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APPENDIX 6

FCSL
IMPACT ON ILS FLIGHT INSPECTION REPORT

FLIGHT CALIBRATION SERVICES LTD

COOM GREEN ENERGY PARK

IMPACT ON ILS FLIGHT INSPECTION

Prepared For:	Ørsted
Author:	John Wilson
Reviewed by:	David Bartlett
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COOM GREEN ENERGY PARK

Impact on ILS Flight Inspection

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ABBREVIATIONS

AIP	Aeronautical Information Publication
AMSL	Above Mean Sea Level
DME	Distance Measuring Equipment
FCSL	Flight Calibration Services Ltd
FIP	Flight Inspection Procedure
GP	Glide Path
GPS	Global Positioning System
ha	hectare
ICAO	International Civil Aviation Organization
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
ITM	Irish Transverse Mercator
LOC	Localiser
NM	Nautical Mile
RF	Radio Frequency
VMC	Visual Meteorological Conditions
WGS	World Geodetic System

1 INTRODUCTION

Coom Green Energy Park is a proposed renewable energy project in County Cork located approximately 23 km (12.4 NM) north of Cork Airport.

The wind farm developer has requested that an assessment be performed to establish any adverse effect the proposed wind farm may have on flight inspection procedures and profiles associated with the Cork Airport Runway 16 Instrument Landing System (ILS).

2 DETAILS OF PROPOSED WIND FARM

The proposed Coom Green Energy Park comprises 22 wind turbines and associated infrastructure including turbine foundations, access tracks, 2 electricity substations, 2 battery storage units and underground cabling located in an area of approximately 1,500 ha as shown in Figure 2.1 below. Figure 2.2 below shows the location of the wind farm in relation to Cork Airport.

The proposed wind turbine coordinates and base heights are shown in Table 2.1 below.

The maximum height of the proposed wind turbines (to blade tip) is 169 m (554 ft) above ground level. Ground height at the highest turbine (T22) is 377 m (1,237 ft) AMSL.

The height of the highest turbine (to blade tip) is therefore 546 m (1,791 ft) AMSL.

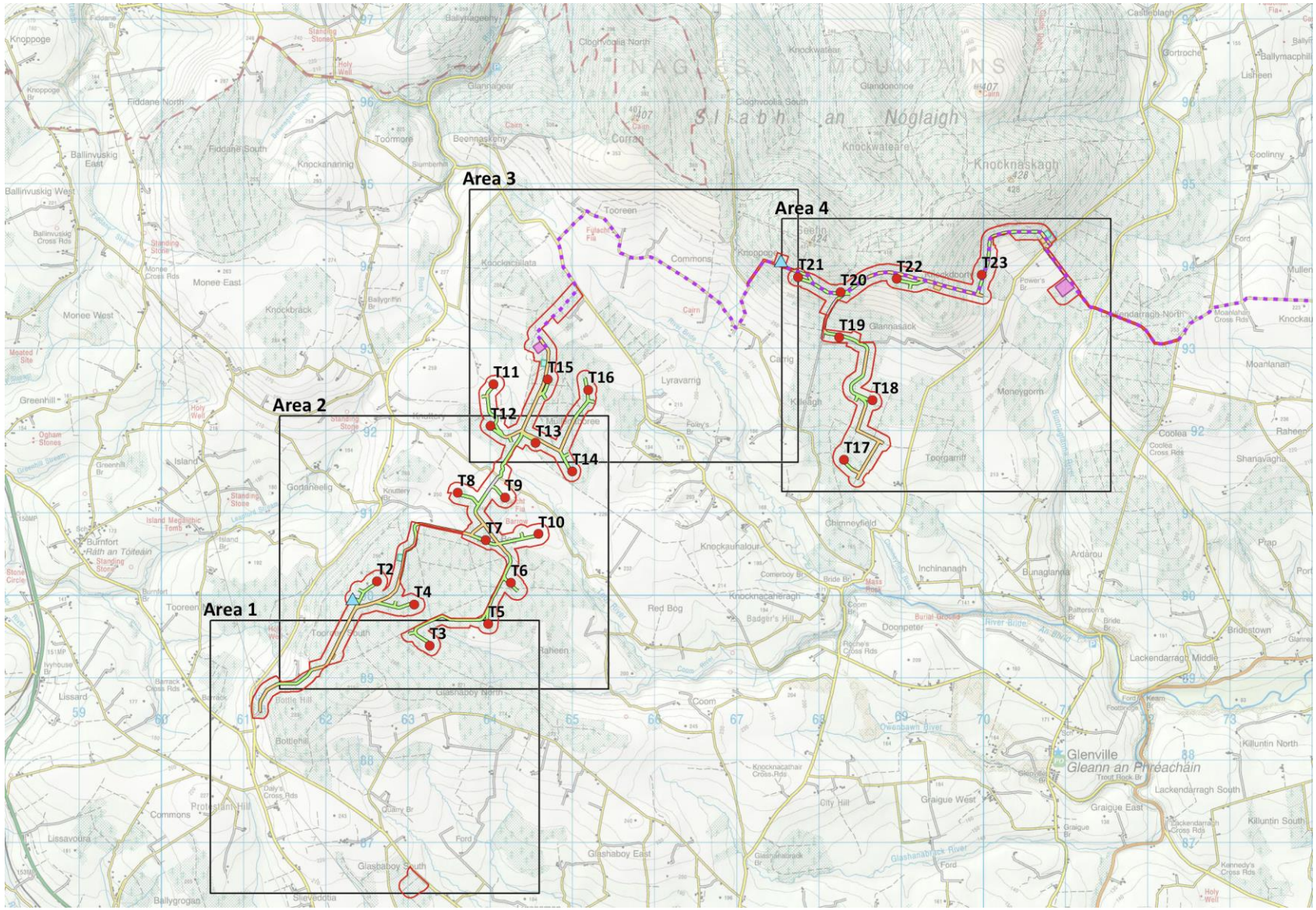

Figure 2.1 - Proposed Coom Green Energy Park Site Layout

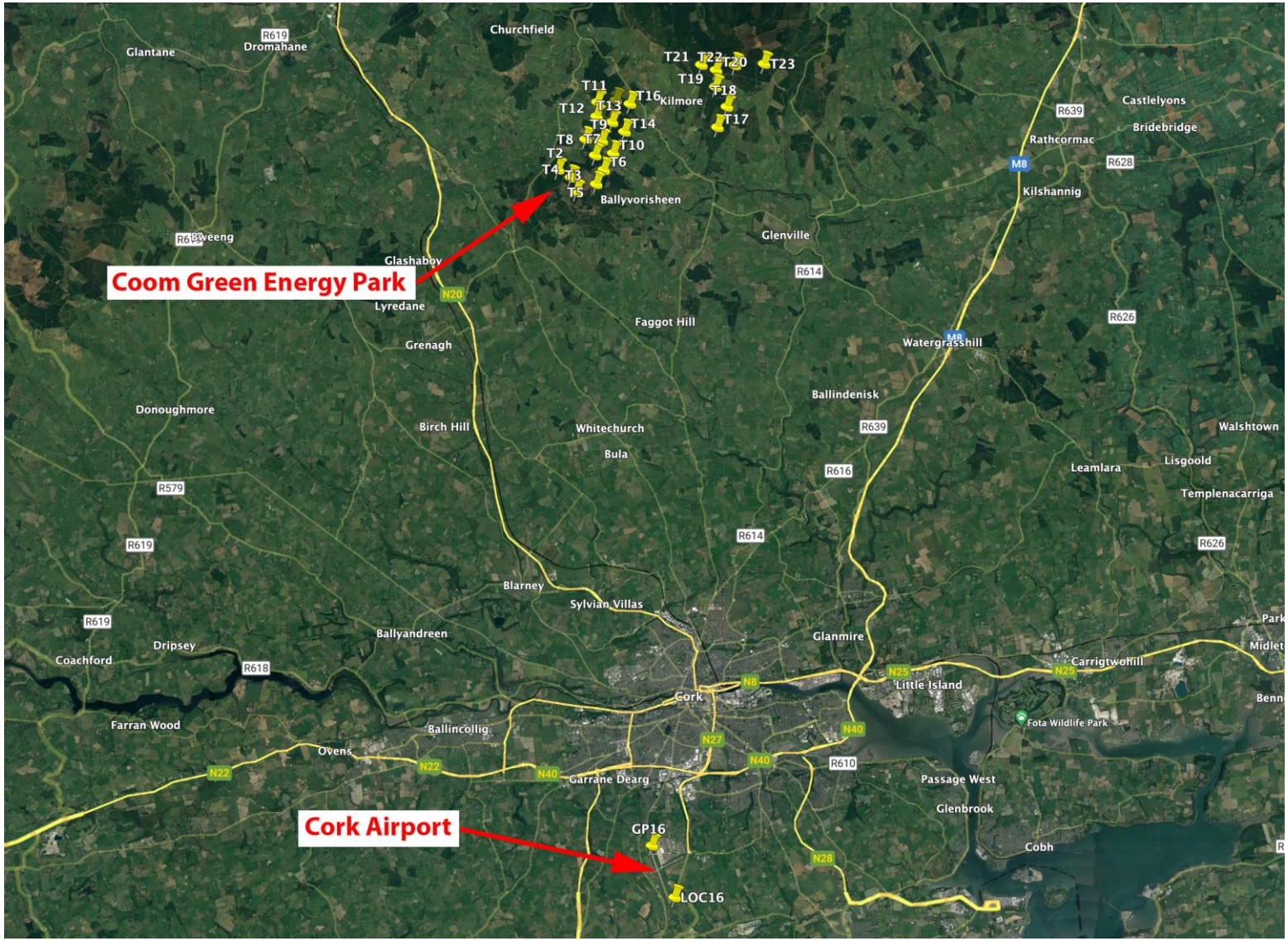

Figure 2.2 – Location of Proposed Coom Green Energy Park and Cork Airport

Turbine	ITM Coordinates		WGS-84 Coordinates		Ground Level AMSL (m)
	X	Y	Latitude	Longitude	
2	562583	590234	52.062794	-8.545682	294
3	563227	589449	52.055781	-8.536206	261
4	563039	589951	52.060281	-8.539001	260
5	563936	589713	52.058201	-8.525896	260
6	564212	590214	52.062722	-8.521924	257
7	563907	590734	52.067376	-8.526426	250
8	563567	591306	52.072496	-8.531446	245
9	564146	591247	52.072003	-8.522995	245
10	564550	590806	52.068065	-8.517056	227
11	564002	592625	52.084380	-8.525240	245
12	563969	592119	52.079829	-8.525668	241
13	564515	591909	52.077977	-8.517681	256
14	564961	591567	52.074931	-8.511140	248
15	564661	592686	52.084971	-8.515632	270
16	565156	592556	52.083833	-8.508396	234
17	568267	591705	52.076371	-8.462927	190
18	568612	592430	52.082908	-8.457961	237
19	568206	593139	52.089257	-8.463951	263
20	568229	593738	52.094643	-8.463671	332
21	567708	593928	52.096320	-8.471292	344
22	568905	593906	52.096191	-8.453821	377
23	569943	593950	52.096644	-8.438676	310

Table 2.1 - Proposed Turbine Coordinates

NOTE

Turbines are numbered from T2 to T23. This reflects the original assigned turbine numbering system in which several turbines were removed including T1.

3 ILS INFORMATION

3.1 ILS Site Information

The Runway 16 ILS provides radionavigation information to aircraft in the initial and final approach phases of flight towards Runway 16 within 25 NM of Cork Airport. The ILS ground installation comprises:

- Localiser equipment (providing lateral guidance to the runway centreline) located on the extended runway centreline approximately 190 m from the stop end of Runway 16.
- Glide Path equipment (providing vertical guidance to a 3.0° glide path) located approximately 130 m offset from runway centreline and backset 300 m from Runway 16 threshold.
- Distance Measuring Equipment (DME) transponder (providing distance to runway threshold information). The DME antenna is mounted on the Glide Path mast.

ILS Localiser, Glide Path and DME antenna coordinates are shown in the extract from AIP Ireland shown in Figure 3.1 below.

3.2 ILS Coverage Information

International Standards and Recommended Practices (SARPS) for ILS are published by the International Civil Aviation Organization (ICAO). ICAO Annex 10 Chapter 3.1 defines ILS Localiser and Glide Path lateral coverage sectors as described below.

3.2.1 Localiser Coverage

The Localiser coverage sector shall extend from the centre of the localiser antenna system to distances of:

- 46.3 km (25 NM) within plus or minus 10 degrees from the front course line;
- 31.5 km (17 NM) between 10 degrees and 35 degrees from the front course line;
- 18.5 km (10 NM) outside of plus or minus 35 degrees from the front course line if coverage is provided.

Figure 3.2 below shows ILS Localiser lateral coverage sector as defined in ICAO Annex 10.

Figure 3.3 below shows the Runway 16 ILS Localiser lateral coverage sector in relation to the proposed Coom Green Energy Park.

3.2.2 Glide Path Coverage

The Glide Path equipment shall provide signals sufficient to allow satisfactory operation of a typical aircraft installation in sectors of 8 degrees in azimuth on each side of the centre line of the ILS glide path, to a distance of at least 18.5 km (10 NM).

ICAO Annex 10 Volume I states that ILS Glide Path coverage shall extend to a range of 10 NM, up to 1.75θ and down to 0.45θ above the horizontal, or to a lower angle, down to 0.3θ as required to safeguard the promulgated Glide Path intercept procedure (where θ is the nominal Glide Path angle).

Figure 3.4 below shows ILS Glide Path coverage as defined in ICAO Annex 10.

Figure 3.5 below shows the Runway 16 ILS Glide Path lateral coverage sector in relation to the proposed Coom Green Energy Park.

3.2.3 DME Coverage

The DME equipment shall provide aircraft with distance to threshold information throughout the Localiser coverage sector as defined in 3.2.1 above.

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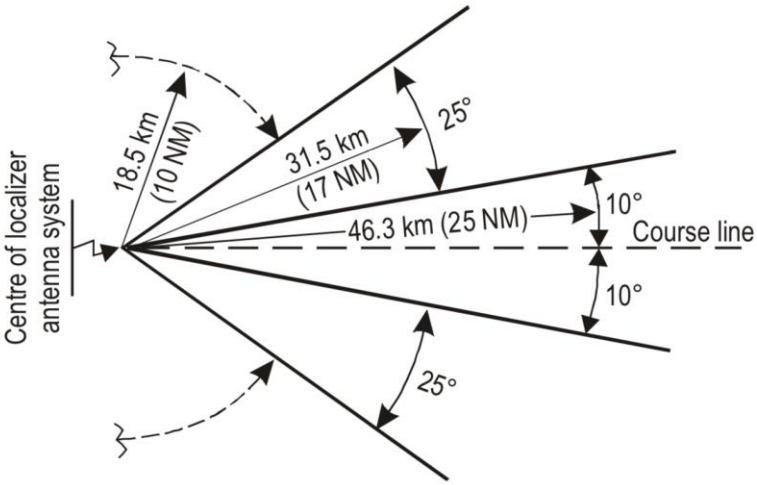
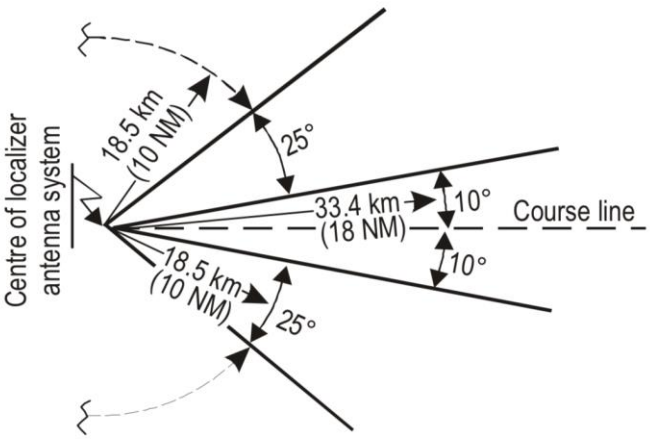
Type of aid, MAG VAR, Type of supported OP (for VOR/ ILS/MLS/ GNSS/SBAS and GBAS, give declination)	ID	Frequency	Hours of operation	Position of transmitting antenna coordinates	Elevation of DME transmitting antenna or SBAS: ellipsoid height of LTP/ FTP	Service Volume Radius from the GBAS Reference Point	Remarks
1	2	3	4	5	6	7	8
DVOR/DME 4°W (2018)	CRK	114.6MHz	H24	515026.19N 0082939.37W	500ft		Designated Operational Coverage 80 NM
ILS LOC RWY 16 CAT II 4° W (2018)	ICS	109.9 MHz	H24	514950.47N 0082905.47W			Coverage is restricted to 35° either side of course line. Signals received outside the coverage sector including back beam radiation should be ignored. Use at 3000 feet AMSL restricted to 18NM, due low signal coverage. LLZ Flags may be observed below 3000ft AMSL outside 10NM range from threshold.
ILS GP RWY 16		333.8 MHz	H24	515050.04N 0082947.93W			GP Angle 3.0° RDH 57ft Perturbations might be observed between 3NM and touchdown. Flight calibration reported perturbations to be well within tolerances.
ILS DME RWY 16	ICS	CH36X	H24	515050.04N 0082947.93W	530ft *		The DME Zero range is indicated at THR RWY 16 * Data whose quality is not assured

Figure 3.1 - AIP Ireland



When topographical features dictate or operational requirements and alternative navigation facilities permit, the following coverage may be provided:



Note.— If coverage as prescribed in Chapter 3, 3.1.3.3.1 is required outside the plus or minus 35-degree sector, this is provided to 18.5 km (10 NM), as indicated by the broken arc above.

Figure 3.2 - ILS Localiser Lateral Coverage Sector

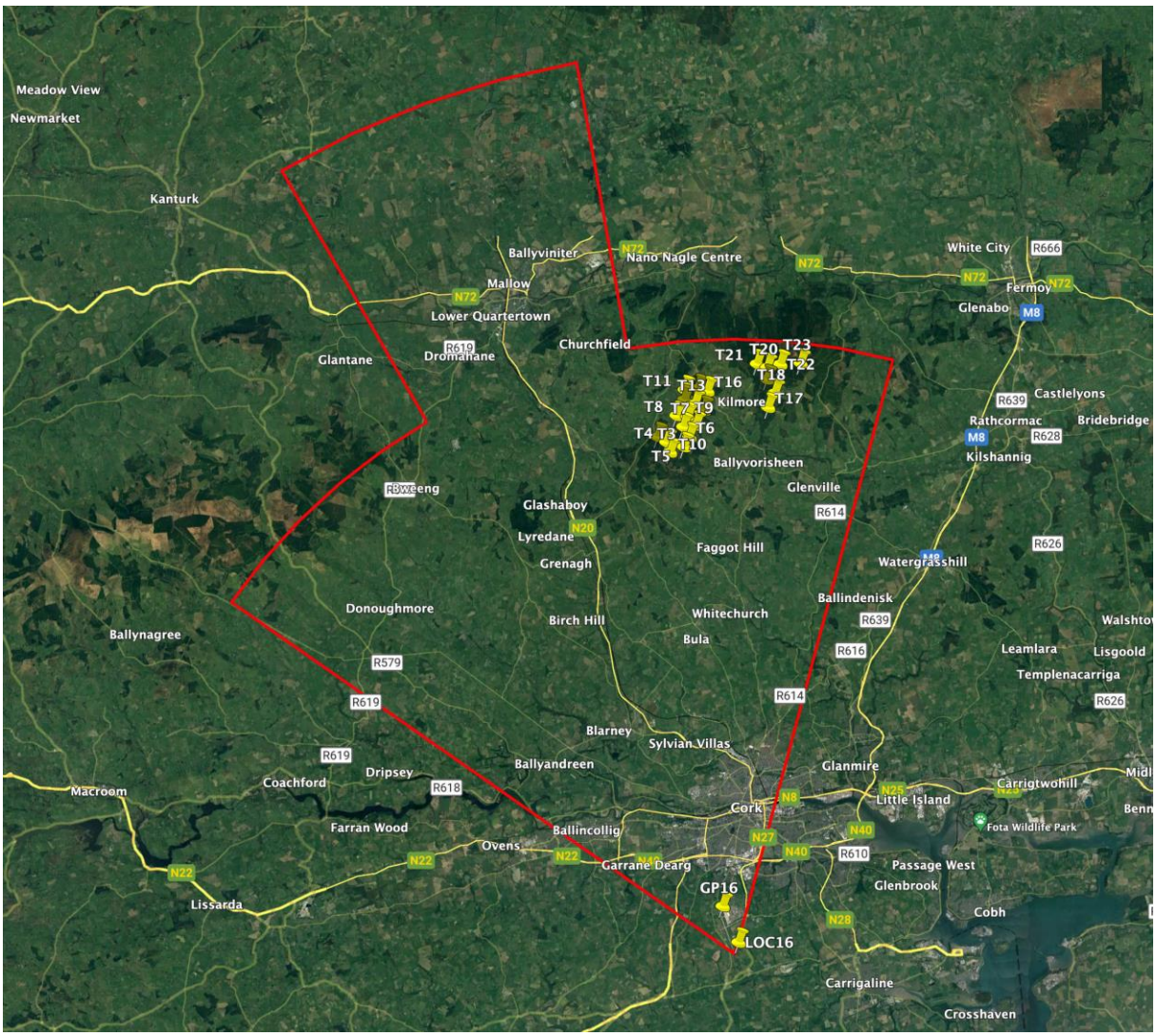


Figure 3.3 - Runway 16 ILS Localiser Lateral Coverage Sector

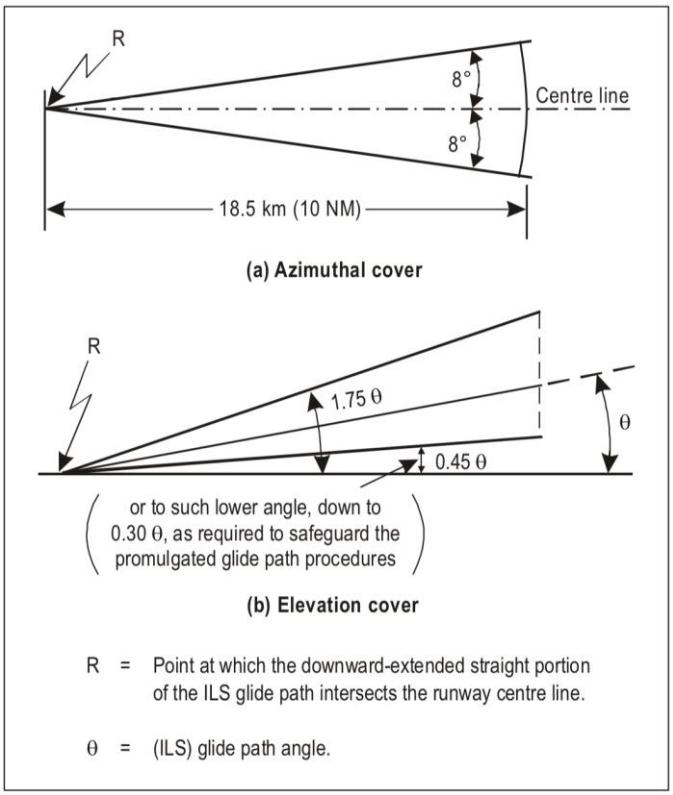


Figure 3.4 - ILS Glide Path Coverage

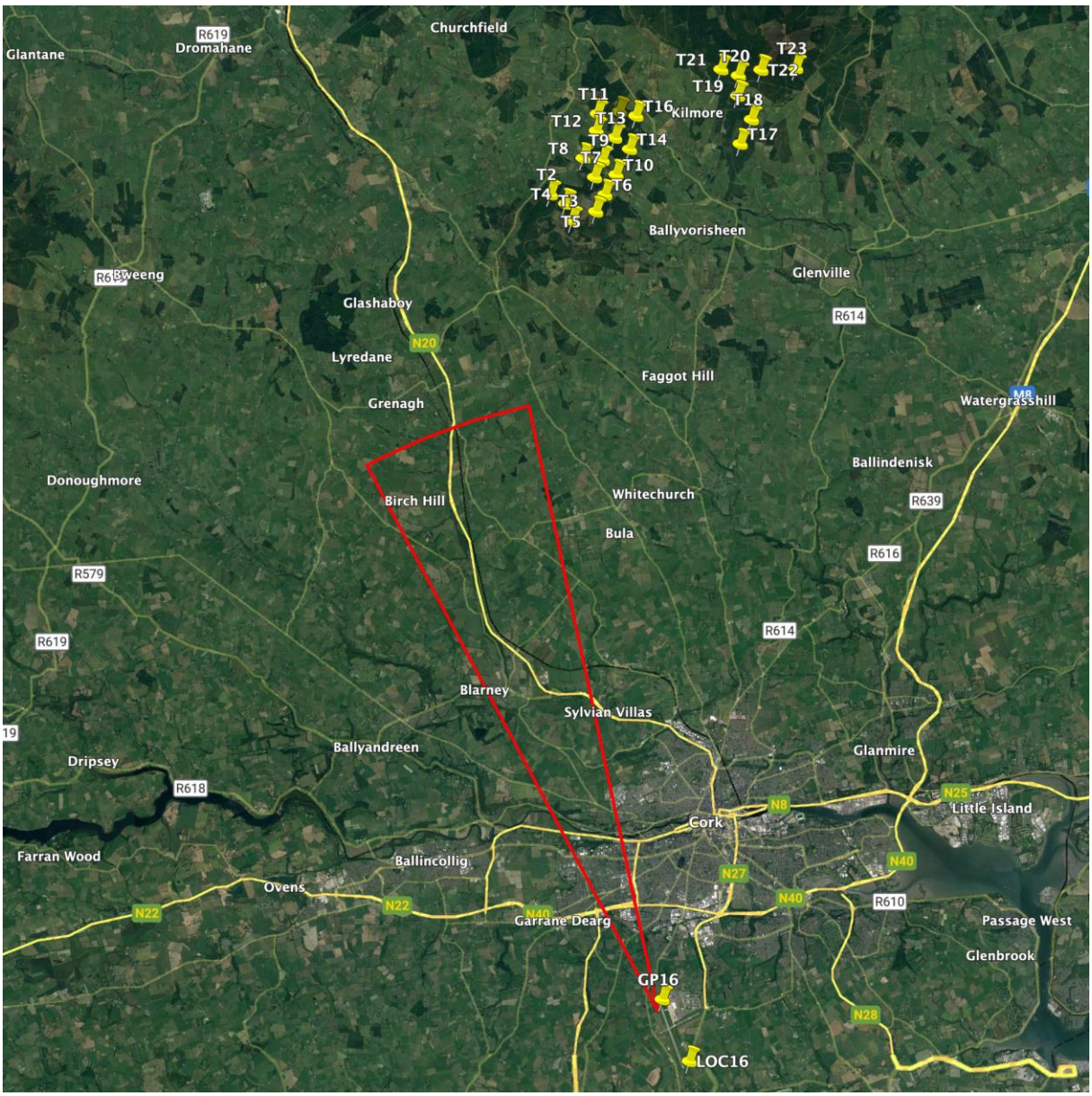


Figure 3.5 - Runway 16 ILS Glide Path Lateral Coverage Sector

4 ICAO ILS FLIGHT INSPECTION RECOMMENDATIONS

International Standards and Recommended Practices (SARPS) for ILS are published by the International Civil Aviation Organization (ICAO). Guidance material on factory, ground and flight testing of ILS installations is published in ICAO Doc 8071 Volume I. The purpose of ICAO Doc 8071 Volume I is to provide general guidance on the extent of testing and inspection normally carried out to ensure that radio navigation systems meet the SARPS published by ICAO.

To verify guidance signal accuracy within the ILS coverage volume, ICAO Doc 8071 recommends that a normal centreline approach should be flown, using the glide path, where available. For a Category II and III Localisers, the aircraft should cross the threshold at approximately the normal design height of the glide path and continue downward to normal touchdown point.

To verify that the ILS Localiser and Glide Path guidance signals provide the correct information to the user throughout the area of operational use, coverage checks should be performed. At periodic inspections, it is necessary to check coverage only at 31.5 km (17 NM) and 35 degrees either side of the course, unless use is made of the localiser outside of this area. Arc (part orbit) profiles may be flown at distances closer than this, provided an arc profile is flown at the same distance and altitude during the commissioning inspection to establish reference values.

To verify Glide Path displacement sensitivity, ICAO Doc 8071 recommends that approaches be made on centreline, 0.12θ below and 0.12θ above the nominal glide path angle (θ), where aircraft should receive 50% full-scale fly up (below path) and 50% full-scale fly down (above path) guidance indications.

The clearance of the Glide Path sector is verified by flying towards the facility on centreline at a constant height (level run) starting at a distance corresponding to an angle of 0.3θ (where θ is the nominal glide path angle) continuing to a point where twice the glide path angle (2θ) has been passed. Glide Path RF signal level is also measured during the level run to ensure the received signal level meets ICAO minimum requirements at the limits of coverage.

5 FCSL FLIGHT INSPECTION PROCEDURES

FCSL have developed company procedures for commissioning and routine flight inspection of ILS Localiser and Glide Path facilities. Customer flight inspection requirements are initially captured on a Client Facility Data Sheet (Form 101). Form 101 records the technical details of the navigation aid to be flight checked and the specified interval between flight checks. For the Runway 16 ILS, the interval between flight checks is 180 days.

In the case of the Runway 16 ILS, the ILS is flight checked in accordance with FCSL Flight Inspection Procedure (FIP) FIP 23 (ILS Flight Inspections GPS Southern Ireland).

FIP 23 specifies that the following flight profiles are flown as defined in FCSL Form 102 (Flight Profile Chart):

Profile No	Profile Description	See Figure
01	Centreline Approach	5.1
04	Part Orbit	5.2
12	Top Edge	5.3
13	Bottom Edge	5.4
14	Slice (Level run)	5.5
15	Left Slice 8° (Level run)	5.6
16	Right Slice 8° (Level run)	5.7

Figures 5.1 to 5.7 below show the flight profiles to be flown during ILS flight inspection.

The start points, heights and distances for each flight profile are decided by the FCSL Flight Inspector in conjunction with the pilots to ensure correct and sufficient data is recorded while taking into account local terrain and obstacle clearance requirements.

FCSL FIP 23 states that flight inspection pilots will not fly within 1,000 ft of the ground in IMC (unless on centreline and edge approaches) and commissioning flights should be carried out in sight of the surface at all times. FIP 23 also states that Inspection Pilots will not fly within 1,000 ft of the highest obstacle within 5 NM either side of track in IMC.

Glide Path flight inspection procedures include checks below the Glide Path sector to assure a safe flight path area between the bottom edge of the Glide Path sector and any obstacles on the approach path. The Glide Path slice, and left and right slice 8° (level runs) flight profiles must therefore ensure that the flight inspection aircraft clears obstacles by at least 500 ft in VMC and by at least 1,000 ft in IMC.

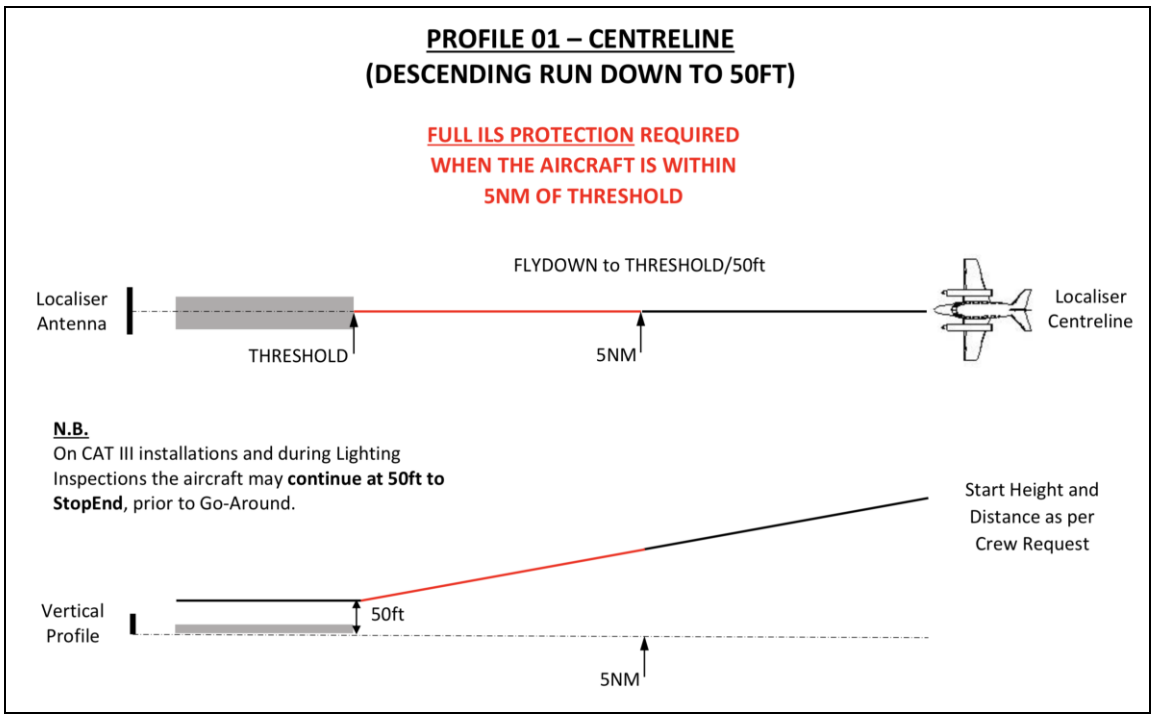


Figure 5.1 - Centreline Approach Flight Profile

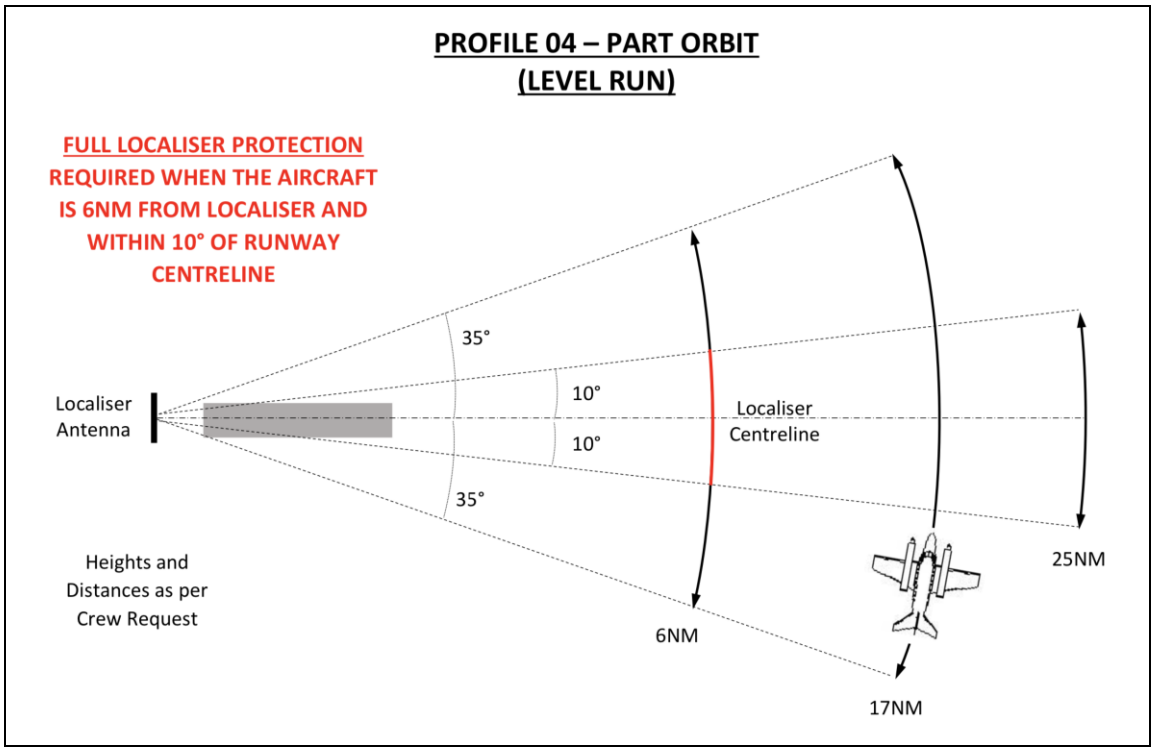


Figure 5.2 – Part Orbit Flight Profile

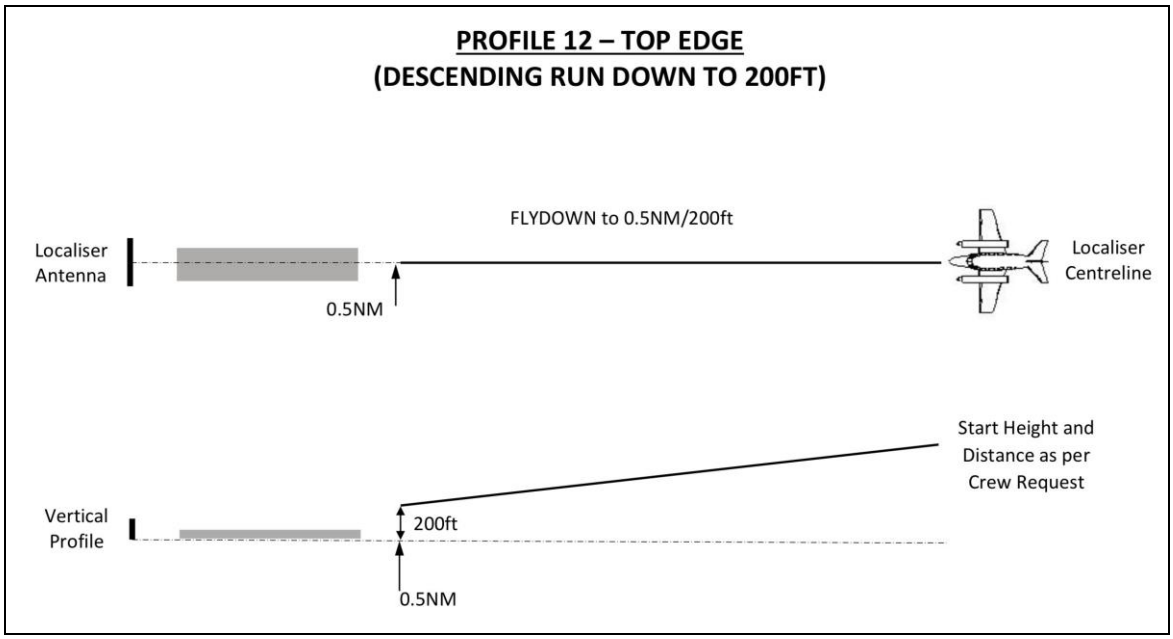


Figure 5.3 – Top Edge Flight Profile

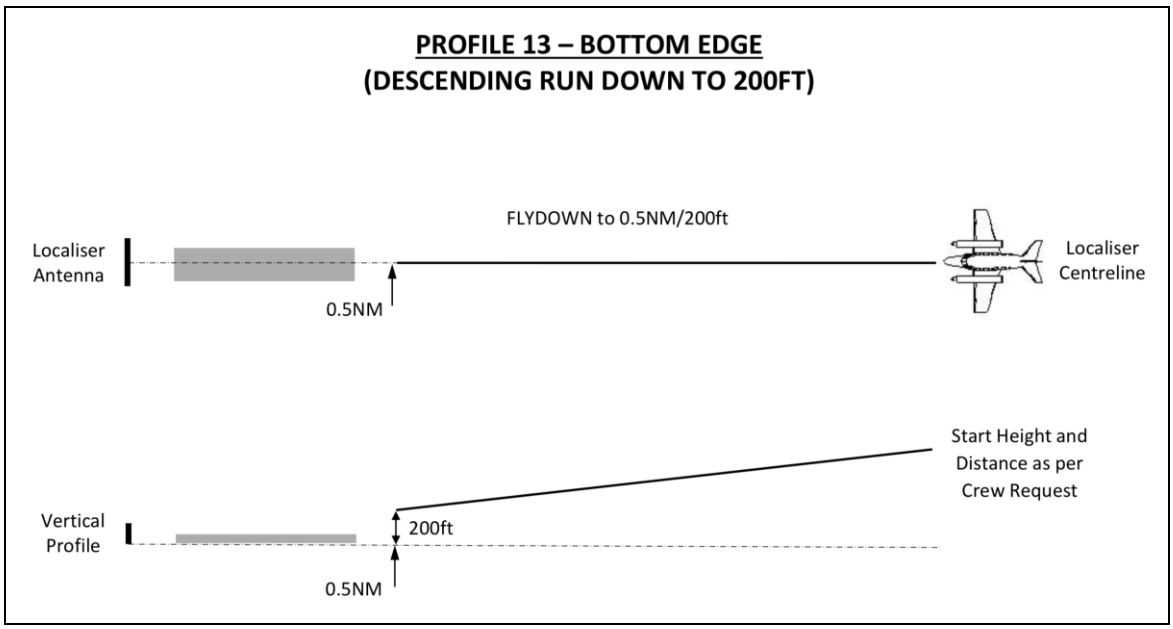


Figure 5.4 – Bottom Edge Flight Profile

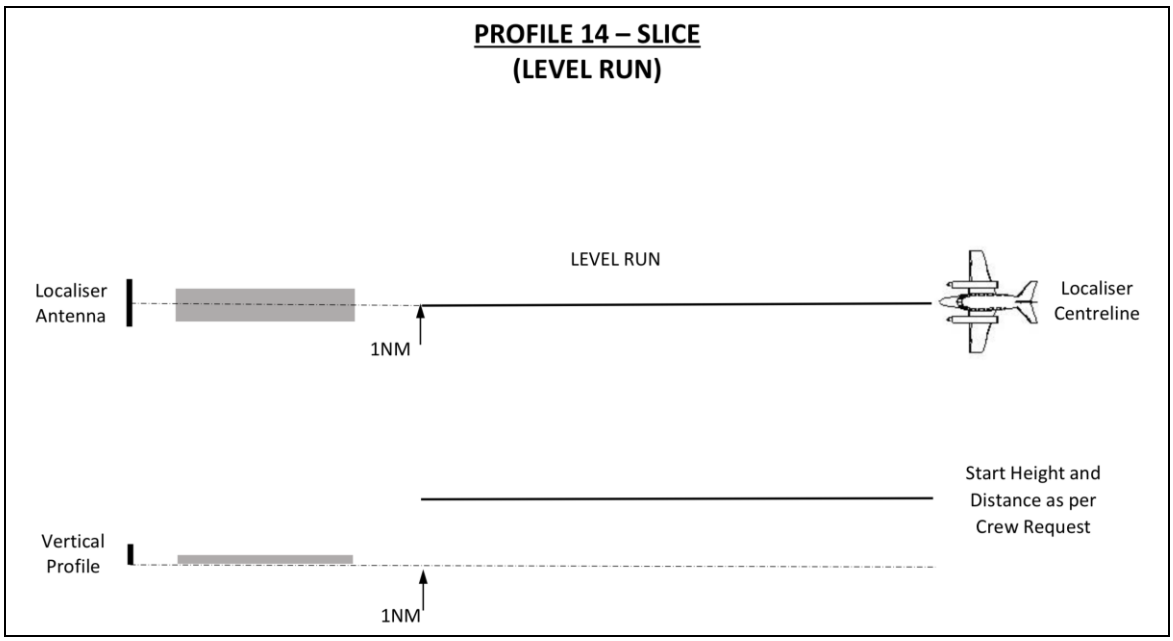


Figure 5.5 – Slice Flight Profile

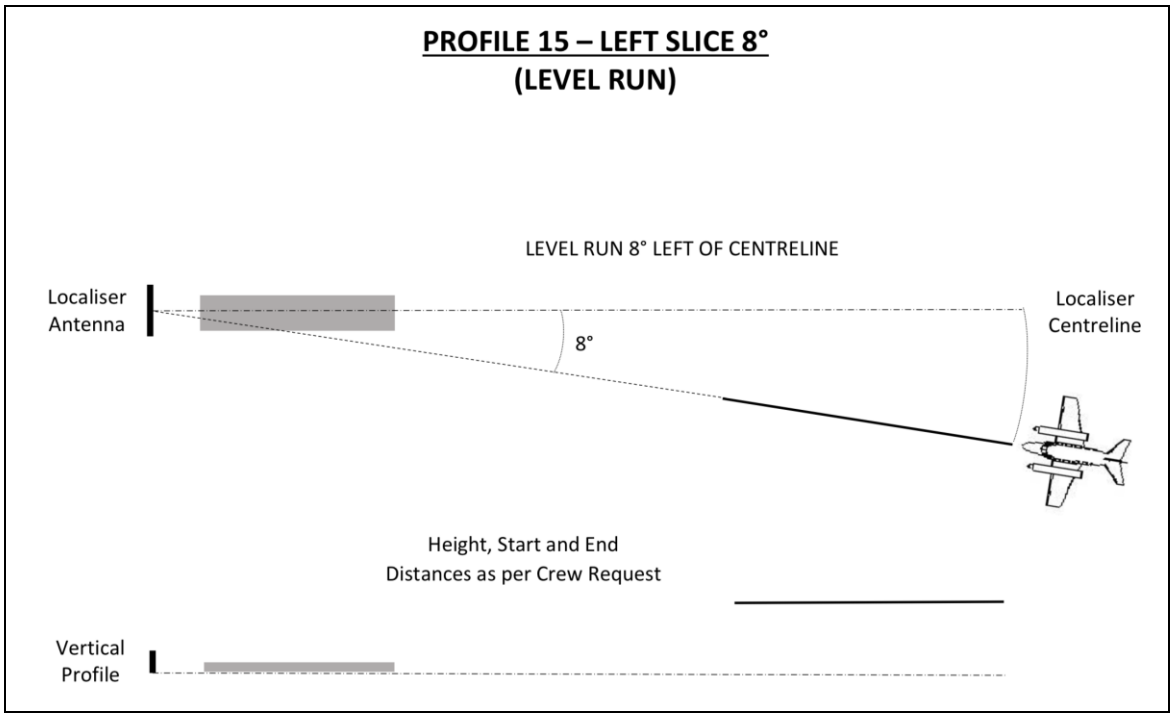


Figure 5.6 – Left Slice 8° Flight Profile

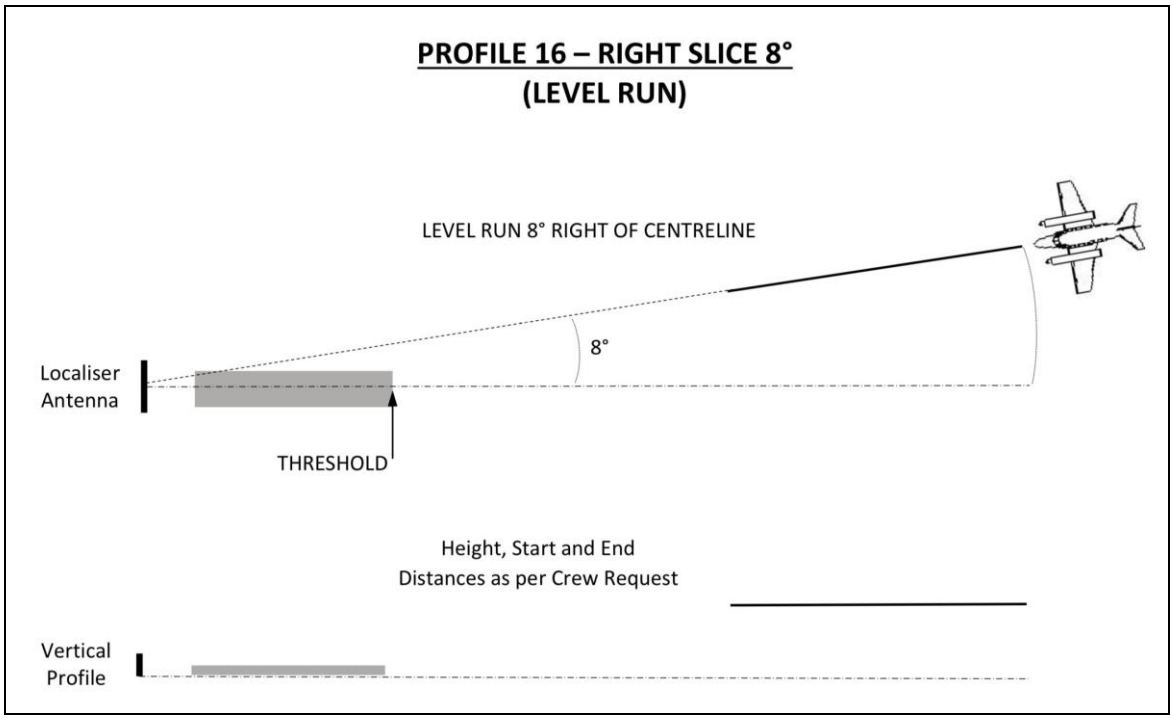


Figure 5.7 – Right Slice 8° Flight Profile

6 IMPACT ASSESSMENT

6.1 ILS Centreline Approach Flight Profile

For ILS centreline approach flight profiles, heights and distances are decided by the FCSL Flight Inspector in conjunction with the pilots to ensure correct and sufficient data is recorded while taking into account local terrain and obstacle clearance requirements.

For annual and commissioning ILS flight inspections, centreline approaches are flown from a range of 25 NM from the Localiser antenna.

6.1.1 Horizontal Obstacle Clearances

For a centreline approach profile, the flight inspection aircraft will be approximately 2.7 NM laterally from the nearest wind turbine (T2) at a point on the extended runway centreline closest to the wind farm. This distance is less than the minimum clearance required from any object in IMC, but greater than the minimum clearance required in VMC, as defined in FIP 23.

6.1.2 Vertical Obstacle Clearances

For a centreline approach on a 3.0° glide path, the flight inspection aircraft will pass above, but 2.7 NM laterally distant from, the proposed Coom Green Energy Park site. The flight inspection aircraft vertical clearance above the highest turbine (T22) can be estimated as follows (see Figure 6.1):

Horizontal distance from 16 Glide Path antenna (on boresight) to Turbine T22

= 24,984 m

Assume ground height at 16 Glide Path Antenna = Runway 16 threshold height = 477 ft = 145 m

Clearance (h) above highest turbine (T22)

= (24,984 m × tan 3.0°) − (377 m − 145 m) − 169 m = 908 m = 2,979 ft

This height exceeds the minimum clearance required above terrain and obstacles in IMC and VMC.

6.1.3 Summary

For a centreline approach profile on a 3.0° glide path, the flight inspection aircraft will have sufficient clearance above terrain and obstacles in IMC and VMC. The proposed wind farm will therefore have no impact on the centreline approach flight profile.

6.2 ILS Part Orbit Flight Profiles

For ILS part orbit flight profiles, heights and distances are decided by the FCSL Flight Inspector in conjunction with the pilots to ensure correct and sufficient data is recorded while taking into account local terrain and obstacle clearance requirements.

For all ILS flight inspections (routine, annual and commissioning), part orbits are flown at a range of 6 NM from the Localiser antenna at a height of 1,500 ft above runway threshold.

For annual and commissioning ILS flight inspections, part orbits are also flown at ranges of 17 NM and 25 NM from the Localiser antenna at a height of 2,000 ft above runway threshold.

The track of the 6 NM and 17 NM part orbit profiles are shown in Figure 6.2 below. Figure 6.3 below shows the terrain elevation profile for the 17 NM part orbit.

6.2.1 Horizontal Obstacle Clearances

For a 6 NM part orbit flight profile, the flight inspection aircraft will be approximately 7.5 NM from the nearest wind turbine (T3) at a point on the part orbit track closest to the wind farm site. This distance exceeds the minimum clearance required from any object in IMC, as defined in FIP 23.

For a 17 NM part orbit flight profile, the flight inspection aircraft will be approximately 0.9 NM from the nearest wind turbine (T23) at a point on the part orbit track closest to the wind farm site. This distance is less than the minimum clearance required from any object in IMC, but exceeds the minimum clearance required in VMC, as defined in FIP 23.

For a 25 NM part orbit flight profile, the flight inspection aircraft will be approximately 8.9 NM from the nearest wind turbine (T23) at a point on the part orbit track closest to the wind farm site. This distance exceeds the minimum clearance required from any object in IMC, as defined in FIP 23.

6.2.2 Vertical Obstacle Clearances

In accordance with FCSL FIP 23, pilots must not fly within 1,000 ft of the ground in IMC. The 17 NM part orbit flight must therefore be flown at a height of at least 1,000 ft above the highest obstacle to be encountered.

Figure 6.3 below shows that a flight inspection aircraft flying a 17 NM part orbit will pass overhead and close to the summit of Knocknaskagh Mountain (1,399 ft AMSL). The 17 NM part orbit must therefore be flown at a height of at least 2,399 ft AMSL to remain at least 1,000 ft clear of the summit of Knocknaskagh Mountain.

The maximum height of the highest wind turbine (T22) AMSL can be estimated as:

Ground height + maximum turbine height = 377 m + 169 m = 546 m (1,791 ft).

For an orbit height of 2,399 ft AMSL, a flight inspection aircraft will therefore have a clearance of 608 ft above the highest wind turbine. This height is less than the minimum clearance required above terrain and obstacles in IMC, but exceeds the minimum clearance required in VMC, as defined in FIP 23.

6.2.3 Summary

For a part orbit profile, the flight inspection aircraft will have sufficient clearance above terrain and obstacles in VMC. If the flight inspection is to be conducted in IMC, the part orbit flight profile height will need to be increased by approximately 390 ft to remain sufficiently clear of obstacles.

The proposed wind farm will therefore have no significant impact on the part orbit flight profile.

6.3 ILS Bottom Edge Flight Profile

For the bottom edge flight profile (flown on centreline), the flight inspection aircraft is flown at a glide path angle 0.12θ below the nominal glide path angle (θ). For commissioning, annual and routine ILS flight inspections, FIP 23 specifies that the bottom edge flight profile is flown from a distance of 4 NM from runway threshold towards the runway.

As the nearest turbine (T3) is approximately 12 NM from Runway 16 threshold, the proposed Coom Green Energy Park will not have any impact on the bottom edge ILS flight inspection profile.

6.4 ILS Slice Flight Profile (Level Run)

6.4.1 Horizontal Obstacle Clearances

For routine, annual and commissioning ILS flight inspections, FIP 23 specifies that the slice flight profile (on centreline) is flown towards the runway from a distance of 12 NM from runway threshold, or from a distance that corresponds to an angle of 0.3θ (0.9°) at a height of 1,000 ft above runway threshold.

For a slice height of 1,000 ft, the distance *d* that corresponds to an angle of 0.3θ is calculated as:

$$d = \frac{1{,}000\,ft}{\tan(0.9°)} = 63{,}656\,ft = 10.48\,NM$$

An additional 2 NM is added to this range to allow the flight inspection pilots to establish on profile. For the most recent routine Runway 16 ILS flight inspections conducted by FCSL, the slice profiles were flown from a range of 12 NM from runway threshold and a height of 1,000 ft above runway threshold.

For a slice flight profile (on centreline) at a range of 12 NM from runway threshold, the flight inspection aircraft will be approximately 2.7 NM from the nearest wind turbines (T2, T3 and T4). This distance is less than the minimum clearance required from any object in IMC, but exceeds the minimum clearance required in VMC, as defined in FIP 23 (see Figure 6.4 below).

6.4.2 Vertical Obstacle Clearances

For a slice height of 1,000 ft above runway threshold, the flight inspection aircraft will be at a height of 1,477 ft AMSL. As the height of the highest turbine (T22) is 1,791 ft AMSL, the flight inspection aircraft will therefore be 314 ft *below* the highest turbine. This height is less than the minimum clearance required from any object in IMC, as defined in FIP 23.

Figure 6.5 below shows the terrain elevation profile for the slice flight profile. The highest terrain on the slice profile from a range of 12 NM (13.8 miles) is approximately 557 ft AMSL (80 ft above runway threshold). The 1,000 ft slice flight profile must therefore be flown within sight of the surface and not flown in IMC.

Figure 6.5 below shows that for a slice profile (level run) at an altitude of 1,000 ft above runway threshold (1,477 ft AMSL), clearance above the highest terrain (557 ft AMSL) will be adequate at approximately 920 ft. However, in IMC, Glide Path level runs will need to be flown at an altitude of at least 2,791 ft AMSL (2,314 ft above runway threshold) to remain 1,000 ft above the highest wind turbine. The altitude will be rounded up to the nearest 100 ft, so the ILS Glide Path slice profile will therefore have to be flown at 2,800 ft AMSL in IMC.

6.4.3 Summary

For a slice flight profile, the flight inspection aircraft will have sufficient clearance above terrain and obstacles in VMC. If the flight inspection is to be conducted in IMC, the slice flight profile height will need to be increased to remain sufficiently clear of obstacles.

The proposed wind farm will therefore a minimal impact on the slice flight profile if flown in IMC.

6.5 ILS Left Slice 8° Flight Profile (Level Run)

6.5.1 Horizontal Obstacle Clearances

For routine, annual and commissioning ILS flight inspections, FIP 23 specifies that the left slice 8° flight profile (flown at an angle of 8° left of centreline with respect to the Localiser antenna), is flown towards the runway from a distance of 10 NM from runway threshold, or from a distance that corresponds to an angle of 0.45θ (1.35°) at a height of 1,000 ft above runway threshold.

For a left slice height of 1,000 ft, the distance *d* that corresponds to an angle of 0.45θ is calculated as:

$$d = \frac{1{,}000\,ft}{\tan(1.35°)} = 42{,}433\,ft = 7NM$$

An additional 2 NM is added to the 10 NM range specified in FIP 23 to allow the flight inspection pilots to establish on profile. For the most recent routine Runway 16 ILS flight inspections conducted by FCSL, the left slice 8° profiles were flown from a range of 12 NM from runway threshold and a height of 1,000 ft above runway threshold.

For a left slice 8° flight profile at a range of 12 NM from runway threshold, the flight inspection aircraft will be approximately 1 NM from the nearest wind turbine (T3). This distance is less than the minimum clearance required from any object in IMC, but exceeds the minimum clearance required in VMC, as defined in FIP 23 (see Figure 6.4 below).

6.5.2 Vertical Obstacle Clearances

For a left slice 8° flight profile height of 1,000 ft above runway threshold, the flight inspection aircraft will be at a height of 1,477 ft AMSL. As the height of the highest turbine (T22) is 1,791 ft AMSL, the flight inspection aircraft will therefore be 314 ft *below* the highest turbine. This height is less than the minimum clearance required from any object in IMC, as defined in FIP 23.

Figure 6.6 below shows the terrain elevation profile for the left slice 8° flight profile. The highest terrain on the slice profile from a range of 12 NM (13.8 miles) is approximately 917 ft AMSL (440 ft above runway threshold). The 1,000 ft slice flight profile must therefore be flown within sight of the surface and not flown in IMC.

Figure 6.6 below shows that for a slice profile (level run) at an altitude of 1,000 ft above runway threshold (1,477 ft AMSL), clearance above the highest terrain (917 ft AMSL) will be adequate at approximately 560 ft. However, in IMC, Glide Path level runs will need to be flown at an altitude of at least 2,791 ft AMSL (2,314 ft above runway threshold) to remain 1,000 ft above the highest wind turbine. The altitude will be rounded up to the nearest 100 ft, so the ILS Glide Path left slice 8° profile will therefore have to be flown at 2,800 ft AMSL in IMC.

6.5.3 Summary

For a left slice 8° flight profile, the flight inspection aircraft will have sufficient clearance above terrain and obstacles in VMC. If the flight inspection is to be conducted in IMC, the slice flight profile height will need to be increased to remain sufficiently clear of obstacles.

The proposed wind farm will therefore a minimal impact on the left slice 8° flight profile if flown in IMC.

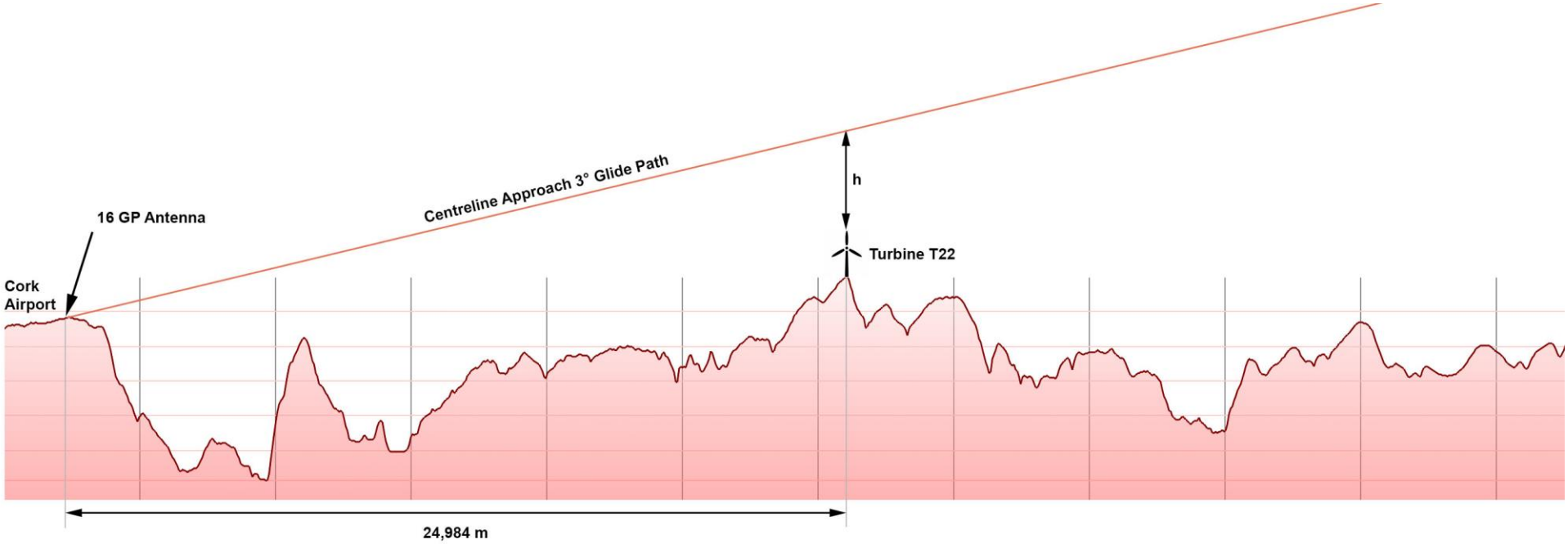


Figure 6.1 – ILS Centreline Approach Profile

(Not to scale)

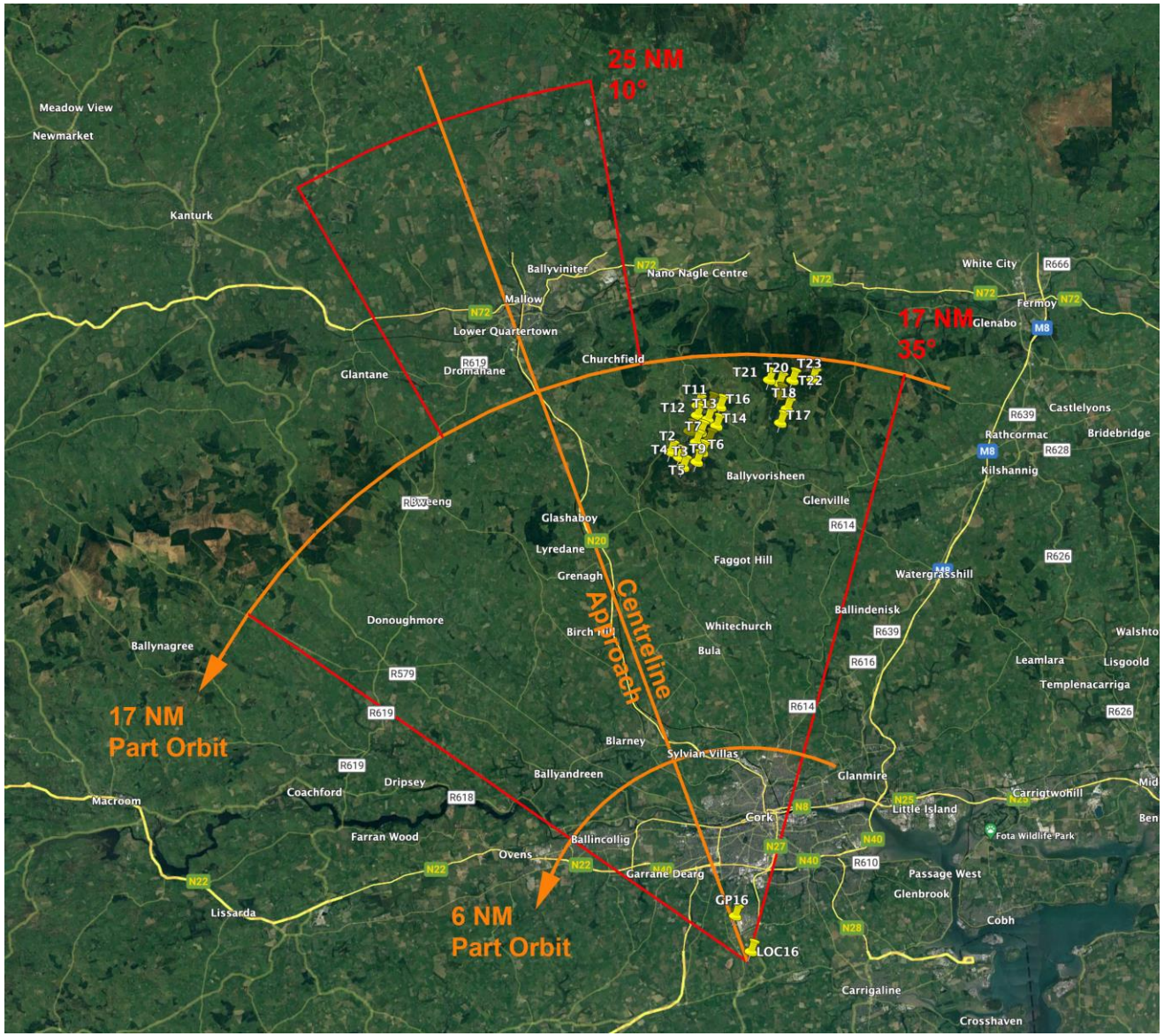


Figure 6.2 – ILS Centreline Approach and Part Orbit Tracks

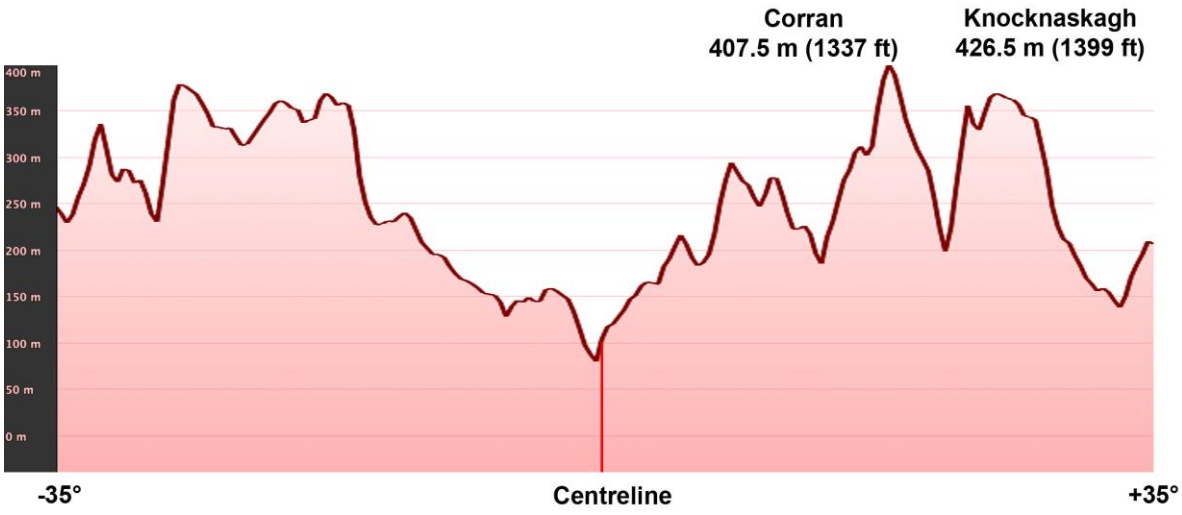


Figure 6.3 – 17 NM Part Orbit Terrain Elevation Profile

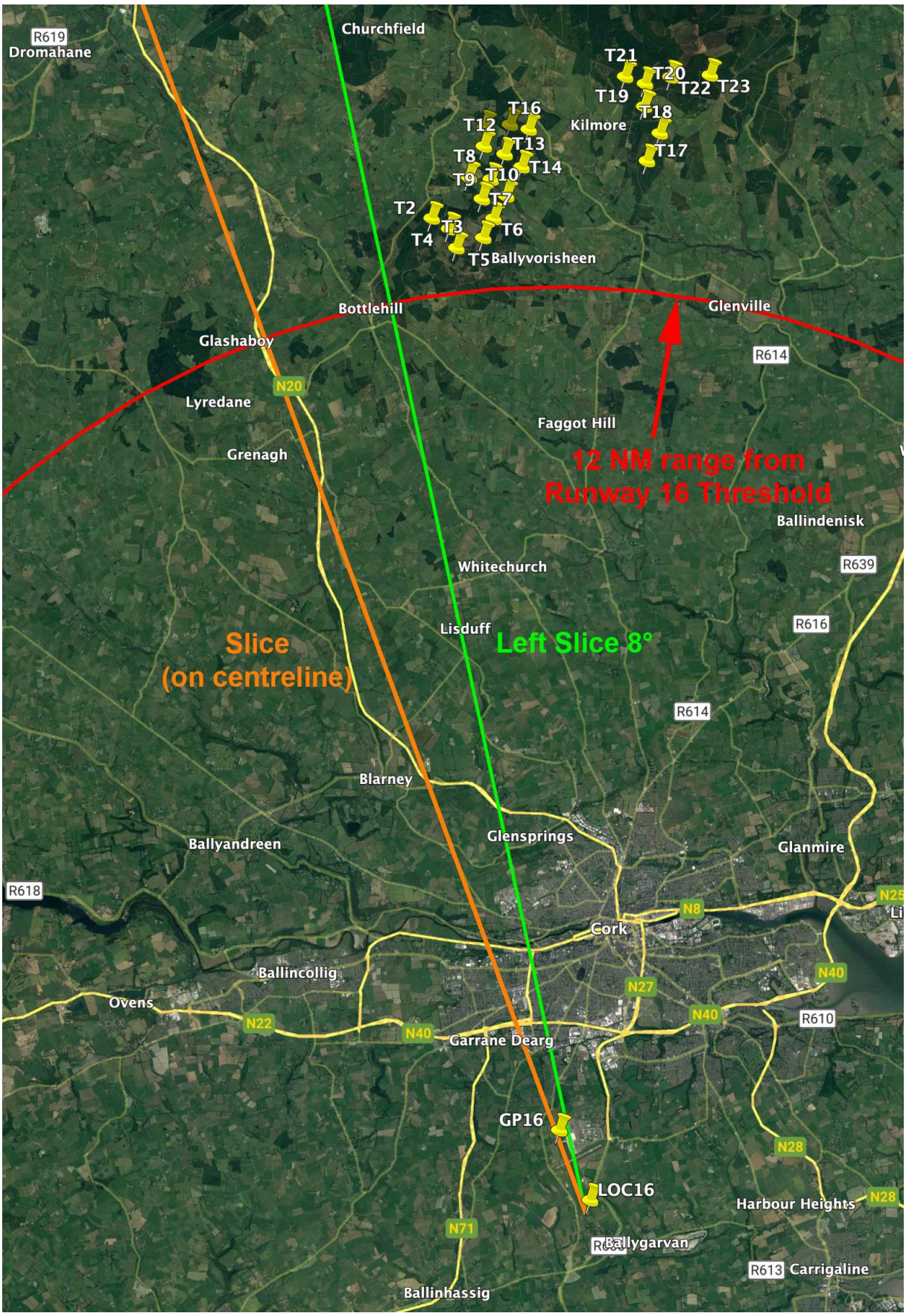


Figure 6.4 – Slice and Left Slice 8° Tracks

Figure 6.5 – Slice Terrain Elevation Profile

Figure 6.6 – Left Slice 8° Terrain Elevation Profile

6.6 Analysis

If Glide Path flight inspection level runs (slice profiles) are to be flown at higher altitudes to provide sufficient clearance above obstacles, the length and duration of the runs, and distance from the runway will increase correspondingly. This could result in some increased flight inspection costs.

In addition, at increased ranges, there may not be sufficient Glide Path RF signal to ensure correct ILS receiver operation. It is therefore recommended that flight trials are conducted (at the next routine ILS flight inspection) to ensure correct ILS receiver operation at increased ranges.

7 RECOMMENDATIONS

7.1 Flight Trials

Additional flight trials should be conducted at the next routine Runway 16 ILS flight inspection to assess the RF signal levels for extended Glide Path level runs at an altitude of 2,800 ft AMSL.

8 CONCLUSIONS

The assessment presented in Section 6 above has shown that a flight inspection aircraft flying centreline, part orbit, bottom edge, slice and left slice 8° flight profiles associated with the Cork Airport Runway 16 ILS will remain sufficiently clear of the proposed Coom Green Energy Park site in VMC.

However, if the 17 NM part orbit profile is to be flown in IMC, the part orbit height will need to be increased to allow 1,000 ft vertical clearance above the highest wind turbine (T22).

For the slice and left slice 8° profiles, the proposed wind farm will require that these profiles are flown at higher altitudes to provide sufficient clearance above the proposed wind turbines in IMC.

The flight inspection Glide Path slice and left slice 8° profile (level runs) will have to be raised to an altitude of 2,800ft in IMC to provide the flight inspection aircraft adequate clearance over the proposed wind turbines.

This will result in increased flight inspection costs for the extended Glide Path level runs. If there is insufficient Glide Path RF signal for the extended level run at 2,800 ft then it may not be possible to conduct this flight inspection in conditions of bad visibility. This may result in additional cost if the flight inspection aircraft is delayed while waiting for improved visibility conditions.

Additional flight trials should be conducted at the next routine Runway 16 ILS flight inspection to assess the RF signal levels for extended Glide Path level runs at an altitude of 2,800 ft AMSL.

Overall, the impact of the proposed Coom Green Energy Park on Runway 16 ILS flight inspection procedures is expected to be minimal, with minimal cost implications, as ILS flight inspection tasks are normally planned such that they are conducted in conditions of good visibility (VMC).

However, if visibility conditions deteriorate during a flight inspection task, or if the task must be conducted in IMC for other operational reasons, aircraft crew will need to revert to instrument flight rules. It is therefore recommended that flight trials be conducted at the next routine Runway 16 ILS flight inspection as described in paragraph 7.1 above.