicinity & not assessed for obstacle clearance
PDR Compton		N/A	Not in vicinity & not assessed for obstacle clearance
PDR Dover		No	Not in vicinity & not assessed for obstacle clearance
PDR LYDD		No	Not in vicinity & not assessed for obstacle clearance
RNAV 1 SID CLN1F		No	Outside Obstacle Protection Areas
RNAV 1 SID EKNIV1F		No	Outside Obstacle Protection Areas
RNAV 1 SID LAM1F		No	Outside Obstacle Protection Areas
ODD		No	Outside Obstacle Protection Areas

Table 2: IFP Assessment Impact Summary

IFP's not Assessed

The following IFPs, although considered, were not assessed. The Standard Instrument Arrival Routes (STARs) generally fall outside of where the obstacles are located and have a lowest level of 5000ft:

- RNAV5 (VOR/DME, DME/DME or GNSS) STANDARD ARRIVAL - INSTRUMENT RWY 05/23 SUMUM 1S XAMAN 1S
- RNAV5 DME/DME or GNSS) STANDARD ARRIVAL - INSTRUMENT RWY 05/23 KATHY 1S NEVIL 1S SAM 1S SOVAT 1S
- RNAV5 (DME/DME or GNSS) STANDARD ARRIVAL - INSTRUMENT (STAR) RWY 05/23 FINMA 1S LISTO 1S SILVA 1S

As an additional check, the en-route holding at waypoint GEGMU was constructed however the wind farm is outside of the obstacle protection areas.

The Lowest holding altitude at JACKO is Flight Level (FL) 80 and at the worst-case MOC, the holding is cleared by more than 5700 ft.

Conclusion

The proposed offshore wind farm development does not impact the assessed or proposed IFPs. A summary of the nearest procedures or procedure entities and the associated relational distances is provided below, to further support the findings as detailed within this report.

Cyrrus are not in possession of the proposed Required Navigational Performance (RNP) Approaches for London Southend Airport and therefore, are not able to provide any assessment for these. It is however advised that the respective design organisation is consulted to confirm nil impact to these approaches and the related procedure entities.

SUMMARY

Air Traffic Control Surveillance Minimum Altitude Chart (ATCSMAC)

As indicated in Figure 2, the proposed offshore wind farm development is approximately 19.34 NM from the ATCSMAC Surveillance Minimum Altitude Area (SMAA) buffer boundary.

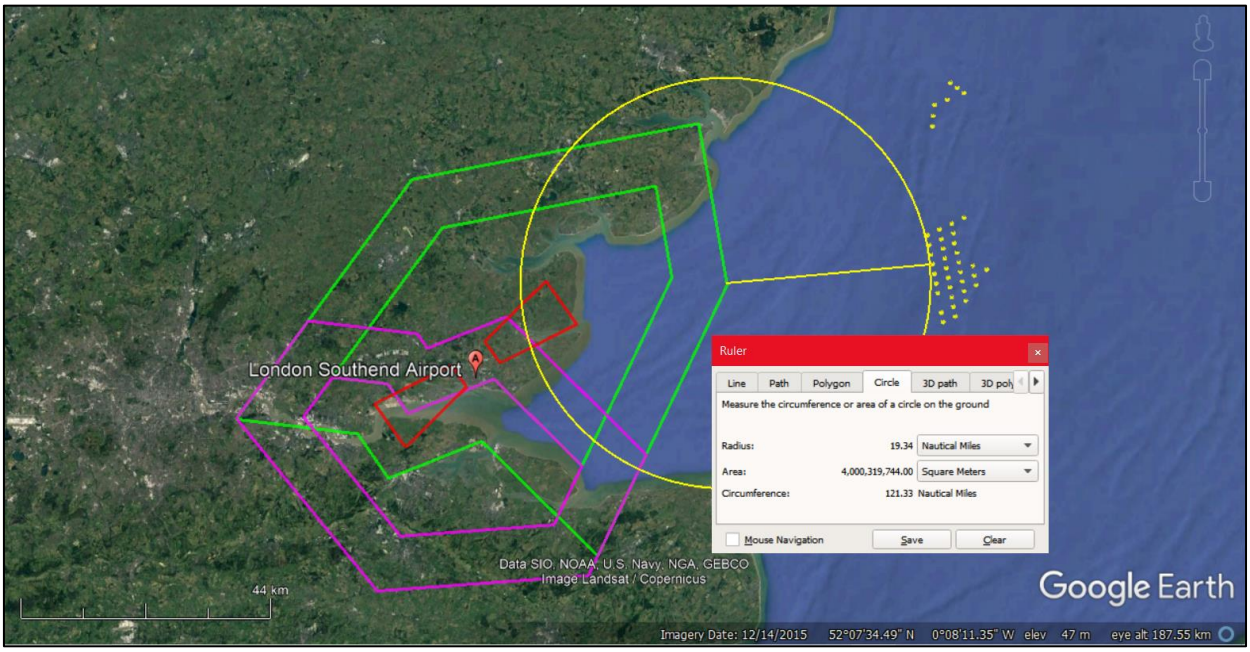

Figure 2: Obstacles Position from ATCSMAC SMAA Buffer Boundary

Minimum Sector Altitude (MSA)

As indicated in Figure 3, the proposed offshore wind farm development is approximately 13.57 NM from the MSA Buffer boundary.

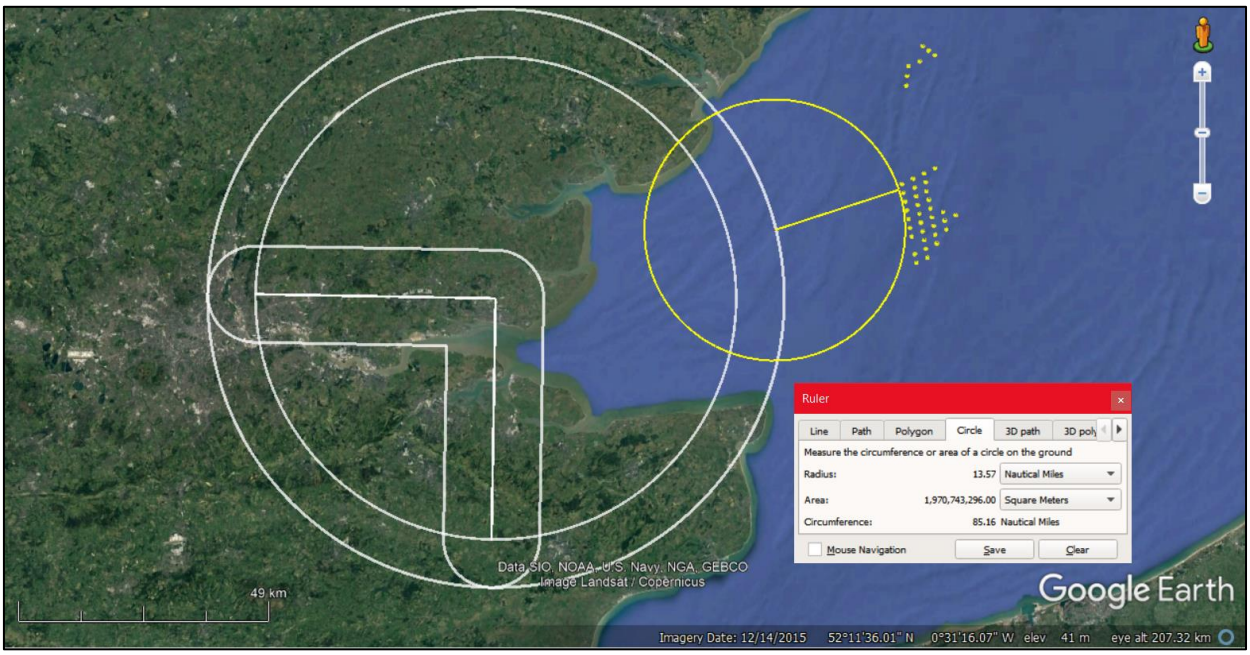

Figure 3: Obstacles Position from MSA Buffer Boundary

ILS and LOC RWY 23 Related Direct Arrival

As indicated in Figure 4, the proposed offshore wind farm development is approximately 26.87 NM from the reporting point GEGMU.

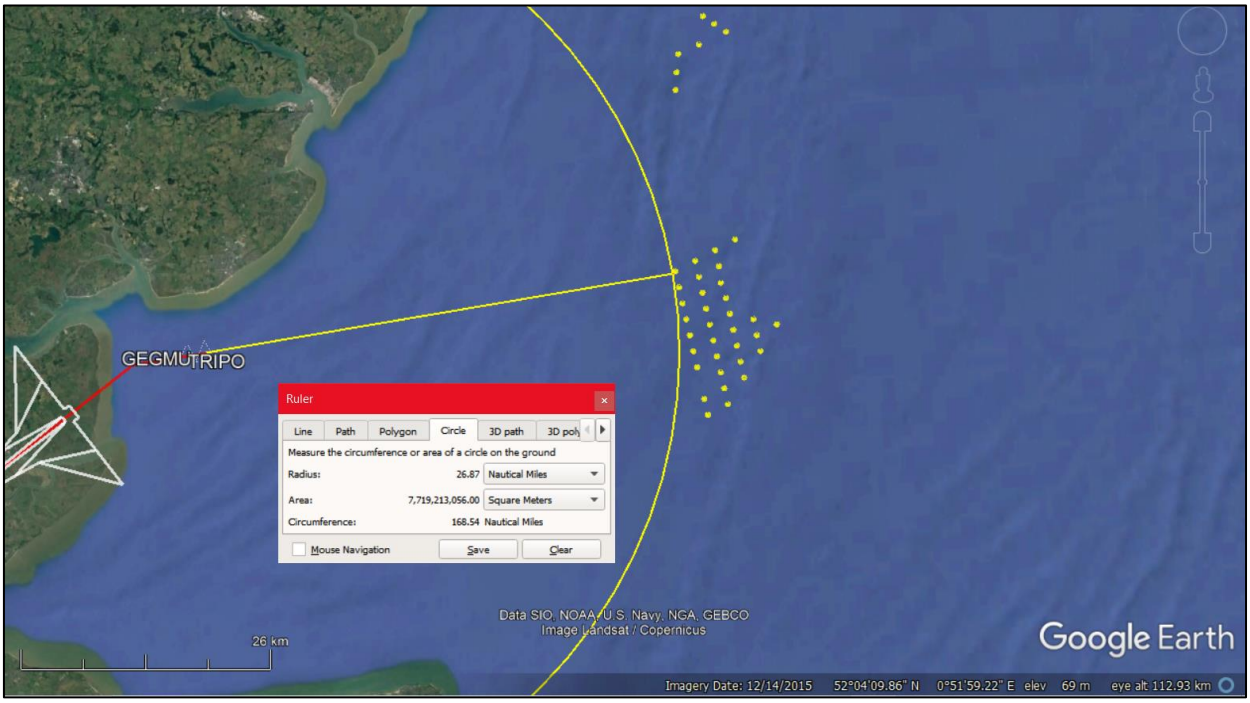

Figure 4: Obstacles Position from GEGMU Reporting Point

Omni-Directional Departures (ODD)

As indicated in Figure 5, the proposed offshore wind farm development is approximately 14.32 NM from the ODD "Area 3" boundary established for joining the en-route network at 6000 ft.

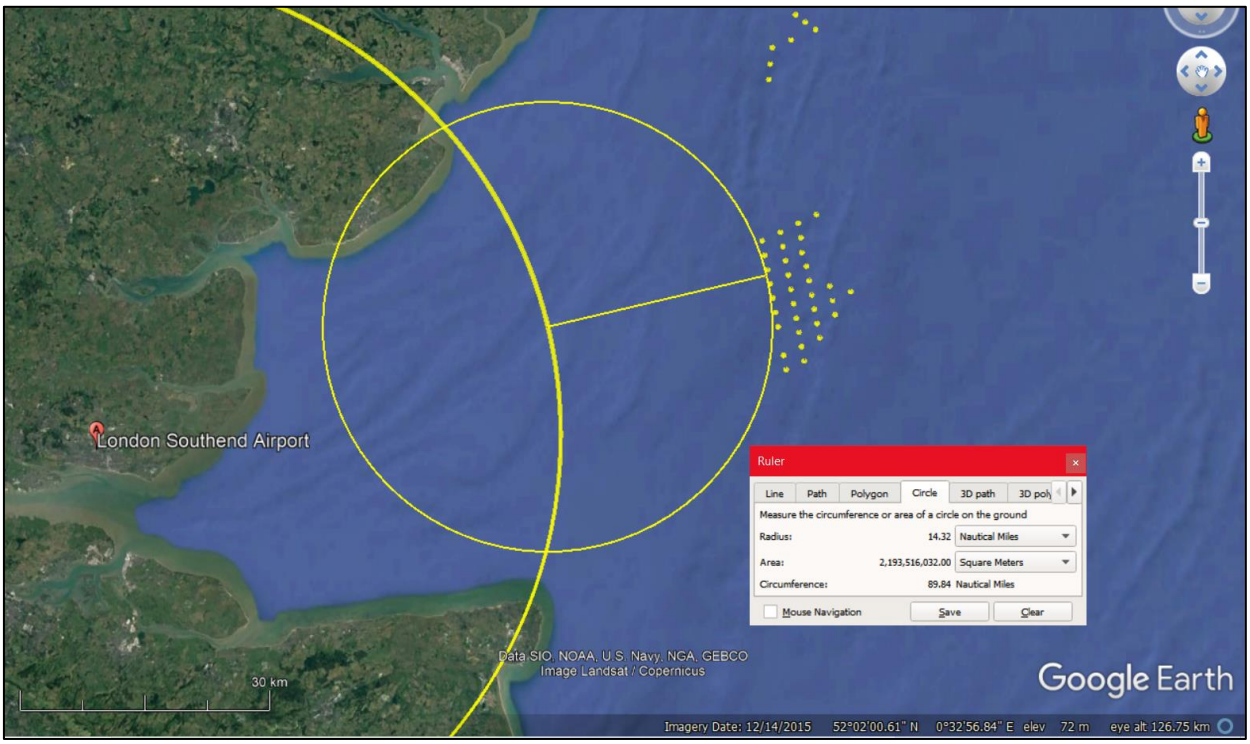

Figure 5: Obstacles Position from the ODD boundary

RNAV-1 Standard Instrument Departures (CLN1F/1G) RWY 23 and RWY 05

As indicated in Figure 6, the proposed offshore wind farm development is approximately 23.45 NM from the Obstacle Protection Area Boundary established for the proposed departure procedures.

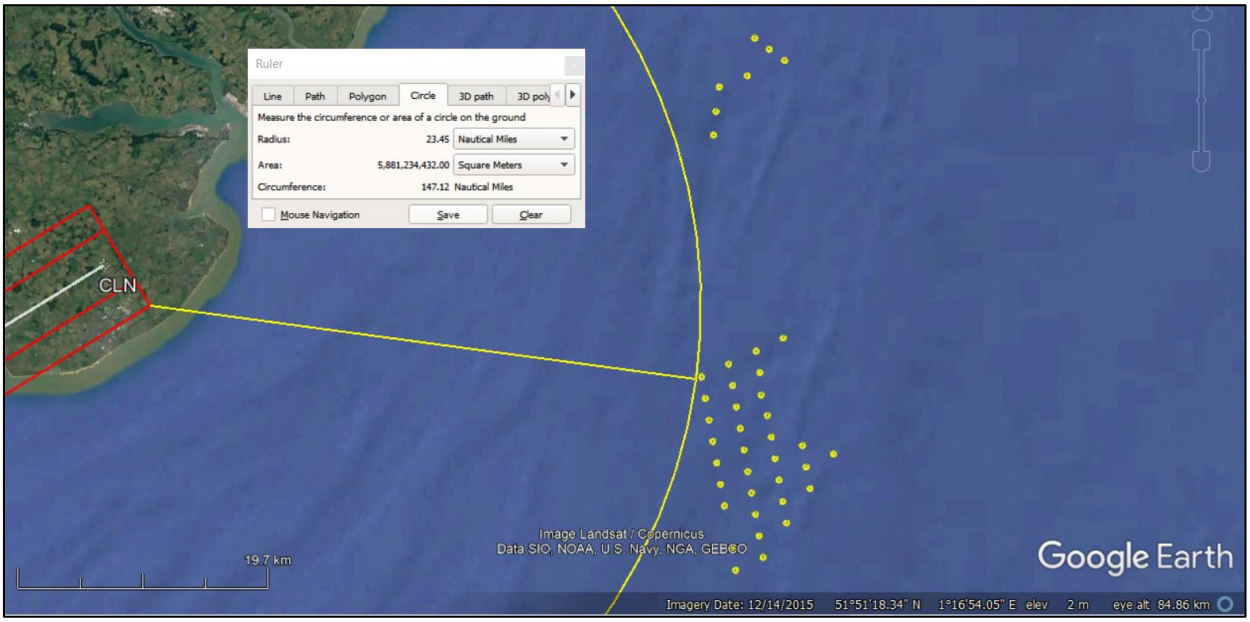

Figure 6: Obstacles Position from the RNAV1 SID CLN1F/1G for RWY 23/05

Preferred Departure Route (PDR) Clacton RWY 23 and RWY 05

As indicated in Figure 7, the proposed offshore wind farm development is approximately 25.70 NM from the nominal track. PDRs as an instruction, are not associated with obstacle protection areas.

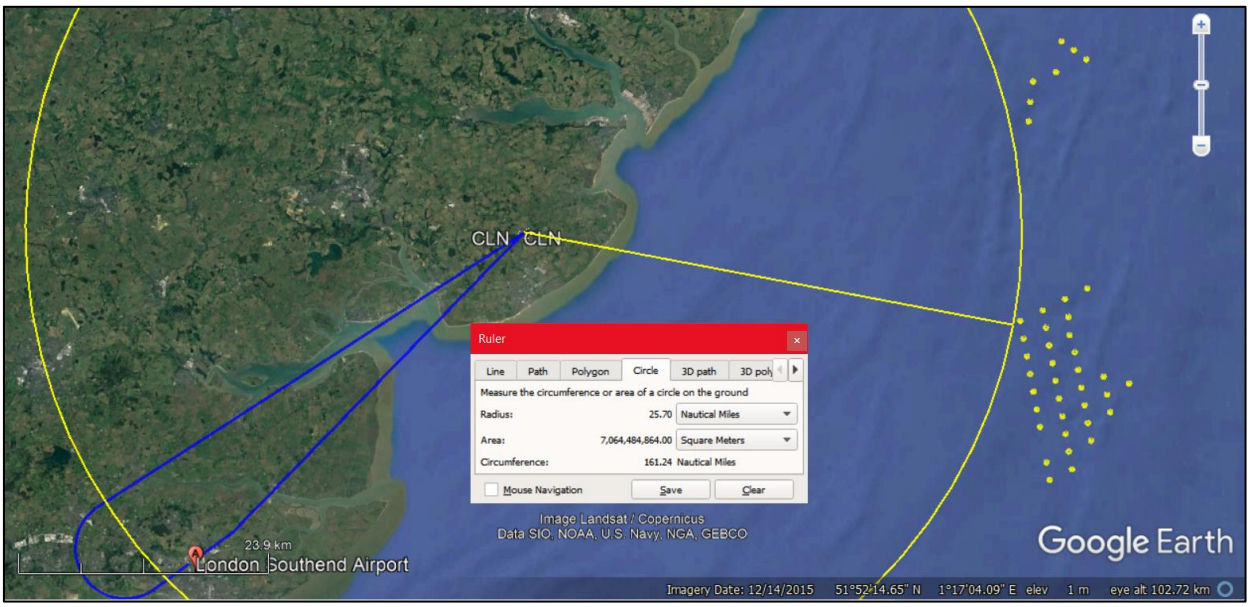

Figure 7: Obstacles Position from GEGMU Reporting Point

En-route Holding at GEGMU

As indicated in Figure 8, the proposed offshore wind farm development is approximately 9.05 NM from the extremity of the en-route holding buffer areas.

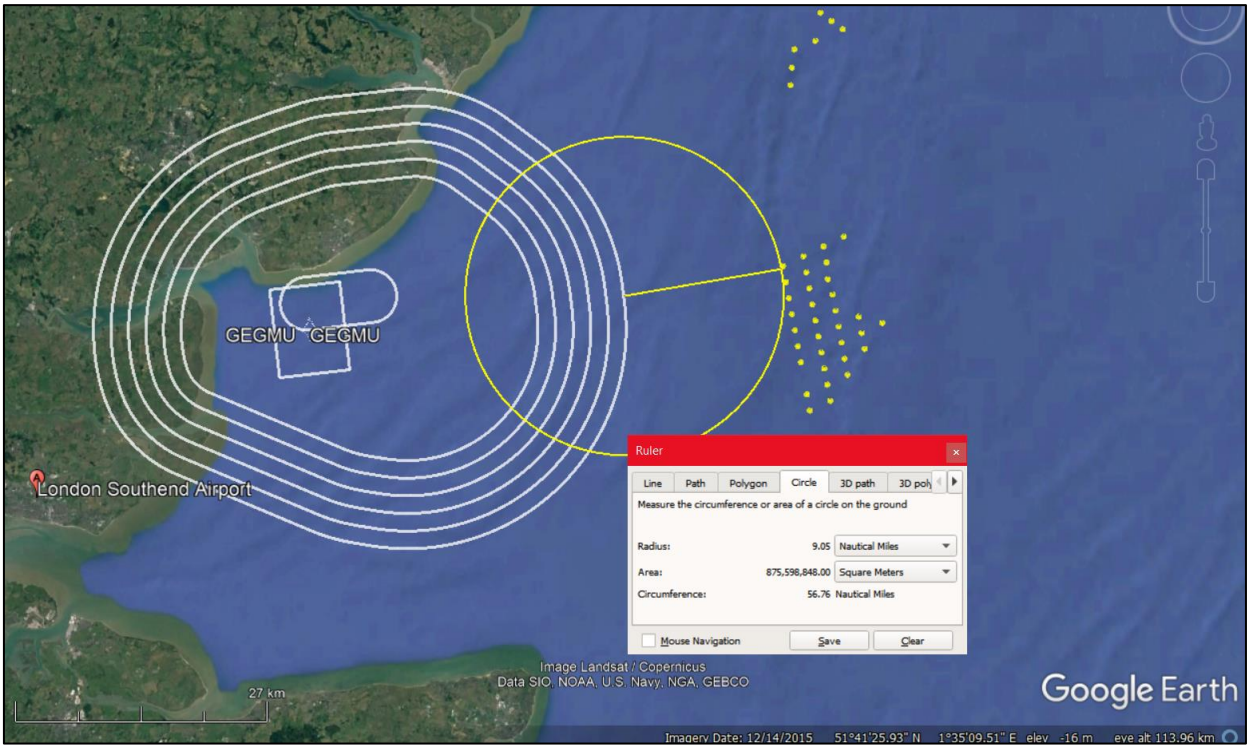

Figure 8: Obstacles Position from GEGMU en-route holding

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NORTH FALLS

Offshore Wind Farm

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HARNESSING THE POWER OF NORTH SEA WIND

North Falls Offshore Wind Farm Limited

A joint venture company owned equally by SSE Renewables and RWE.

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