

**Effects of Beaw Field Windfarm
Development on Scatsta
Airport Instrument Flight
Procedures**

Document information	
Document title	Effects of Beaw Field Windfarm Development on Scatsta Airport Instrument Flight Procedures
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Produced under contract	PO – 43087 & 43088
Version	1
Copy Number	1 of 2
Date of release	20 October 2015
Document reference	CL-5152-DOC-004 V1

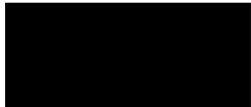
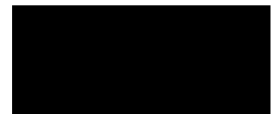
Change History Record

Issue	Change Reference	Date	Details
Draft A		17 October 2015	Internal review
1.0		20 October 2015	Initial Issue

Controlled Copy Distribution

Copy Number	Ownership
1.	Peel Energy Limited
2.	Cyrrus Limited

Document Release

Organisation	Name and signature	Position	Date
Cyrrus Limited	 Liam Clarke	IFP Designer	20/10/2015
Cyrrus Limited	 Garyth Lofthouse	Director	20/10/2015

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Executive Summary

This report details the effects of the planned Beaw Field wind farm development on the Obstacle Limitation Surfaces and Instrument Flight Procedures serving Scatsta Airport.

The main findings of this report are as follows:

- Assessment of the CAP168 Obstacle Limitation Surfaces found that no turbines penetrate any surface;
- The existing NDB (L) Runway 24 Instrument Approach procedure would be significantly affected by the operation of the wind farm. The Initial segment (base turn) Minimum Obstacle Clearance Altitude would have to be raised from 1700ft to 2000ft. The effects of the turbines on the Intermediate segment would require the procedure to be redesigned;
- The proposed GNSS LNAV / APV Runway 24 and planned GNSS LNAV / APV Runway 06 would be unaffected by the proposed development;
- All procedures, including those which are not affected from a procedure design perspective will require re-charting with the proposed wind-farm shown as a new obstacle and the new MOCAs where applicable.

Abbreviations

AMSL	Above Mean Sea Level
APV	Approach Procedure with Vertical Guidance
ATC	Air Traffic Control
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
DME	Distance Measuring Equipment
DSM	Digital Surface Model
FAF	Final Approach Fix
FAVA	Final Approach Vectoring Area
GNSS	Global Navigation Satellite System
IAF	Initial Approach Fix
IFP	Instrument Flight Procedure
LHA	Lowest Holding Altitude
LOC	Localiser
LNAV	Lateral Navigation
MOCA	Minimum Obstacle Clearance Altitude
MSA	Minimum Sector Altitudes
NDB	Non-Directional Beacon
OCA	Obstacle Clearance Altitude
RW	Runway
SOC	Start of Climb

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1. Introduction

1.1. Background

1.1.1. Peel Energy Ltd wish to develop a wind farm known as Beaw Field located in the Shetland Islands. The site of the proposed development is located approximately 15km North-East of Scatsta Airport and is currently planned to comprise 17 wind turbine generators each with a planned tip height of 145m above ground level (AGL).

1.1.2. This report was commissioned to evaluate the updated Beaw Field array as of October 2015.

1.2. Data Used

1.2.1. The proposed wind turbine positions and heights were provided by the client. The received co-ordinates were in OSGB36 and converted to ETRS89 Geodetic. Tip Altitudes were calculated using Digital Surface Model (DSM) terrain files. Terrain values were rounded up to the nearest 5m as a conservative measure. A lateral tolerance of 100m was used for assessment of each turbine.

OSGB36 - NG				ETRS89 Geodetic		Next Contour (M)
	X	Y		North	West	
Turbine 1	450454	1183369	(=)	60° 31' 50.748"N	1° 4' 57.126"W	100
Turbine 2	450654	1183105	(=)	60° 31' 42.125"N	1° 4' 44.205"W	110
Turbine 3	451094	1183089	(=)	60° 31' 41.409"N	1° 4' 15.410"W	125
Turbine 4	450670	1182757	(=)	60° 31' 30.871"N	1° 4' 43.481"W	95
Turbine 5	451343	1182860	(=)	60° 31' 33.894"N	1° 3' 59.254"W	85
Turbine 6	450910	1182525	(=)	60° 31' 23.265"N	1° 4' 27.990"W	120
Turbine 7	451627	1182659	(=)	60° 31' 27.268"N	1° 3' 40.831"W	50
Turbine 8	451079	1182243	(=)	60° 31' 14.074"N	1° 4' 17.130"W	95
Turbine 9	451998	1182488	(=)	60° 31' 21.570"N	1° 3' 16.678"W	65
Turbine 10	451679	1182109	(=)	60° 31' 9.469"N	1° 3' 37.975"W	55
Turbine 11	451233	1181946	(=)	60° 31' 4.406"N	1° 4' 7.360"W	95
Turbine 12	452190	1182208	(=)	60° 31' 12.432"N	1° 3' 4.340"W	70
Turbine 13	451966	1181818	(=)	60° 30' 59.932"N	1° 3' 19.406"W	95
Turbine 14	451477	1181723	(=)	60° 30' 57.087"N	1° 3' 51.565"W	75
Turbine 15	452111	1181525	(=)	60° 30' 50.395"N	1° 3' 10.150"W	85
Turbine 16	451603	1181433	(=)	60° 30' 47.657"N	1° 3' 43.589"W	60
Turbine 17	452358	1181254	(=)	60° 30' 41.523"N	1° 2' 54.262"W	70

Table 1 – Wind Turbine Data

1.2.2. Other data used included the United Kingdom AIP, CAP 232 2014 Survey Data, Digital Vertical Obstruction File (DVOF) and Digital terrain data.

2. CAP 168 Check

- 2.1. The purpose of the CAP 168 surfaces is to define the volume of airspace that should be ideally kept free from obstacles to minimize the danger presented by an obstacle to an aircraft in the vicinity of an airport.
- 2.2. Scatsta Airport runway 24 is a Code 3 Non-Precision Instrument runway and runway 06 is currently a Non-Instrument runway. The evaluation was made with runway 06 as a non-precision runway due to the planned introduction of LNAV / APV.

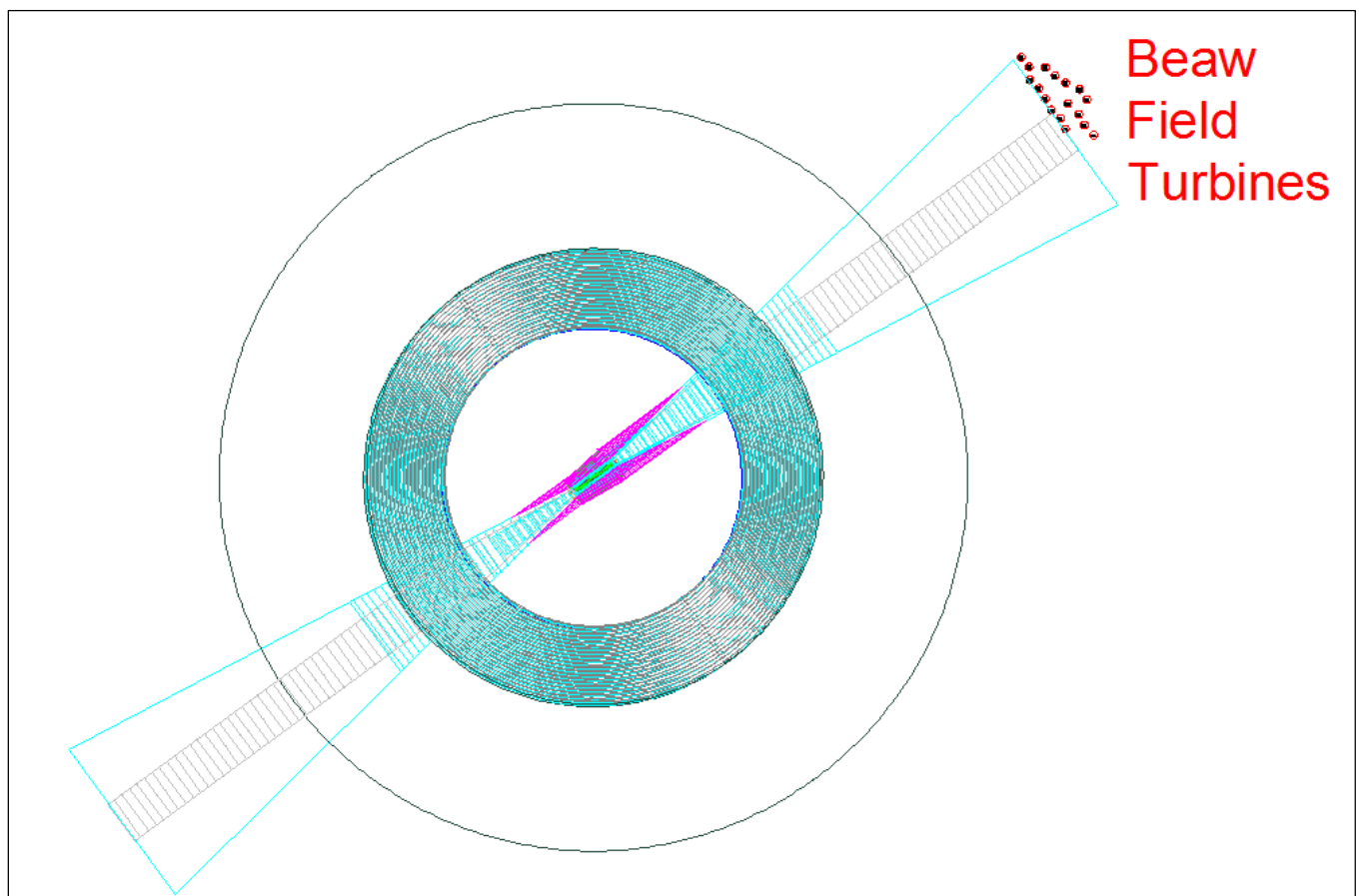


Figure 1 CAP 168 Surfaces – Runways 06 and 24

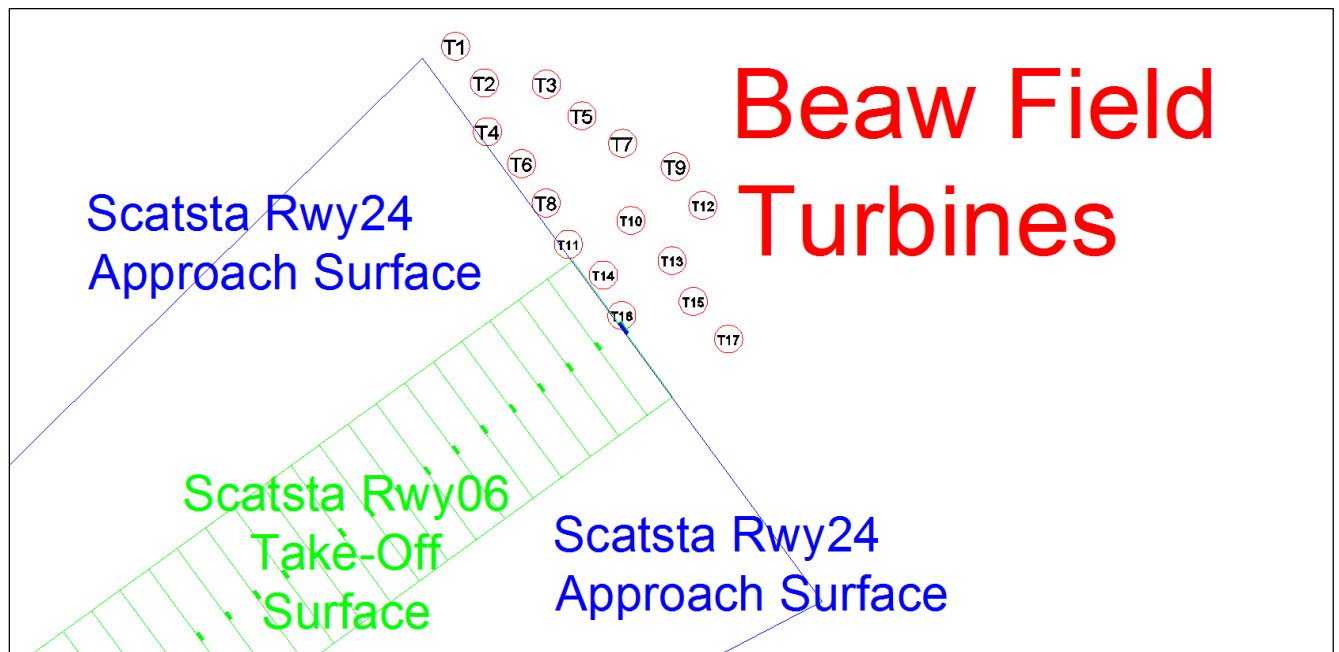


Figure 2 CAP 168 Surfaces – Runways 06 and 24 (Detail)

- 2.3. As can be seen in the previous two Figures there is lateral infringement of the OLS when a 100m buffer radius is applied. The 100m is excessive and using a 45m or 54m buffer the OLS is not infringed. The planned blade lengths are 45m or 54m.

3. ATC Radar Vectoring Minimum Altitudes

- 3.1. A Surveillance Minimum Altitude Area (SMAA) is a defined area in the vicinity of an aerodrome, in which the minimum safe levels allocated by a controller vectoring IFR flights with Primary and/or Secondary Surveillance RADAR equipment have been predetermined.
- 3.2. A Final Approach Vectoring Area (FAVA) is provided when further descent, either on the final approach track, or while establishing on the final approach track, provides operational flexibility.

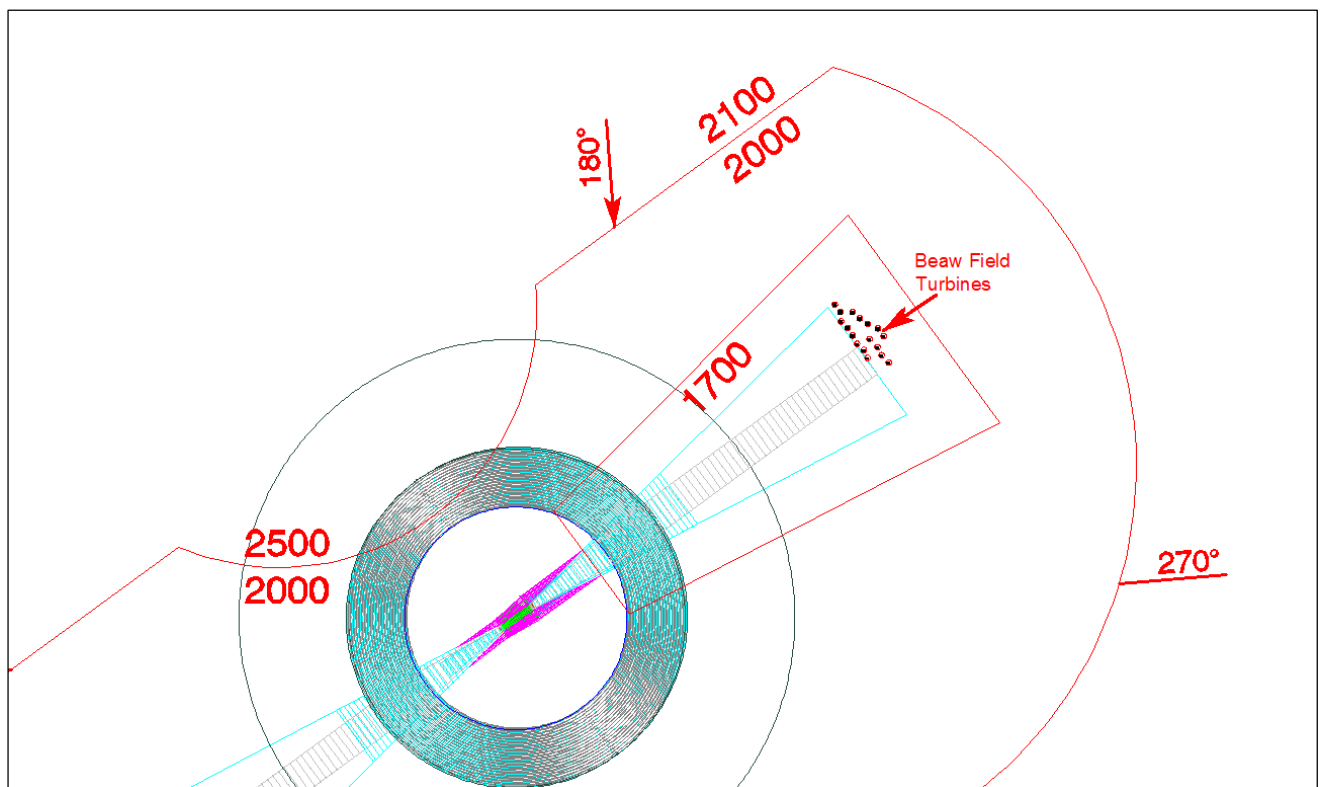


Figure 3 – ATC Radar Vectoring Minimum Altitudes

- 3.3. As can be seen in the previous Figure the proposed turbines are situated in the FAVA with a minimum ATC radar vectoring altitude of 1700ft.
- 3.4. The Minimum Obstacle Clearance (MOC) is 150m. The following extract is from CAP777 (P.21):

“Within the FAVA, a reduced clearance of 150 m (492 ft) above obstacles shall be applied and this figure will be rounded up to the nearest hundreds of feet.”
- 3.5. An assessment was carried out to determine whether any of the planned turbines would require an increase to the published 1700ft.

General	
Primary MOC	150 m
Obstacles	
Number of Checked Obstacles	2020

Name	Latitude	Longitude	Alt. (m)	MOC applied (m)	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	150.0	420.0	1378.0
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	150.0	415.0	1361.6
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	150.0	405.0	1328.8
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	150.0	395.0	1296.0
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	150.0	390.0	1279.6
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	150.0	390.0	1279.6
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	150.0	390.0	1279.6
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	150.0	390.0	1279.6
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	150.0	380.0	1246.8
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	150.0	380.0	1246.8
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	150.0	370.0	1214.0
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	150.0	365.0	1197.6
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	150.0	365.0	1197.6
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	150.0	360.0	1181.2
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	150.0	355.0	1164.7
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	150.0	350.0	1148.3
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	150.0	345.0	1131.9

Table 2 – ATC Radar Vectoring Minimum Altitudes Assessment

- 3.6. As can be seen in the previous table, there are no penetrations of the FAVA by Beaw Field Wind Farm.
- 3.7. The ATC Radar Vectoring Minimum Altitudes are unaffected by Beaw Field Wind Farm.

4. Holding Patterns

- 4.1. The holding patterns at Scatsta were considered. The published and proposed holds have a Lowest Holding Altitude (LHA) of 2000ft.

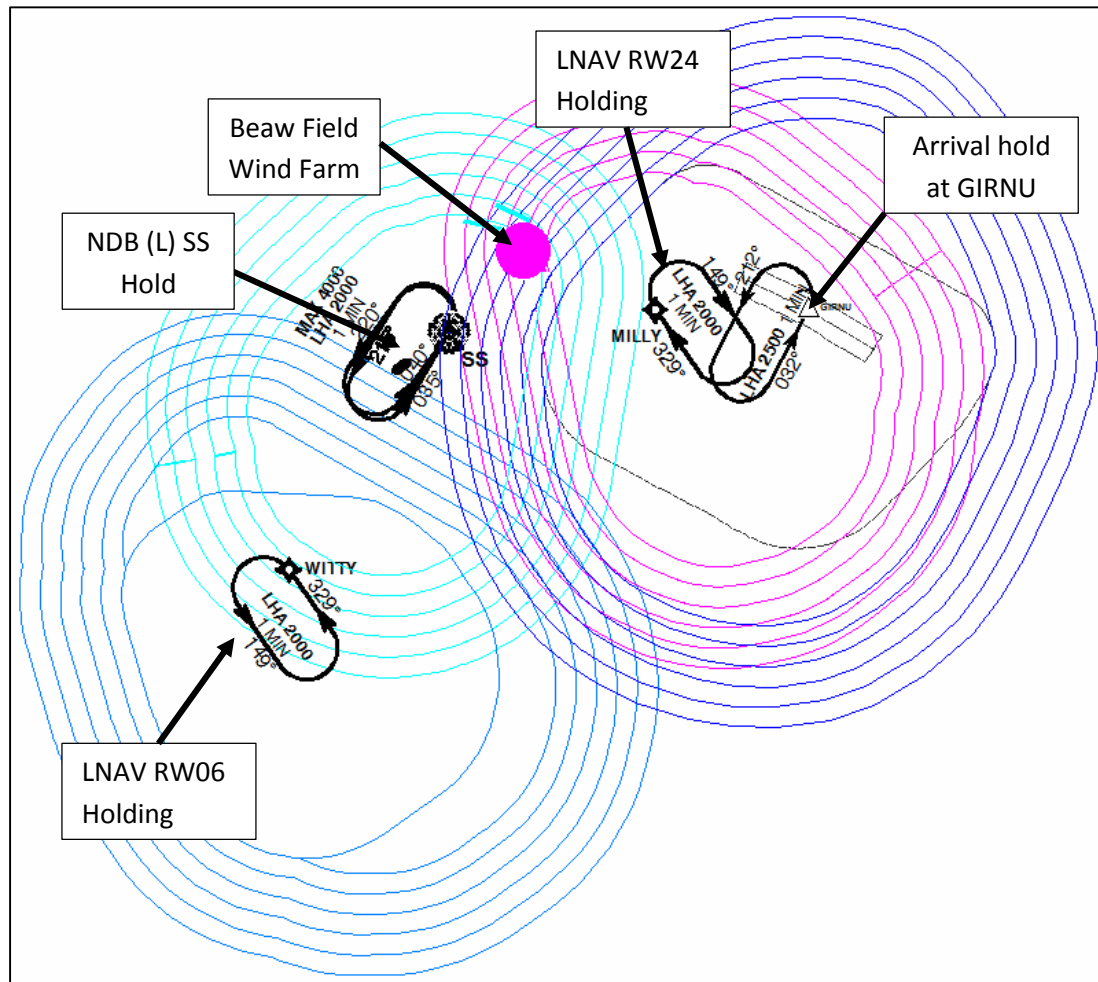


Figure 4 – Scatsta Holding Patterns

- 4.2. As can be seen in the previous picture the proposed turbines are situated within the protection areas of the NDB (L) SS Hold, proposed LNAV RW24 Hold and the arrival Hold at GIRNU.

Checked Turbines – Minimum Altitude 2000ft

General	
Primary MOC	300 m
Obstacles	
Number of Checked Obstacles	2020

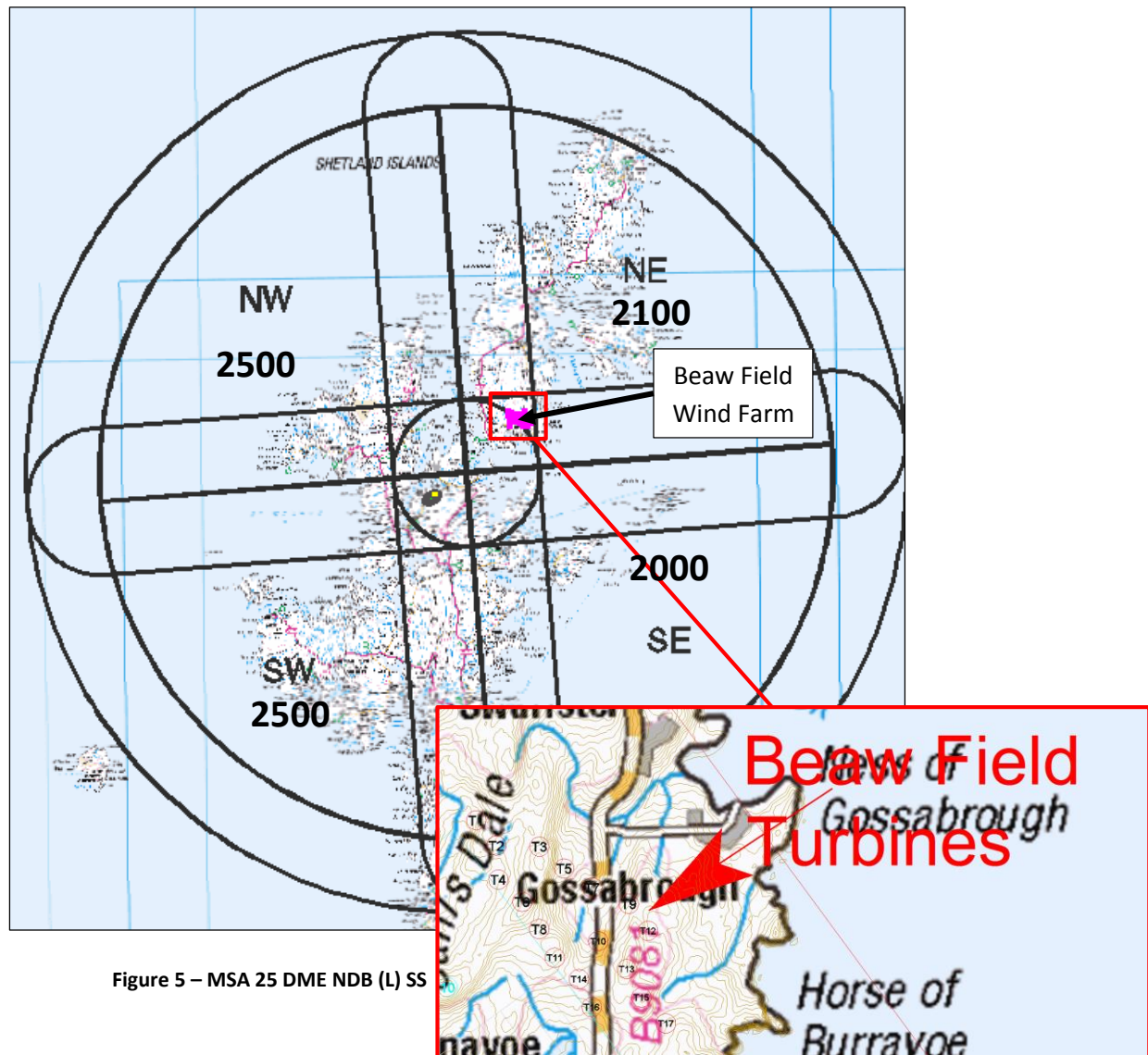
Name	Latitude	Longitude	Alt. (m)	MOC applied (m)	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	300.0	570.0	1870.1
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	300.0	565.0	1853.7
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	300.0	555.0	1820.9
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	300.0	545.0	1788.1
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	300.0	540.0	1771.7
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	300.0	540.0	1771.7
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	300.0	540.0	1771.7
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	300.0	540.0	1771.7
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	300.0	530.0	1738.9
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	300.0	530.0	1738.9
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	300.0	520.0	1706.1
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	300.0	515.0	1689.7
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	300.0	515.0	1689.7
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	300.0	510.0	1673.3
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	300.0	505.0	1656.9
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	300.0	500.0	1640.5
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	300.0	495.0	1624.1

Table 3 – Scatsta Holding Patterns Assessment

- 4.3. As can be seen in the previous table none of the turbines penetrate the obstacle protection areas for the holding patterns at Scatsta.
- 4.4. The Holding Patterns are not affected by the proposed Beaw Field Wind Farm.

5. Minimum Sector Altitudes (MSA)

5.1. The Minimum Sector Altitudes (MSA) at Scatsta Airport were considered.



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5.2. The lowest current MSA quadrant is 270° - 360° with a minimum alt of 2000ft.

Checked Turbines MSA 0 - 90° - Minimum Altitude 2100ft

Name	Latitude	Longitude	Alt. (m)	MOC applied (m)	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	300.0	570.0	1870.1
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	300.0	565.0	1853.7
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	300.0	555.0	1820.9
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	300.0	545.0	1788.1
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	300.0	540.0	1771.7
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	300.0	540.0	1771.7
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	300.0	540.0	1771.7
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	300.0	540.0	1771.7
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	300.0	530.0	1738.9
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	300.0	530.0	1738.9
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	300.0	520.0	1706.1
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	300.0	515.0	1689.7
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	300.0	515.0	1689.7
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	300.0	510.0	1673.3
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	300.0	505.0	1656.9
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	300.0	500.0	1640.5
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	300.0	495.0	1624.1

Table 4 – Minimum Sector Altitude – 0 - 90° Assessment

Checked Turbines MSA 90 - 180° - Minimum Altitude 2000ft

Name	Latitude	Longitude	Alt. (m)	MOC applied (m)	OCA (m)	OCA (ft)
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	300.0	515.0	1689.7
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	300.0	505.0	1656.9

Table 5 – Minimum Sector Altitude – 90 - 180° Assessment

Checked Turbines MSA 180 - 270° - Minimum Altitude 2500ft

Turbines Not In Area

Table 6 – Minimum Sector Altitude – 180 - 270° Assessment

Checked Turbines MSA 270 - 360° - Minimum Altitude 2500ft

Turbines Not In Area

Table 7 – Minimum Sector Altitude – 270 - 360° Assessment

5.3. As can be seen in the previous tables none of the turbines penetrate the obstacle protection areas for the Minimum Sector Altitudes at Scatsta Airport.

5.4. The Minimum Sector Altitudes are not affected by the proposed Beaw Field Wind Farm.

6. Visual Circling

- 6.1. As can be seen in the following Figure, Beaw Field Wind Farm is outside the lateral confines of the Visual Circling obstacle protection areas at Scatsta Airport.

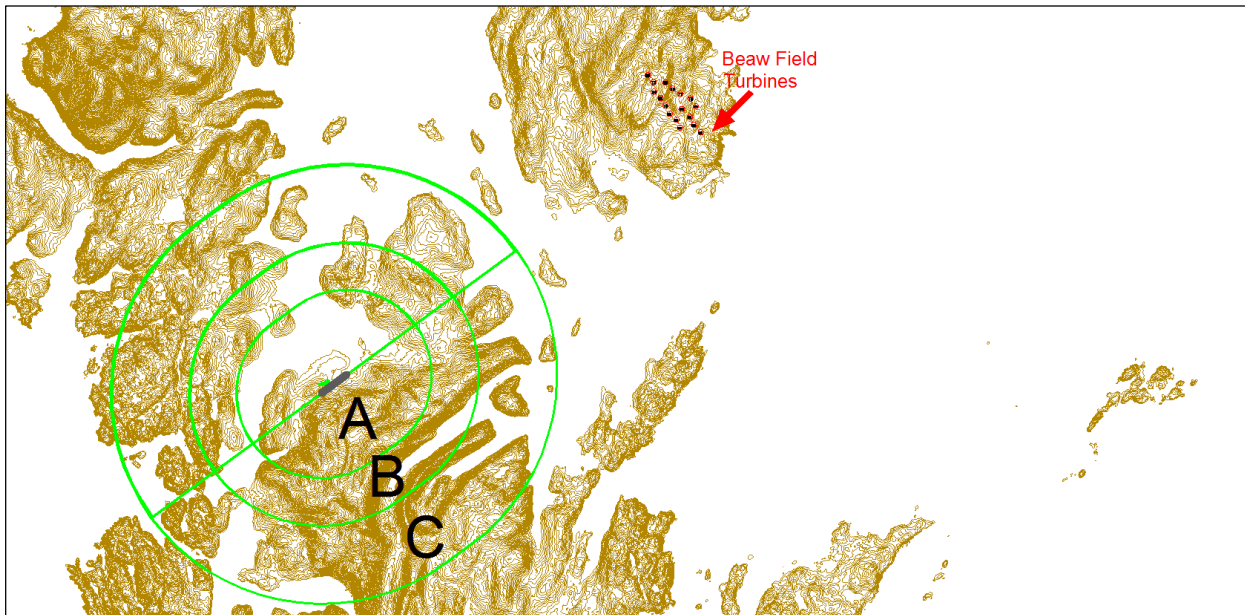


Figure 6 – Visual Circling

- 6.2. The Visual Circling altitudes are not affected by the proposed Beaw Field Wind Farm.

7. NDB (L) Runway 24 – Existing Procedure

- 7.1. The currently published NDB (L) RW24 procedure is considered. All of the turbines are within the Primary protection area of the Initial segment (base turn).

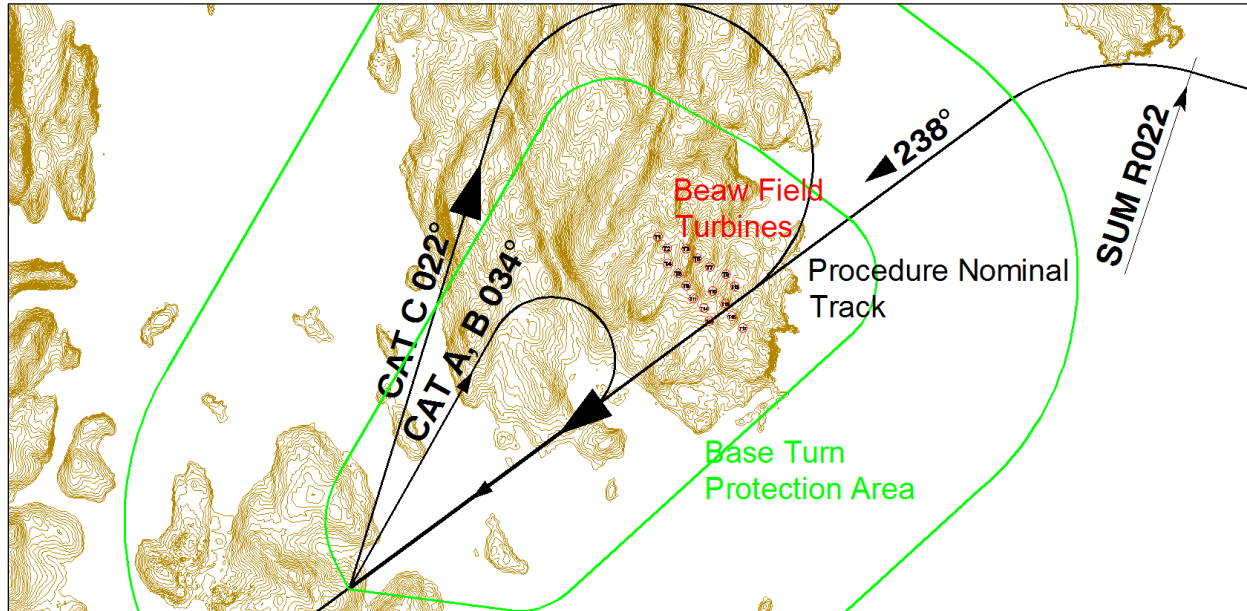


Figure 7 – NDB (L) RW24 Initial Segment Protection Areas (from Base Turn)

Checked Turbines Initial Segment Minimum Altitude 1700ft

General	
Primary MOC	300 m
Obstacles	
Number of Checked Obstacles	17

Name	Latitude	Longitude	Alt. (m)	Area	MOC applied (m)	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	Primary	300.0	570.0	1870.1
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	Primary	300.0	565.0	1853.7
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	Primary	300.0	555.0	1820.9
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	Primary	300.0	545.0	1788.1
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	Primary	300.0	540.0	1771.7
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	Primary	300.0	540.0	1771.7
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	Primary	300.0	540.0	1771.7
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	Primary	300.0	540.0	1771.7
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	Primary	300.0	530.0	1738.9
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	Primary	300.0	530.0	1738.9
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	Primary	300.0	520.0	1706.1
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	Primary	300.0	515.0	1689.7
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	Primary	300.0	515.0	1689.7
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	Primary	300.0	510.0	1673.3
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	Primary	300.0	505.0	1656.9
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	Primary	300.0	500.0	1640.5
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	Primary	300.0	495.0	1624.1

Table 8 – NDB (L) RWY 24 Initial Segment (base turn) Assessment

- 7.2. The presence of the turbines causes the MOCA to increase from the current value of 1700ft to 1870.1ft, which would be rounded up to 2000ft.
- 7.3. For the Intermediate segment from the Base Turn, all of the turbines are within the Primary obstacle protection area.

General	
Primary MOC	150 m
Obstacles	
Number of Checked Obstacles	17

Name	Latitude	Longitude	Alt. (m)	Trees (m)	Area	MOC applied	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	0.0	Primary	150.0	420.0	1378.0
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	0.0	Primary	150.0	415.0	1361.6
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	0.0	Primary	150.0	405.0	1328.8
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	0.0	Primary	150.0	395.0	1296.0
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	0.0	Primary	150.0	390.0	1279.6
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	0.0	Primary	150.0	390.0	1279.6
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	0.0	Primary	150.0	390.0	1279.6
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	0.0	Primary	150.0	390.0	1279.6
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	0.0	Primary	150.0	380.0	1246.8
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	0.0	Primary	150.0	380.0	1246.8
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	0.0	Primary	150.0	370.0	1214.0
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	0.0	Primary	150.0	365.0	1197.6
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	0.0	Primary	150.0	365.0	1197.6
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	0.0	Primary	150.0	360.0	1181.2
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	0.0	Primary	150.0	355.0	1164.7
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	0.0	Primary	150.0	350.0	1148.3
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	0.0	Primary	150.0	345.0	1131.9

Figure 8 – NDB (L) RW24 Intermediate Segment Protection Areas (from Base Turn)

- 7.4. The presence of the turbines would cause the MOCA to increase from the current value of 1005ft to 1378.0ft, which would be rounded up to 1400ft.
- 7.5. For the Intermediate segment from the Direct Arrival, all the turbines are again within the Primary obstacle protection area.

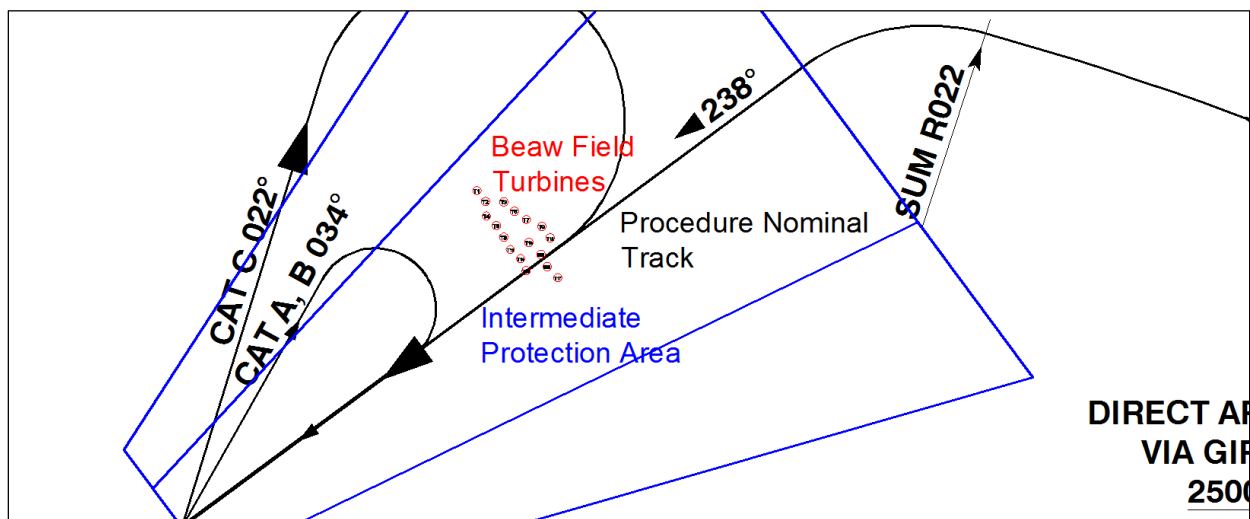


Figure 9 – NDB (L) RW24 Intermediate Segment Protection Areas (from Direct Arrival)

- 7.6. The presence of the turbines causes the MOCA to increase from the current value of 1005ft to 1378.0ft, which would be rounded up to 1500ft.

8. NDB DME Runway 24 – Proposed Procedure

- 8.1. The NDB DME Runway 24 draft design was considered. All of the turbines are within the Primary protection area of the Initial segment (base turn).

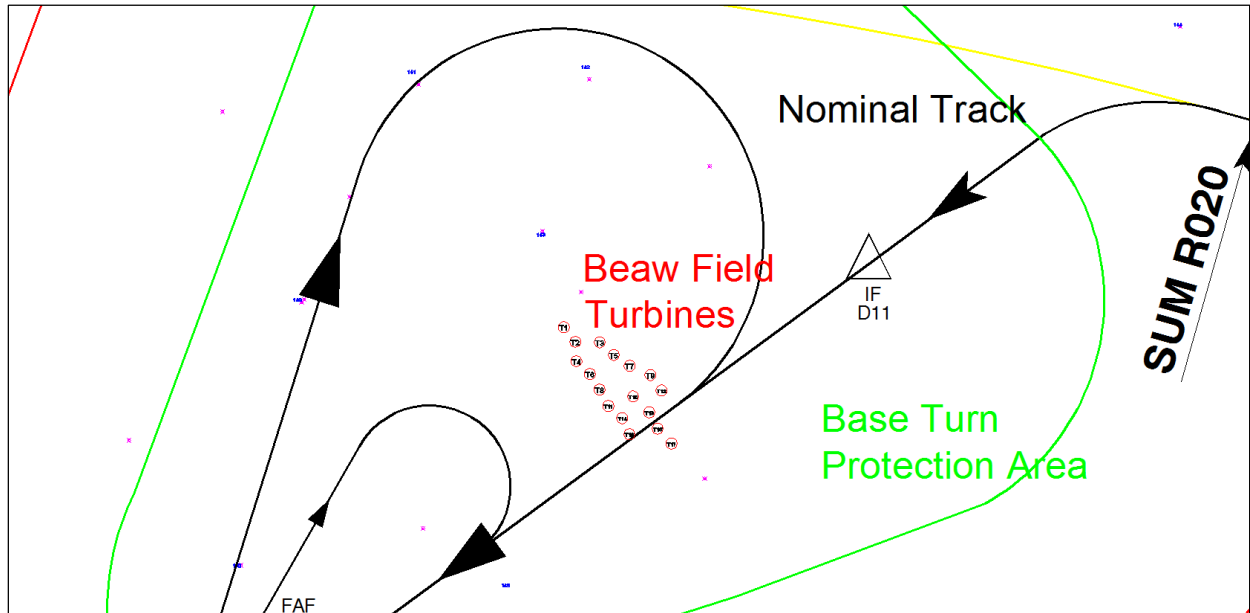


Figure 10 NDB DME RW24 Initial Segment Protection Areas (from Base Turn)

Checked Turbines Initial Segment Minimum Altitude 2000ft

General	
Primary MOC	300 m
Obstacles	
Number of Checked Obstacles	17

Name	Latitude	Longitude	Alt. (m)	Area	MOC applied (m)	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	Primary	300.0	570.0	1870.1
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	Primary	300.0	565.0	1853.7
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	Primary	300.0	555.0	1820.9
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	Primary	300.0	545.0	1788.1
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	Primary	300.0	540.0	1771.7
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	Primary	300.0	540.0	1771.7
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	Primary	300.0	540.0	1771.7
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	Primary	300.0	540.0	1771.7
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	Primary	300.0	530.0	1738.9
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	Primary	300.0	530.0	1738.9
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	Primary	300.0	520.0	1706.1
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	Primary	300.0	515.0	1689.7
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	Primary	300.0	515.0	1689.7
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	Primary	300.0	510.0	1673.3
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	Primary	300.0	505.0	1656.9
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	Primary	300.0	500.0	1640.5
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	Primary	300.0	495.0	1624.1

Table 9 NDB DME RWY 24 Initial Segment (base turn) Assessment

- 8.2. The presence of the turbines causes the MOCA to increase from the current value of 1700ft to 1870.1ft, which would be rounded up to 2000ft. This would not affect the Procedure Altitude of 2000ft.
- 8.3. For the Intermediate segment from the Direct Arrival and following the Base Turn, all the turbines are again within the Primary obstacle protection area.

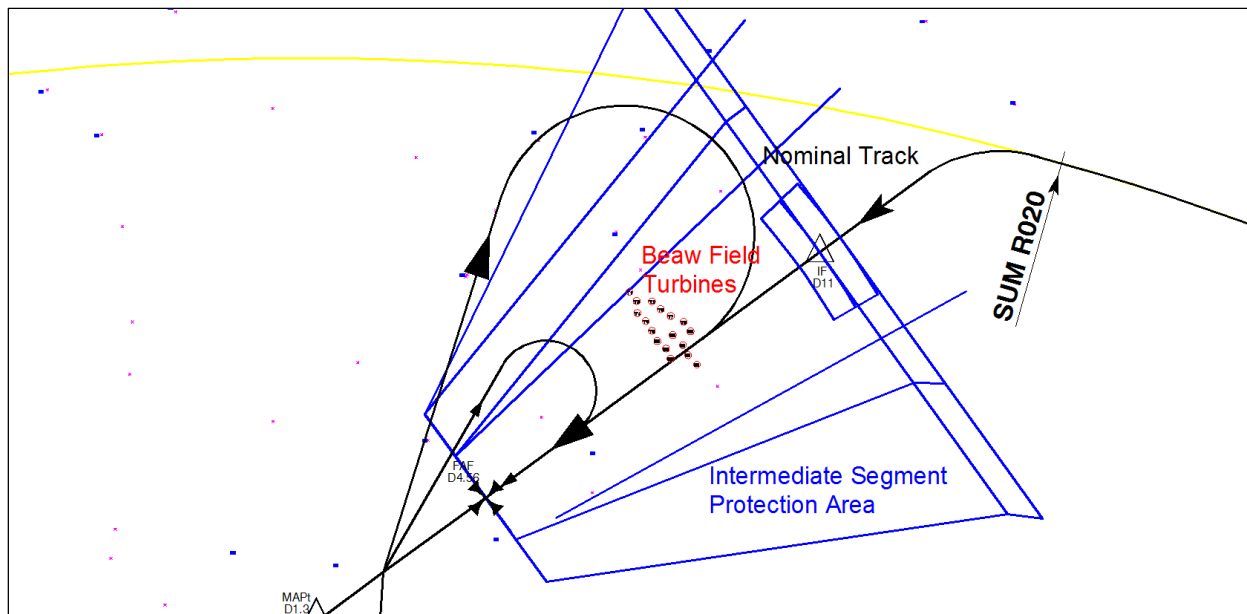


Figure 11 NDB DME RW24 Intermediate Segment Protection Areas (from Direct Arrival)

General	
Primary MOC	150 m
Obstacles	
Number of Checked Obstacles	17

Name	Latitude	Longitude	Alt. (m)	Trees (m)	Area	MOC applied	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	0.0	Primary	150.0	420.0	1378.0
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	0.0	Primary	150.0	415.0	1361.6
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	0.0	Primary	150.0	405.0	1328.8
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	0.0	Primary	150.0	395.0	1296.0
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	0.0	Primary	150.0	390.0	1279.6
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	0.0	Primary	150.0	390.0	1279.6
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	0.0	Primary	150.0	390.0	1279.6
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	0.0	Primary	150.0	390.0	1279.6
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	0.0	Primary	150.0	380.0	1246.8
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	0.0	Primary	150.0	380.0	1246.8
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	0.0	Primary	150.0	370.0	1214.0
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	0.0	Primary	150.0	365.0	1197.6
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	0.0	Primary	150.0	365.0	1197.6
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	0.0	Primary	150.0	360.0	1181.2
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	0.0	Primary	150.0	355.0	1164.7
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	0.0	Primary	150.0	350.0	1148.3
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	0.0	Primary	150.0	345.0	1131.9

Table 10 NDB DME RW24 Intermediate Segment Protection Areas (from Direct Arrival and after Base Turn)

- 8.4. The presence of the turbines causes the MOCA to increase from the current value of 1150.8ft to 1378.0ft, which would be rounded up to 1500ft. This would not affect the Procedure Altitude of 2000ft.

9. SRA RTR 0.5NM Runway 24 –Existing Procedure

- 9.1. The existing SRA RTR 0.5NM Runway 24 approach procedure is considered. All of the turbines are located within the protection areas of the Intermediate segment.

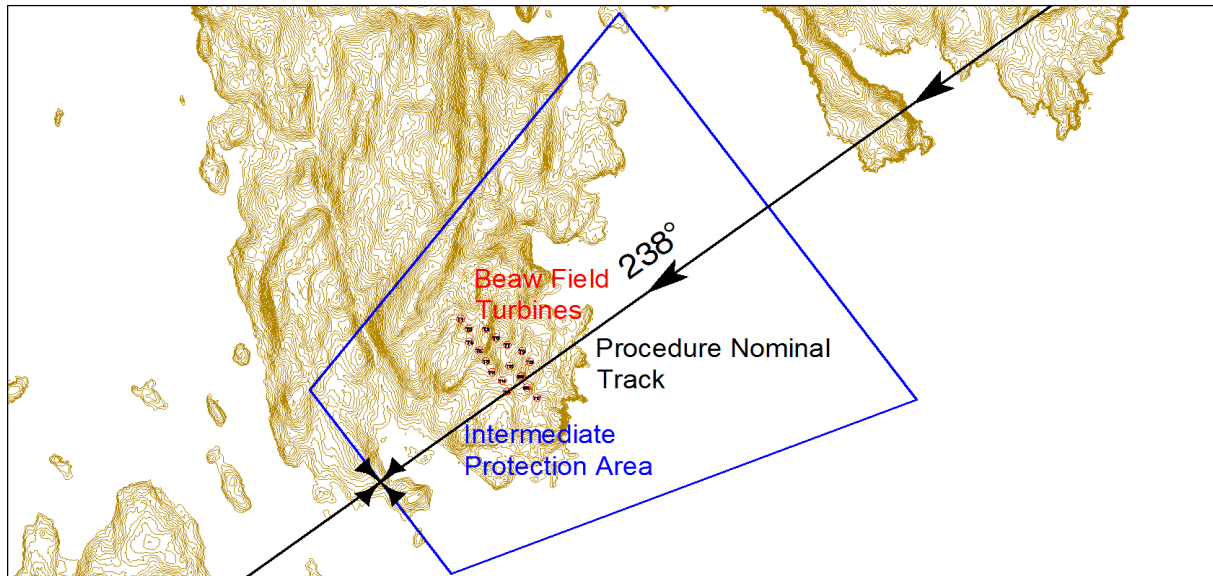


Figure 12 – SRA RTR 0.5 NM Intermediate Segment Protection Areas

Checked Turbines Intermediate Segment Minimum Altitude 2115ft

Name	Latitude	Longitude	Alt. (m)	Trees (m)	Area	MOC applied	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	0.0	Primary	150.0	420.0	1378.0
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	0.0	Primary	150.0	415.0	1361.6
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	0.0	Primary	150.0	405.0	1328.8
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	0.0	Primary	150.0	395.0	1296.0
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	0.0	Primary	150.0	390.0	1279.6
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	0.0	Primary	150.0	390.0	1279.6
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	0.0	Primary	150.0	390.0	1279.6
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	0.0	Primary	150.0	390.0	1279.6
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	0.0	Primary	150.0	380.0	1246.8
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	0.0	Primary	150.0	380.0	1246.8
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	0.0	Primary	150.0	370.0	1214.0
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	0.0	Primary	150.0	365.0	1197.6
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	0.0	Primary	150.0	365.0	1197.6
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	0.0	Primary	150.0	360.0	1181.2
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	0.0	Primary	150.0	355.0	1164.7
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	0.0	Primary	150.0	350.0	1148.3
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	0.0	Primary	150.0	345.0	1131.9

Table 11 – SRA RTR 0.5NM Intermediate Segment Assessment

- 9.2. The table above shows that the proposed wind turbines would require an OCA of 1378.0ft which would be rounded to 1400ft.
- 9.3. With an Intermediate Procedure Altitude of 2115ft the procedure would be unaffected.
- 9.4. The procedure may require re-charting to show the new obstacles.
- 9.5. The instrument approach procedure SRA RTR 0.5 NM Runway 24 is not affected by the proposed Beaw Field Windfarm development.

10. Offset LOC/DME/NDB (L) Runway 24 – Proposed Procedure

- 10.1. The proposed Offset LOC/DME/NDB (L) Runway 24 procedure is considered.
- 10.2. The turbines are within the lateral confines of the Initial base turn protection areas.

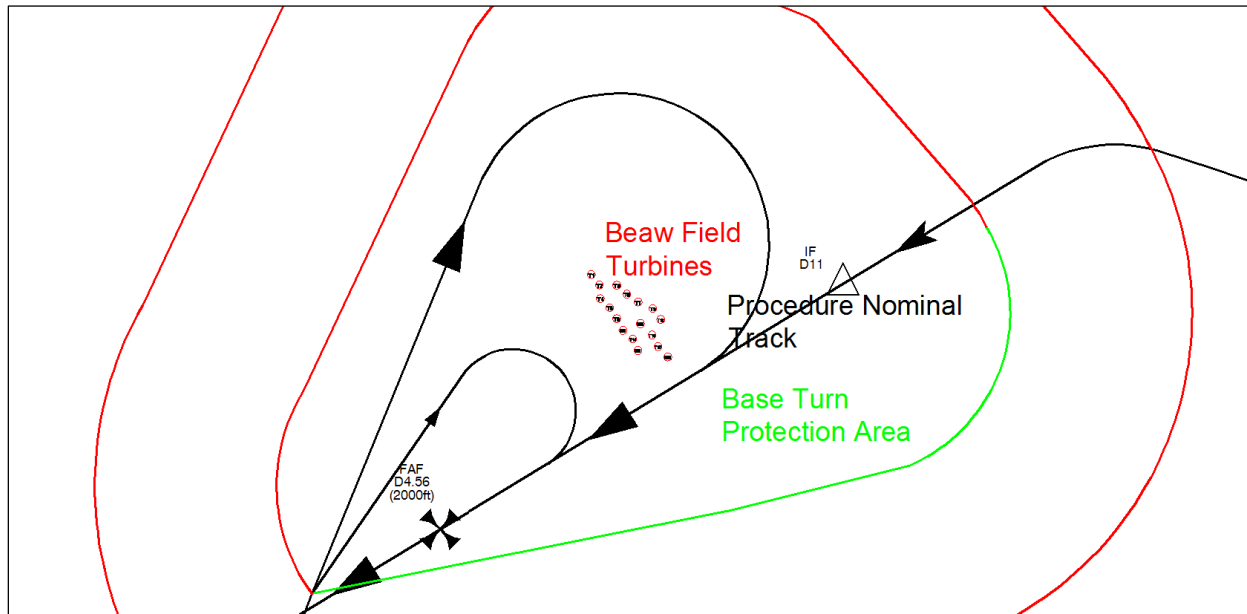


Figure 13 – Offset LOC/DME/NDB (L) RW24 Initial Segment Protection Areas (Base Turn)

Checked Turbines Initial Segment Minimum Altitude 2000ft

General	
Primary MOC	300 m
Obstacles	
Number of Checked Obstacles	17

Name	Latitude	Longitude	Alt. (m)	Area	MOC applied (m)	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	Primary	300.0	570.0	1870.1
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	Primary	300.0	565.0	1853.7
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	Primary	300.0	555.0	1820.9
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	Primary	300.0	545.0	1788.1
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	Primary	300.0	540.0	1771.7
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	Primary	300.0	540.0	1771.7
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	Primary	300.0	540.0	1771.7
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	Primary	300.0	540.0	1771.7
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	Primary	300.0	530.0	1738.9
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	Primary	300.0	530.0	1738.9
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	Primary	300.0	520.0	1706.1
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	Primary	300.0	515.0	1689.7
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	Primary	300.0	515.0	1689.7
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	Primary	300.0	510.0	1673.3
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	Primary	300.0	505.0	1656.9
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	Primary	300.0	500.0	1640.5
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	Primary	300.0	495.0	1624.1

Table 12 – Offset LOC/DME/NDB (L) RWY 24 Initial Segment Assessment

- 10.3. The table above shows that the proposed wind turbines do not penetrate the Offset LOC/DME/NDB (L) RW 24 Initial segment protection area.
- 10.4. For the Intermediate segment from the Base Turn, all turbines are within the protection areas.

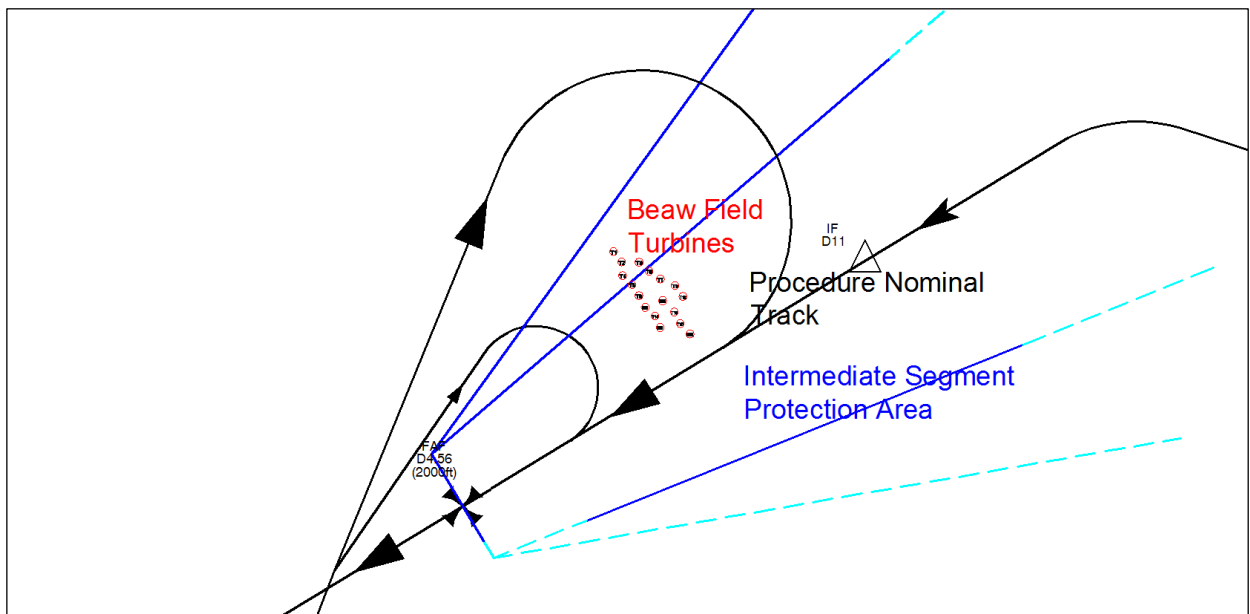


Figure 14 – Offset LOC/DME/NDB (L) RW24 Intermediate Segment Protection Areas (from Base Turn)

- 10.5. For the Intermediate segment from the Direct Arrival, all of the turbines are within the protection areas.

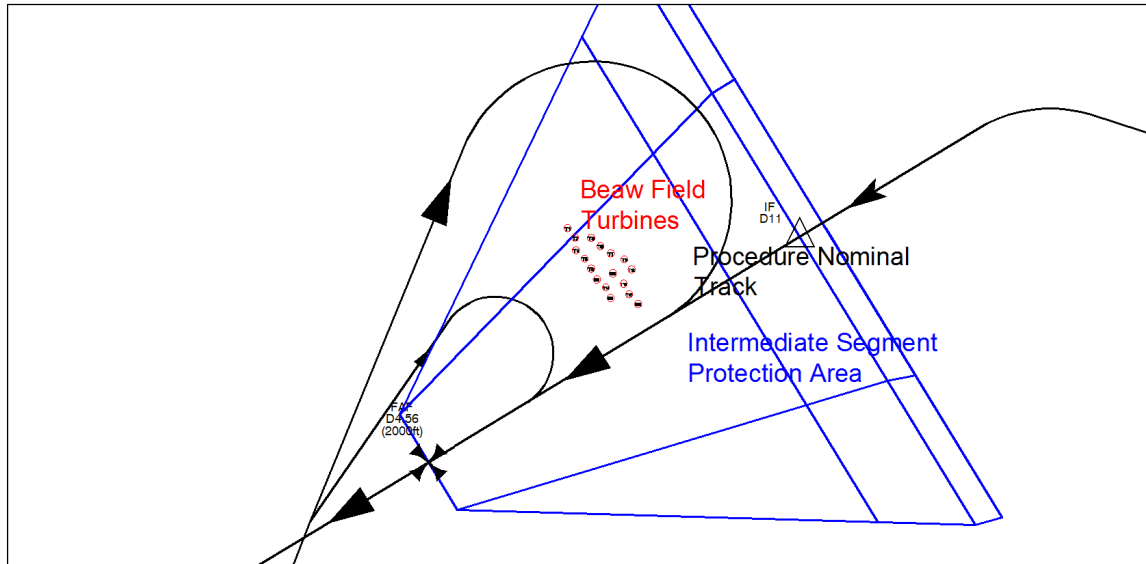


Figure 15 – Offset LOC/DME/NDB (L) RW24 Intermediate Segment Protection Areas (from Direct Arrival)

- 10.6. The combined assessments of the two Intermediate segments are shown below, T1 as currently planned would lay in the Secondary protection area but was assessed as Primary due to its proximity to that area.

Checked Turbines – Intermediate Segments Minimum Altitude 1000ft

Name	Latitude	Longitude	Alt. (m)	Trees (m)	Area	MOC applied	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	0.0	Primary	150.0	420.0	1378.0
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	0.0	Primary	150.0	415.0	1361.6
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	0.0	Primary	150.0	405.0	1328.8
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	0.0	Primary	150.0	395.0	1296.0
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	0.0	Primary	150.0	390.0	1279.6
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	0.0	Primary	150.0	390.0	1279.6
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	0.0	Primary	150.0	390.0	1279.6
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	0.0	Primary	150.0	390.0	1279.6
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	0.0	Primary	150.0	380.0	1246.8
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	0.0	Primary	150.0	380.0	1246.8
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	0.0	Primary	150.0	370.0	1214.0
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	0.0	Primary	150.0	365.0	1197.6
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	0.0	Primary	150.0	365.0	1197.6
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	0.0	Primary	150.0	360.0	1181.2
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	0.0	Primary	150.0	355.0	1164.7
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	0.0	Primary	150.0	350.0	1148.3
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	0.0	Primary	150.0	345.0	1131.9

Table 13 – Offset LOC/DME/NDB (L) RWY 24 Intermediate Segment Assessment

- 10.7. The turbines would not require an increase to the previously calculated Intermediate OCA of 2000ft.
- 10.8. The instrument approach procedure Offset LOC/DME/NDB (L) RWY24 is not affected by Beaw Field Wind Farm.

11. GNSS LNAV Runway 24 – Proposed Procedure

11.1. Procedure

- 11.1.1. The following diagram shows the proposed Beaw Field turbines in relation to the LNAV Runway 24 procedure.

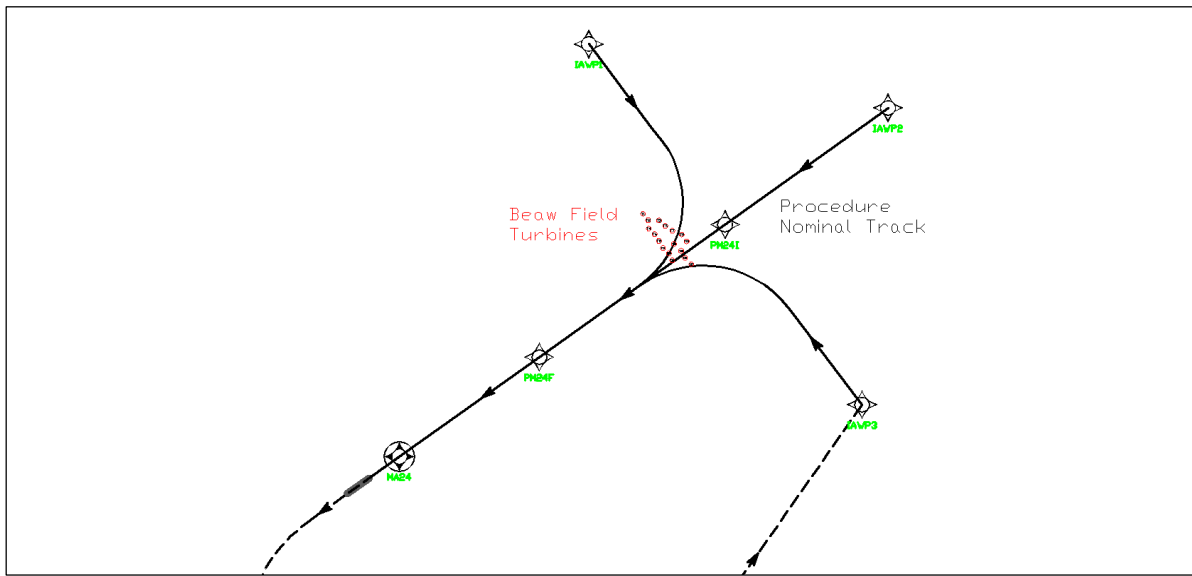


Figure 16 – GNSS LNAV Runway 24 Procedure

11.2. Initial segment from IAWP1

- 11.2.1. The turbines are located within the lateral confines of the Initial segment (IAWP1) protection areas.

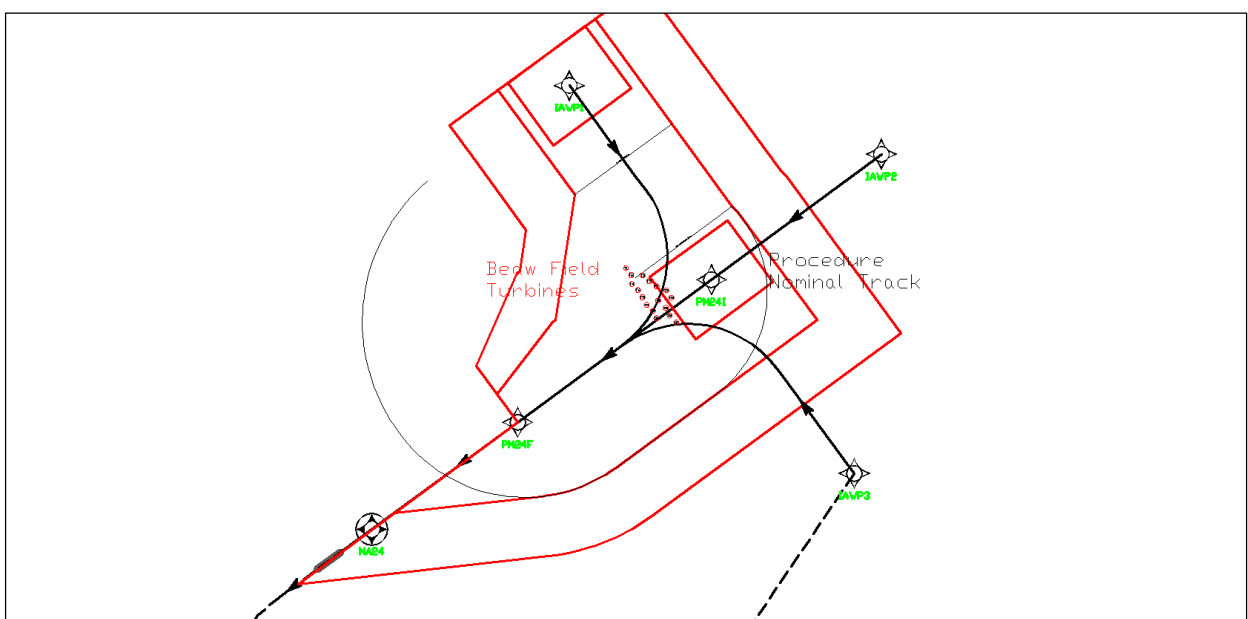


Figure 17 – GNSS LNAV Runway 24 Initial Segment from IAWP1 Protection Areas

Checked Turbines – Initial Segment Minimum Altitude 2000ft

Name	Latitude	Longitude	Alt. (m)	Area	MOC applied (m)	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	Primary	300.0	570.0	1870.1
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	Primary	300.0	565.0	1853.7
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	Primary	300.0	555.0	1820.9
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	Primary	300.0	545.0	1788.1
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	Primary	300.0	540.0	1771.7
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	Primary	300.0	540.0	1771.7
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	Primary	300.0	540.0	1771.7
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	Primary	300.0	540.0	1771.7
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	Primary	300.0	530.0	1738.9
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	Primary	300.0	530.0	1738.9
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	Primary	300.0	520.0	1706.1
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	Primary	300.0	515.0	1689.7
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	Primary	300.0	515.0	1689.7
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	Primary	300.0	510.0	1673.3
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	Primary	300.0	505.0	1656.9
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	Primary	300.0	500.0	1640.5
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	Primary	300.0	495.0	1624.1

Table 14 –GNSS LNAV Runway 24 Initial Segment from IAWP1 Assessment

11.2.2. As can be seen in the previous table the proposed turbines would not require a change to the previously calculated Procedure Minimum of 2000’.

11.2.3. The Initial segment from IAWP1 is not affected by the proposed Beaw Field Wind Farm.

11.3. Initial segment from IAWP2

11.3.1. The turbines are located outside of the lateral confines of the Initial segment (IAWP2) protection areas.

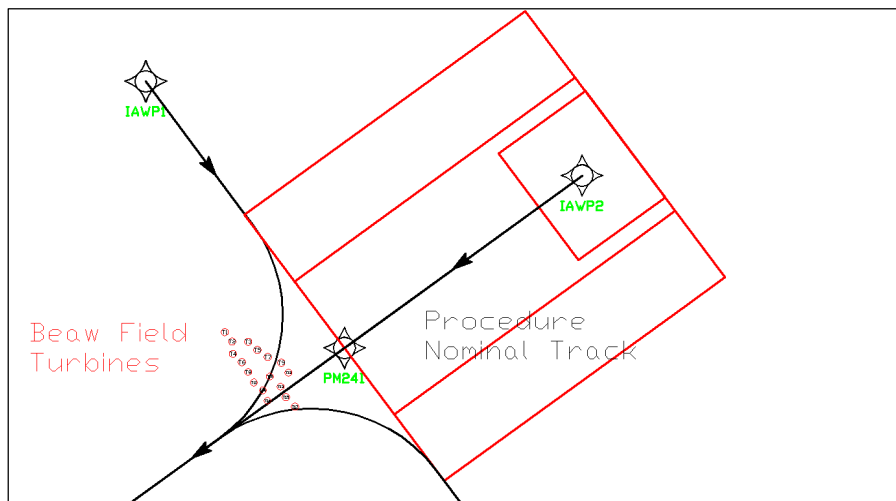


Figure 18 – GNSS LNAV Runway 24 Initial Segment from IAWP2 (RIKKI) Protection Areas

11.4. Initial segment from IAWP3

- 11.4.1. The turbines are located within the lateral confines of the Initial segment (IAWP3) protection areas.

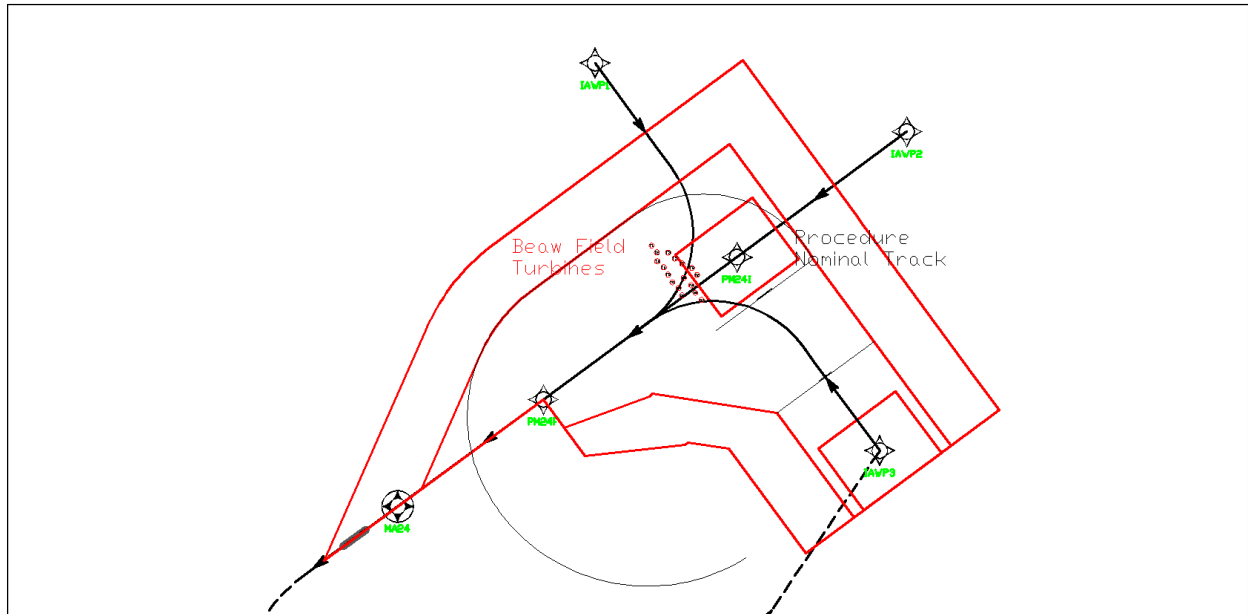


Figure 19 – GNSS LNAV Runway 24 Initial Segment from IAWP3 (MILLI) Protection Areas

- 11.4.2. As can be seen in the previous diagram all proposed Wind turbines are inside the protection area for this segment.

Checked Turbines – Minimum Segment Altitude 2000ft

Name	Latitude	Longitude	Alt. (m)	Area	MOC applied (m)	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	Primary	300.0	570.0	1870.1
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	Primary	300.0	565.0	1853.7
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	Primary	300.0	555.0	1820.9
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	Primary	300.0	545.0	1788.1
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	Primary	300.0	540.0	1771.7
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	Primary	300.0	540.0	1771.7
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	Primary	300.0	540.0	1771.7
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	Primary	300.0	540.0	1771.7
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	Primary	300.0	530.0	1738.9
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	Primary	300.0	530.0	1738.9
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	Primary	300.0	520.0	1706.1
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	Primary	300.0	515.0	1689.7
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	Primary	300.0	515.0	1689.7
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	Primary	300.0	510.0	1673.3
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	Primary	300.0	505.0	1656.9
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	Primary	300.0	500.0	1640.5
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	Primary	300.0	495.0	1624.1

Table 15 – GNSS LNAV Runway 24 Initial Segment from IAWP3 Assessment

- 11.4.3. As can be seen in the previous table the proposed turbines would not require a change to the previously calculated Procedure Minimum of 2000'.
- 11.4.4. The Initial segment from IAWP1 is not affected by the proposed Beaw Field Wind Farm.

11.5. Intermediate segment

- 11.5.1. The turbines are located within the lateral confines of the Intermediate segment obstacle protection areas.

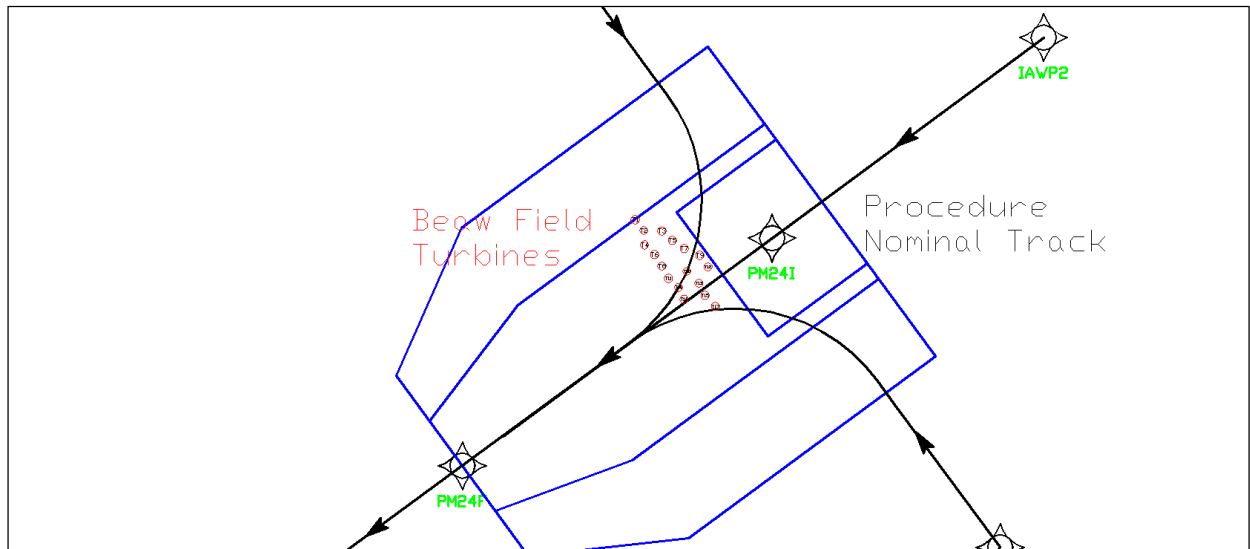


Figure 20 – GNSS LNAV Runway 24 Intermediate Segment Protection Areas

- 11.5.2. As can be seen in the previous diagram all proposed Wind turbines are inside the protection area for this segment.

Checked Turbines – Minimum Segment Altitude 2000ft

Name	Latitude	Longitude	Alt. (m)	Trees (m)	Area	MOC applied	OCA (m)	OCA (ft)
T3	60°31'41.4090"N	001°04'15.4100"W	270.0	0.0	Primary	150.0	420.0	1378.0
T6	60°31'23.2650"N	001°04'27.9900"W	265.0	0.0	Primary	150.0	415.0	1361.6
T2	60°31'42.1250"N	001°04'44.2050"W	255.0	0.0	Primary	150.0	405.0	1328.8
T1	60°31'50.7480"N	001°04'57.1260"W	245.0	0.0	Primary	150.0	395.0	1296.0
T8	60°31'14.0740"N	001°04'17.1300"W	240.0	0.0	Primary	150.0	390.0	1279.6
T4	60°31'30.8710"N	001°04'43.4810"W	240.0	0.0	Primary	150.0	390.0	1279.6
T11	60°31'04.4060"N	001°04'07.3600"W	240.0	0.0	Primary	150.0	390.0	1279.6
T13	60°30'59.9320"N	001°03'19.4060"W	240.0	0.0	Primary	150.0	390.0	1279.6
T5	60°31'33.8940"N	001°03'59.2540"W	230.0	0.0	Primary	150.0	380.0	1246.8
T15	60°30'50.3950"N	001°03'10.1500"W	230.0	0.0	Primary	150.0	380.0	1246.8
T14	60°30'57.0870"N	001°03'51.5650"W	220.0	0.0	Primary	150.0	370.0	1214.0
T12	60°31'12.4320"N	001°03'04.3400"W	215.0	0.0	Primary	150.0	365.0	1197.6
T17	60°30'41.5230"N	001°02'54.2620"W	215.0	0.0	Primary	150.0	365.0	1197.6
T9	60°31'21.5700"N	001°03'16.6780"W	210.0	0.0	Primary	150.0	360.0	1181.2
T16	60°30'47.6570"N	001°03'43.5890"W	205.0	0.0	Primary	150.0	355.0	1164.7
T10	60°31'09.4690"N	001°03'37.9750"W	200.0	0.0	Primary	150.0	350.0	1148.3
T7	60°31'27.2680"N	001°03'40.8310"W	195.0	0.0	Primary	150.0	345.0	1131.9

Table 16 – GNSS LNAV Runway 24 Intermediate) Assessment

- 11.6. As can be seen in the previous table the proposed turbines would not require a change to the previously calculated Procedure Minimum of 2000’.
- 11.7. The Intermediate Segment is not affected by the proposed Beaw Field Wind Farm.
- 11.8. The GNSS LNAV RW 24 Procedure is not affected by the proposed Beaw Field Wind Farm.

12. GNSS APV Runway 24 – Proposed Procedure

12.1. Intermediate segment

- 12.1.1. The proposed turbines were assessed in the primary protection area for the intermediate segment in the LNAV section. With the same minima the proposed turbines would not require any change to the procedure altitude of 2000ft for the APV Intermediate.

12.2. APV Segment

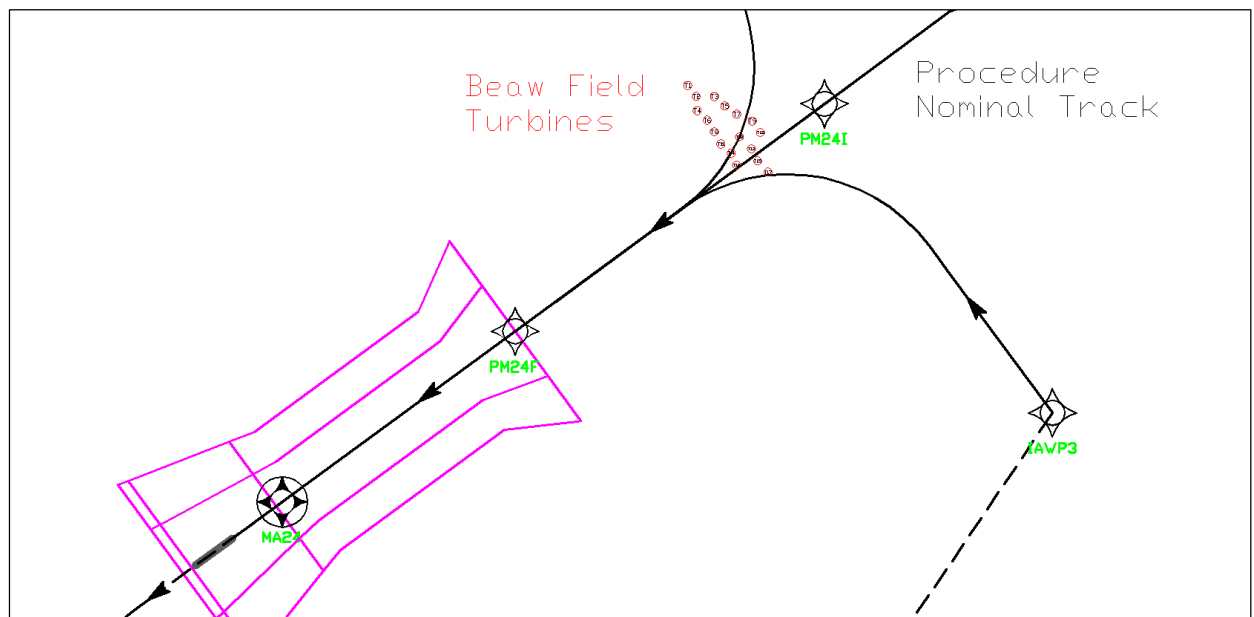


Figure 21 – GNSS APV Runway 24 Obstacle Assessment Surfaces

- 12.2.1. As can be seen, the Wind Turbines lay outside of the Obstacle Assessment Surfaces (OAS) and do not require assessment.
- 12.3. The GNSS APV RW 24 Procedure is not affected by the proposed Beaw Field Wind Farm.

12.4. Terminal Arrival Area (TAA) Runway 24

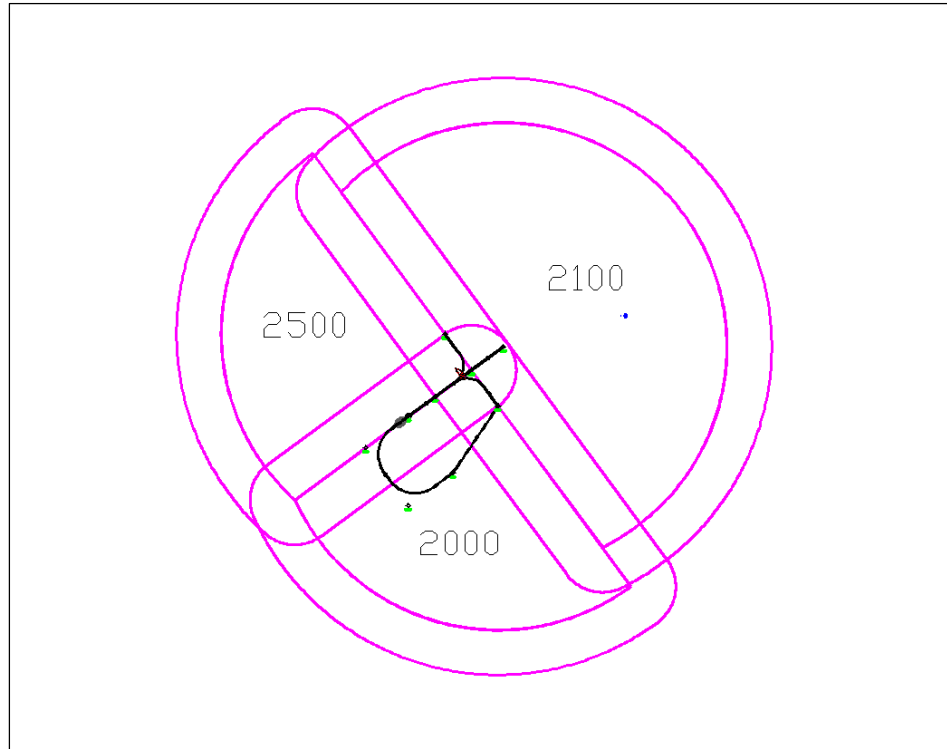


Figure 22 – RW24 Terminal Arrival Altitudes

- 12.4.1. As shown in previous table the highest proposed tip-height with a 300m MOC applied requires an OCA of 1870.1' rounded up to 1900'.
- 12.4.2. The lowest calculated TAA is 2000'.
- 12.4.3. The TAAs are not affected by the proposed Beaw Field Wind Farm.

13. GNSS LNAV Runway 06 – Proposed Procedure

13.1. Procedure

- 13.1.1. Cyrrus Ltd have been commissioned to produce an LNAV approach to Runway 06 with an APV element.
- 13.1.2. It is anticipated that the proposed wind turbines will lay within the lateral confines of the Missed Approach segment.

13.2. Missed Approach Segment

Checked Turbines – Missed Approach – MACG required < 2.5 %

Turbine	Area	Dist. in (m)	Do (m)	MOC req. (m)	Ac. alt. (ft)	Alt. req. (ft)	MACG (%)
T1	Secondary	1171.4	12422.7	18.4	1718.9	1028.1	0.9
T2	Secondary	727.5	12667.0	30.4	1739.0	1018.2	0.8
T7	Secondary	283.9	12274.3	42.3	1706.8	991.9	0.8
T13	Primary	N/A	12266.9	50.0	1706.1	984.3	0.8
T15	Secondary	45.3	12848.9	48.8	1753.9	996.6	0.8
T3	Secondary	354.4	12897.8	40.4	1757.9	969.3	0.7
T10	Secondary	853.3	13657.0	27.0	1820.2	941.5	0.6
T6	Secondary	800.9	12075.6	28.4	1690.5	896.9	0.5
T9	Secondary	421.4	13225.0	38.6	1784.7	897.7	0.5
T14	Primary	N/A	12582.3	50.0	1732.0	885.8	0.5
T5	Secondary	1284.6	14088.2	15.3	1855.5	903.3	0.5
T8	Secondary	48.9	12852.5	48.7	1754.2	865.1	0.4
T4	Secondary	671.4	13475.0	31.9	1805.2	859.2	0.4
T16	Secondary	585.4	13389.1	34.2	1798.2	850.4	0.4
T17	Secondary	996.2	13799.8	23.1	1831.9	830.4	0.3
T11	Secondary	1260.9	14064.6	16.0	1853.6	823.4	0.3
T12	Primary	N/A	11797.8	50.0	1667.7	787.4	0.3

Table 17 – LNAV RW06 Missed Approach Assessment

- 13.2.1. As can be seen in the previous table none of the Wind Turbines penetrate the anticipated obstacle protection area for the LNAV RW06.
- 13.2.2. LNAV RW06 is not expected to be affected by the proposed Beaw Field Wind Farm.

14. CONCLUSION

This report details the effects of the planned Beaw Field wind farm development on the Obstacle Limitation Surfaces and Instrument Flight Procedures serving Scatsta Airport.

The main findings of this report are as follows:

- Assessment of the CAP168 Obstacle Limitation Surfaces found that no turbines penetrate any surface;
- The existing NDB (L) Runway 24 Instrument Approach procedure would be significantly affected by the operation of the wind farm. The Initial segment (base turn) Minimum Obstacle Clearance Altitude would have to be raised from 1700ft to 2000ft. The effects of the turbines on the Intermediate segment would require the procedure to be redesigned;
- The proposed GNSS LNAV / APV Runway 24 and planned GNSS LNAV / APV Runway 06 would be unaffected by the proposed development;
- All procedures, including those which are not affected from a procedure design perspective will require re-charting with the proposed wind-farm shown as a new obstacle and the new MOCAs where applicable.

Procedure	Effect on Procedure by Beaw Field Windfarm?	Details
CAP 168 Surfaces	No	N/A
ATC Radar Vectoring Minimum Altitudes	No	N/A
Holding Patterns	No	N/A
Minimum Sector Altitudes (MSA)	No	N/A
Visual Circling	No	N/A
NDB (L) RW 24 (Existing)	Yes	The Initial segment (base turn) with a Minimum Obstacle Clearance Altitude of 1700ft, is penetrated. The Intermediate segment with a Minimum Obstacle Clearance Altitude of 1005ft, both from the base turn and direct arrival, is penetrated.
SRA RTR 0.5NM RW 24 (Existing)	No	N/A
Offset LOC/DME/NDB (L) RW 24 (New)	No	N/A
LNAV GNSS RW24 (Proposed)	No	N/A
APV GNSS RW24 (Proposed)	No	N/A
TAA RW24 (Proposed)	No	N/A
LNAV GNSS RW06 (Proposed)	No	N/A
APV GNSS RW06 (Proposed)	No	N/A
TAA RW06 (Proposed)	No	N/A