

Tangy IV Wind Farm Section 36C Variation

Technical Appendix 15.3: Safeguarding Report

Title	Tangy IV - Safeguarding Report
ID	TANGY-IV-SFG-SafeguardingReport
Version	1.0
Date	26/12/2025
Project	TANGY IV SFG
Distribution	Confidential

Tangy IV

Safeguarding Report

Document Approval

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Change log

Version	Change Description	Date
1.0	First consolidated version	26/12/2025

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REFERENCE DOCUMENTS		
Ref.	Title	Issue
[1]	UK AIP	27 NOV 2025
[2]	ICAO PANS-OPS vol. II (Doc 8168)	7 th Ed. Amdt 10
[3]	UK CAA CAP 738	3 (29-Oct-2020)
[4]	Pildo Wessex Quality Management System Manual	6.0

Table 1-1: Reference documents

ACRONYMS and ABBREVIATIONS	
Name	Description
AAL	Above Aerodrome Level
AGL	Above Ground Level
AIP	Aeronautical Information Publication
AMA	Area Minimum Altitude
AMSL	Above Mean Sea Level
ARP	Aerodrome Reference Point
ATC	Air Traffic Control
ATCSMA	ATC Surveillance Minimum Altitude
ATS	Air Traffic Services
CAA	Civil Aviation Authority
CAP	Civil Aviation Policy
CTA	Control Area
CTR	Controlled Traffic Region
CWY	Clearway
DER	Departure End of the Runway
DME	Distance Measurement Equipment
FAF	Final Approach Fix
FAS	Final Approach Segment
FL	Flight Level
GND	Ground
GNSS	Global Navigation Satellite System
GPA	Glide Path Angle
HL	Height Loss
IAC	Instrument Approach Chart
IAF	Initial Approach Fix
IAP	Instrument Approach Procedure
IAS	Indicated airspeed
IF	Intermediate fix / Initial fix
IFP	Instrument Flight Procedure
IFR	Instrument Flight Rules
ILS	Instrument Landing System
LOC	Localizer

ACRONYMS and ABBREVIATIONS	
Name	Description
LNAV	Lateral Navigation
MACG	Missed Approach Climb Gradient
MAPt	Missed Approach Point
MAS	Missed Approach Segment
MAX	Maximum
MNM	Minimum
MOC	Minimum Obstacle Clearance
MSA	Minimum Sector Altitudes
MSO	Most Significant Obstacle
N/A	Not Applicable
NAVSPEC	Navigation Specification
OAS	Obstacle Assessment Surface
OCA	Obstacle Clearance Altitude
OCH	Obstacle Clearance Height
OIS	Obstacle Identification Surface
PDG	Procedure Design Gradient
RCL	Runway Centre Line
RNAV	Area Navigation
RNP	Required Navigation Performance
ROD	Rate of Descent
RWY	Runway
SDF	Stepdown Fix
SID	Standard Instrument Departure
SOC	Start of Climb
STAR	Standard Arrival Route
TCH	Threshold Crossing Height
THR	Threshold
TODA	Take-Off Distance Available
UNL	Unlimited
UTM	Universal Transverse Mercator
VFR	Visual Flight Rules
VNAV	Vertical Navigation
VOR	VHF Omnidirectional Range
VSS	Visual Segment Surfaces

Table 1-2: Glossary, Acronyms and Abbreviations

1 INTRODUCTION

1.1 Background of the Activity

SSE Renewables is willing to install a set of wind turbines in Tangy IV, a site located approx. 4 nautical miles to the north of Campbeltown Airport.

The wind farm developments surrounding the aeronautical infrastructure have to be carried out ensuring the safety of the aircraft operations. This is the main reason behind the need of instrument flight procedures (IFP) safeguarding, which is the assessment to determine whether the new obstacles have any impact on them and to allow the Aerodrome Certificate Holders to determine the most appropriate mitigations in collaboration with the IFP designer.

This safeguarding assessment activity has been contracted to Pildo Labs Wessex, LTD.

1.2 Objective of the Document

This document is the safeguarding report that contains all the justifications, the applied criteria and calculations performed to determine if the safety of the published instrument flight procedures at Campbeltown and Islay airports are affected by the planned wind farm.

1.3 Document Structure

This document contains the following chapters:

- Chapter 1 is this introduction;
- Chapter 2 lists the list of obstacles to be assessed;
- Chapter 3 includes the impact analysis of the obstacles described in the previous section on the published IFP;
- Chapter 4 presents the summary and conclusions of this assessment;
- Chapter 5 refers to the quality process followed during the process;
- Chapter 6 lists the Software tools used in the safeguarding analysis;

2 OBSTACLES LIST

The wind turbines are planned to be installed on one of the western isles in Scotland. This area is located close to Islay Airport and Campbeltown Airport.

The following figure presents the planned development relative to the position of the mentioned airports and the location of all the turbines planned to be constructed:

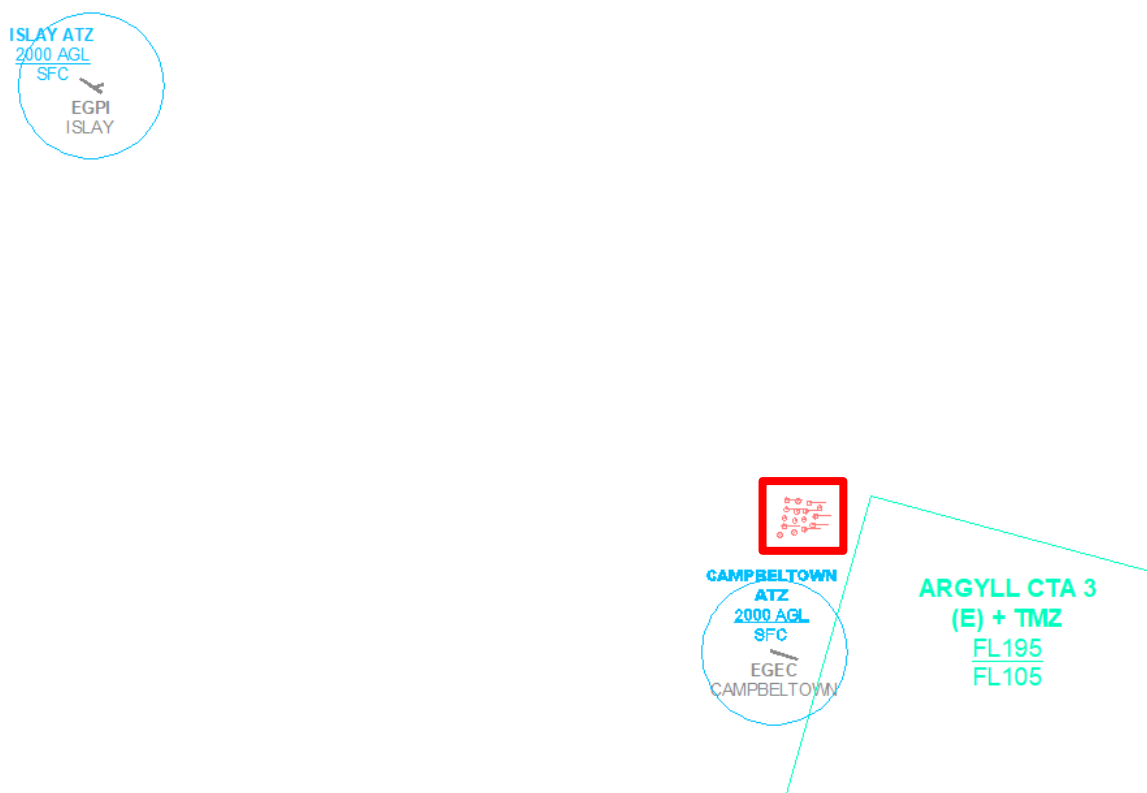


Figure 2-1: Obstacles area location and nearby airports

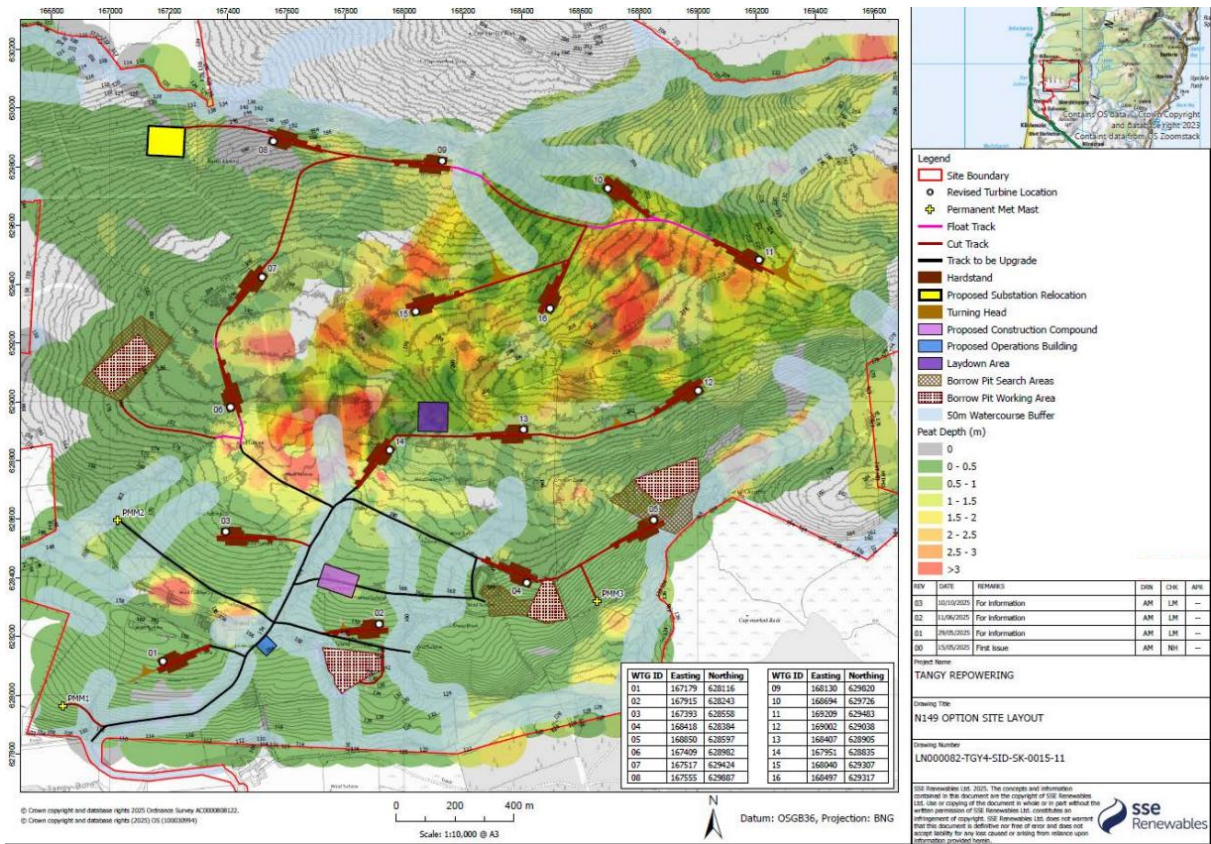


Figure 2-2: Obstacles subject to safeguarding assessment

The following table shows the provided positions of each of the turbines:

Turbine ID	X (OSGB36)	Y (OSGB36)	DTM Elevation (m)
5	168850.0000	628597.0000	162.5019989
12	169001.5647	629037.7933	202.1179962
11	169208.7708	629482.9276	219.7270050
4	168417.7148	628383.5921	175.0130005
13	168406.5946	628905.3624	201.5930023
16	168496.9095	629317.3516	200.9270020
10	168693.5076	629726.4545	196.6609955
2	167915.1458	628242.8812	160.6629944
14	167951.0000	628835.0000	188.6829987
15	168040.0000	629307.0000	193.8739929
9	168130.0000	629820.0000	165.7169952
1	167179.2761	628116.0080	156.1699982
3	167392.8650	628557.7432	180.0540009
6	167409.3991	628981.5915	185.6670074
7	167517.0000	629424.0000	194.2160034
8	167555.0000	629887.0000	156.2660065

Table 2-1: Obstacle input data

The intended maximum tip height is up to 200m and the rotor diameter would be 150m, with a hub height of 125m.

The OSGB36 Easting and Northing have been converted to WGS84 Latitude and Longitude by the use of the python library *pyproj*.

The altitude of the turbines has been calculated to be 200m over the provided DTM Elevation.

The calculated coordinates and altitudes of the turbines are shown in the following table:

Turbine ID	Lat (WGS84)	Lon (WGS84)	Altitude AMSL (m)
5	55.49632603	-5.66113701	362.5019989
12	55.50035031	-5.65910989	402.1179962
11	55.50443977	-5.65620689	419.7270050
4	55.49420780	-5.66778720	375.0130005
13	55.49888124	-5.66839831	401.5930023
16	55.50261833	-5.66731542	400.9270020
10	55.50637986	-5.66455068	396.6609955
2	55.49270772	-5.67560752	360.6629944
14	55.49803423	-5.67553634	388.6829987
15	55.50230886	-5.67452510	393.8739929
9	55.50695160	-5.67353215	365.7169952
1	55.49122020	-5.68712342	356.1699982
3	55.49528283	-5.68412033	380.0540009
6	55.49909127	-5.68421444	385.6670074
7	55.50310947	-5.68288547	394.2160034
8	55.50727919	-5.68267318	356.2660065

Table 2-2: Obstacle coordinates and altitude

As the turbine diameter is 150m, a horizontal extent of 75m has been considered for all turbines, plus a generous 50m of horizontal tolerance to account for position inaccuracies and conversion errors.

A vertical tolerance of 5m has been established to account for vertical measurements inaccuracies.

3 SAFEGUARDING ASSESSMENT

3.1 Islay Airport (EGPI)

In order to ensure the safety of the aircraft operations at Islay Airport, an IFP safeguarding assessment of the obstacles described in the previous chapter has been performed.

3.1.1 Obstacle Limitation Surfaces (OLS)

The turbines are more than 15000m away from the ARP, thus being outside of the airport OLS.

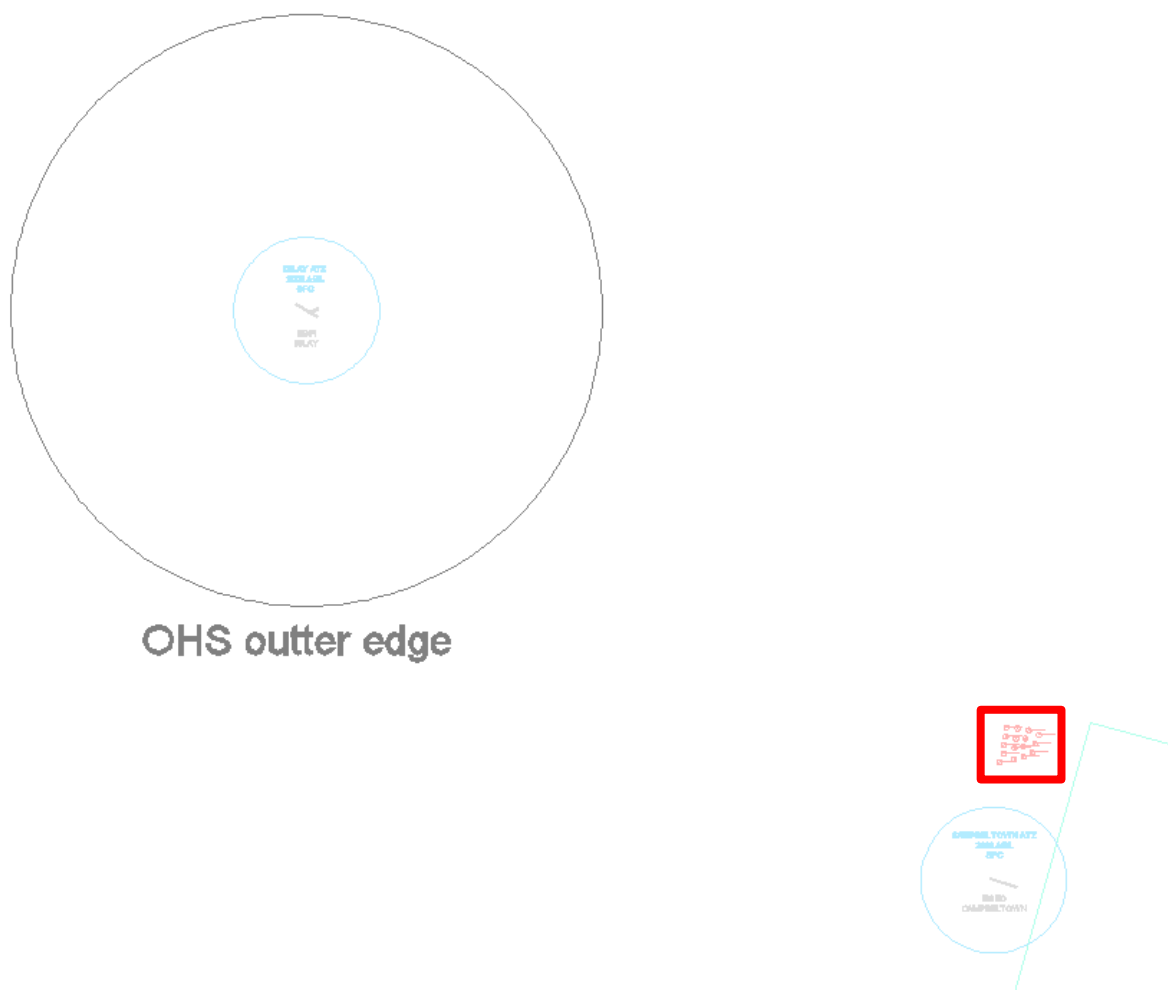


Figure 3-1: obstacles with respect to EGPI OLS

3.1.2 Instrument Flight Procedures

The flight procedures of this airport, published in the UK AIP, are the following:

- RNP RWY 12
- RNP RWY 30

3.1.2.1 Approach Procedures

There are two RNP approach procedures published in the AIP, one to each of the main runway thresholds.

3.1.2.1.1 RNP RWY 12

The figure below shows the proposed obstacles in relation to EGPI RNP RWY 12 approach procedure:

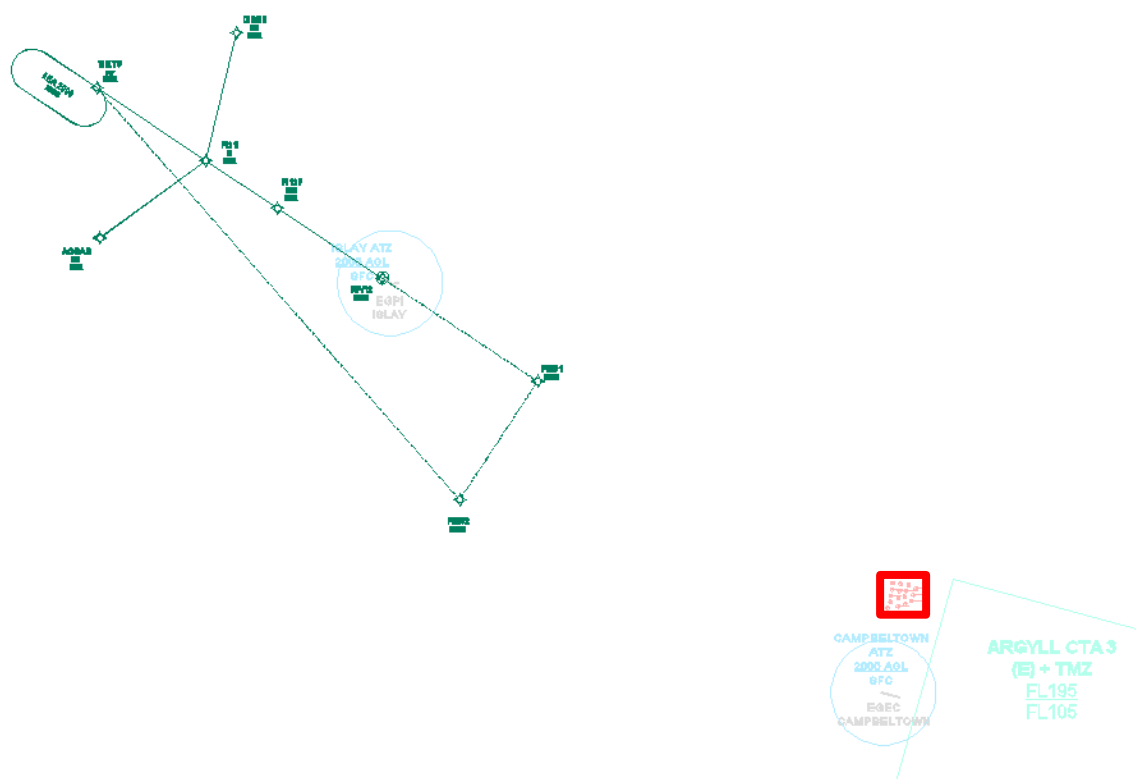


Figure 3-2: New obstacles with respect to EGPI RNP RWY 12

It is observed that the obstacles are too far away to affect any of the procedure legs, including the holding. However, assessment shall be made to conclude if they may affect the procedures right and left base TAAs

3.1.2.1.1.1 TAA

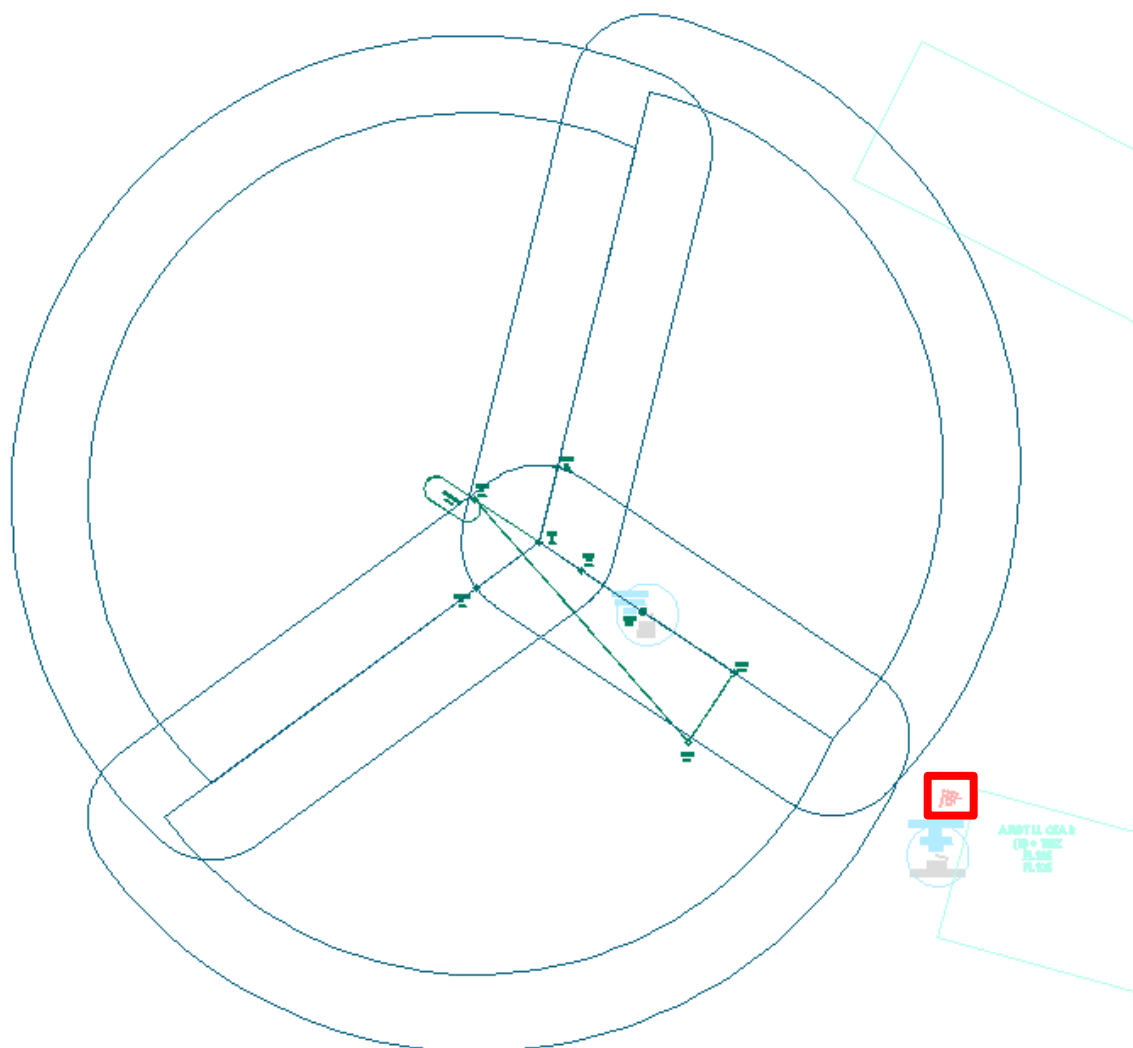


Figure 3-3: New obstacles with respect to EGPI RNP RWY 12 TAA

All the proposed turbines fall outside of all the TAA sectors

3.1.2.1.2 *RNP RWY 30*

The figure below shows the proposed obstacles in relation to EGPI RNP RWY 30 approach procedure:

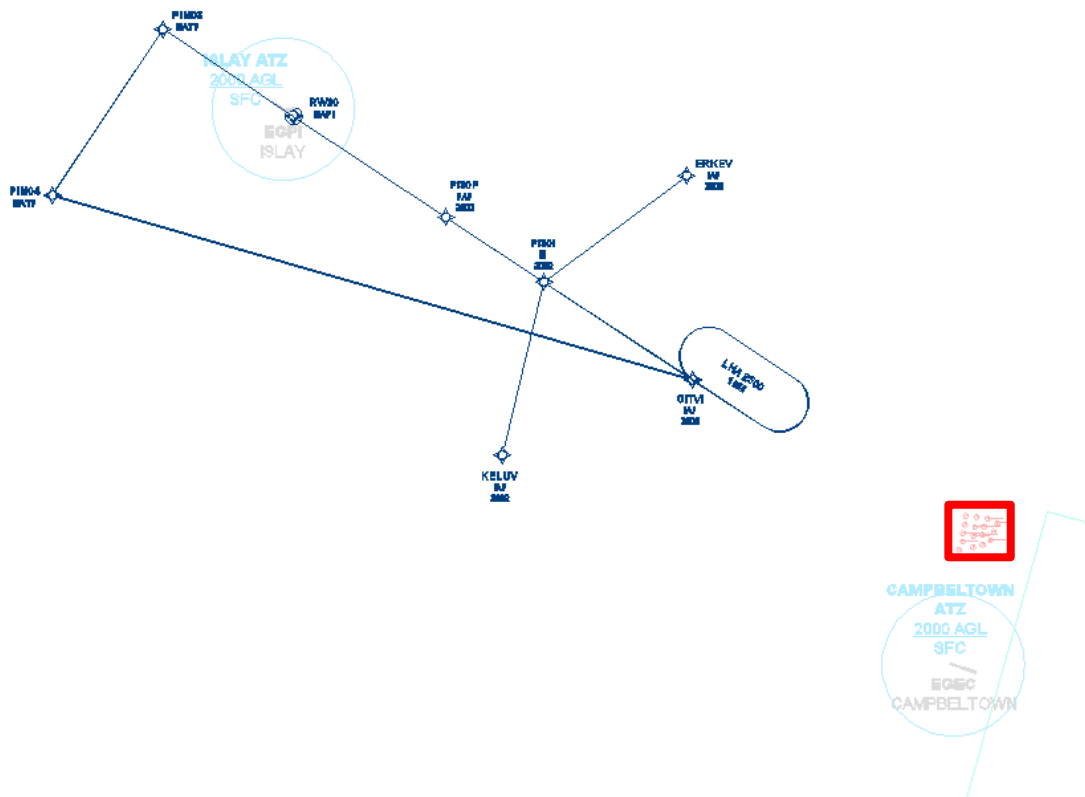


Figure 3-4: New obstacles with respect to EGPI RNP RWY 30

It is observed that the obstacles are too far away to affect any of the procedure legs. However, assessment shall be made to conclude if they may affect the procedure holding or the straight in TAA

3.1.2.1.2.1 Holding

The holding pattern at GITVI (IAF) has been analysed to assess the impact of the new obstacles. The published LHA is 2500 ft.

The maximum holding altitude is not published. 14000ft has been used, considering this would be more than enough.

All proposed turbines are located inside the holding area (see Figure 3-5).

Following the obstacle assessment, it has been concluded that no increase in the LHA is required (see Table 3-3).

3.1.2.1.2.1.1 Input parameters

Input parameters	
Max A/C Category	C
ISA VAR	15 °C
Outbound Leg Definition	Time
MNM proposed ALT	2500 ft
MAX ALT	14000 ft
MAX IAS	230 kt
Outbound Time	1.0 min
ATT	0.80 NM
XTT	1.00 NM

Table 3-1: Holding at GITVI construction input parameters

Conventional or RNAV w/o HLDG functionality			
Output parameters			
K	1.2755	Wb	0.10 NM
V (TAS)	293.4 kt	Wc	0.23 NM
v	0.0815 NM/s	Wd	0.77 NM
R	1.736 °/s	We	1.31 NM
r	2.69 NM	Wf	1.85 NM
h	14.0	Wg	2.39 NM
w	75 kt	Wh	2.26 NM
w'	0.0208 NM/s	Wo	2.80 NM
E ₄₅	0.540 NM	Wp	3.34 NM
t	60.0 s	Wi1 = Wi3	3.54 NM
L	4.89 NM	Wi2 = Wi4	3.83 NM
ab	0.41 NM	Wj	4.37 NM
ac	0.90 NM	Wk = WI	4.91 NM
gi1 = gi3	4.48 NM	Wm	5.45 NM
gi2 = gi4	6.60 NM	Wn3	5.70 NM
arcsin(w/V)	14.81 °	Wn4	5.99 NM
		XE	15.62 NM
		YE	8.28 NM

Table 3-2: Holding at GITVI construction output parameters

3.1.2.1.2.1.2 *Drawing*

Figure 3-5: New obstacles with respect to EGPI RNP RWY 30 holding at GITVI

3.1.2.1.2.1.3 *Obstacle assessment*

Holding area		
MOC	300	m
Proposed HLDG ALT	2500	ft
	762	m
HLDG MOCA	2378	ft
	725	m
HLDG MNM ALT	2400	ft
	750	m
Effective Obstacle Clearance	1107	ft
	337	m
Controlling Obstacle		
ID	Tangy IV - 11	
Description	TANGY TURBINE	
Lat	553015.9832N	
Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73	

Table 3-3: Holding at GITVI obstacle assessment

The diagram is a complex geometric construction. It features several concentric circles centered around a common point. A network of straight lines, some straight and some curved, intersect these circles. Key points are marked with small black squares and labeled with letters: 'A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I', 'J', 'K', 'L', 'M', 'N', 'O', 'P', 'Q', 'R', 'S', 'T', 'U', 'V', 'W', 'X', 'Y', 'Z'. A red square highlights a specific region. Labels include 'ARROW CTAS (ON THE PLANE PLAT)' and 'ARROW CTAS (ON THE PLANE PLAT)'. The diagram is a technical drawing, likely a map or a diagram of a system.

Figure 3-6: New obstacles with respect to EGPI RNP RWY 30 TAAs

All the new obstacles fall within the TAA of the straight in IAF (GITVI) and its 10 NM sub-sector. These sectors have been analysed and the results are presented below:

GITVI IAF		
25NM		
MOC	300	m
Proposed TAA ALT	3900	ft
	1189	m
TAA MOCA	2378	ft
	725	m
TAA MNM ALT	2400	ft
	750	m
Effective Obstacle Clearance	2507	ft
	764	m
Controlling Obstacle		
ID	Tangy IV - 11	
Description	TANGY TURBINE	
Lat	553015.9832N	
Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73	

10NM		
MOC	300	m
Proposed TAA ALT	2600	ft
	792	m
TAA MOCA	2378	ft
	725	m
TAA MNM ALT	2400	ft
	750	m
Effective Obstacle Clearance	1207	ft
	368	m
Controlling Obstacle		
ID	Tangy IV - 11	
Description	TANGY TURBINE	
Lat	553015.9832N	
Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73	

Table 3-4: EGPI RNP RWY 30 TAA assessment results

The published TAA altitude is higher than the obstacle-clearance altitude required by any of the assessed obstacles, as demonstrated in the obstacle assessment results (see Table 3-4).

Therefore, no increase in altitude is required in any of the EGPI RNP RWY 30 TAA sectors or sub-sectors.

3.1.2.2 Other Procedures

In addition to the previous IFP, there are other procedures and altitude restrictions that shall be considered to ensure the air operations safety. The following subsections present their analysis and main outcomes.

3.1.2.2.1 Minimum Sector Altitudes (MSA)

All EGPI Instrument Approach Charts (IACs) publish the same MSA referenced to the ARP. The obstacle area lies exclusively within the south-eastern sector of the MSA (see Figure 3-7); therefore, only this sector has been analysed.

The published minimum altitude for the south-eastern sector is 2600 ft, which is higher than the obstacle-clearance altitude required by any of the assessed obstacles (2400 ft) as shown in Table 3-5.

Therefore, no increase in altitude is required in any of the MSA sectors or sub-sectors.

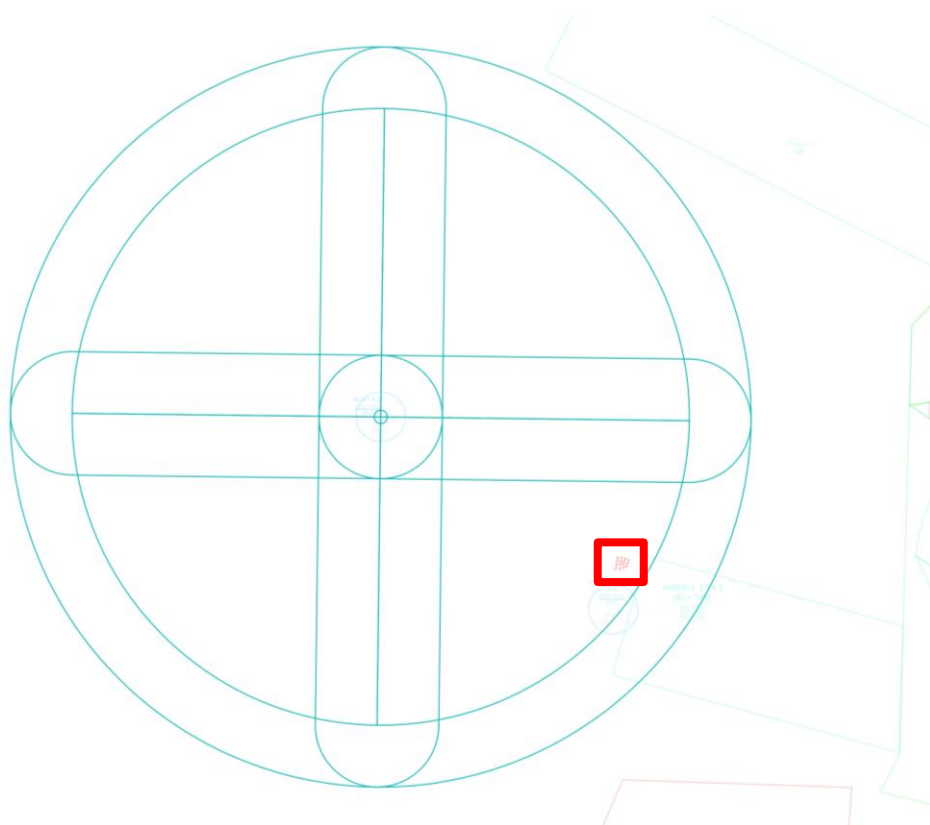


Figure 3-7: EGPI MSA and obstacles area

SE		
25NM		
MOC	300	m
Proposed MSA ALT	2600	ft
	792	m
MSA MOCA	2378	ft
	725	m
MSA MNM ALT	2400	ft
	750	m
Effective Obstacle Clearance	1207	ft
	368	m
Controlling Obstacle		
ID	Tangy IV - 11	
Description	TANGY TURBINE	
Lat	553015.9832N	
Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73	

Table 3-5: EGPI MSA assessment results

3.1.3 Visual Flight Procedures

Islay airport does not have visual charts associated with it; it only makes reference in section EGPI AD 2.22 FLIGHT PROCEDURES subsection 2 Visual Reference Points (VRP) to the consolidated 'Visual Reference Points List' published on the 'Digital Dataset' page of the NATS AIS website.

All the obstacles are outside the ATZ (Aerodrome Traffic Zone), intended to protect and regulate visual traffic during landing and take-off operations.

The following visual points are associated to Islay airport:

VRP name	Latitude	Longitude	Associated Aerodrome
MULL OF OA	553530N	0062018W	ISLAY
NORTH COAST	555600N	0060954W	ISLAY
PORT ELLEN	553800N	0061124W	ISLAY
RHINNS POINT	554024N	0062906W	ISLAY

Table 3-6: VRP associated to EGPI

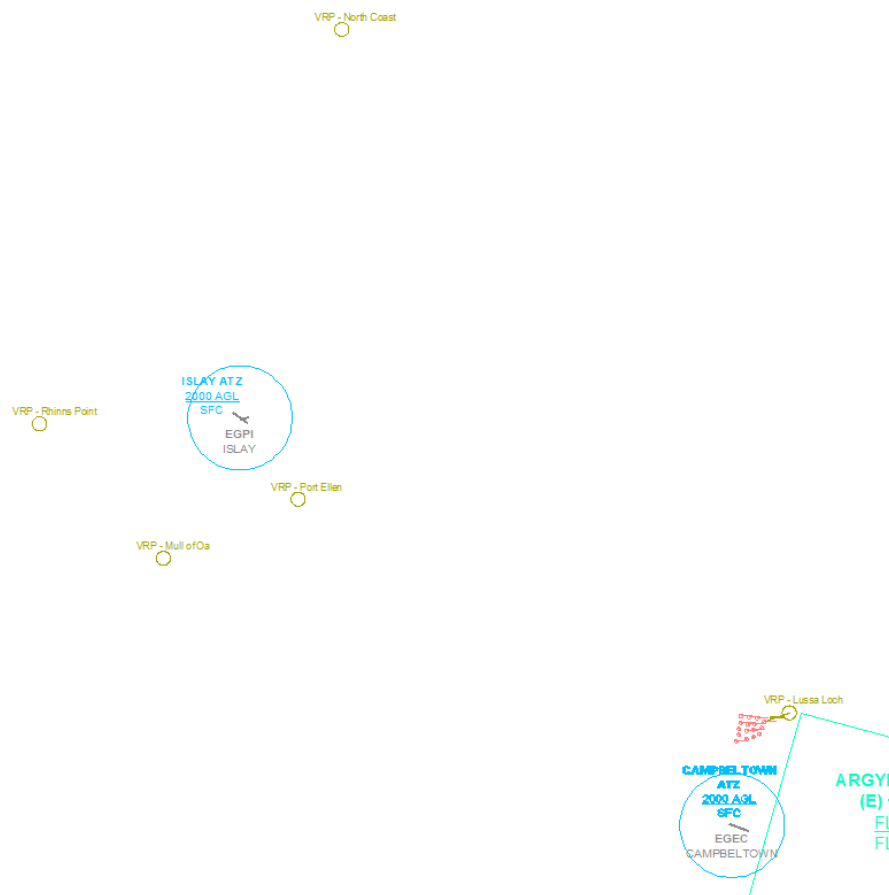


Figure 3-8: VRP associated to EGPI

All the Islay VRP points are too far away to have any direct impact.

3.1.4 Other information contained in AIP

AIP sections AD2.20, AD2.21, AD2.22 and AD2.23 describe important operational information of the airport, which should be considered in the safeguarding assessment.

3.1.4.1 AD2.20 Local Aerodrome Regulations

This section includes mainly, information regarding the airport regulations, ground movement, use of runways, etc.

None of this information affects the safeguarding analysis.

3.1.4.2 AD2.21 Noise abatement procedures

Noise abatement procedures are not applicable at this airport.

3.1.4.3 AD2.22 Flight procedures

This section presents information regarding the radio calls and VRPs

None of this information affects the safeguarding analysis.

3.1.4.4 AD2.23 Additional information

This section includes information regarding searching of the parked aircraft, but this information is not relevant for the IFP safeguarding evaluation.

3.2 Campbeltown Airport (EGEC)

In order to ensure the safety of the aircraft operations at Campbeltown Airport, an IFP safeguarding assessment of the obstacles described in the previous chapter has been performed.

3.2.1 Obstacle Limitation Surfaces (OLS)

The figure below shows how the turbines are all inside the OHS surface.

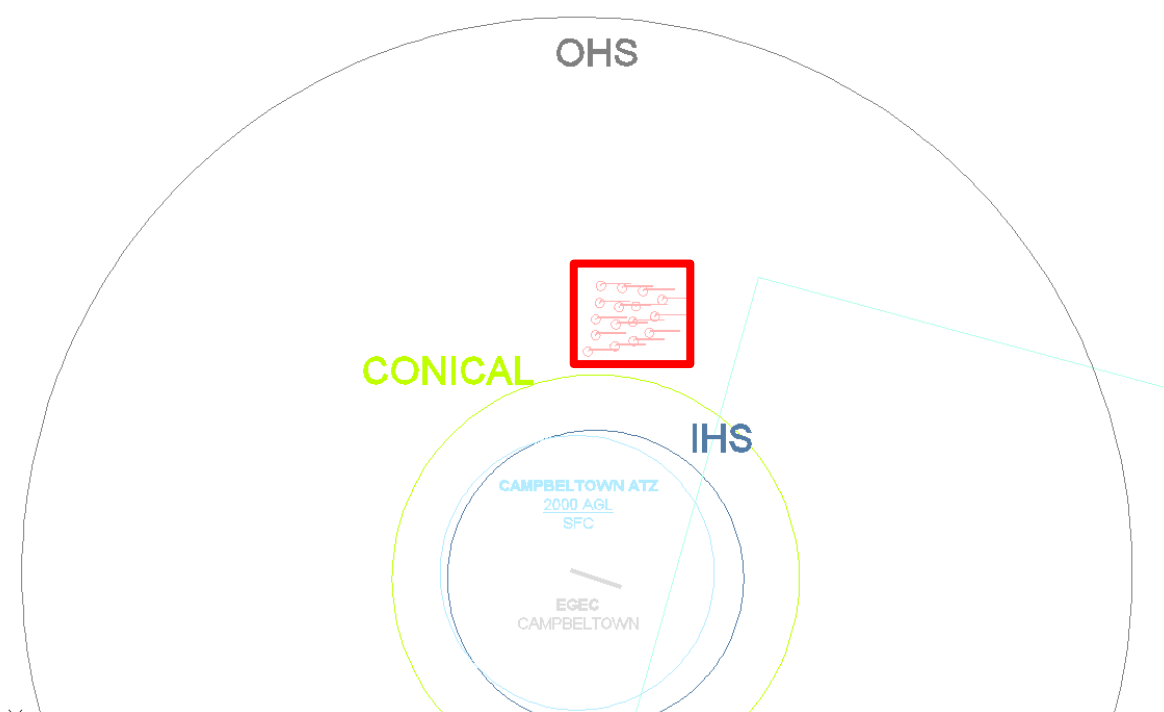


Figure 3-9: obstacles with respect to EGEC OLS

The UK CAA has historically applied an OHS at those aerodromes where the overall runway length exceeds 1100m. Aerodromes, especially those issued with a certificate based on the EU Regulation, are free to determine the suitability of an OHS, taking into account the surrounding topography and proliferations of existing tall structures.

If Campbeltown does not have an OHS, then all the turbines are outside the OLS of the aerodrome.

If the airport has an OHS, this will be 150m above the AD elevation, and the AD elevation is 42ft, then the OHS is 162.8m AMSL.

AI turbines have altitudes between 350m and 420m, so all of them are penetrating the OHS. Consideration needs to be given to the control of these new obstacles in order to facilitate practicable and efficient instrument approach procedures.

3.2.2 Instrument Flight Procedures

The flight procedures of this airport, published in the UK AIP, are the following:

- RNP RWY 11
- RNP RWY 29

3.2.2.1 Approach Procedures

There are two RNP approach procedures published in the AIP, one to each of the runway thresholds.

3.2.2.1.1 RNP RWY 11

The figure below shows the proposed obstacles in relation to EGEC RNP RWY 11 approach procedure:

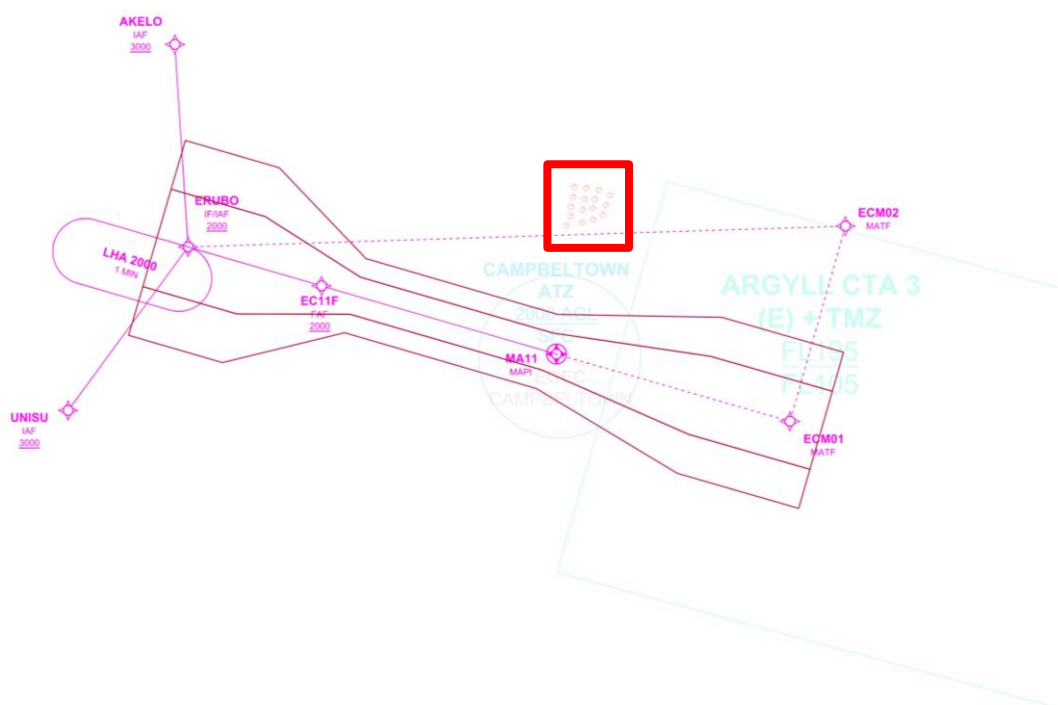


Figure 3-10: New obstacles with respect to EGEC RNP RWY 11

It has been observed that the obstacles could affect the Missed Approach Segment. An assessment has been carried out to determine whether these obstacles could affect the Missed Approach Segment, as well as the associated holding procedure, the circling area, the TAA and the MSA.

3.2.2.1.1.1 Missed Approach Segment

The figure below shows the proposed obstacles in relation to EGE C RNP RWY 11 missed approach segment areas:

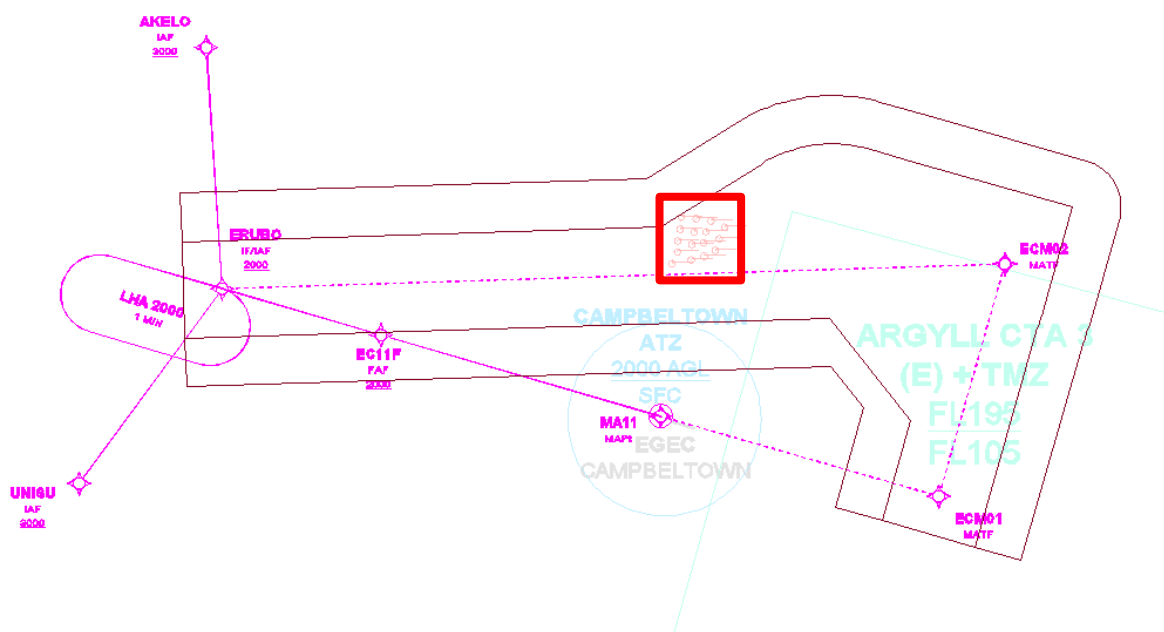


Figure 3-11: New obstacles with respect to EGE C RNP RWY 11 missed approach segment protection areas.

All the proposed obstacles fall inside the primary protection area between ECM02 and ERUBO. Turn construction parameters can be found in Table 3-7 and Table 3-8.

As two OCA/H exist for this procedure, depending on the Missed Approach Climb Gradient (MACG), the obstacle analysis has been done evaluating each possibility. Obstacle assessment results can be found in sections 3.2.2.1.1.1.1 and 3.2.2.1.1.1.2.

After completing the obstacle assessment, it has been concluded that the new obstacles do not have any impact on the current OCA/H as published in the AIP.

TURN CONSTRUCTION			
Description:		ECM01	

Turn Parameters	
Basic Parameters	
Turn type	Fly-by
Track Change	90.00 deg 1.57 rad
Bank Angle	15.00 deg 0.26 rad
Turn MAX Altitude (*)	2000 ft 609.60 m
ISA VAR	15 °C
T factor (IAS->TAS)	1.0567

Applicable Speeds	
Max A/C Category	D
IAS	185 kt 343 km/h
TAS	195 kt 362 km/h
Tailwind	30 kt 56 km/h
TAS + Tailwind	225 kt 418 km/h

Other parameters	
ATT	0.8 NM 1481.60 m
Pilot reaction time and distance	3 s 0.188 NM 348.02 m
Bank angle delay	3 s 0.188 NM 348.02 m

Rate / Radius of turn	
Rate of turn [R]	1.50 deg/s
Radius of turn [r]	2.08 NM 3849.66 m

Wind Spiral Geometry			
θ (°)	E (NM)	E (m)	arcsin(W/v)
0	0.00	0	8.83°
15	0.08	155	
30	0.17	309	
45	0.25	464	
60	0.33	619	
75	0.42	773	
90	0.50	928	
105	0.58	1083	
120	0.67	1237	
135	0.75	1392	
150	0.84	1547	
165	0.92	1701	
180	1.00	1856	
195	1.09	2011	
210	1.17	2165	

Earliest and Latest Turning Point		
Fly-by	Earliest (from TP)	5331.26 m 2.88 NM
	Latest (from TP)	2020.05 m 1.09 NM

Minimum Stabilization distances	
Fly-by (fixed wing)	4352.53 m 2.35 NM

Table 3-7: EGEC RNP RWY 11 ECM01 turn construction parameters

TURN CONSTRUCTION			
Description:		ECM02	

Turn Parameters	
Basic Parameters	
Turn type	Fly-by
Track Change	108.00 deg 1.88 rad
Bank Angle	15.00 deg 0.26 rad
Turn MAX Altitude (*)	2000 ft 609.60 m
ISA VAR	15 °C
T factor (IAS->TAS)	1.0567

Rate / Radius of turn	
Rate of turn [R]	1.50 deg/s
Radius of turn [r]	2.08 NM 3849.66 m

Wind Spiral Geometry			
θ (°)	E (NM)	E (m)	arcsin(W/v)
0	0.00	0	8.83°
15	0.08	155	
30	0.17	309	
45	0.25	464	
60	0.33	619	
75	0.42	773	
90	0.50	928	
105	0.58	1083	
120	0.67	1237	
135	0.75	1392	
150	0.84	1547	
165	0.92	1701	
180	1.00	1856	
195	1.09	2011	
210	1.17	2165	

Applicable Speeds	
Max A/C Category	D
IAS	185 kt 343 km/h
TAS	195 kt 362 km/h
Tailwind	30 kt 56 km/h
TAS + Tailwind	225 kt 418 km/h

Other parameters	
ATT	0.8 NM 1481.60 m
Pilot reaction time and distance	3 s 0.188 NM 348.02 m
Bank angle delay	3 s 0.188 NM 348.02 m

Earliest and Latest Turning Point		
Fly-by	Earliest (from TP)	6780.21 m 3.66 NM
	Latest (from TP)	2020.05 m 1.09 NM

Minimum Stabilization distances	
Fly-by (fixed wing)	5801.47 m 3.13 NM

Table 3-8: EGEK RNP RWY 11 ECM02 turn construction parameters

3.2.2.1.1.1.1 2.5% MACG

Main LNAV MAS parameters	
Distance MAPt-FTP	0.00 m
% MOC increase	0%
MOC LNAV FAS	75 m
MOC Intermediate MAS	30 m
MOC Final MAS	50 m
MACG	2.5%
MAX MAS ALT	2000 ft
LNAV system minima	300 ft
KK' line (from MAPt)	-5775.95 m

Table 3-9: EGEK RNP RWY 11 LNAV MAS main parameters (MACG 2.5%)

Computed LNAV OCA/H MAS				
	CAT A	CAT B	CAT C	CAT D
OBS penetration?	no	no	no	no
OCHft	840	840	840	840
m	256.03	256.03	256.03	256.03
OCAft	870	870	870	870
m	265.18	265.18	265.18	265.18

Proposed (*) OCA/H (ft)				
	CAT A	CAT B	CAT C	CAT D
OCH LNAV MAS	840	840	840	840
OCA LNAV MAS	870	870	870	870

(*) Rounding and system minima considered

Table 3-10: EGEK RNP RWY 11 LNAV MAS OCH obstacle assessment results (MACG 2.5%)

Most Significant Obstacle		
CAT	A	B
ID	Tangy IV - 11	Tangy IV - 11
Description	TANGY TURBINE	TANGY TURBINE
Lat	553015.9832N	553015.9832N
Lon	0053922.3448W	0053922.3448W
Alt AMSL + margin (m)	424.727005	424.727005
CAT	C	D
ID	Tangy IV - 11	Tangy IV - 11
Description	TANGY TURBINE	TANGY TURBINE
Lat	553015.9832N	553015.9832N
Lon	0053922.3448W	0053922.3448W
Alt AMSL + margin (m)	424.727005	424.727005

Table 3-11: EGEK RNP RWY 11 LNAV MAS Most significant obstacle of each aircraft category (MACG 2.5%)

		Obstacle assessment														
		Obstacle classification		d OBS - SOC (m)				Z (AFTP) - MOC Final (m)				OBS penetration?				
				CAT A	CAT B	CAT C	CAT D	CAT A	CAT B	CAT C	CAT D	CAT A	CAT B	CAT C	CAT D	
Obstacle list																
ID	OBS analysis	Area	d OBS - KK' line (m)													
Tangy IV - 5	Turn MAS	Primary	6267.65	9519.01	9233.89	8948.77	8711.17	444.01	436.88	429.75	423.81		no	no	no	no
Tangy IV - 12	Turn MAS	Primary	6487.98	9739.33	9454.21	9169.09	8931.49	449.52	442.39	435.26	429.32		no	no	no	no
Tangy IV - 11	Turn MAS	Primary	6703.10	9954.46	9669.34	9384.22	9146.62	454.89	447.77	440.64	434.70		no	no	no	no
Tangy IV - 4	Turn MAS	Primary	6435.98	9687.33	9402.21	9117.09	8879.49	448.22	441.09	433.96	428.02		no	no	no	no
Tangy IV - 13	Turn MAS	Primary	6799.20	10050.56	9765.44	9480.32	9242.72	457.30	450.17	443.04	437.10		no	no	no	no
Tangy IV - 16	Turn MAS	Primary	7032.56	10283.92	9998.80	9713.68	9476.08	463.13	456.00	448.87	442.93		no	no	no	no
Tangy IV - 10	Turn MAS	Primary	7212.99	10464.35	10179.23	9894.11	9656.51	467.64	460.51	453.38	447.44		no	no	no	no
Tangy IV - 2	Turn MAS	Primary	6735.09	9986.44	9701.32	9416.20	9178.60	455.69	448.56	441.44	435.50		no	no	no	no
Tangy IV - 14	Turn MAS	Primary	7084.36	10335.72	10050.60	9765.48	9527.88	464.42	457.30	450.17	444.23		no	no	no	no
Tangy IV - 15	Turn MAS	Primary	7342.06	10593.42	10308.30	10023.18	9785.58	470.87	463.74	456.61	450.67		no	no	no	no
Tangy IV - 9	Turn MAS	Primary	7651.04	10902.39	10617.27	10332.15	10094.55	478.59	471.46	464.34	458.40		no	no	no	no
Tangy IV - 1	Turn MAS	Primary	7261.88	10513.23	10228.11	9942.99	9705.39	468.86	461.73	454.61	448.67		no	no	no	no
Tangy IV - 3	Turn MAS	Primary	7341.18	10592.54	10307.42	10022.30	9784.70	470.85	463.72	456.59	450.65		no	no	no	no
Tangy IV - 6	Turn MAS	Primary	7590.99	10842.34	10557.22	10272.10	10034.50	477.09	469.96	462.83	456.89		no	no	no	no
Tangy IV - 7	Turn MAS	Primary	7800.99	11052.35	10767.23	10482.11	10244.51	482.34	475.21	468.08	462.14		no	no	no	no
Tangy IV - 8	Turn MAS	Primary	8094.86	11346.22	11061.10	10775.98	10538.38	489.69	482.56	475.43	469.49		no	no	no	no

Table 3-12: EGEK RNP RWY 11 LNAV MAS Full obstacle assessment table (MACG 2.5%)

Note: The "Z-MOC Final(m)" columns show values above the threshold altitude

3.2.2.1.1.1.2 5.0% MACG

Main LNAV MAS parameters	
Distance MAPt-FTP	0.00 m
% MOC increase	0%
MOC LNAV FAS	75 m
MOC Intermediate MAS	30 m
MOC Final MAS	50 m
MACG	5.0%
MAX MAS ALT	2000 ft
LNAV system minima	300 ft
KK' line (from MAPt)	-5775.95 m

Table 3-13: EGEC RNP RWY 11 LNAV MAS main parameters (MACG 5.0%)

Computed LNAV OCA/H MAS				
	CAT A	CAT B	CAT C	CAT D
OBS penetration?	no	no	no	no
OCH ft	470	470	470	470
m	143.26	143.26	143.26	143.26
OCA ft	500	500	500	500
m	152.40	152.40	152.40	152.40

Proposed (*) OCA/H (ft)				
	CAT A	CAT B	CAT C	CAT D
OCH LNAV MAS	470	470	470	470
OCA LNAV MAS	500	500	500	500

(*) Rounding and system minima considered

Table 3-14: EGEC RNP RWY 11 LNAV MAS OCH obstacle assessment results (MACG 5.0%)

Most Significant Obstacle		
CAT	A	B
ID	Tangy IV - 11	Tangy IV - 11
Description	TANGY TURBINE	TANGY TURBINE
Lat	553015.9832N	553015.9832N
Lon	0053922.3448W	0053922.3448W
Alt AMSL + margin (m)	424.727005	424.727005
CAT	C	D
ID	Tangy IV - 11	Tangy IV - 11
Description	TANGY TURBINE	TANGY TURBINE
Lat	553015.9832N	553015.9832N
Lon	0053922.3448W	0053922.3448W
Alt AMSL + margin (m)	424.727005	424.727005

Table 3-15: EGEC RNP RWY 11 LNAV MAS Most significant obstacle of each aircraft category (MACG 5.0%)

		Obstacle assessment													
Obstacle classification				d OBS - SOC (m)				Z (AFTP) - MOC Final (m)				OBS penetration?			
Obstacle list				CAT A	CAT B	CAT C	CAT D	CAT A	CAT B	CAT C	CAT D	CAT A	CAT B	CAT C	CAT D
ID	OBS analysis	Area	d OBS - KK' line (m)												
Tangy IV - 5	Turn MAS	Primary	6267.65	9519.01	9233.89	8948.77	8711.17	550.46	550.46	540.69	528.81				
Tangy IV - 12	Turn MAS	Primary	6487.98	9739.33	9454.21	9169.09	8931.49	550.46	550.46	550.46	539.83	no	no	no	no
Tangy IV - 11	Turn MAS	Primary	6703.10	9954.46	9669.34	9384.22	9146.62	550.46	550.46	550.46	550.46	no	no	no	no
Tangy IV - 4	Turn MAS	Primary	6435.98	9687.33	9402.21	9117.09	8879.49	550.46	550.46	549.11	537.23	no	no	no	no
Tangy IV - 13	Turn MAS	Primary	6799.20	10050.56	9765.44	9480.32	9242.72	550.46	550.46	550.46	550.46	no	no	no	no
Tangy IV - 16	Turn MAS	Primary	7032.56	10283.92	9998.80	9713.68	9476.08	550.46	550.46	550.46	550.46	no	no	no	no
Tangy IV - 10	Turn MAS	Primary	7212.99	10464.35	10179.23	9894.11	9656.51	550.46	550.46	550.46	550.46	no	no	no	no
Tangy IV - 2	Turn MAS	Primary	6735.09	9986.44	9701.32	9416.20	9178.60	550.46	550.46	550.46	550.46	no	no	no	no
Tangy IV - 14	Turn MAS	Primary	7084.36	10335.72	10050.60	9765.48	9527.88	550.46	550.46	550.46	550.46	no	no	no	no
Tangy IV - 15	Turn MAS	Primary	7342.06	10593.42	10308.30	10023.18	9785.58	550.46	550.46	550.46	550.46	no	no	no	no
Tangy IV - 9	Turn MAS	Primary	7651.04	10902.39	10617.27	10332.15	10094.55	550.46	550.46	550.46	550.46	no	no	no	no
Tangy IV - 1	Turn MAS	Primary	7261.88	10513.23	10228.11	9942.99	9705.39	550.46	550.46	550.46	550.46	no	no	no	no
Tangy IV - 3	Turn MAS	Primary	7341.18	10592.54	10307.42	10022.30	9784.70	550.46	550.46	550.46	550.46	no	no	no	no
Tangy IV - 6	Turn MAS	Primary	7590.99	10842.34	10557.22	10272.10	10034.50	550.46	550.46	550.46	550.46	no	no	no	no
Tangy IV - 7	Turn MAS	Primary	7800.99	11052.35	10767.23	10482.11	10244.51	550.46	550.46	550.46	550.46	no	no	no	no
Tangy IV - 8	Turn MAS	Primary	8094.86	11346.22	11061.10	10775.98	10538.38	550.46	550.46	550.46	550.46	no	no	no	no

Table 3-16: EGEc RNP RWY 11 LNAV MAS Full obstacle assessment table (MACG 5.0%)

Note: The "Z-MOC Final(m)" columns show values above the threshold altitude

3.2.2.1.1.2 Holding

The holding pattern at ERUBO (IF/IAF) has been analysed to assess the impact of the new obstacles. The published LHA is 2000 ft.

The maximum holding altitude is not published. 13000ft has been used, considering this would be sufficient.

All proposed turbines are located outside the holding area but within the buffer area, specifically within the 2 NM and 3 NM buffers (see Figure 3-12).

Following the obstacle assessment, it has been concluded that no increase in the LHA is required (see Table 3-19).

3.2.2.1.1.2.1 Input parameters

Input parameters	
Max A/C Category	D
ISA VAR	15 °C
Outbound Leg Definition	Time
MNM proposed ALT	2000 ft
MAX ALT	13000 ft
MAX IAS	230 kt
Outbound Time	1.0 min
ATT	0.80 NM
XTT	1.00 NM

Table 3-17: Holding at ERUBO construction input parameters

Conventional or RNAV w/o HLDG functionality			
Output parameters			
		Wb	0.10 NM
		Wc	0.22 NM
K	1.2549	Wd	0.74 NM
V (TAS)	288.6 kt	We	1.26 NM
v	0.0802 NM/s	Wf	1.77 NM
R	1.764 °/s	Wg	2.29 NM
r	2.60 NM	Wh	2.17 NM
h	13.0	Wo	2.69 NM
w	73 kt	Wp	3.20 NM
w'	0.0203 NM/s	Wi1 = Wi3	3.41 NM
E ₄₅	0.517 NM	Wi2 = Wi4	3.69 NM
t	60.0 s	Wj	4.21 NM
L	4.81 NM	Wk = Wl	4.73 NM
ab	0.40 NM	Wm	5.24 NM
ac	0.88 NM	Wn3	5.48 NM
gi1 = gi3	4.41 NM	Wn4	5.76 NM
gi2 = gi4	6.49 NM	XE	15.20 NM
arcsin(w/V)	14.65 °	YE	8.03 NM

Table 3-18: Holding at ERUBO construction output parameters

3.2.2.1.1.2.2 Drawing

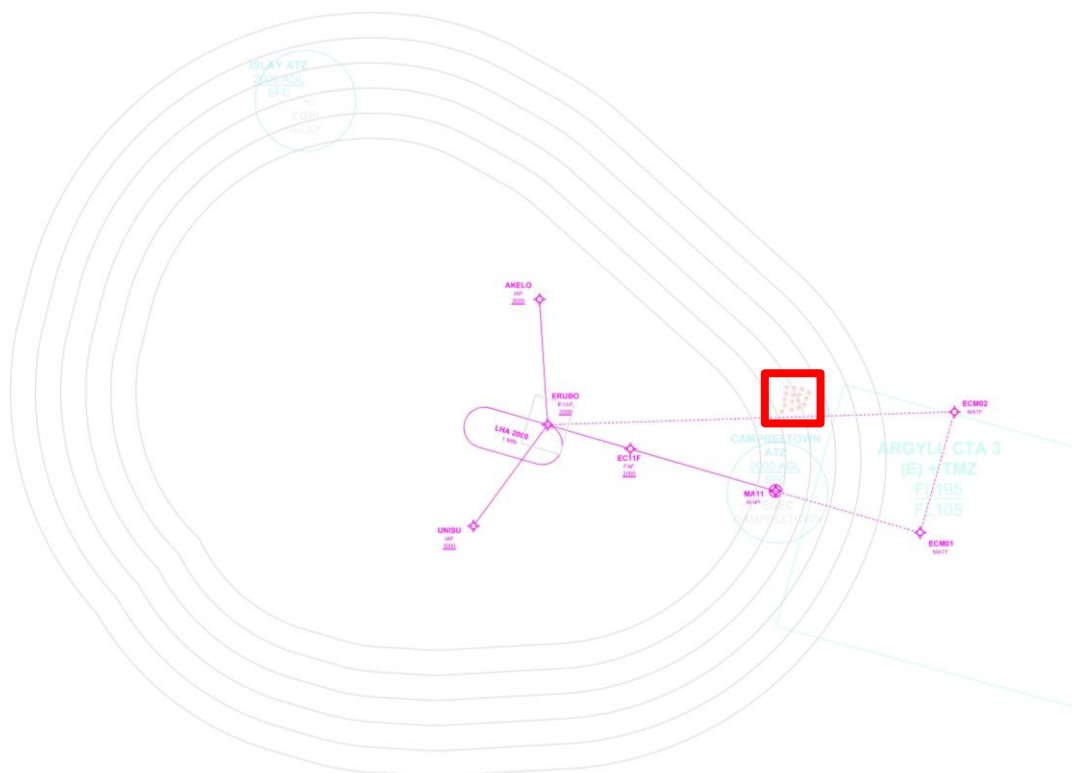


Figure 3-12: New obstacles with respect to EGEC RNP RWY 11 holding at ERUBO

3.2.2.1.1.2.3 Obstacle assessment

2NM buffer area		
MOC	150	m
Proposed HLDG ALT	2000	ft
	610	m
HLDG MOCA	1826	ft
	557	m
HLDG MNM ALT	1900	ft
	600	m
Effective Obstacle Clearance	666	ft
	203	m
Controlling Obstacle		
ID	Tangy IV - 13	
Description	TANGY TURBINE	
Lat	552955.9725N	
Lon	0054006.2339W	
Alt AMSL + margin (m)	406.59	

3NM buffer area		
MOC	120	m
Proposed HLDG ALT	2000	ft
	610	m
HLDG MOCA	1787	ft
	545	m
HLDG MNM ALT	1800	ft
	550	m
Effective Obstacle Clearance	607	ft
	185	m
Controlling Obstacle		
ID	Tangy IV - 11	
Description	TANGY TURBINE	
Lat	553015.9832N	
Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73	

Table 3-19: Holding at ERUBO obstacle assessment

3.2.2.1.1.3 Circling

The figure below shows the Circling area:

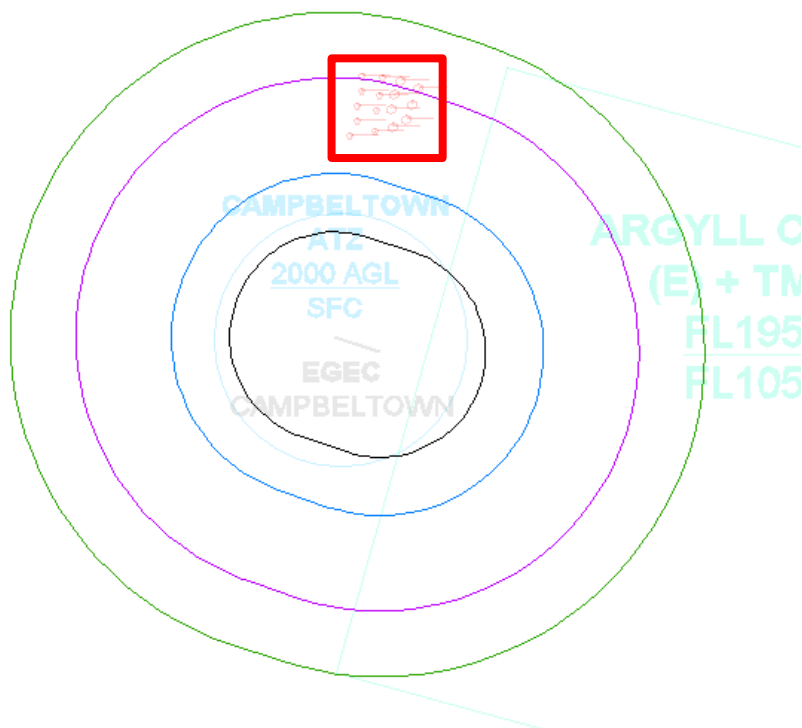


Figure 3-13: New obstacles with respect to EGED RWY 11 Circling area

***Note:** Circling is not allowed south of the runway, but since the obstacles all are clearly in the area north of the runway, the area has been drawn complete to simplify the design work.*

All the obstacles fall within Cat C and D areas, the circling minima for those needs to be assessed.

Circling minima for Cat A and B will not be affected as the obstacles fall outside.

The table below shows the circling input parameters and calculations:

Approach information					
MAX A/C category	D				

Circling Computation					
Aircraft Category	A	B	C	D	
Circling Speeds					
Speed (IAS)	100	135	180	205	kt
TAS + 25 kt tailwind	129	166	213	239	kt
Turn parameters					
Bank Angle	19.53	20.00	20.00	20.00	deg
	0.34	0.35	0.35	0.35	rad
Rate of turn [R]	3.00	2.40	1.87	1.67	deg/s
	0.05	0.04	0.03	0.03	rad/s
Radius of turn [r]	0.69	1.10	1.81	2.28	NM
	1269.55	2034.26	3348.69	4219.74	m
Geometry					
Straight segment	0.3	0.4	0.5	0.6	NM
	555.60	740.80	926.00	1111.20	m
Radius (from THR)	1.67	2.60	4.12	5.16	NM
	3094.70	4809.33	7623.38	9550.68	m

Table 3-20: EGEW RWY 11 Circling Area input parameters and calculations

The table below shows the circling obstacle assessment results:

Computed circling OCA/H (ft)				
	CAT A	CAT B	CAT C	CAT D
OCH (AAL)	-	-	1746	1746
OCA	-	-	1788	1788

Proposed (*) circling OCA/H (ft)				
	CAT A	CAT B	CAT C	CAT D
OCH (AAL)	-	-	1748	1748
OCA	-	-	1790	1790

(*) Rounding and lower circling OCA/H limit considered

Table 3-21: EGEW RWY 11 Circling Area obstacle assessment results

The obtained OAC/H circling values for OCA/H are higher than those published.

Aircraft Category	A	B	C	D
VM(C)OCA (OCH AAL)	Total Area	N/A	N/A	N/A
	North of RWY 11/29	890(848)	1010(968)	1550(1508)

Table 3-22: EGEW RNP RWY 11 Circling minima box

The following table shows the obstacle assessment results for the circling:

Obstacle Assessment			
Obstacle list (m)		OCH (ft)	
ID	Area	CAT C	CAT D
Tangy IV - 5	C	1557	1557
Tangy IV - 12	C	1687	1687
Tangy IV - 11	C	1745	1745
Tangy IV - 4	C	1598	1598
Tangy IV - 13	C	1686	1686
Tangy IV -16	C	1683	1683
Tangy IV - 10	D	-	1669
Tangy IV - 2	C	1551	1551
Tangy IV - 14	C	1643	1643
Tangy IV - 15	C	1660	1660
Tangy IV - 9	D	-	1568
Tangy IV - 1	C	1537	1537
Tangy IV - 3	C	1615	1615
Tangy IV - 6	C	1633	1633
Tangy IV - 7	C	1661	1661
Tangy IV - 8	C	1537	1537

Table 3-23: EGECE RNP RWY 11 obstacle assessment results

Note: The "OCH" columns show values above the threshold altitude

All obstacles except Tangy IV – 10 and Tangy IV – 9 are within the Cat C area and derive OCHs higher than the published (1508ft).

All obstacles are within the Cat D areas but only Tangy IV – 11 conditions a circling OCH higher than the published 1708ft.

This increase in the circling minima may not have an operational impact but it should be discussed with Campbeltown airport.

Should the planned obstacles be finally constructed, the circling minima for Cat C and D should be updated in all charts of Campbeltown Airport to match those obtained in Table 3-21.

3.2.2.1.1.4 TAA

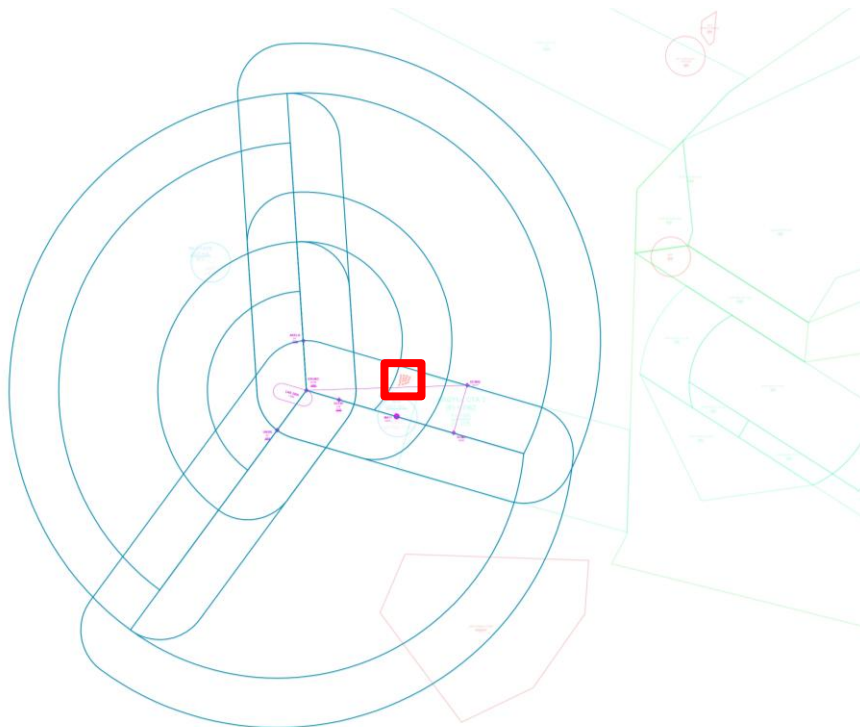


Figure 3-14: New obstacles with respect to EGE RNP RWY 11 TAA

All new obstacles are located within the TAAs of both the right base IAF (UNISU) and the left base IAF (AKELO), including within AKELO's 10 NM sub-arc.

The sectors have been analysed and the results are presented below:

UNISU IAF		
25NM		
MOC	300	m
Proposed TAA ALT	3000	ft
	914	m
TAA MOCA	2378	ft
	725	m
TAA MNM ALT	2400	ft
	750	m
Effective Obstacle Clearance	1607	ft
	490	m
Controlling Obstacle		
ID	Tangy IV - 11	
Description	TANGY TURBINE	
Lat	553015.9832N	
Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73	

Figure 3-15: EGEK RNP RWY 11 right base IAF TAA obstacle assessment result

AKELO IAF			AKELO IAF		
25NM			10NM		
MOC	300	m	MOC	300	m
Proposed TAA ALT	4000	ft	Proposed TAA ALT	3000	ft
	1219	m		914	m
TAA MOCA	2378	ft	TAA MOCA	2378	ft
	725	m		725	m
TAA MNM ALT	2400	ft	TAA MNM ALT	2400	ft
	750	m		750	m
Effective Obstacle Clearance	2607	ft	Effective Obstacle Clearance	1607	ft
	794	m		490	m
Controlling Obstacle			Controlling Obstacle		
ID	Tangy IV - 11		ID	Tangy IV - 11	
Description	TANGY TURBINE		Description	TANGY TURBINE	
Lat	553015.9832N		Lat	553015.9832N	
Lon	0053922.3448W		Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73		Alt AMSL + margin (m)	424.73	

Figure 3-16: EGEK RNP RWY 11 left base IAF TAA obstacle assessment result

The published minimum altitude for each sector and sub-sector is higher than the obstacle-clearance altitude required by any of the assessed obstacles.

Therefore, no increase in altitude is required in any of the EGEK RNP RWY 11 TAA sectors or sub-sectors.

3.2.2.1.2 RNP RWY 29

The figure below shows the proposed obstacles in relation to EGEC RNP RWY 29 approach procedure:

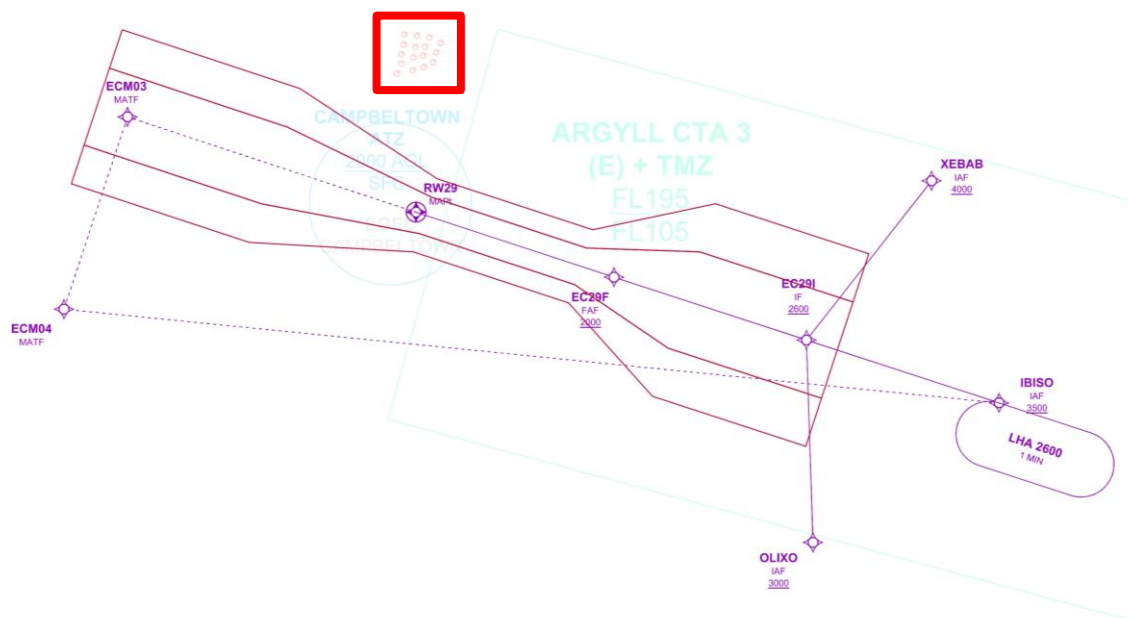


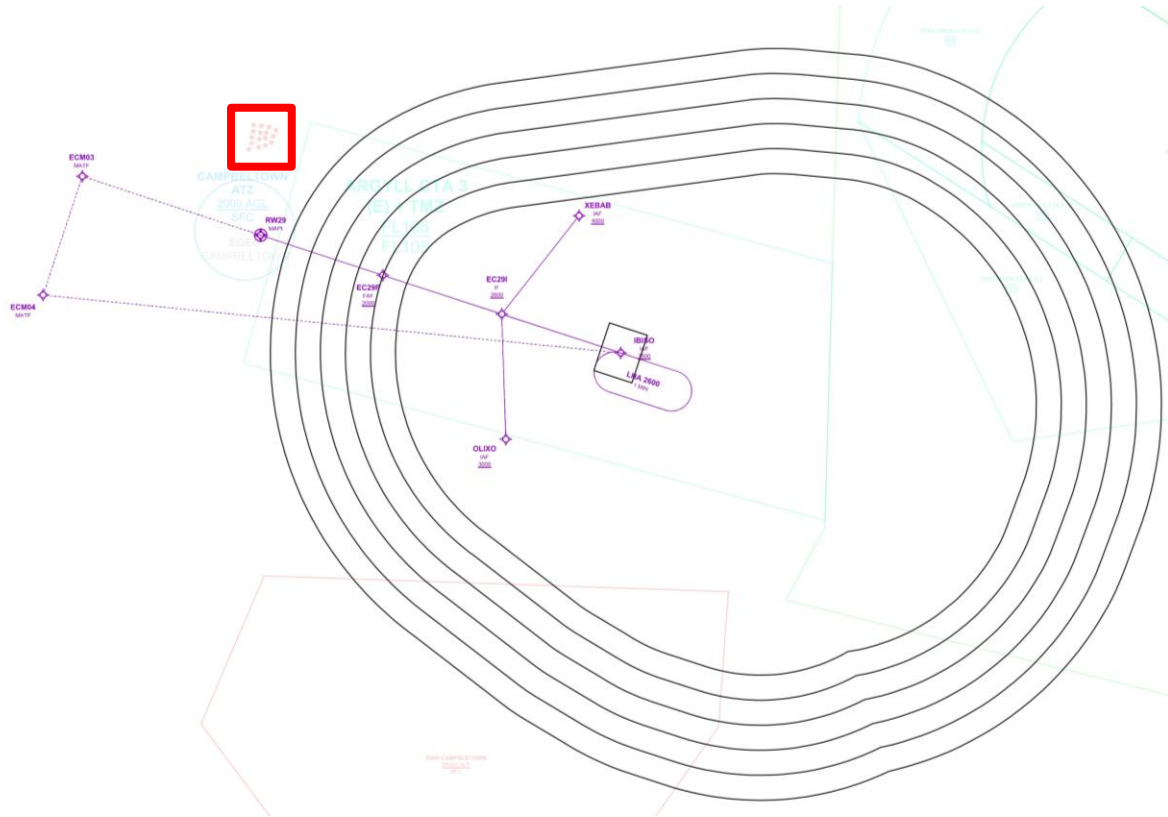
Figure 3-17: New obstacles with respect to EGEC RNP RWY 29

It has been observed that the obstacles are located too far from any procedure legs to have an impact (see Figure 3-17). However, an assessment has been carried out to determine whether these obstacles could affect the associated holding procedure, the circling area, the TAA and the MSA.

3.2.2.1.2.1 *Holding*

A holding at IBISO (IAF) has been analysed, to evaluate the impact of the new obstacles.

All the proposed turbines fall outside of all the Hold areas.



3.2.2.1.2.2 Circling

The circling analysis for this procedure is the same than for EGEK RNP RWY 11, its analysis can be observed in section 3.2.2.1.1.3.

3.2.2.1.2.3 TAA

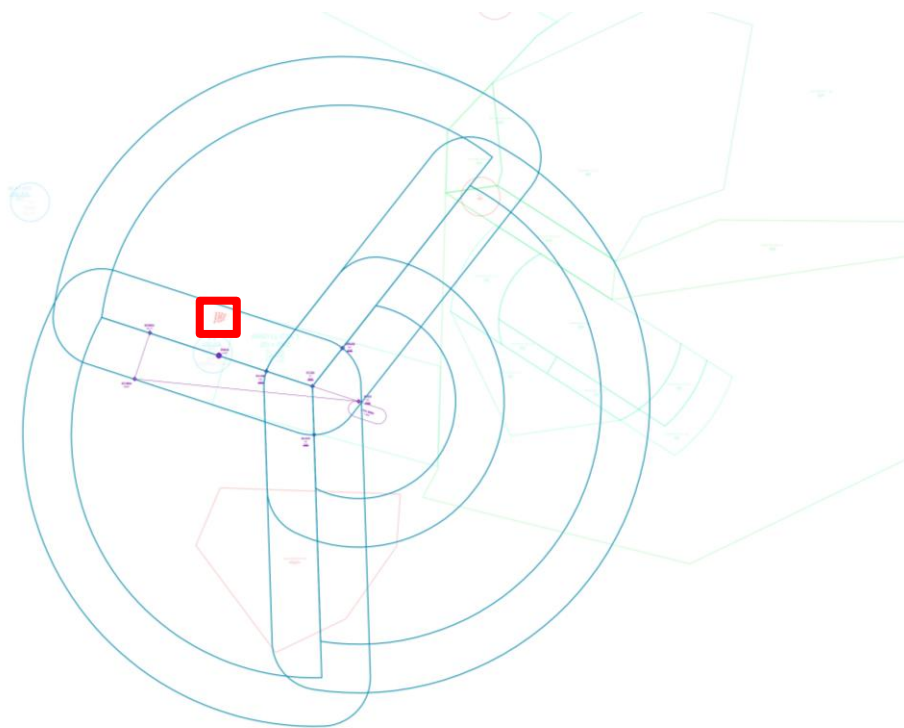


Figure 3-18: New obstacles with respect to EREC RNP RWY 29 TAA

All new obstacles are located within the TAAs associated with the right base IAF (XEBAB) and the left base IAF (OLIXO). Both sectors have been analysed and the results are presented below:

XEBAB IAF		
25NM		
MOC	300	m
Proposed TAA ALT	4000	ft
	1219	m
TAA MOCA	2378	ft
	725	m
TAA MNM ALT	2400	ft
	750	m
Effective Obstacle Clearance	2607	ft
	794	m
Controlling Obstacle		
ID	Tangy IV - 11	
Description	TANGY TURBINE	
Lat	553015.9832N	
Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73	

Figure 3-19: EGEK RNP RWY 29 right base IAF TAA obstacle assessment result

OLIXO IAF		
25NM		
MOC	300	m
Proposed TAA ALT	3000	ft
	914	m
TAA MOCA	2378	ft
	725	m
TAA MNM ALT	2400	ft
	750	m
Effective Obstacle Clearance	1607	ft
	490	m
Controlling Obstacle		
ID	Tangy IV - 11	
Description	TANGY TURBINE	
Lat	553015.9832N	
Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73	

Figure 3-20: EGEK RNP RWY 29 left base IAF TAA obstacle assessment result

The published minimum altitude for each sector is higher than the obstacle-clearance altitude required by any of the assessed obstacles.

Therefore, no increase in altitude is required in any of the EGEK RNP RWY 29 TAA sectors or sub-sectors.

3.2.2.2 Other Procedures

In addition to the previous IFP, there are other procedures and altitude restrictions that shall be considered to ensure the air operations safety. The following subsections present their analysis and main outcomes.

3.2.2.2.1 Minimum Sector Altitudes (MSA)

All EGEN Instrument Approach Charts (IACs) publish the same MSA referenced to the ARP. The obstacle area affects all sectors, including the 10 NM step-down arc (see Figure 3-21); therefore, all sectors have been analysed.

The published minimum altitude for each sector and sub-sector is higher than the obstacle-clearance altitude required by any of the assessed obstacles, as demonstrated in the obstacle assessment results (see Table 3-24).

Therefore, no increase in altitude is required in any of the MSA sectors or sub-sectors.

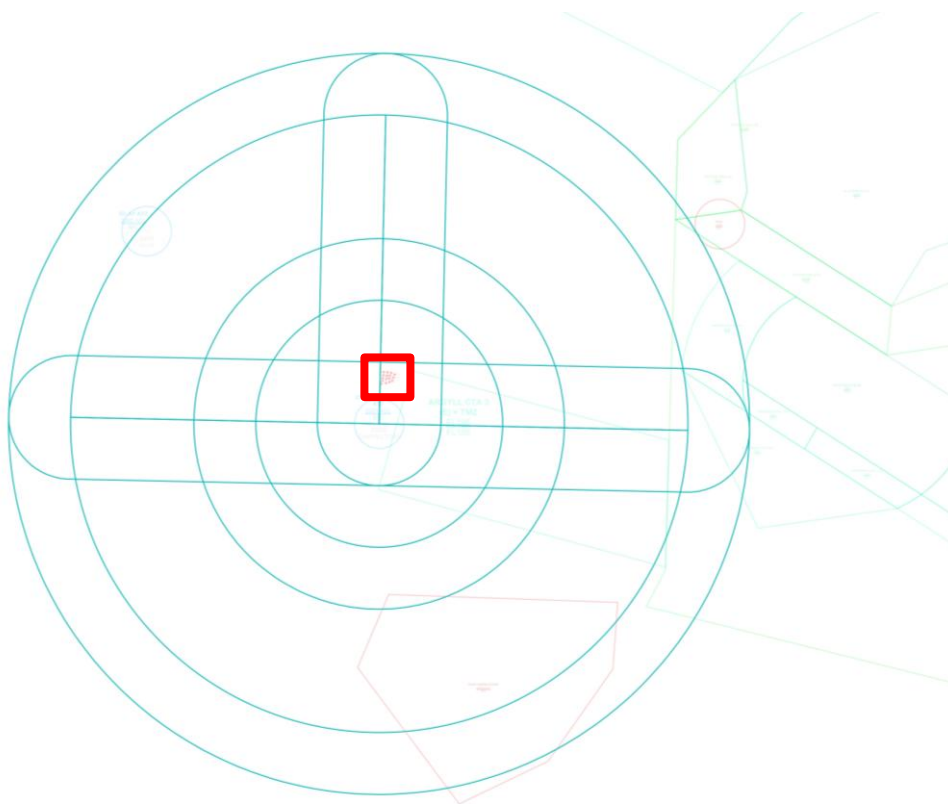


Figure 3-21: EGEN MSA and obstacles area

NW		
25NM		
MOC	300	m
Proposed MSA ALT	3700 1128	ft m
MSA MOCA	2378 725	ft m
MSA MNM ALT	2400 750	ft m
Effective Obstacle Clearance	2307 703	ft m
Controlling Obstacle		
ID	Tangy IV - 11	
Description	TANGY TURBINE	
Lat	553015.9832N	
Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73	

NE		
25NM		
MOC	300	m
Proposed MSA ALT	4000 1219	ft m
MSA MOCA	2378 725	ft m
MSA MNM ALT	2400 750	ft m
Effective Obstacle Clearance	2607 794	ft m
Controlling Obstacle		
ID	Tangy IV - 11	
Description	TANGY TURBINE	
Lat	553015.9832N	
Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73	

S		
25NM		
MOC	300	m
Proposed MSA ALT	3000 914	ft m
MSA MOCA	2378 725	ft m
MSA MNM ALT	2400 750	ft m
Effective Obstacle Clearance	1607 490	ft m
Controlling Obstacle		
ID	Tangy IV - 11	
Description	TANGY TURBINE	
Lat	553015.9832N	
Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73	

ALL SECTORS 10NM		
MOC	300	m
Proposed MSA ALT	3000 914	ft m
MSA MOCA	2378 725	ft m
MSA MNM ALT	2400 750	ft m
Effective Obstacle Clearance	1607 490	ft m
Controlling Obstacle		
ID	Tangy IV - 11	
Description	TANGY TURBINE	
Lat	553015.9832N	
Lon	0053922.3448W	
Alt AMSL + margin (m)	424.73	

Table 3-24: EGEC MSA assessment results

3.2.3 Visual Flight Procedures

Campbeltown airport does not have visual charts associated with it; it only makes reference in section EGEN AD 2.22 FLIGHT PROCEDURES subsection 2 Visual Reference Points (VRP) to the consolidated 'Visual Reference Points List' published on the 'Digital Dataset' page of the NATS AIS website.

All the obstacles are outside the ATZ (Aerodrome Traffic Zone), intended to protect and regulate visual traffic during landing and take-off operations.

The following visual points are associated to Campbeltown airport:

VRP name	Latitude	Longitude	Associated Aerodrome
LUSSA LOCH	553038N	0053743W	CAMPBELTOWN
MULL OF KINTYRE LIGHTHOUSE	551841N	0054812W	CAMPBELTOWN
PLADDA	552535N	0050704W	CAMPBELTOWN, PRESTWICK
SANDA	551650N	0053453W	CAMPBELTOWN

Table 3-25: VRP associated to EGEN

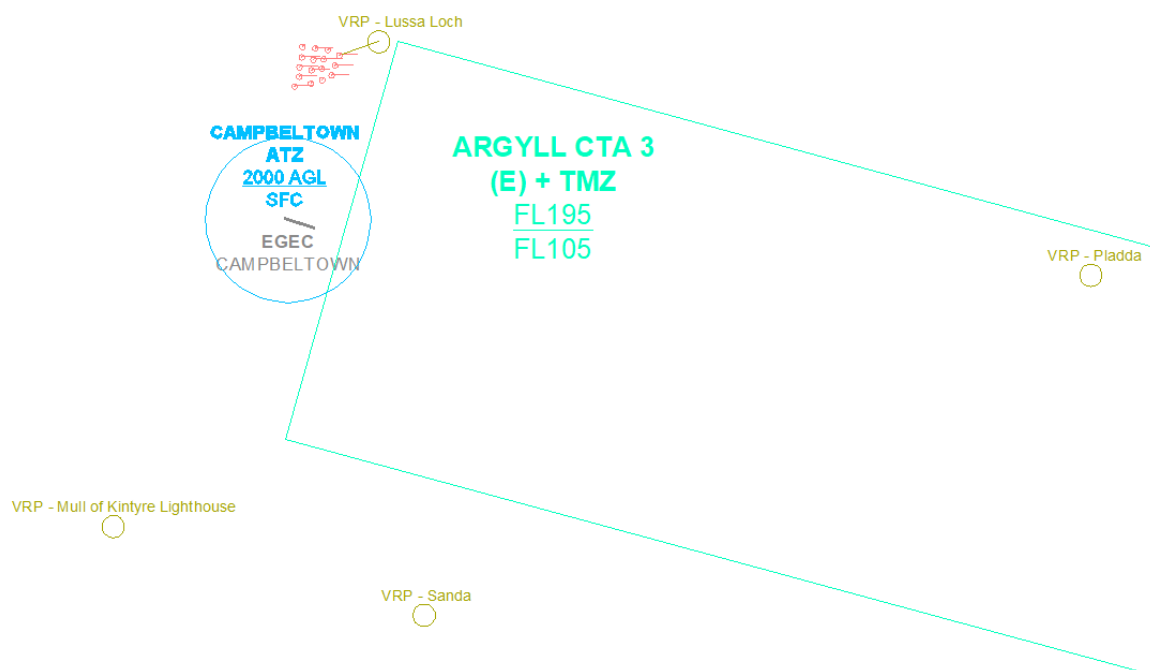


Figure 3-22: VRP associated to EGEN

The VRP Lussa Loch is close to the new obstacles. The other VRP points are too far away to have any direct impact.

VRP Lussa Loch is less than 1NM away from the new obstacles (considering the horizontal margin).

It is recommended to discuss with Campbeltown if there would be interferences with VFR traffic, remembering that the separation from obstacles is under the responsibility of such traffic.

Consideration should be given to mark and light the turbines as a mitigation measure.

3.2.4 Other information contained in AIP

AIP sections AD2.20, AD2.21, AD2.22 and AD2.23 describe important operational information of the airport, which should be considered in the safeguarding assessment.

3.2.4.1 AD2.20 Local Aerodrome Regulations

This section includes mainly, information regarding the airport regulations, ground movement, use of runways, etc.

None of this information affects the safeguarding analysis.

3.2.4.2 AD2.21 Noise abatement procedures

Noise abatement procedures are not applicable at this airport.

3.2.4.3 AD2.22 Flight procedures

This section only signals that VRPs are available in the consolidated 'Visual Reference Points List' published on the 'Digital Dataset' page of the NATS AIS website.

None of this information affects the safeguarding analysis.

3.2.4.4 AD2.23 Additional information

This section presents information regarding passengers in the apron but this information is not relevant for the IFP safeguarding evaluation.

3.3 Area Minimum Altitude (AMA)

The area minimum altitude (AMA) chart divides the UK airspace in different rectangular sectors and shows their minimum safe altitude.

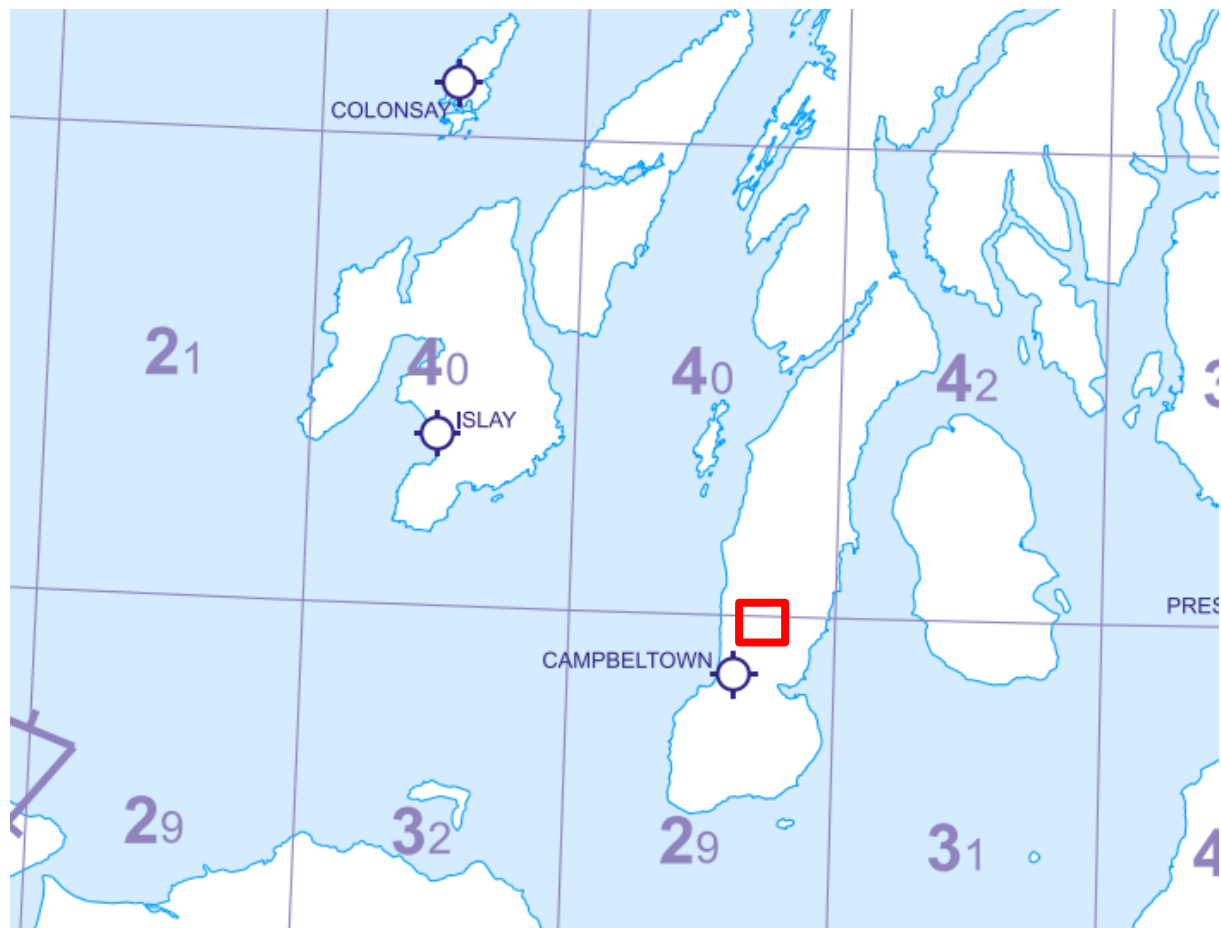


Figure 3-23: AMA chart and obstacles area

The obstacles are distributed into two sectors, the more northern one with an AMA altitude of 4000 and the southernmost one with an altitude of 2900ft.

There is no need to increase the altitude of the AMA sector, as presented in the table below:

Sector	North	South
Most Critical Obstacle	Tangy IV - 11	Tangy IV - 11
Obstacle elevation (m)	424.73	424.73
Obstacle elevation (ft)	1393	1393
Area Minimum Altitude (ft)	4000	2900
MOC (m)	300	300
AMA MOCA (ft)	2400	2400
Effective Obstacle Clearance (ft)	2607	1507

Table 3-26: AMA assessment results

3.4 Lower Airspace Airways

The following figure shows the location of the new obstacles in relation to the lower airspace ATS routes.



Figure 3-24: Lower ATS routes chart (north sheet) and obstacles area

The new obstacles are close to the MAC waypoint, where the airway N552 meets the N562. The segments to/from MAC are all, at least, at or above FL 110, as can be seen in the figures below:

Route Designator		[Route Usage Notes]					
	Significant Point Name	Significant Point Coordinates		Waypoint: IDENT of VOR/DME, BRG, DIST & ELEV of DME antenna		Remarks	
{RNP/RNAV Type & Accuracy}		MAG Track	Geodesic Distance	Upper limit Lower limit	IFR cruising levels max min		Airspace Class/ Controlling Unit/ Channel/ Logon address/ SATVOICE number/ RCP & RSP limitations
		↓ ↑			↓	↑	
N552		Route availability:					
Δ	RUBEX	551912.14N 0065607.21W				(1)	
(RNAV 5)		083° 264°	44.5 NM	FL 255 FL 195	odd FL 250 FL 210	even FL 240 FL 200	(2)
Δ	MACHRIHANISH DME (MAC)	552548.08N 0053901.49W				(3)	

Figure 3-25: Segments of the N552 route to/from MAC

Route Designator		[Route Usage Notes]				
Significant Point Name		Significant Point Coordinates		Waypoint: IDENT of VOR/DME, BRG, DIST & ELEV of DME antenna		Remarks
{RNP/RNAV Type & Accuracy}	MAG Track	Geodesic Distance	Upper limit Lower limit	IFR cruising levels		Airspace Class/ Controlling Unit/ Channel/ Logon address/ SATVOICE number/ RCP & RSP limitations
				max	min	
	↓ ↑			↓	↑	
N562		Route availability:				
Δ HERON	552035.29N 0050000.00W					
(RNAV 5)	285° 105°	22.9 NM	FL 255 FL 105	even FL 240 FL 120	odd FL 250 FL 110	(3)
Δ MACHRIHANISH DME (MAC)	552548.08N 0053901.49W					(4)
(RNAV 5)	287° 107°	35.0 NM	FL 255 FL 195	even FL 240 FL 200	odd FL 250 FL 210	(5)
Δ AMCON	553431.14N 0063837.46W					
(RNAV 5)	287° 106°	36.8 NM	FL 255 FL 195	even FL 240 FL 200	odd FL 250 FL 210	(6)

Figure 3-26: Segments of the N562 route to/from MAC

There is no affection in those airways, as presented in the table below:

Most Critical Obstacle	Tangy IV - 11
Obstacle elevation (m)	424.73
Obstacle elevation (ft)	1393
Airway segments' minimum altitude (ft)	11000
MOC (m)	300
Airway segments' MOCA (ft)	2400
Effective Obstacle Clearance (ft)	9607

Table 3-27: Airway assessment results

4 SUMMARY AND CONCLUSIONS

The safeguarding assessment has been performed to determine the infringements / affections of the planned wind turbines to the airspace and flight procedures at Islay and Campbeltown airports, including the following procedures as published in the UK AIP:

- EGPI RNP RWY 12
- EGPI RNP RWY 30
- EGEC RNP RWY 11
- EGEC RNP RWY 29

The planned turbines penetrate the Campbeltown's OHS (if in place), this is not forbidden but consideration should be given to the control of these new obstacles in order to facilitate practicable and efficient instrument approach procedures.

The planned turbines also require an increase in the Campbeltown's Circling minima for Cat C & D to 1790ft for both its instrument approaches. This increase in the circling minima may not have an operational impact but it should be discussed with Campbeltown airport.

VRP Lussa Loch is less than 1NM away from the new obstacles (considering the horizontal margin). It is recommended to discuss with Campbeltown if there would be interferences with VFR traffic, remembering that the separation from obstacles is under the responsibility of such traffic. Consideration should be given to mark and light the turbines as a mitigation measure.

The holdings are not affected considering the maximum altitude is not higher than 13000ft.

No interferences have been detected with any of the procedures or OLS of Islay airport.

5 QUALITY ASSURANCE

The procedure design and the review process (ground validation) have been carried out following the procedure P004.1 IFP Design, which is part of the Quality Manual of Pildo Wessex [4].

Since November 2016, Pildo Labs Wessex LTD is an Instrument Flight Procedure Design organization approved by the UK CAA (Approval Number UK.785.0007).

6 SOFTWARE TOOLS

The IFP safeguarding assessment described in the previous sections of this document has been developed using the following software tools:

- *PDS* version 3.2.2
- *ProDAN* version 1.3.6.0
- *AutoCAD 2012*
- *Python 3.14.2*
- *Pyproj 3.7.2*
- *Pandas 2.3.3*

END OF DOCUMENT

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