Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Instrument Flight Procedures Assessment for Norwich Airport

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Norwich Airport – Dudgeon and Sheringham Offshore Wind Farm Extension

IFP Assessment for Norwich Airport

Date: 10th May 2023

Author: Ryan Evason under supervision of Chris Latus (APD)

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Cale House, Station Road Wincanton, Somerset BA9 9FE
01420 520200 / enquiries@ospreycsl.co.uk
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Executive Summary

Osprey Consulting Services Ltd (Osprey) have been commissioned to carry out a check of the published Instrument Flight Procedures (IFPs) for Norwich Airport in relation to proposed wind farm extensions at Sheringham and Dudgeon sites.

Impact on the ATCSMAC

The proposed wind farm extensions at Sheringham and Dudgeon South would impact the Norwich Airport's ATCSMAC.

Impact on the MSA

The proposed wind farm extensions at Sheringham and Dudgeon South would impact Norwich Airport's MSA's.

Impact on the IFPs

The proposed wind farm extensions at Sheringham and Dudgeon South would not impact the IFPs.

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1 Introduction

1.1 Background

Osprey Consulting Services Ltd (Osprey) have been commissioned to carry out a check of the published Instrument Flight Procedures (IFPs) for Norwich Airport in relation to proposed wind farm extensions at Sheringham and Dudgeon sites.

1.2 Scope of the Assessment

This report examines the potential impact of the wind farm extensions on the published Instrument Flight Procedures (IFPs) at Norwich using the latest published charts in the State Aeronautical Information Publication (AIP), as of 20th April 2023. AutoCAD Autodesk, ASD PD Toolkit and ICAO Software was used to evaluate the proposal.

1.3 Data Provided by Client

Equinor ASA has informed Osprey that the blade tip height for all wind turbines will be 330m AMSL and also provided the following wind farm site information in the form of a KMZ file (AOI_WGS1984_20191122):

Figure 1 – Provided Wind Farm site information - AOI_WGS1984_20191122 (Shown in Google Earth)

Using the provided information, the wind farm border coordinates were extrapolated from Google Earth and modelled in AutoCAD.

Point	Latitude	Longitude
1	53:16:40.460	1:19:9.980
2	53:17:15.110	1:26:5.550
3	53:18:0.200	1:25:39.200
4	53:18:17.430	1:25:24.420
5	53:18:17.800	1:17:51.070
6	53:18:18.180	1:19:28.570
7	53:18:23.000	1:19:18.150
8	53:18:33.980	1:25:3.960
9	53:18:34.640	1:23:20.400
10	53:18:35.080	1:22:55.030
11	53:18:55.490	1:20:33.660
12	53:18:9.280	1:22:13.960
13	53:19:2.650	1:12:19.910
14	53:19:27.380	1:17:16.540
15	53:19:36.080	1:24:8.190
16	53:19:9.770	1:24:23.540
17	53:20:32.500	1:15:58.750
18	53:20:46.300	1:18:7.200
19	53:20:5.290	1:23:59.990
20	53:20:54.100	1:24:1.370
21	53:20:58.850	1:18:37.480
22	53:21:16.870	1:18:58.260
23	53:21:57.800	1:23:24.290
24	53:21:9.220	1:10:11.070
25	53:21:9.550	1:17:32.280

Table 1 – Dudgeon North Coordinates

Point	Latitude	Longitude
1	53:14:5.350	1:25:52.570
2	53:13:44.720	1:27:26.100
3	53:10:38.840	1:32:6.340
4	53:10:5.820	1:25:33.390
5	53:9:9.190	1:28:22.670
6	53:9:18.480	1:27:22.970

Table 2 – Dudgeon South Coordinates

Point	Latitude	Longitude
1	53:7:20.090	1:17:7.740
2	53:5:8.070	1:15:40.090
3	53:8:58.970	1:10:57.700
4	53:5:47.570	1:13:2.570
5	53:14:44.110	1:5:29.630
6	53:11:4.110	1:2:0.070

Table 3 – Sheringham Coordinates

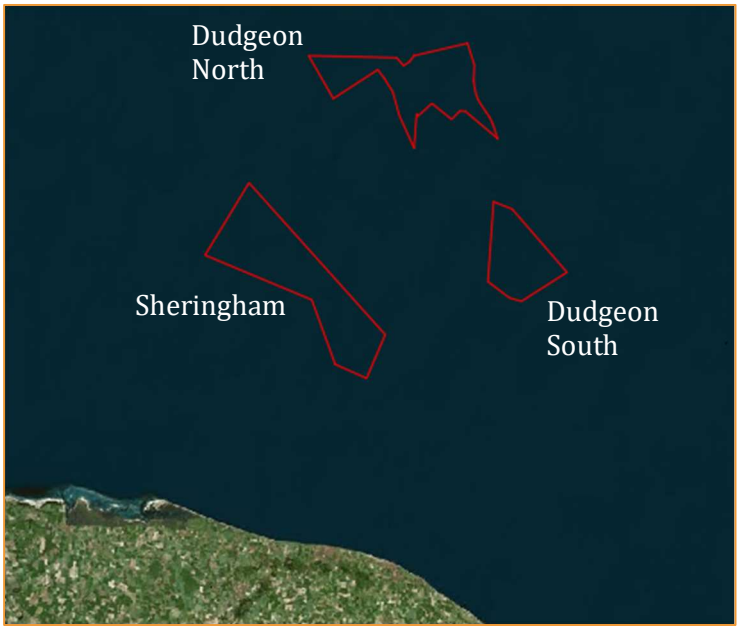

Figure 2 – Modelled Areas

1.4 Orientation

Figure 3 - Orientation to Airport

2 IFP Analysis

2.1 General

The IFPs assessed are as follows:

AIP Effective 20th April 2023

- ATC SURVEILLANCE MINIMUM ALTITUDE CHART - **AD 2-EGSH-5-1** – 15 Jul 2021
- INSTRUMENT APPROACH CHART NDB(L)/DME RWY 09 – **AD 2.EGSH-8-1** – 01 Dec 2022
- INSTRUMENT APPROACH CHART ILS/DME/NDB(L) RWY 27 – **AD 2.EGSH-8-2** – 01 Dec 2022
- INSTRUMENT APPROACH CHART LOC/DME/NDB(L) RWY 27 – **AD 2.EGSH-8-3** – 01 Dec 2022
- INSTRUMENT APPROACH CHART NDB(L)/DME RWY 27 - **AD 2.EGSH-8-4** – 01 Dec 2022

2.2 ATC Surveillance Minimum Altitude Chart

The Wind Farm sites are located to the North of the Airport outside of the ATCSMAC protection areas.

Figure 4 - ATCSMAC

As the sites are outside of the ATCSMAC main areas and the 5nm buffer, they do not affect the ATCSMAC altitude restrictions. However, any obstacle outside of the ATCSMAC areas need to be assessed against the Minimum Sector Altitude (MSA) for the airport.

MSAs are established for each aerodrome and provide at least 300m (1000 ft) obstacle clearance within 25 NM (plus 5NM buffer) of the navigation aid, initial approach fix, or intermediate fix associated with the approach procedure for that aerodrome.

The MSA for Norwich is based on NDB NWI and is split into four sectors.

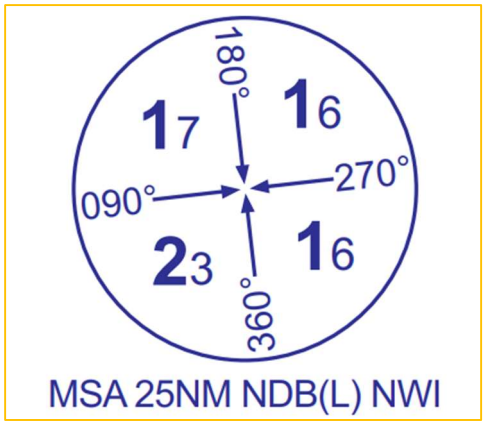

Figure 5 – Norwich MSA

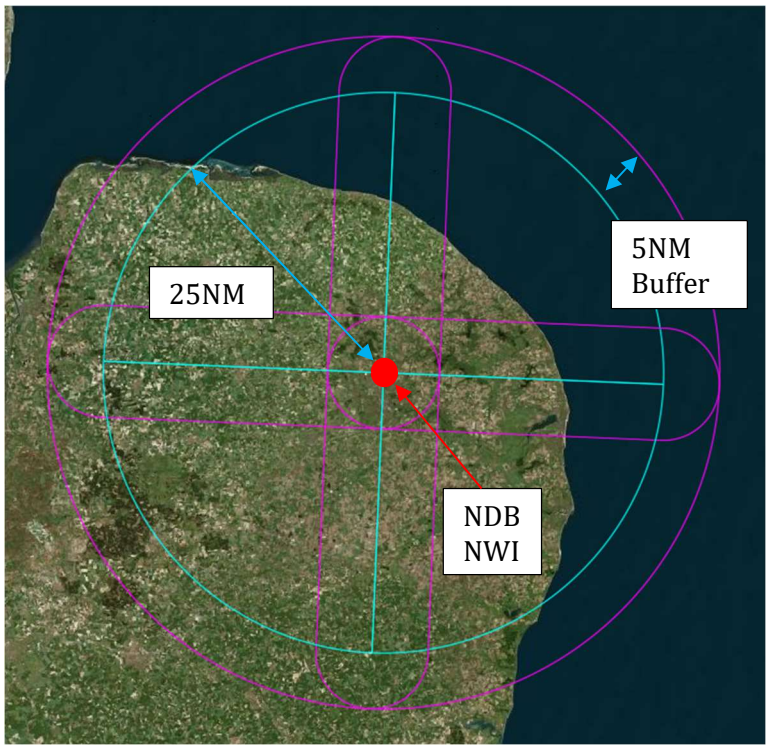

Figure 6 – Norwich MSA Areas

The Sheringham and South Dudgeon extensions are situated in the Northeast 1600ft sector and Sheringham extension is situated in the Northwest 1700ft sector.

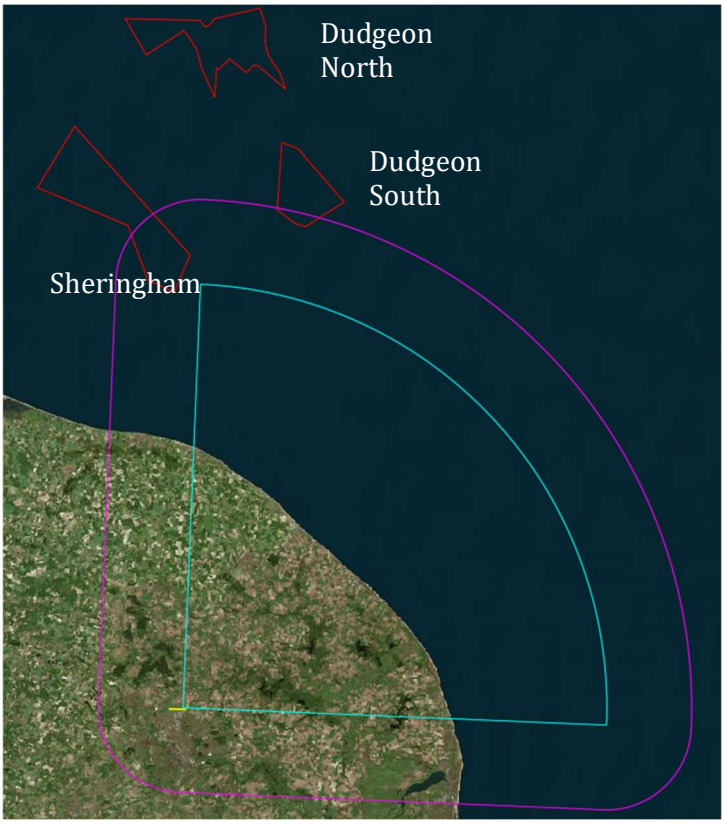

Figure 7 – Wind Farms within Norwich North East MSA Area

Figure 8 – Wind Farms within Norwich North West MSA Area

With a Blade tip elevation of 330m plus the 300m Minimum Obstacle Clearance (MOC) the resultant Minimum Obstacle Clearance Altitude (MOCA) for the Northeast and Northwest MSA sectors will be 630m or 2067ft rounded up to 2100ft for publications.

This is above the published MSA values.

If the Wind Farms are to proceed the Northeast and Northwest MSA's need to be raised to 2100ft.

If the extensions are to go ahead without affecting the MSA values, either the blade tip elevation at Sheringham and Dudgeon South are to be restricted to 187.68m AMSL (1600ft – 300m) or the extensions will need to be restricted to the following areas in green:

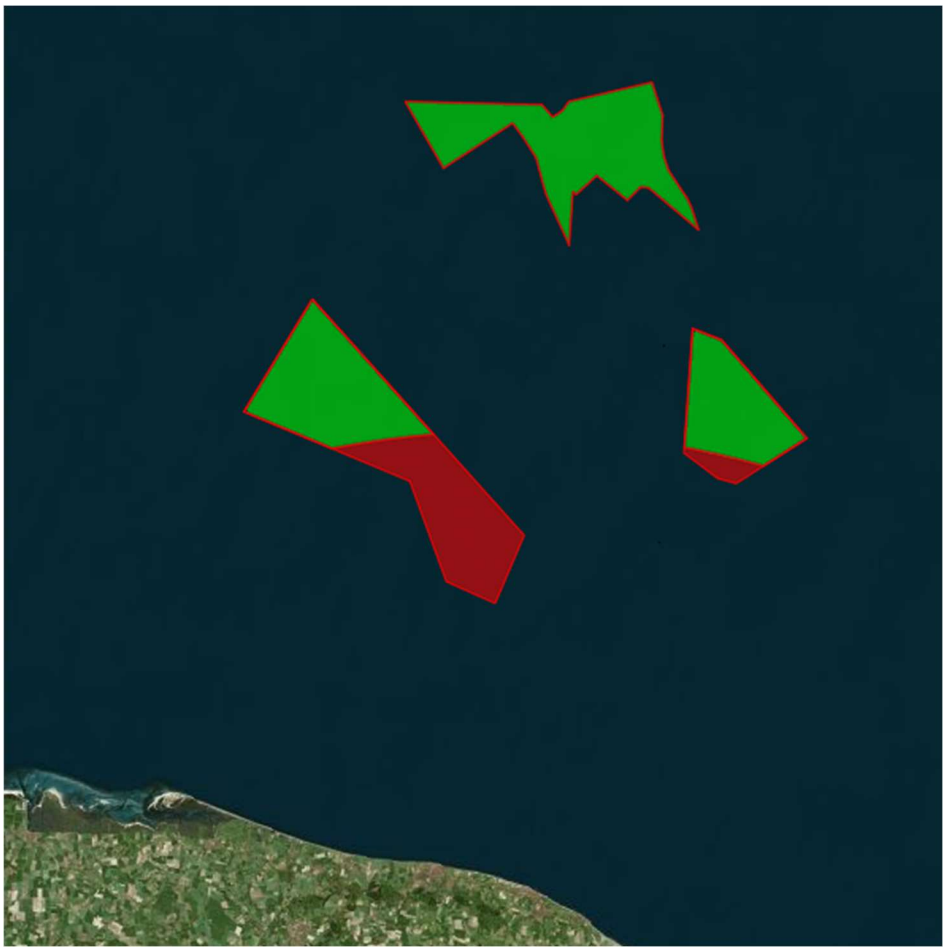

Figure 9 – Extension safe areas (green)

Point	Latitude	Longitude
1*	53:10:16.158	1:25:34.218
2*	53:9:43.810	1:29:48.979
3	53:10:38.840	1:32:6.340
4	53:13:44.720	1:27:26.100
5	53:14:5.350	1:25:52.570

Table 4 – New Dudgeon South Area Coordinates

*Points 1 and 2 joined by a 55660m arc centred on NDB NWI (52:40:39.15, 1:17:29.41)

Point	Latitude	Longitude
1*	53:9:57.646	1:6:46.098
2*	53:10:29.771	1:12:10.232
3	53:14:44.110	1:5:29.630
4	53:11:4.110	1:2:0.070

Table 5 – New Sheringham Area Coordinates

*Points 1 and 2 joined by a 55660m arc centred on NDB NWI (52:40:39.15, 1:17:29.41)

2.3 Arrivals

2.3.1 NDB(L)/DME RWY 09 (AD 2.EGSH-8-1 01 Dec 2022)

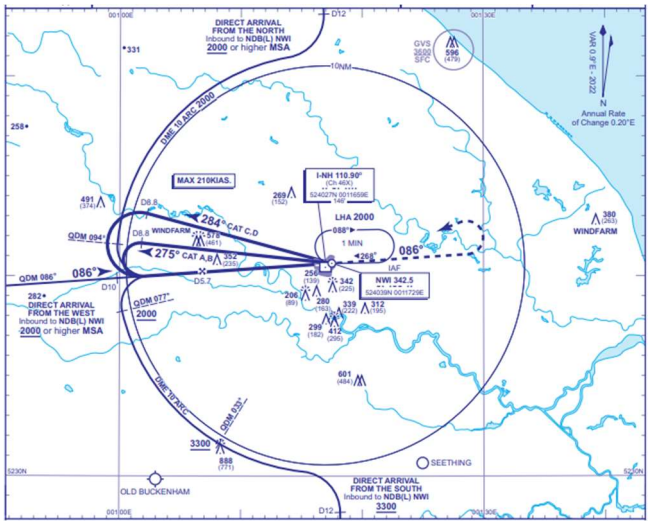

Figure 10 – NDB(L)/DME RWY 09 Procedure

In absence of textual descriptions of the Direct arrivals, they are deemed to commence at D12 I-NH, therefore the proposed wind farms are outside all protection areas.

The wind farm would have no impact on the published procedure.

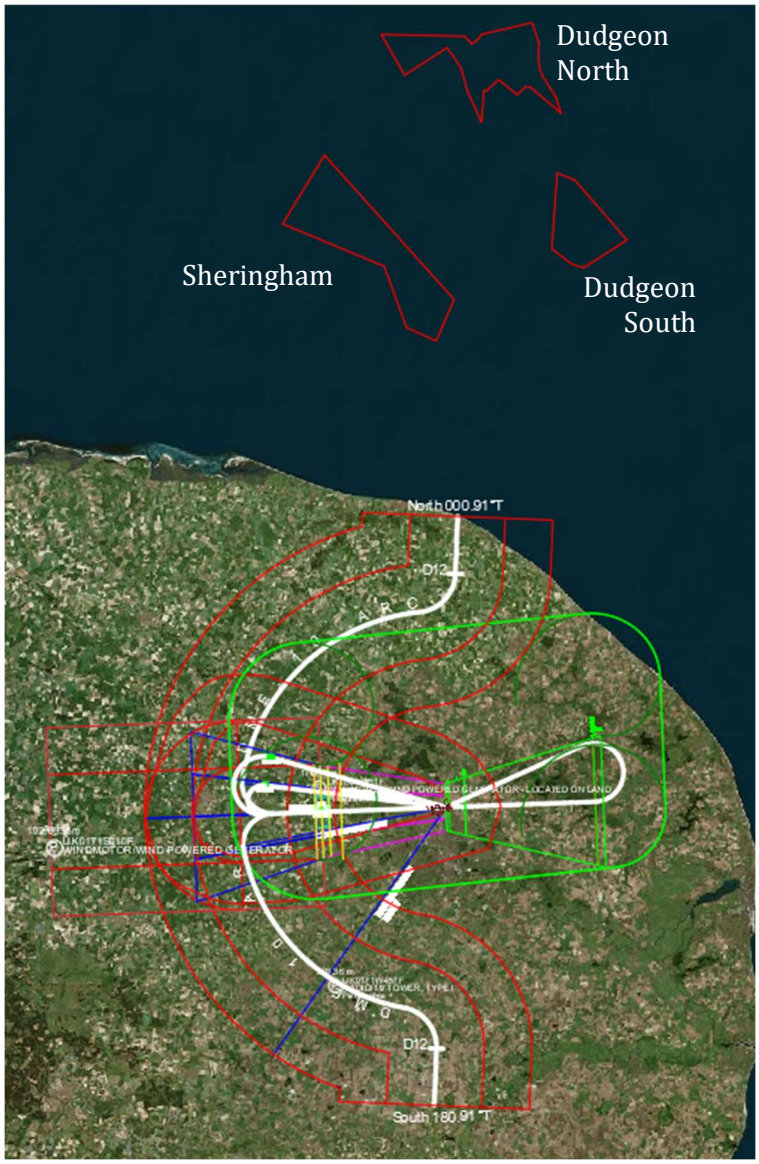

Figure 11 – NDB(L)/DME RWY 09 Protection Areas

2.3.2 ILS/DME/NDB(L) RWY 27 (AD 2.EGSH-8-2 01 Dec 2022)

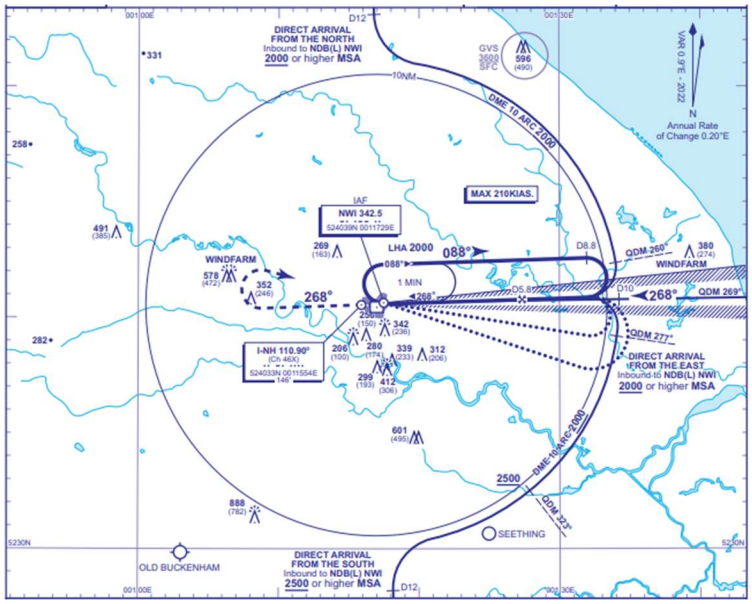

Figure 12 – ILS/DME/NDB(L) RWY 27 Procedure

In absence of textual descriptions of the Direct arrivals, they are deemed to commence at D12 I-NH, therefore the proposed wind farms are outside all protection areas.

The wind farm would have no impact on the published procedure.

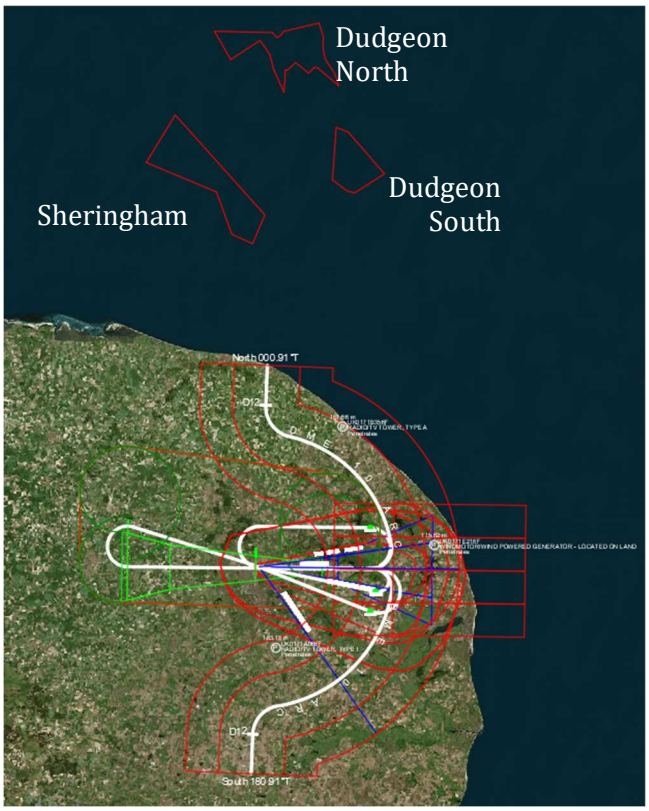

Figure 13 – ILS/DME/NDB(L) RWY 27 Protection Areas

2.3.3 LOC/DME/NDB(L) RWY 27 (AD 2.EGSH-8-3 01 Dec 2022)

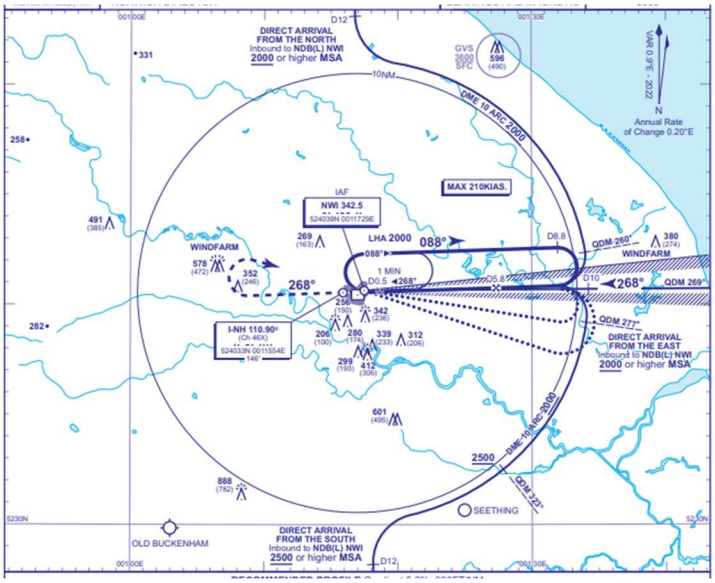

Figure 14 – LOC/DME/NDB(L) RWY 27 Procedure

In absence of textual descriptions of the Direct arrivals, they are deemed to commence at D12 I-NH, therefore the proposed wind farms are outside all protection areas.

The wind farm would have no impact on the published procedure.

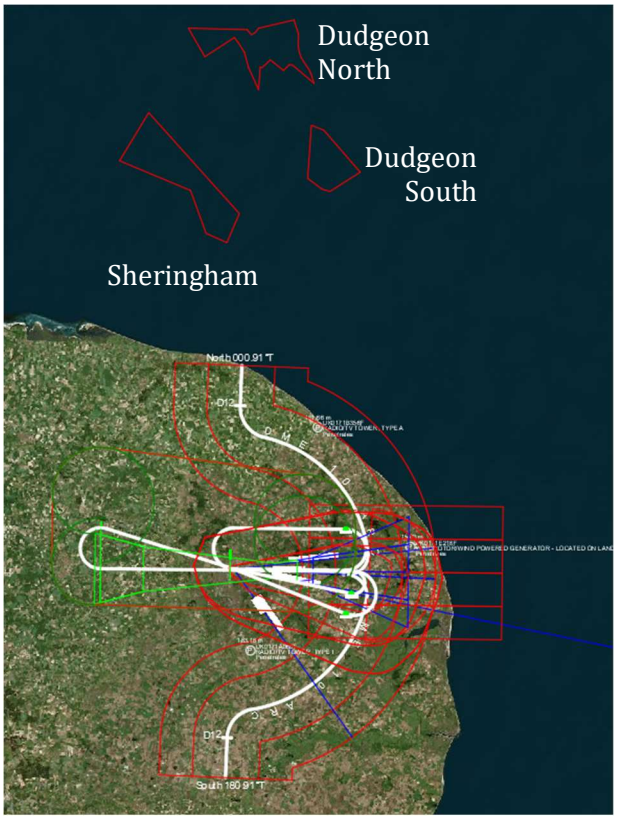

Figure 15 – LOC/DME/NDB(L) RWY 27 Protection Areas

2.3.4 NDB(L)/DME RWY 27 (AD 2.EGSH-8-4 01 Dec 2022)

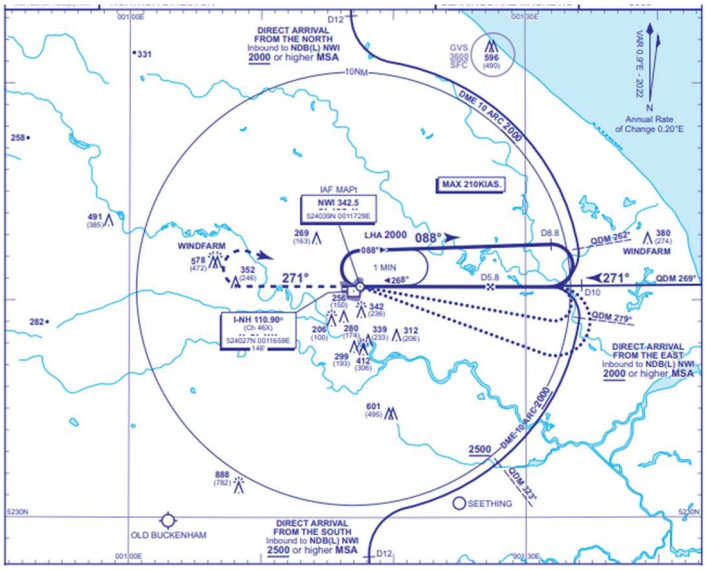

Figure 16 – NDB(L)/DME RWY 27 Procedure

In absence of textual descriptions of the Direct arrivals, they are deemed to commence at D12 I-NH, therefore the proposed wind farms are outside all protection areas.

The wind farm would have no impact on the published procedure.

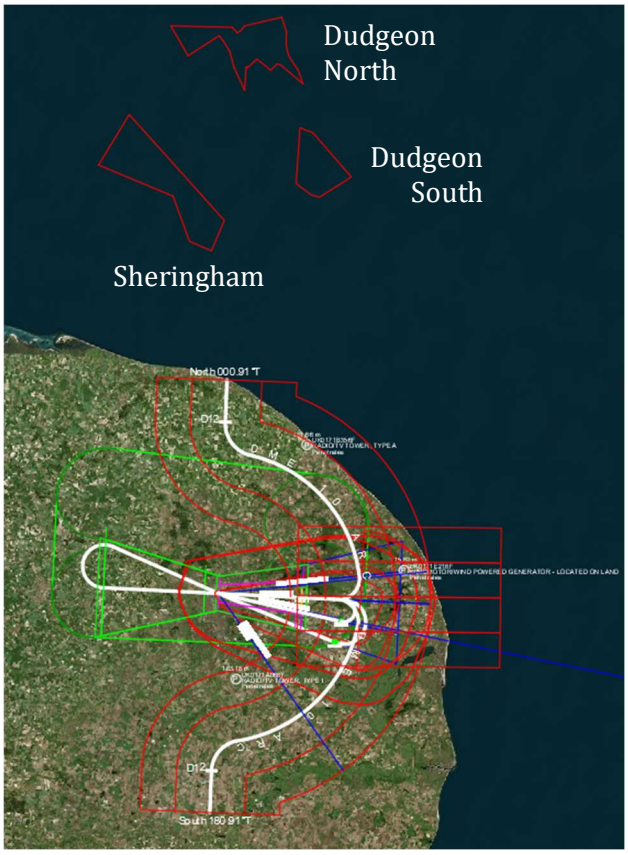

Figure 17 – NDB(L)/DME RWY 27 Protection Areas

2.4 Visual Manoeuvring (Circling)

The proposed wind farm is outside all protection areas.

The wind farm would have no impact on the Visual Circling.

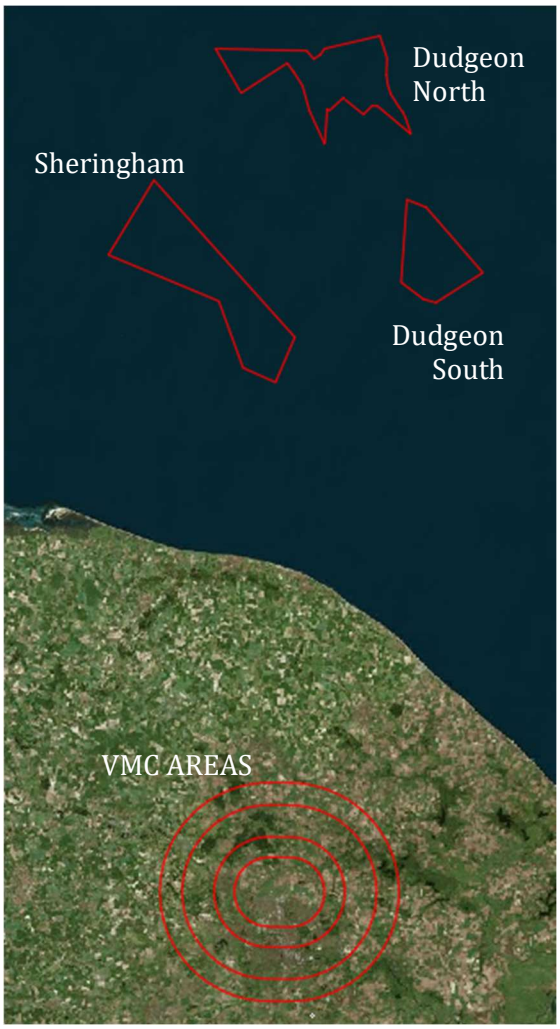

Figure 18 – NDB(L)/DME RWY 27 Protection Areas

2.5 Visual Segment Surface (VSS)

The proposed wind farm is outside all VSS areas.

The wind farm would have no impact on the VSS for both runways.

Figure 19 – VSS Protection Areas

2.6 Holding

The proposed wind farm is outside the protection area of the hold.

The wind farm would have no impact on the hold.

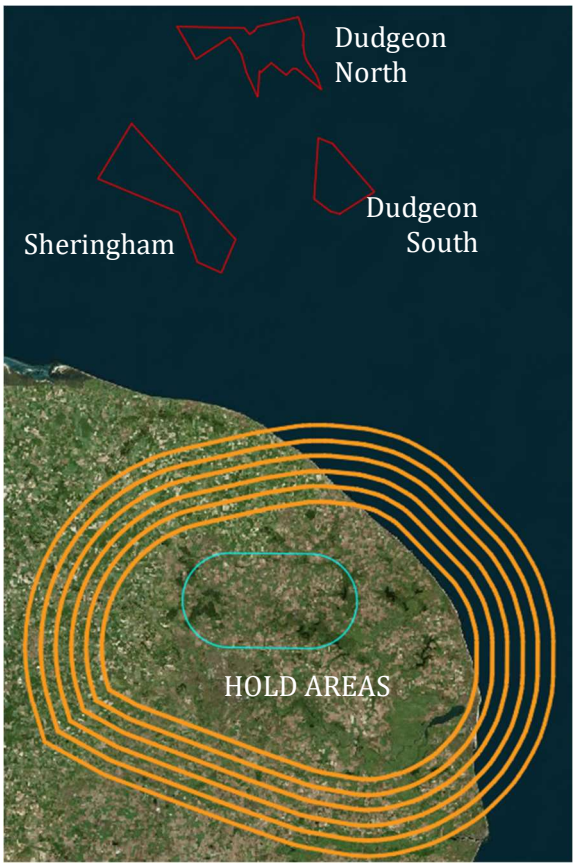

Figure 20 – Hold Protection Areas

3 Conclusions

Impact on the ATCSMAC

The proposed wind farm extensions at Sheringham and Dudgeon South would impact the Norwich Airport's ATCSMAC.

Impact on the MSA

The proposed wind farm extensions at Sheringham and Dudgeon South would impact the Norwich Airport's MSA's.

Impact on the IFPs

The proposed wind farm extensions at Sheringham and Dudgeon South would not impact the IFPs.

REPORT ENDS