



Instrument Flight Procedures Assessment

Atlas Business Park

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Executive Summary

Osprey Consulting Services Limited was commissioned to undertake an Instrument Flight Procedures (IFPs) assessment at Manchester Airport, in relation to the Atlas Business Park proposed development for five buildings.

Using a maximum elevation of 91m Above Mean Sea Level (AMSL), there is no effect from the proposed Development on the Manchester Airport IFPs.

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1 Introduction

1.1 Background

Osprey Consulting Services Limited was commissioned to undertake an Instrument Flight Procedures (IFP) assessment at Manchester Airport, in relation to the Atlas Business Park proposed development for five buildings.

1.2 Scope of the Assessment

This report assesses the Business Park in relation to the IFPs and has been completed with the use of the Airport's 2021 CAP 1732 aerodrome survey data.

1.3 Data Provided by Client

- 20071-PL210 Unit 1 Proposed Plans.
- 20071-PL215 Unit 1 Proposed Elevations.
- 20071-PL220 Units 2 & 3 Proposed Plans.
- 20071-PL225 Units 2 & 3 Proposed Elevations.
- 20071-PL240 Unit 4 Proposed Plans.
- 20071-PL245 Unit 4 Proposed Elevations.
- 20071-PL255 Unit 5 Proposed Plans & Elevations.
- Atlas Business Park, Brief Specification - Issue 2 220810.
- Peter Lam 16.08.22.
- PL 201C Proposed Site Plan.

1.4 Build Heights and Site Datum

OS Terrain 50 data suggests that the maximum ground elevation within the red line boundary is 71m.

The document 'Atlas Business Park, Brief Specification - Issue 2 220810' states the following.

- Unit 1 (84,100 ft²), clear height to underside of haunch: 16m.
- Unit 2 (37,300 ft²), clear height to underside of haunch: 12.5m.
- Unit 3 (49,500 ft²), clear height to underside of haunch: 12.5m.
- Unit 4 (74,200 ft²), clear height to underside of haunch: 12.5m.
- Unit 5 (166,200 ft²), clear height to underside of haunch: 16m.

As there is no information on the external height, i.e. the apex or the highest physical point of the developments, Osprey has applied the following parameters.

- A maximum building height of 20m Above Ground Level (AGL) is used.
- A site datum of 71m Above Mean Sea Level (AMSL) is used.

Therefore, a maximum building elevation of **91m AMSL** is used.

In the absence of site topographical surveys, it is recommended that the site ground elevation and the maximum building elevation AMSL is verified for accuracy.



Figure 1 – PL 201C Proposed Site Plan

1.5 Orientation

The provided 'PL 201C Proposed Site Plan' was scaled into the AutoCAD drawing. A 20m buffer was used for the red line boundary of the site, as depicted in Figure 2, and this was considered as a possible obstruction with an elevation of 91m AMSL to assess against the IFPs.



Figure 2¹ – PL 201C Proposed Site Plan (AutoCAD scaling)

¹ All Figures shown in this report that contain an Aerial Map Background, are from Autodesk AutoCAD 2019 embedded Online Maps Data.

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The site is approximately 2.5 km from the Aerodrome Reference Point (ARP), see Figure 3.



Figure 3 – Site in relation to Manchester Airport ARP

2 IFP Analysis

2.1 General

The IFPs assessed are as follows:

AIRAC 12/2022 - Effective 1st December 2022

- AD 2.EGCC-5-1 ATC SURVEILLANCE MINIMUM ALTITUDE CHART (2 Jan 2020)
- AD 2.EGCC-6-1 STANDARD DEPARTURE CHART - INSTRUMENT (SID) MONTY 1R 1S 1Y 1Z (06 Oct 2022)
- AD 2.EGCC-6-2 STANDARD DEPARTURE CHART - INSTRUMENT (SID) ASMIM 1S 1Z/KUXEM 1R 1Y/EKLAD 1R 1Y (06 Oct 2022)
- AD 2.EGCC-6-3 STANDARD DEPARTURE CHART - INSTRUMENT (SID) LISTO 2S 2Z (06 Oct 2022)
- AD 2.EGCC-6-4 STANDARD DEPARTURE CHART - INSTRUMENT (SID) (Restricted Use) LISTO 2R 2Y (06 Oct 2022)
- AD 2.EGCC-6-5 STANDARD DEPARTURE CHART - INSTRUMENT (SID) POL 5R 4S 1Y 1Z (06 Oct 2022)
- AD 2.EGCC-6-6 STANDARD DEPARTURE CHART - INSTRUMENT (SID) SONEX 1R 1Y/DESIG 1S 1Z (06 Oct 2022)
- AD 2.EGCC-6-7 STANDARD DEPARTURE CHART - INSTRUMENT (SID) (Jet Aircraft Only) SANBA 1R 1Y (06 Oct 2022)
- AD 2.EGCC-7-1 RNAV 1 (DME/DME or GNSS) STANDARD ARRIVAL CHART - INSTRUMENT (STAR) LAKEY 1M SETEL 1M TILNI 1M (06 Oct 2022)
- AD 2.EGCC-7-2 RNAV 1 (DME/DME or GNSS) STANDARD ARRIVAL CHART - INSTRUMENT (STAR) LIBSO 1M OTBED 1M (06 Oct 2022)
- AD 2.EGCC-7-3 RNAV 1 (DME/DME or GNSS) STANDARD ARRIVAL CHART - INSTRUMENT (STAR) MAKUX 1M MALUD 1M OKTEM 1M PENIL 1M (06 Oct 2022)
- AD 2.EGCC-7-4 RNAV 1 (DME/DME or GNSS) STANDARD ARRIVAL CHART - INSTRUMENT (STAR) ELVOS 1M LESTA 1M (06 Oct 2022)
- AD 2.EGCC-8-1 INSTRUMENT APPROACH CHART ILS/DME (I-MC) RWY 05R (28 Feb 2019)
- AD 2.EGCC-8-2 INSTRUMENT APPROACH CHART ILS/DME (MCT) RWY 05R (28 Feb 2019)
- AD 2.EGCC-8-3 INSTRUMENT APPROACH CHART LOC/DME (I-MC) RWY 05R (28 Feb 2019)
- AD 2.EGCC-8-4 INSTRUMENT APPROACH CHART VOR/DME RWY 05R (28 Feb 2019)
- AD 2.EGCC-8-5 INSTRUMENT APPROACH CHART ILS/DME (I-MM) RWY 05L (28 Feb 2019)
- AD 2.EGCC-8-6 INSTRUMENT APPROACH CHART ILS/DME (MCT) RWY 05L (28 Feb 2019)
- AD 2.EGCC-8-7 INSTRUMENT APPROACH CHART LOC/DME RWY 05L (28 Feb 2019)
- AD 2.EGCC-8-8 INSTRUMENT APPROACH CHART VOR/DME RWY 05L (28 Feb 2019)
- AD 2.EGCC-8-9 INSTRUMENT APPROACH CHART ILS/DME (I-NN) RWY 23R (28 Feb 2019)
- AD 2.EGCC-8-10 INSTRUMENT APPROACH CHART ILS/DME (MCT) RWY 23R (28 Feb 2019)
- AD 2.EGCC-8-11 INSTRUMENT APPROACH CHART LOC/DME RWY 23R (28 Feb 2019)

- AD 2.EGCC-8-12 INSTRUMENT APPROACH CHART VOR/DME RWY 23R (28 Feb 2019)
- AD 2.EGCC-8-13 INSTRUMENT APPROACH CHART VOR/DME RWY 23L (28 Feb 2019)
- AD 2.EGCC-8-14 INSTRUMENT APPROACH CHART RNP RWY 23L (5 Nov 2020)

2.2 Departures

The Development is located **inside** the initial departure splay for Runway 05L.



Figure 4 – Initial Departure Splay – Runway 05L

Departure End of Runway (DER) elevation = 75.76m

Distance from DER to Development = 811.4m

Elevation of Obstacle Identification Surface (OIS) at Development = $(811.4 \times 0.025) + 75.76\text{m} + 5\text{m} = 101.0\text{m}$

With a maximum elevation of 91m, the Development is 10.0m below the OIS.

The Development is located **inside** the initial departure splay for Runway 05R.

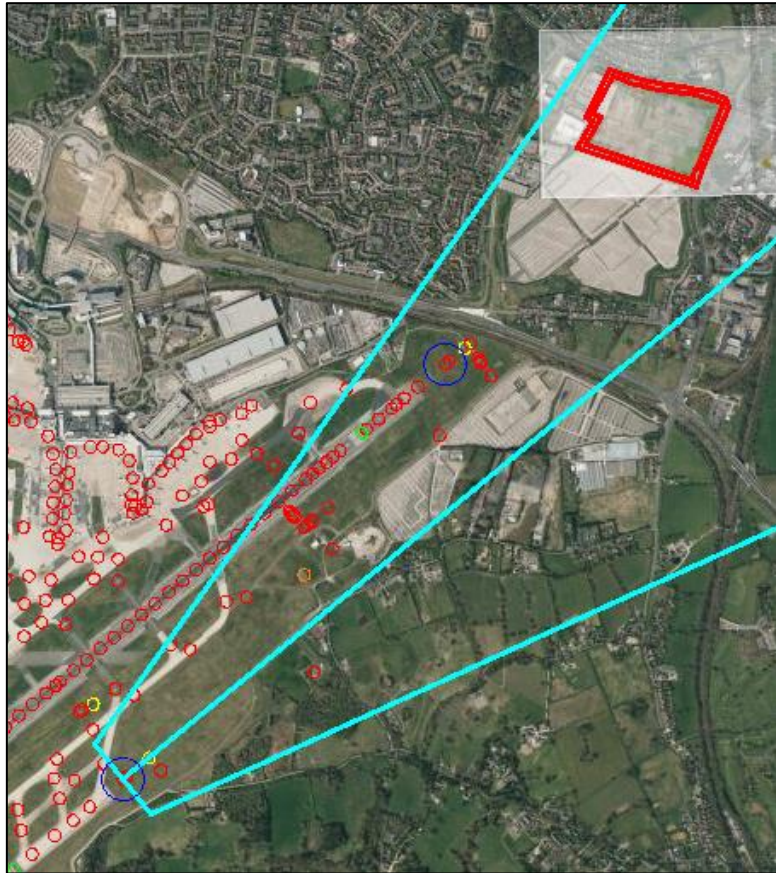


Figure 5 – Initial Departure Splay – Runway 05R

DER elevation = 73.017m

Distance from DER to Development = 2541.9m

Elevation of Obstacle Identification Surface (OIS) at Development = $(2541.9 \times 0.025) + 73.017\text{m} + 5\text{m} = 141.5\text{m}$

With a maximum elevation of 91m, the Development is 50.5m below the OIS.

The Development is located outside the initial departure splays for Runways 23L/R.

Aircraft in a turn would have to be at a minimum altitude of 757ft. As the Development is below 757ft – 75m = 155.73m, it would not penetrate the Assessment Surface.

There is no impact on the Departures.

2.3 Arrivals

All Arrivals terminate at or above FL070.

The maximum possible elevation of the Development, before affecting the Minimum Initial Altitude of FL070, has been calculated.

$$7000\text{ft} = 2133.6\text{m}$$

2133.6m – 300m Minimum Obstacle Clearance (MOC) = 1833.6m AMSL.

The maximum elevation of the Development is below this altitude; therefore, the procedure would be unaffected in this instance.

The Development will have no impact on any of published Arrival Procedures.

2.4 Approaches

2.4.1 ILS/DME (I-MC) RWY 05R (28 Feb 2019)

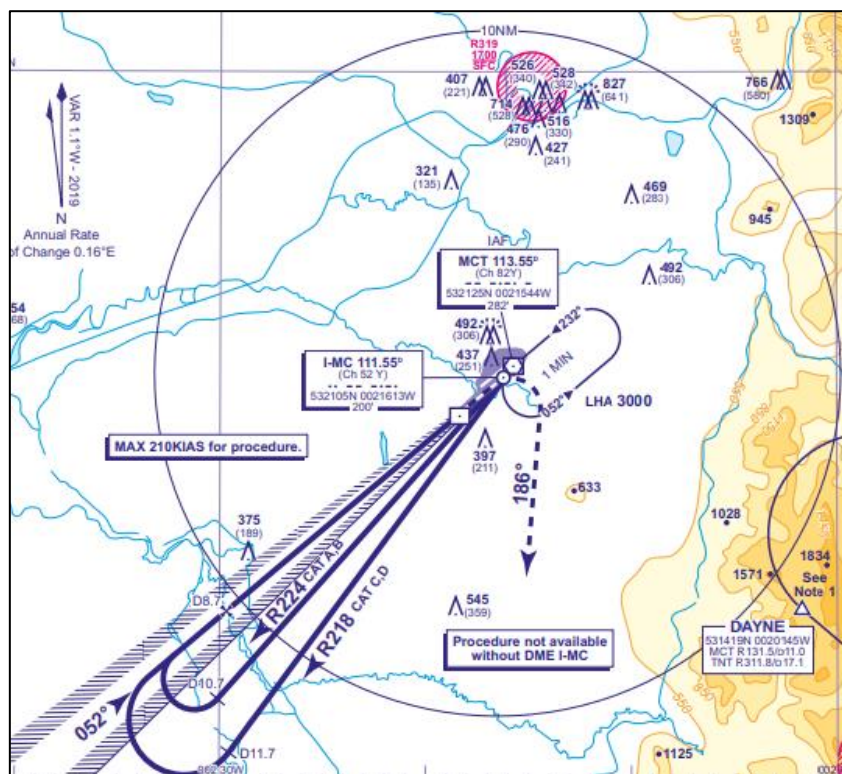


Figure 6 – ILS/DME (I-MC) RWY 05R Procedure



Figure 7 – ILS/DME (I-MC) RWY 05R OAS

OAS

NAVIGATION AID DATA

Approach Category:

Glide path (*):

RDH: m

LOC THR Dist ⁽¹⁾: m

Course width at THR: m

AIRCRAFT DATA

M/App CG (%): CAT: STD: ☒ Wing Semi Span: m GP Wheel / Antenna height: m

OAS constants

	A	B	C		A	B	C
W	0.028500	0.000000	-8.77	Y	0.024585	0.215648	-23.54
W*				Z	-0.025000	0.000000	-22.50
X	0.028319	0.186708	-18.33				

OAS Template coordinates -m (metres)

THR Elevation

	X	Y
C	307	51
D	-290	142
E	-900	211

300 m Height

	X	Y
C*	10833	61
C**		
D*	5433	880
E*	-12900	2970

OAS height calculator

X: m Y: m Z: m

(1) For MLS read: "Azimuth antenna to THR distance"; for GBAS/APV read: "GARP-LTP distance".

Figure 8 – Results RW05R CAT I – PANS-OPS OAS Tool

The Development is located within the lateral confines of the ILS OAS Z surface, and therefore would need to be considered for assessment.

The surface height is 124.7m. This surface elevation is 181.47m (when adding the THR 05R elevation of 56.77m) which would be 90.47m above that of the maximum Development elevation of 91m. Therefore, the Development does not need to be considered towards OCA calculation.

The missed approach procedure routes aircraft south; however, the aircraft are unable to commence a turn before reaching 700ft AMSL.

Applying a 50m MOC to the maximum Development elevation of 91m results in a MOCA of 141m/463ft. This is below the missed approach turn altitude (700ft). (Max Development Elevation without affecting the turn would be 163.36m)

The proposed Development would have no impact on the published minima.

2.4.2 ILS/DME (MCT) RWY 05R (28 Feb 2019)

See Section 2.4.1.

2.4.3 LOC/DME (I-MC) RWY 05R (28 Feb 2019)

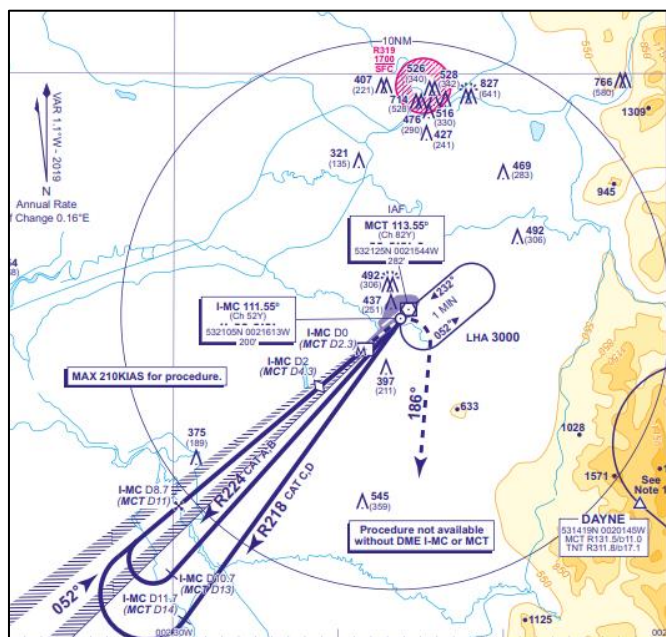


Figure 9 – LOC/DME (I-MC) RWY 05R Procedure

The Development is within the lateral confines of the OAS and therefore requires assessment.

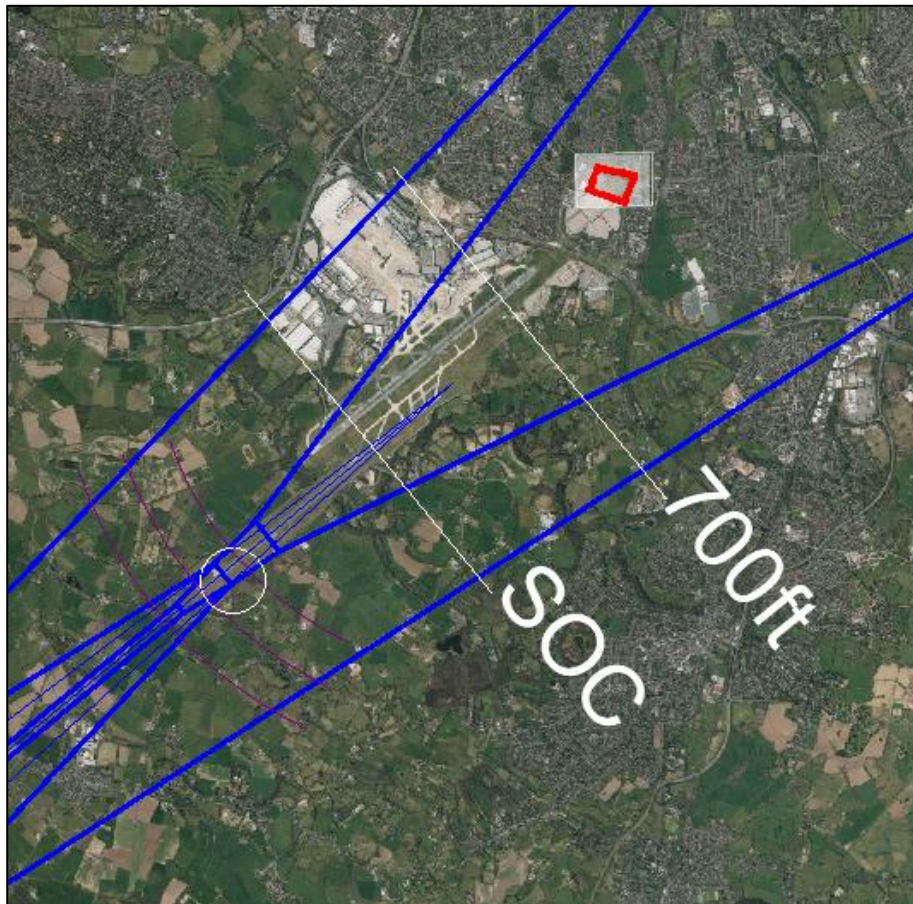


Figure 10 – LOC/DME RW05R Protection Areas

The Development is within the Final Missed Approach, beyond the point where the 700ft turning altitude is reached on a 2.5% Climb Gradient.

Applying a 50m MOC, the maximum Development elevation before affecting the turning altitude of 700ft would be $700\text{ft} - 50\text{m} = 163.36\text{m}$.

The proposed Development elevation of 91m is below this.

The proposed Development would have no impact on the published minima.

2.4.4 VOR/DME RWY 05R (28 Feb 2019)

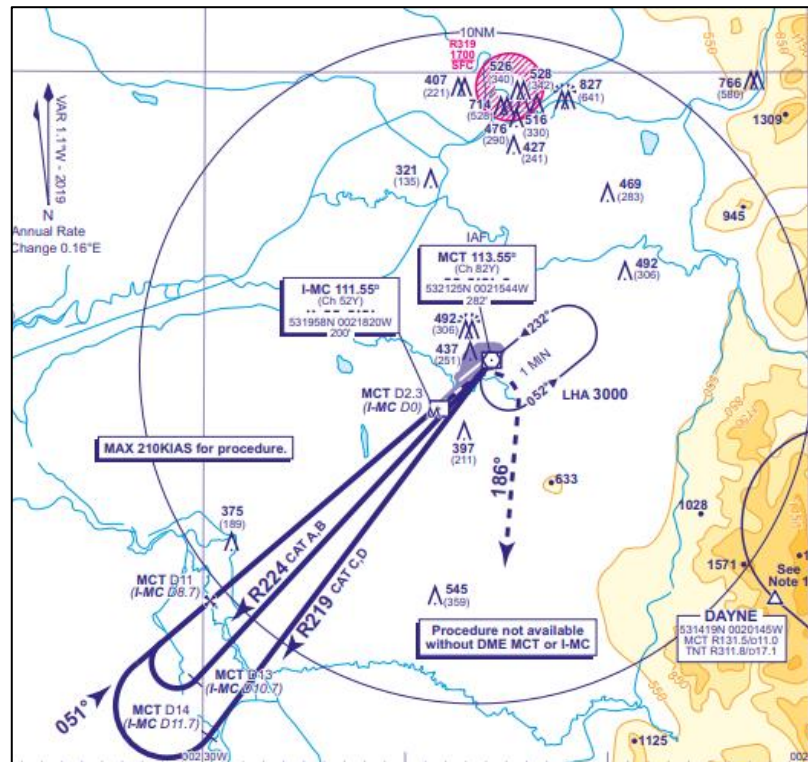


Figure 11 – VOR/DME RWY 05R Procedure

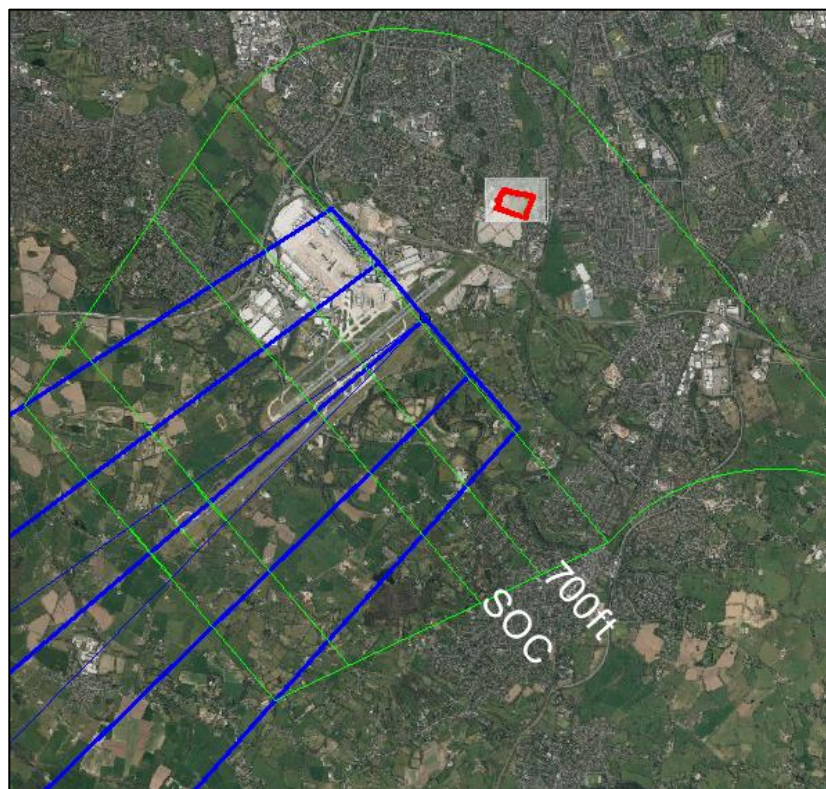


Figure 12 – VOR/DME RWY 05R Protection Area

The Development is within the Final Missed Approach, beyond the point where the 700ft turning altitude is reached on a 2.5% Climb Gradient.

Applying a 50m MOC, the maximum Development elevation before affecting the turning altitude of 700ft would be 700ft – 50m = 163.36m.

The proposed Development elevation of 91m is below this.

The proposed Development would have no impact on the published minima.

2.4.5 ILS/DME (I-MM) RWY 05L (28 Feb 2019)

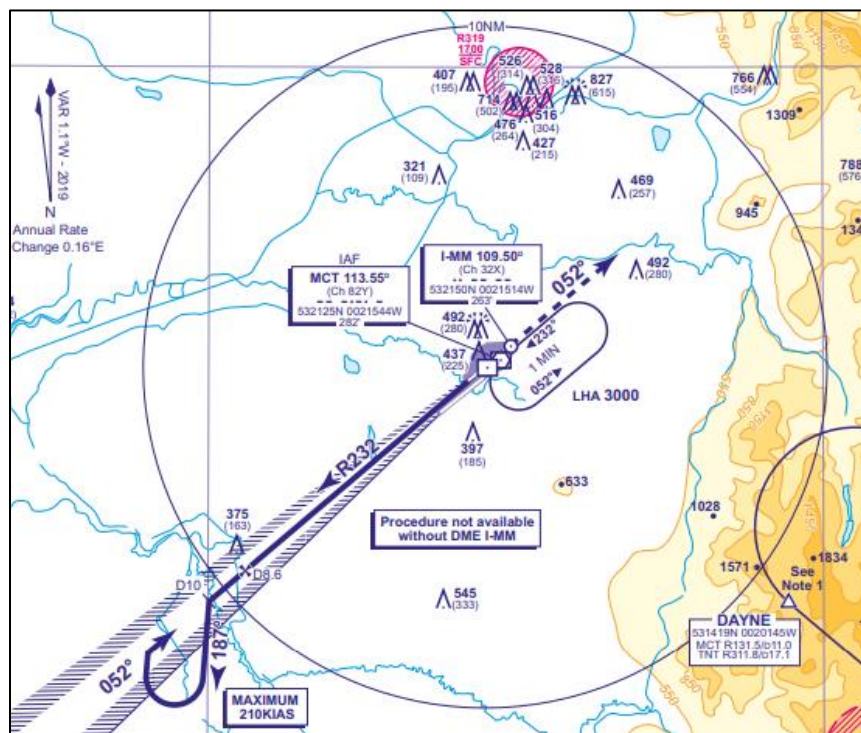


Figure 13 – ILS/DME (I-MM) RWY 05L



Figure 14 – Extent of Runway 05L ILS OAS CAT I

OAS

NAVIGATION AID DATA

Approach Category:

Glide path (*): LOC THR Dist ⁽¹⁾ m

RDH: m Course width at THR m

AIRCRAFT DATA

M/App CG (%): CAT: STD: ☒ Wing Semi Span: m GP Wheel / Antenna height: m

OAS constants

	A	B	C		A	B	C
W	0.028500	0.000000	-6.64	Y	0.023760	0.208407	-20.64
W*				Z	-0.025000	0.000000	-22.50
X	0.027492	0.181256	-15.69				

OAS Template coordinates -m (metres)

THR Elevation			300 m Height		
	X	Y		X	Y
C	232	51	C*	10759	109
D	-331	136	C**		
E	-900	201	D*	5393	923
			E*	-12900	3009

OAS height calculator

X: m Y: m Z: m

(1) For MLS read: "Azimuth antenna to THR distance"; for GBAS/APV read: "GARP-LTP distance".

Figure 15 – Results RW05L – PANS-OPS OAS Tool – CAT I



Figure 16 – Extent of Runway 05L ILS OAS CAT II

OAS

NAVIGATION AID DATA

Approach Category:

Glide path (°): LOC THR Dist ⁽¹⁾ m

RDH: m Course width at THR: m

AIRCRAFT DATA

M/App CG (%): CAT: STD: ☒ Wing Semi Span: m GP Wheel / Antenna height: m

OAS constants

	A	B	C		A	B	C
W	0.035800	0.000000	-4.82	Y	0.031792	0.278860	-28.07
W*				Z	-0.025000	0.000000	-22.50
X	0.035131	0.233696	-20.72				

OAS Template coordinates -m (metres)

THR Elevation

	X	Y
C	134	68
D	-331	138
E	-900	203

150 m Height

	X	Y
C*	4324	80
C**		
D*	2530	350
E*	-6900	1425

OAS height calculator

X: m Y: m Z: m

(1) For MLS read: "Azimuth antenna to THR distance"; for GBAS/APV read: "GARP-LTP distance".

Figure 17 – Results RW05L – PANS-OPS OAS Tool – CAT II

The Development is located within the lateral confines of the ILS OAS Z surface, and therefore would need to be considered for assessment.

ILS CAT I

The surface height of the CAT I OAS is 67.84m. The surface elevation is 132.41m (when adding the THR 05L elevation of 64.57m). This is 41.41m above the Development elevation and therefore it does not require consideration for OCA assessment.

The proposed Development would have no impact on the published minima.

ILS CAT II

The surface height of the CAT II OAS is 67.84m. The surface elevation is 132.41m (when adding the THR 05L elevation of 64.57m). This is 41.41m above the Development elevation and therefore it does not require consideration for OCA assessment.

The proposed Development would have no impact on the published minima.

2.4.6 ILS/DME (MCT) RWY 05L (28 Feb 2019)

See Section 2.4.5.

2.4.7 LOC/DME RWY 05L (28 Feb 2019)

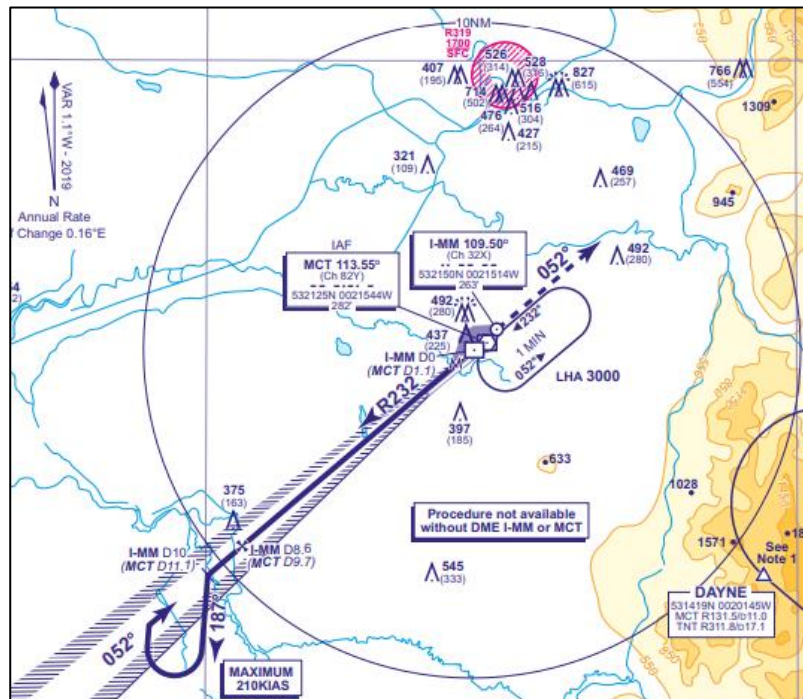


Figure 18 – LOC/DME RWY 05L Procedure



Figure 19 – LOC/DME RW05L Protection Areas

The Development is within the Intermediate Missed Approach area, located after the SOC.

When applying a 30m MOC, the maximum allowable elevation of the Development before affecting the procedure OCA (670ft) would be $(670\text{ft}/3.2808) - 30\text{m} = 174.21\text{m}$. The proposed Development elevation of 91m is below this value.

The proposed Development would have no impact on the published minima.

2.4.8 VOR/DME RWY 05L (28 Feb 2019)

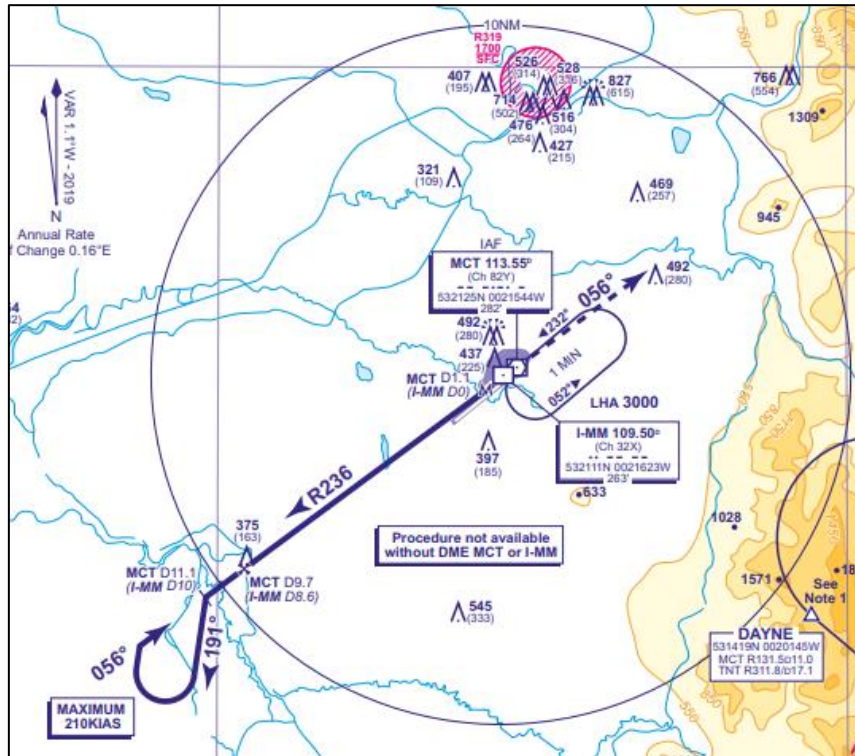


Figure 20 – VOR/DME RWY 05L Procedure

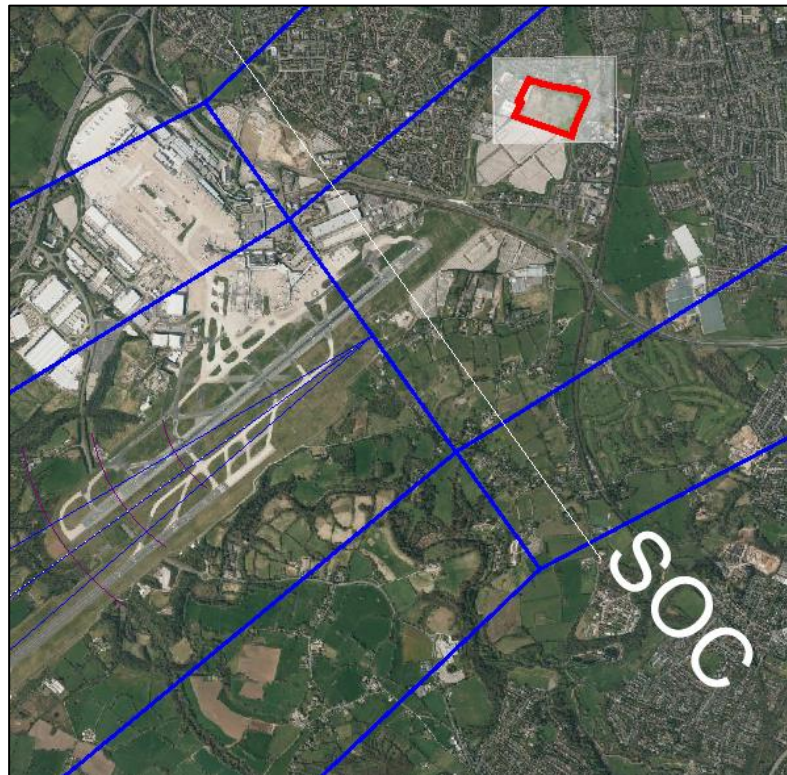


Figure 21 – VOR/DME RWY 05L Protection Area

The Development is within the Intermediate Missed Approach area, located after the SOC.

When applying a 30m MOC, the maximum allowable elevation of the Development before affecting the procedure OCA (690ft) would be $(690\text{ft}/3.2808) - 30\text{m} = 180.31\text{m}$. The proposed Development elevation of 91m is below this value.

The proposed Development would have no impact on the published minima.

2.4.9 ILS/DME (I-NN) RWY 23R (28 Feb 2019)

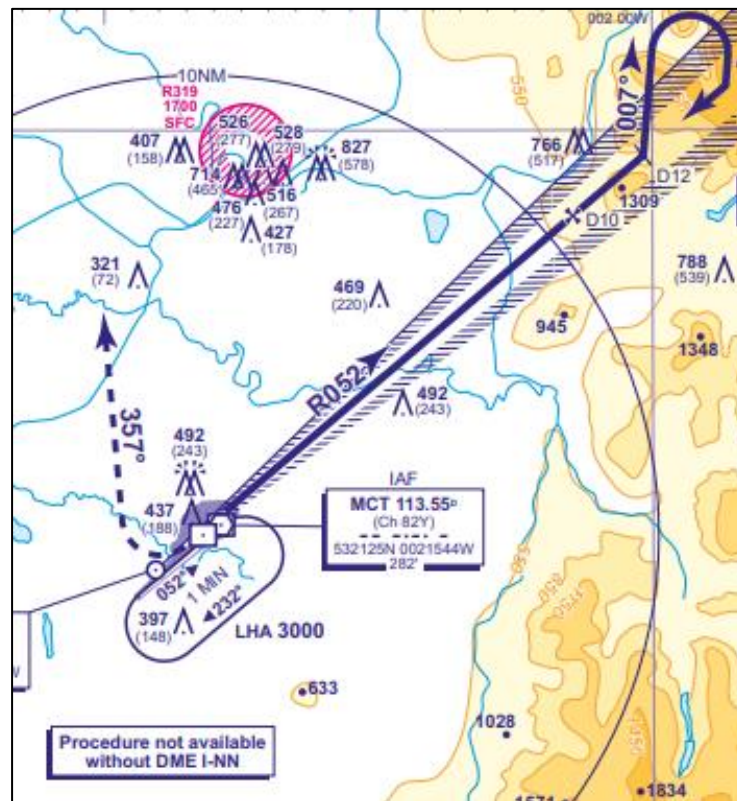


Figure 22 – ILS/DME (I-NN) RWY 23R



Figure 23 – Extent of Runway 23R ILS OAS CAT I

OAS

NAVIGATION AID DATA

Approach Category:

Glide path (*): LOC THR Dist⁽¹⁾: m

RDH: m Course width at THR: m

AIRCRAFT DATA

M/App CG (%): CAT: STD: ☒ Wing Semi Span: m GP Wheel / Antenna height: m

OAS constants

	A	B	C		A	B	C
W	0.028500	0.000000	-7.24	Y	0.024770	0.217264	-22.18
W*				Z	-0.025000	0.000000	-22.50
X	0.028503	0.187918	-16.92				

OAS Template coordinates -m (metres)

THR Elevation

	X	Y
C	254	51
D	-319	138
E	-900	204

300 m Height

	X	Y
C*	10780	51
C**		
D*	5404	866
E*	-12900	2953

OAS height calculator

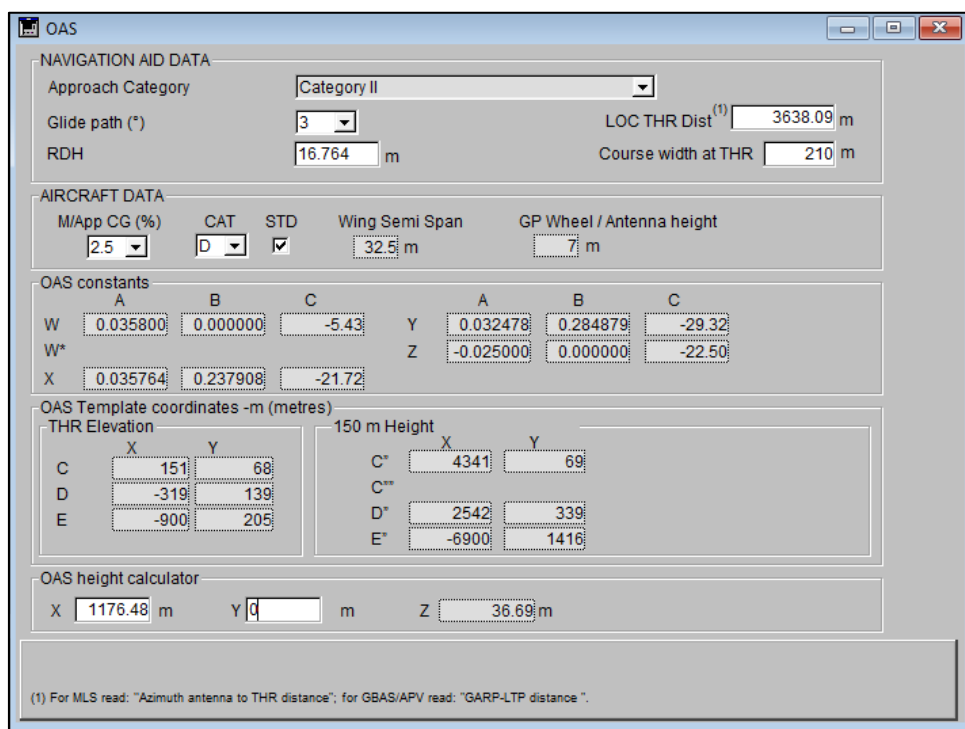
X: m Y: m Z: m

(1) For MLS read: "Azimuth antenna to THR distance"; for GBAS/APV read: "GARP-LTP distance".

Figure 24 – Results RW23R – PANS-OPS OAS Tool – CAT I



Figure 25 – Extent of Runway 23R ILS OAS CAT II



OAS

NAVIGATION AID DATA

Approach Category:

Glide path (°): LOC THR Dist⁽¹⁾: m

RDH: m Course width at THR: m

AIRCRAFT DATA

M/App CG (%): CAT: STD: ☒ Wing Semi Span: m GP Wheel / Antenna height: m

OAS constants

	A	B	C		A	B	C
W	0.035800	0.000000	-5.43	Y	0.032478	0.284879	-29.32
W*				Z	-0.025000	0.000000	-22.50
X	0.035764	0.237908	-21.72				

OAS Template coordinates -m (metres)

THR Elevation

	X	Y
C	151	68
D	-319	139
E	-900	205

150 m Height

	X	Y
C*	4341	69
C**		
D*	2542	339
E*	-6900	1416

OAS height calculator

X: m Y: m Z: m

(1) For MLS read: "Azimuth antenna to THR distance"; for GBAS/APV read: "GARP-LTP distance".

Figure 26 - Results RW23R – PANS-OPS OAS Tool – CAT II

The Development is located within the lateral confines of the ILS OAS, and therefore would need to be considered for assessment.

ILS CAT I

The surface height of the CAT I OAS is 26.29m. This translates into an elevation of 102.22m (when adding the THR 23R elevation of 75.93m) which would be 11.22m above that of the Development elevation of 91m; therefore, the Development does not need to be considered towards OCA Calculation.

ILS CAT II

The surface height of the CAT II OAS is 36.69m. This translates into an elevation of 112.62m (when adding the THR 23R elevation of 75.93m) which would be 21.62m above that of the Development elevation of 91m; therefore, the Development does not need to be considered towards OCA Calculation.

The Missed Approach procedure routes aircraft north; however, the aircraft are unable to commence a turn before reaching 750ft AMSL.

Applying a max 50m MOC to the 91m Development results in a MOCA of 141m/463ft. This is below the Missed Approach turn altitude (750ft). (Max Development Elevation without affecting the turn would be 178.6m)

The proposed Development would have no impact on the published minima.

2.4.10 ILS/DME (MCT) RWY 23R (28 Feb 2019)

See Section 2.4.9.

2.4.11 LOC/DME RWY 23R (28 Feb 2019)

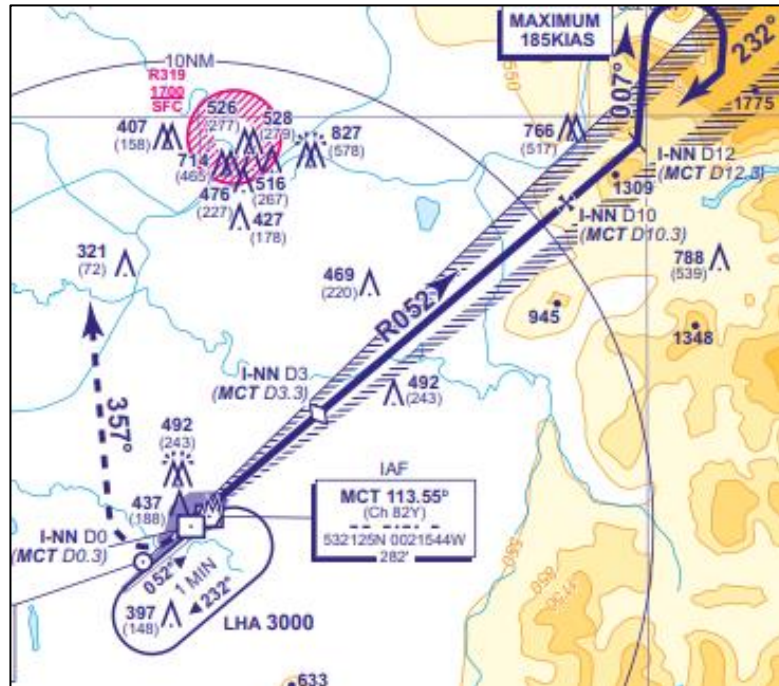


Figure 27 – LOC/DME RWY 23R

The Development is located in the Final Approach segment between the SDF and the MAPt. When applying a 75m MOC, the maximum allowable elevation of the Development before affecting the procedure OCA (640ft) would be $(640\text{ft}/3.2808) - 75\text{m} = 120.07\text{m}$. The proposed Development elevation of 91m is below this value.

The proposed Development would have no impact on the published minima.

2.4.12 VOR/DME RWY 23R (28 Feb 2019)

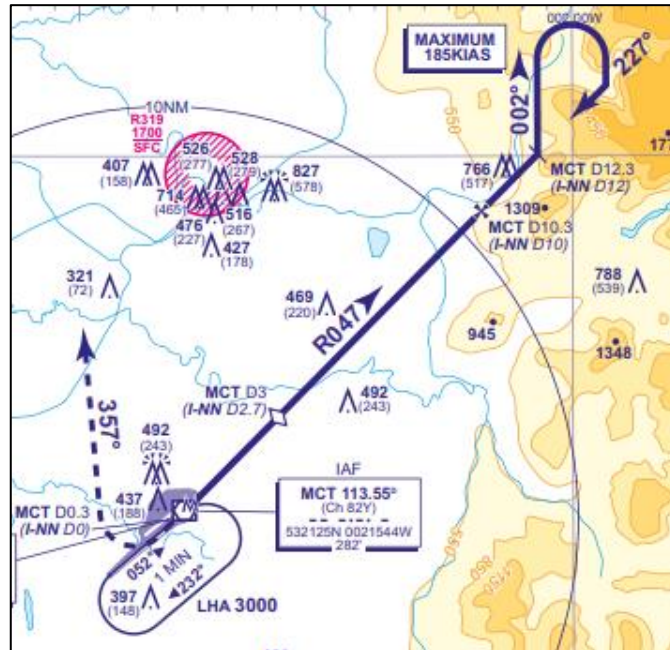


Figure 28 – VOR/DME RWY 23R



Figure 29 – VOR/DME RWY 23R Protection Area

The Development is located in the Final Approach segment between the SDF and the MAPt. When applying a 75m MOC, the maximum allowable elevation of the Development before affecting the procedure OCA (690ft) would be $(690\text{ft}/3.2808) - 75\text{m} = 135.3\text{m}$. The proposed Development elevation of 91m is below this value.

The proposed Development would have no impact on the published minima.

2.4.13 VOR/DME RWY 23L (28 Feb 2019)

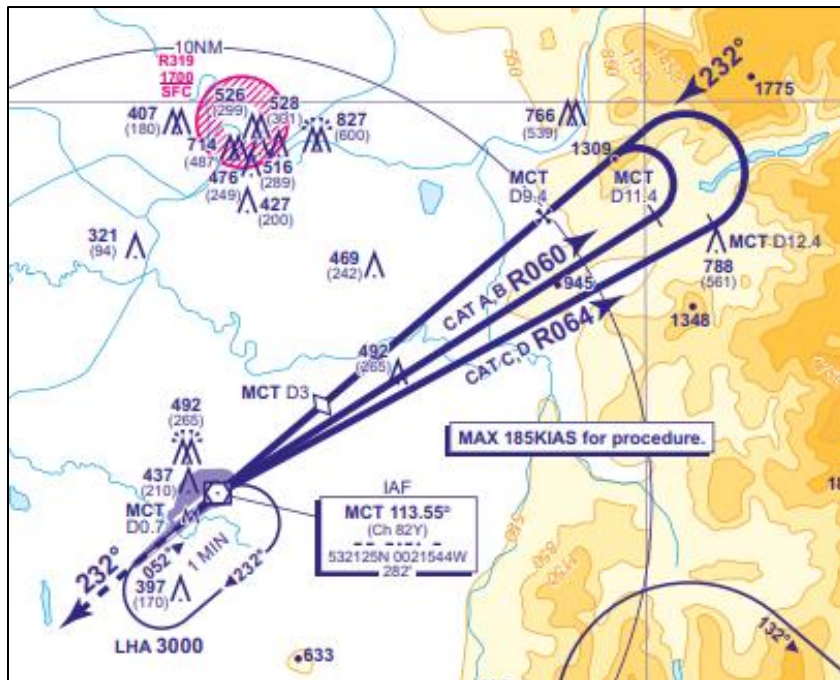


Figure 30 – VOR/DME RWY 23L



Figure 31 – VOR/DME RWY 23L Protection Area

The Development is located in the Final Approach segment between the SDF and the MAPt. When applying a 75m MOC, the maximum allowable elevation of the Development before affecting the procedure OCA (690ft) would be $(690\text{ft}/3.2808) - 75\text{m} = 135.3\text{m}$. The proposed Development elevation of 91m is below this value.

The proposed Development would have no impact on the published minima.

2.4.14 RNP RWY 23L (5 Nov 2020)

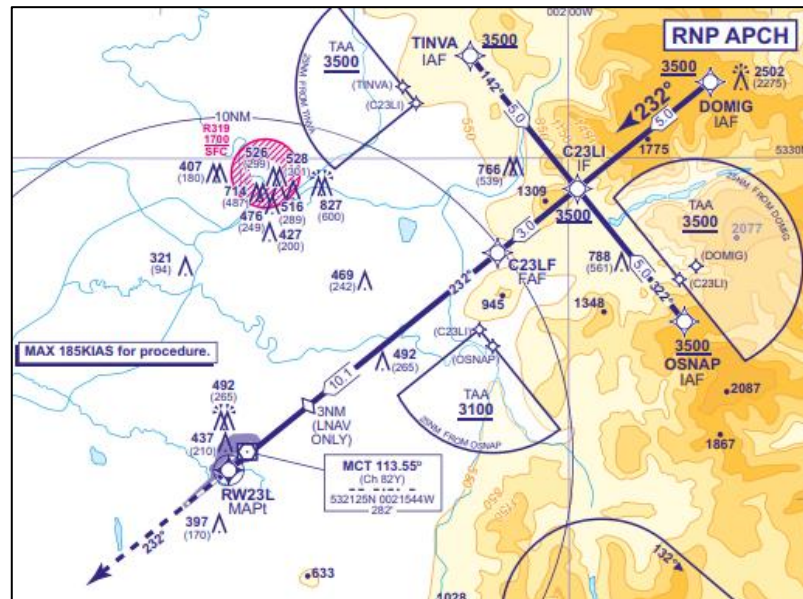


Figure 32 – RNP RWY 23L

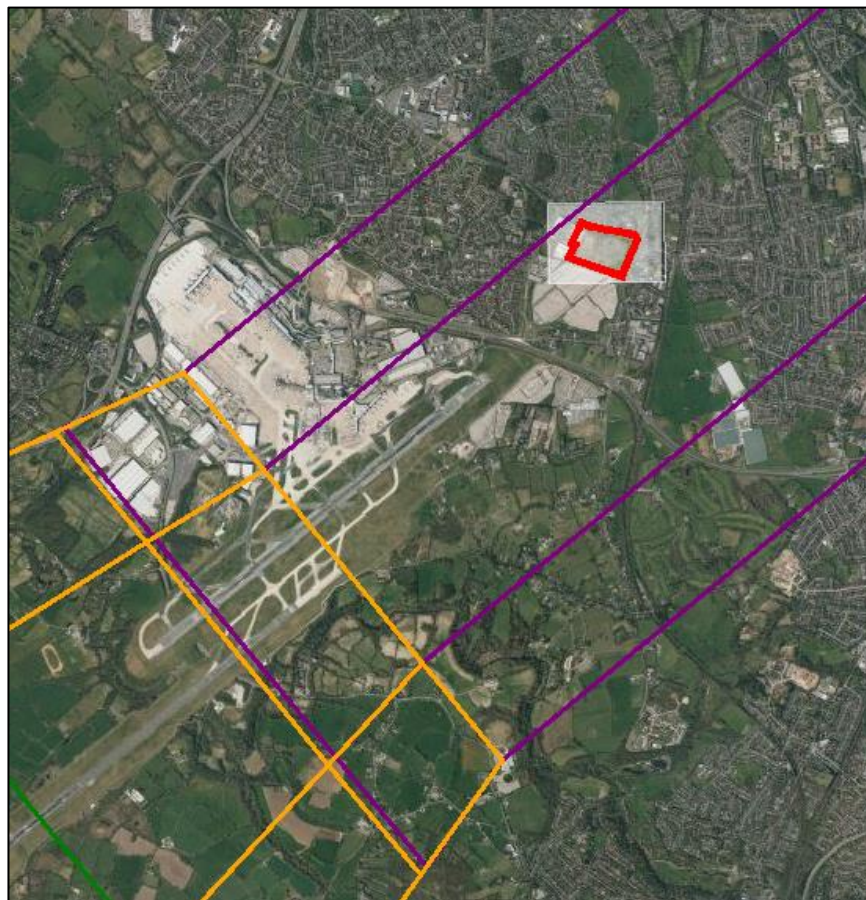


Figure 33 – RNP RWY 23L Protection Area

LNAV

The Development is located within the Final Approach Segment.

Applying a 75m MOC to the 91m Development results in an OCA of 166m/545ft (which would round to 550ft). This is below the published OCA of 680ft. (Max Development Elevation without affecting OCA would be 132.26m for the LNAV).

The proposed Development would have no impact on the published LNAV minima.

LNAV/VNAV

Applying the required Height Loss (HL) for every aircraft category, the maximum allowable elevation of the Development before affecting the LNAV/VNAV minima would be:

LNAV/VNAV OCA = 680ft = 207.264m

HL CAT A = 40m

HL CAT B = 43m

HL CAT C = 46m

HL CAT D = 49m

Max Elevation CAT A = 207.264m – 40m = 167.264m

Max Elevation CAT B = 207.264m – 43m = 164.264m

Max Elevation CAT C = 207.264m – 46m = 161.264m

Max Elevation CAT D = 207.264m – 49m = 158.264m

As the maximum Development elevation of 91m is below these values, the LNAV/VNAV OCA will not be impacted.

The proposed Development would have no impact on the published LNAV/VNAV minima.

2.5 Air Traffic Control Surveillance Minimum Altitude Chart (ATCSMAC)

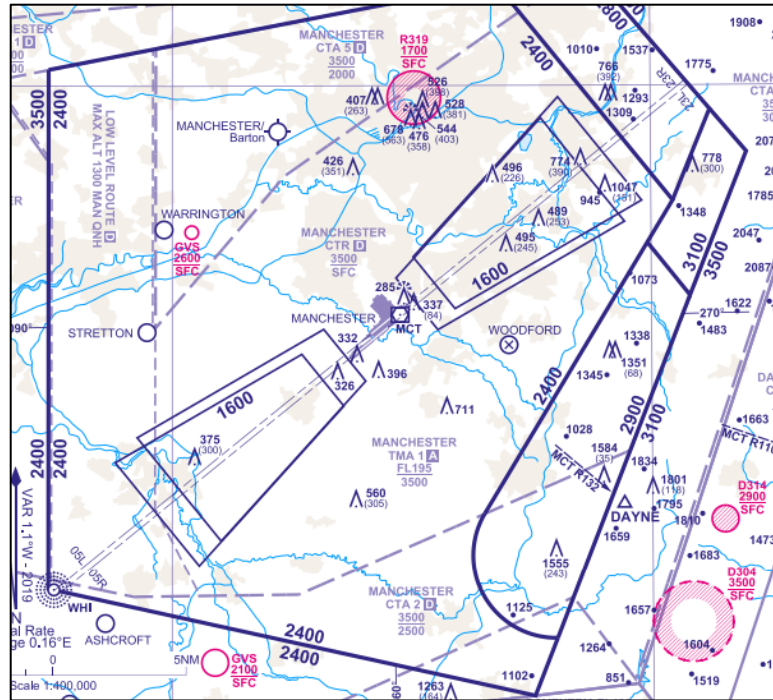


Figure 34 – ATCSMAC



Figure 35 – ATCSMAC FAVA 23L

The Development lies **inside** the FAVA for Runway 23L.

The maximum possible elevation of the Development, before affecting the MOCA of 1600ft, has been calculated.

$$1600\text{ft} = 487.68\text{m}$$

$$487.68\text{m} - 150\text{m MOC} = 337.68\text{m AMSL.}$$

The maximum elevation of the Development is below this altitude; therefore, the FAVA would be unaffected in this instance.

The Development lies within the SMAA (Surveillance Minimum Altitude Area) with MOCA 2400ft.

The maximum possible elevation of the Development, before affecting the MOCA of 2400ft, has been calculated.

$$2400\text{ft} = 731.52\text{m}$$

$$731.52\text{m} - 300\text{m MOC} = 431.52\text{m AMSL.}$$

The maximum elevation of the Development is below this altitude; therefore, the SMAA would be unaffected in this instance.

The proposed Development would have no impact on the published ATCSMAC.

2.6 Visual Manoeuvring (Circling)

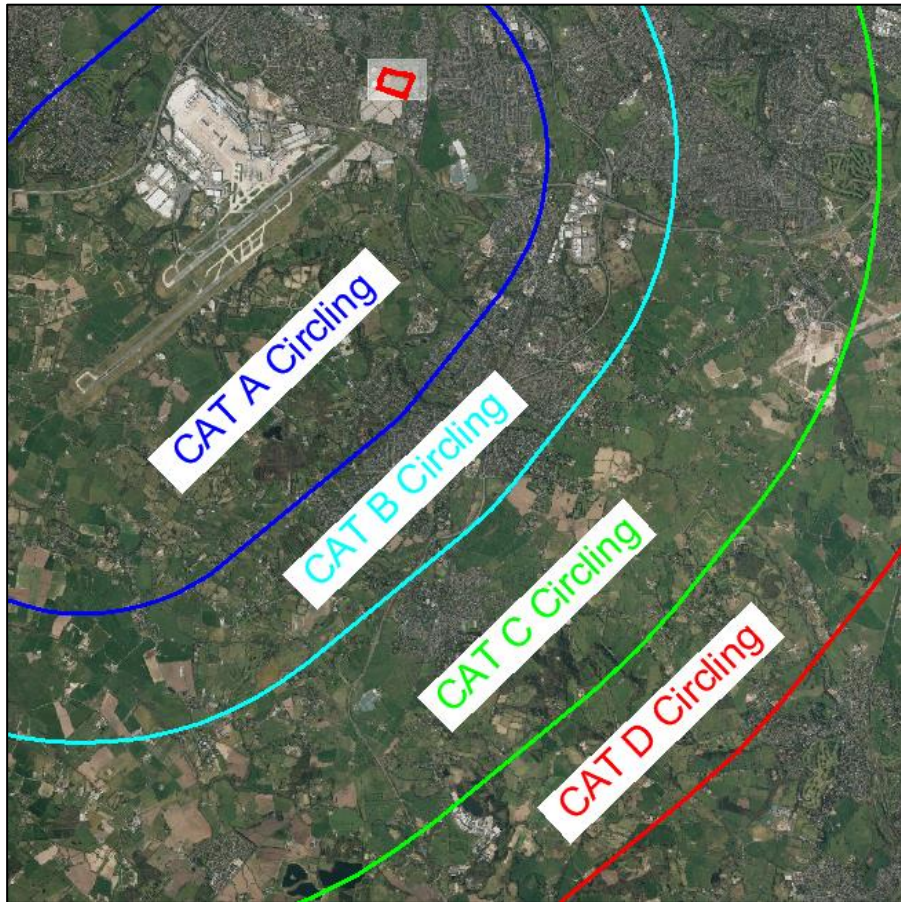


Figure 36 – Circling Protection Area

The Development lies within the Visual Circling Obstacle Protection Areas for all Categories and requires assessment.

CAT AB MOC = 90m

CAT CD MOC = 120m.

CAT AB Circling OCA due to Development = $91\text{m} + 90\text{m} = 181\text{m}$ (594ft). Published OCA 790ft for CAT A and 820ft for CAT B.

CAT CD Circling OCA due to Development = $91\text{m} + 120\text{m} = 211\text{m}$ (693ft).

Published OCA 1120ft for CATs C and D.

(Max Development Elevation without affecting circling OCA would be 150.7m for CAT A, 159.9m for CAT B and 218.3m for CAT C, D).

The proposed Development will have no effect on the Visual Circling.

2.7 Visual Segment Surface (VSS)



Figure 37 – VSS Runways 23R and 23L

The Development lies inside the VSS for both Runway 23R and 23L.

Runway 23R

Distance from Start of VSS to Development = 1116.46m

Elev. of VSS at Development = $(1116.46\text{m} \times 0.032417\%) + 75.93\text{m (THR)} = 112.12\text{m}$

Elevation of Development = 91m

There is no penetration of the Runway 23R VSS.

Runway 23L

Distance from Start of VSS to Development = 2964.89m

Elev. of VSS at Development = $(2964.89\text{m} \times 0.032417\%) + 69.192\text{m (THR)} = 165.30\text{m}$

Elevation of Development = 91m

There is no penetration of the Runway 23L VSS.

2.8 Holding

The Lowest Holding Altitude (LHA) for any of the Holds is 3000ft.

The maximum possible elevation of the Development, before affecting a LHA of 3000ft, has been calculated.

- 3000ft = 914.4m
- 914.4m – 300m MOC = 614.4m AMSL. The maximum Development elevation is below this altitude.

The proposed Development will have no effect on the Holding.

2.9 Minimum Sector Altitude (MSA)

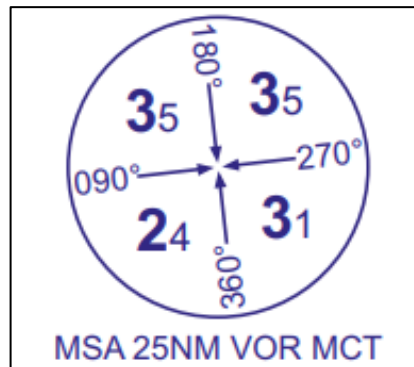


Figure 38 – MSA

The lowest MSA value is 2400ft.

The maximum possible elevation of the Development, before affecting 2400ft, has been calculated.

- 2400ft = 731.5m
- 731.5m – 300m MOC = 431.5m AMSL. The maximum Development elevation is below this altitude.

The proposed Development will have no effect on the MSA.

3 Conclusion

Instrument Flight Procedures (IFPs)

Using a maximum elevation of 91m Above Mean Sea Level (AMSL), there is no effect from the proposed Development on the Manchester Airport IFPs.