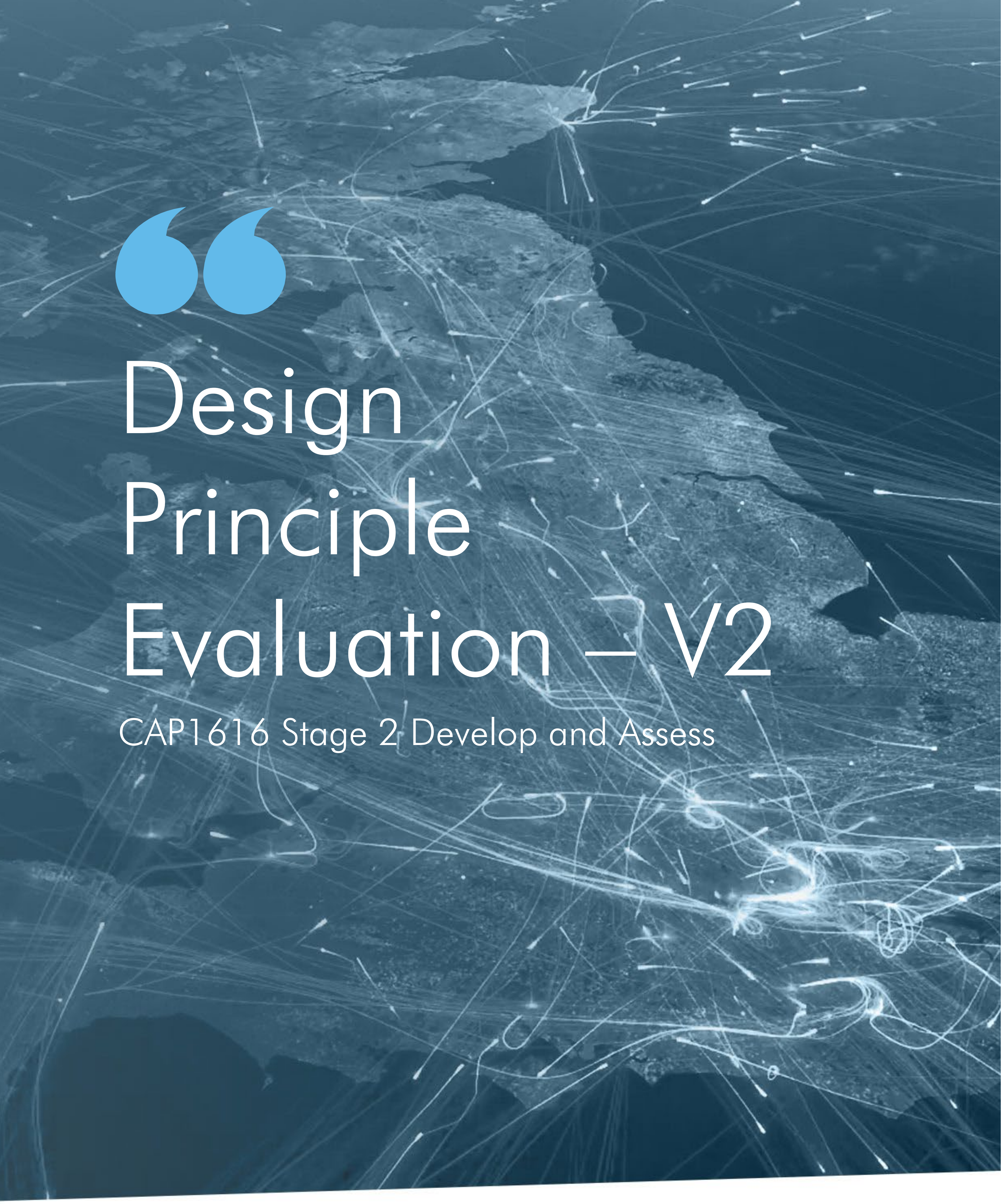

Design Principle Evaluation – V2

CAP1616 Stage 2 Develop and Assess

MAG Manchester Airport

Document Details

Reference	Description	
Document Title	Design Principle Evaluation (DPE) V2	
Issue	Version 2	
Date	03/03/2023	
Document History	Version 1 -submitted to the CAA November 2022 –Sections with amendments shown in blue	
Amendments	Section	Amendment Description
	3.3	Minor changes to descriptive text
	4.2 and 4.3	Updated Acceptance/Rejection criteria for Departures Updated Acceptance/Rejection criteria for Arrivals The quantified data for the 'do nothing' scenarios have been provided
	4.4	Updated criteria for Design Principle Safety
	4.5	Updated criteria for Design Principle Policy
	4.8	Updated RAG for Design Principle Noise N1 and source of planned property developments included.
	4.10	Updated RAG for Design Principle Noise N3 to define greater and less than
	5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 and 18	Departures Evaluation updated
	18	SID Evaluation Summary updated
	19, 20, 21, 22, 23, 24, 25, 26, 27 and 28	Transitions Evaluation updated
	29	Transitions Evaluation Summary updated
	30	Updated Next Steps
	31	Updated Glossary
	6.4, 7.7, 8.9, 9.6, 10.11, 11.9, 12.10, 13.8, 14.7, 15.14,	Summary tables provided

	15.15, 16.18, 16.19, 16.20, 17.13, 20.7, 21.8, 22.4, 23.6, 24.6, 25.7, 26.10, 27.7 and 28.7.	
	-	Appendices 1 and 2 have been removed as this information is now detailed in the summary tables following each design envelope/transitions FAF altitude group

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1 Introduction

1.1 Background

The Manchester Airport (MAN) Airspace Change Proposal (ACP) is currently at Stage 2 – Develop and Assess - of the CAA's CAP1616 Airspace Design process. Step 2A requires the sponsor to develop a comprehensive list of design options that address the Statement of Need (SoN) and align with the design principles that were developed at Stage 1.

This **Design Principle Evaluation (DPE)** sets out MAN's response to that requirement, by presenting the assessment of the design options identified in the Design Options Report (DOR) against the design principles. This DPE forms part of the suite of documents submitted to the Civil Aviation Authority (CAA) at Gateway 2 of the CAP1616 process and is intended to be read alongside these documents.

The full suite of Stage 2 submission documents is:

- Stage 2 Summary Document, which draws together the key points from the Stage 2 submission and provides an overview of the Government's national programme of airspace change, the CAP1616 process and the progress to date of the Manchester Airport Future Airspace project. This information is not repeated in this report.
- Design Options Evolution (DOE), Appendix A to the Stage 2 Summary Document, shows the evolution of the design options through Steps 2A and 2B of the CAP1616 process. The resulting shortlist of design options will be considered in the Full Options Appraisal (FOA) at Stage 3.
- The Design Options Report (DOR), which sets out the change sponsor's approach to the design process and the output of that process in the form of design options for both departures and arrivals at the airport. It presents the design options identified and describes how those options were refined to provide a comprehensive list of design options to be progressed to the Design Principle Evaluation.
- This report, the Design Principle Evaluation (DPE), which assesses how the design options have responded to the design principles, which were established at Stage 1 of the CAP1616 process and identifies those that warrant further analysis at the next stage.
- Initial Options Appraisal (IOA), building on the results of the DPE, the IOA is the first iteration of three option appraisals, required as part of the CAP1616 process. The purpose of the IOA is to provide, at a minimum, a qualitative assessment of each design option providing stakeholders and the CAA with the relative differences between impacts, both positive and negative.
- The Stakeholder Engagement Report (SER), which explains how engagement has been used in the processes described in the other Stage 2 documents and records its outputs.

The full suite of reports, together with their supporting appendices, will be published on the CAA Airspace Change Portal www.airspacechange.caa.co.uk.

1.2 Step 2A

At Step 2A, a list of design options was developed which included options that challenged how we currently operate and sought to explore how we might improve our operations at MAN, taking into account the feedback received during the engagement with stakeholders when establishing our design principles at Stage 1. As part of this process, the options were tested with stakeholders, as detailed in the SER. As part of the options development process, the initial list of design options was assessed to identify options which did not perform well against the 'must have' design principles of Safety, Policy and Capacity.

The initial assessment is described in the DOR as the 'viability filter' and resulted in a Comprehensive List of viable options, which have been analysed further within this DPE. In addition, this DPE also re-iterates the analysis of the ‘viable but poor fit’ design options against the three ‘must have’ design principles that was conducted during the DOR phase. However, as described in Section 5 of the DOR, these design options were not progressed to the full DPE. It should be noted that the criteria that inform the colour coding associated with the ‘viable but poor fit’ options within the DOR are different to the criteria for the analysis of the options within the DPE. The criteria for ‘viable but poor fit’ have been described within section 5.14 of the DOR.

Sections 5 to 25 of this DPE describe how each of the design options have been individually assessed against the design principles and how the design options have responded to each of those design principles. During the stakeholder engagement undertaken as part of Stage 2, stakeholders provided feedback on the application of the design principles. In doing so, they emphasised the importance of considering certain features or areas, including areas of planned property developments. These have been taken into account in the criteria used to assess the design options against the design principles in this DPE. For full details on Stage 2 engagement please refer to the SER and accompanying appendices or Sections 12 and 17 of the Stage 2 Summary Document.

In assessing the design options, we have borne in mind that the options that are eventually chosen must also be compliant with the relevant technical criteria, as detailed in Appendix F to CAP1616. Sections 5 to 25 of this DPE also present an initial evaluation of how each design option responds to the technical criteria, identifying where plans will need to be established to resolve any compliance issues that may otherwise arise during Stage 4.

1.3 Purpose of the Design Principle Evaluation Process

The purpose of the DPE is to assess how the design options have responded to the design principles and identify those design options that warrant further analysis at the next step: the IOA at Step 2B. The DPE process also identifies design options that should be rejected at this stage due to a lack of alignment with the design principles; the process of evaluating the design principles, is detailed in Section 3. The evaluation assessment criteria and accept/reject criteria are detailed in Section 4.

1.4 List of Design Principles

The work undertaken during Stage 1 established a set of design principles. These design principles provide a framework against which design options have been evaluated. The list of design principles is shown in Table 1 below, while the Design Principles Report submitted to the CAA at the ‘Define’ Gateway can be found here Design Principles Report.

Design Principle Designation	Design Principle Description
S	**Safety** Our routes must be safe and must comply with industry standards and regulations.
P	**Policy** Any changes must accord with the Civil Aviation Authority's Airspace Modernisation Strategy. Any airspace change must also allow connection to the wider UK en route network and be aligned with the Future Airspace Strategy Implementation for the North programme and take into consideration the needs of other airports.
C	**Capacity** Our future airspace must enable best use of the capacity of our existing runways, in line with Government policy.
E	**Emissions** We will minimise and where possible, reduce emissions when we design routes. This may be achieved by selecting the most direct routes.
N1	**Noise 1** Our route designs should seek to minimise, and where possible, reduce the number of people affected by noise from our flights.
N2	**Noise 2** Where practical, noise effects should be shared. The use of dispersion and/or respite, especially at night, will be considered to achieve this.
N3	**Noise 3** Where practical, our route designs should avoid, or limit effects upon, noise sensitive areas. These may include cultural or historic assets, tranquil or rural areas, sites of care or education.
A	**Airspace** Our route designs should minimise the impacts on other airspace users by limiting Controlled Airspace (CAS).
T	**Technology** Our route designs should be based on the latest aircraft navigational technology widely available.

Table 1 - List of Agreed Design Principles

1.5 Manchester Current Operations

In order to follow both how the design options have been developed and evaluated it is necessary to have an understanding of the current operational arrangements at MAN. This section gives an overview of these arrangements.

MAN has two runways running from a north-easterly direction to a south-westerly direction. Runways 23L and 23R are used in westerly operations, and the reciprocal Runways 05L and 05R in easterly operations. It has a mixed fleet of passenger aircraft serving destinations around the globe. MAN also supports an air freight operation.

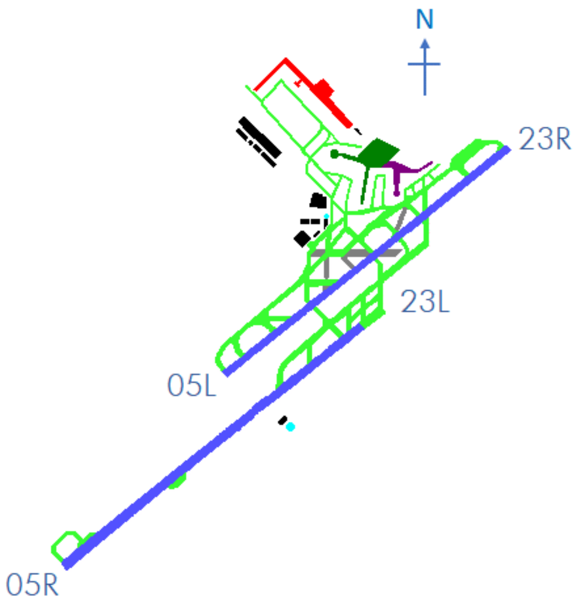


Figure 1: MAN runway orientation

The number of aircraft arrivals and departures in 2020 and 2021 was significantly affected by the pandemic with a greatly reduced number of movements, no dual runway operations, and a distorted mix of short/long-haul operations/destinations. The calendar year and summer of 2019 represent the last experience of (pre-pandemic) normal operations and has therefore been used as the most appropriate illustration of current operations.

The current operation at MAN can be summarised as follows:

- Runways 23R/05L are open 24 hours a day and both are certified for CATIIIB operations.
- The use of Runways 23L/05R is governed by a planning condition which allows their use between 06.00 to 22.00. They can only be used at night in cases of emergency or if there is planned maintenance which make Runways 23R/05L unavailable.
- Runway 23L has no ILS facility. Runway 05R has an ILS but is only certified for CATI operations.
- In practice, the use of Runways 23L/05R is driven by a mix of demand, weather, fire cover and ATC staffing.
- Winter operating hours for Runways 23L/05R are[1]:
  - Mon - Fri 06.30 to10.30 and 16.00 to 20.00,
  - Sat 06.30 to 10.30
  - Sun 16.00 to 20.00

[1] Hours of operation Winter 2022/23 (October 2022 to March 2023) as stated in Operational Advice Note 058/2022.

- Summer operating hours for Runways 23L/05R are[2]:
  - Mon - Fri 06.15 to 20.00
  - Sat 06.15 to 16.00
  - Sun 06.15 to 09.30 and 13.00 to 20.00.

- Westerly operations from Runways 23R/23L are predominant, and over the last 20 years the split between Runways 23R/23L and Runways 05L/05R operations has been approximately 80%/20%. When operating in dual runway mode there is a need for aircraft to cross an active runway. During easterly (Runways 05L/05R) operations this has limited impact, but during westerly (Runways 23R/23L) operations, the location of the crossing points for departures results in an adverse impact on arrival spacing.
- Instrument Flight Rules (IFR) departing traffic utilise Standard Instrument Departures (SIDs) but these are all based upon ground-based navaids, in particular the MCT DVOR. Departing aircraft are generally transferred to Prestwick Centre after passing 2,500ft, up to 5,000ft.
- Arrivals are routed towards one of three airborne holds, by NATS Prestwick Centre. Once transferred to MAN, aircraft are vectored by ATC onto final approach, normally for ILS or VOR/DME. One PBN arrival exists for Runway 23L.
- Below 7,000ft, management of the airspace relies heavily on Air Traffic Control (ATC) tactical intervention with very little systemisation employed.
- Continuous descent arrivals (CDA) are measured from 5,000ft (because of the base of the holding level, which is aligned to the transition altitude), but design of the arrival routes and the lack of systemised airspace means these cannot be consistently delivered. In financial year 2020, which was the last year of pre-pandemic traffic levels, 92% of arrivals achieved a CDA.

[2] Hours of operation Summer 2022 (April to September) as stated in Operational Advice Note 032/2022.

2 Comprehensive List of Viable Options

2.1 Procedure Options

In accordance with the SoN, MAN is seeking to modernise its airspace arrangements for aircraft operating to and from the Airport at altitudes of 7,000ft and below. The SoN can be found here Statement of Need.

MAN is considering new departure and arrival routes as part of a coordinated plan for airspace modernisation along with other airports in the north of England. This will ensure that the airport can make use of new technologies so that the operational efficiency and environmental benefits that modern aircraft offer can be realised. In doing so, the airport seeks to introduce optimised procedures that will integrate fully with other airports and the wider airspace system.

Currently, the airport relies on conventional ground-based Doppler Very High Frequency Omni Range Radio Beacons (DVOR) navigational aids that are reaching the end of their life. In accordance with international obligations to transfer to Performance Based Navigation (PBN), there is a UK wide plan for these aging navigational aids to be withdrawn. This plan also forms part of CAP1711 the UK Government Airspace Modernisation Strategy (AMS).

The current departure procedures use a system of navigational beacons or points, each with a unique name, such as EKLAD, ASMIM, LISTO or Pole Hill (POL). If new routes are introduced, some new navigational points will have to be established, and each will have a new name assigned, and these will not be associated with beacons.

Table 2 below contains a summary of the existing procedures in use at MAN, together with the list of options under assessment within this DPE.

NOTE: In some instances, the term "replication" is used. This refers to a route design that has been developed to match an existing route, which is already in use, as far as is practicable. This provides a 'do minimum' option, as described in further detail in Section 4.4 in the DOR. Most of the current route tracks can vary due to a number of factors including aircraft type, speed that the procedure is being flown, weather conditions and the type of Flight Management System (FMS) on board a given aircraft. Routes designed using satellite navigation are designed to a different set of criteria and are normally flown more consistently. As a result, it is impossible to exactly replicate a conventional procedure and its effects using a satellite-based procedure.

2.2 Design Options Development

Step 2A requires the sponsor to develop a comprehensive list of options that address the SoN and that align with the design principles that were developed at Stage 1. The DOR details the design process at MAN and lists the design options developed for both departures and arrivals.

As the sponsor of the ACP, MAN tested these options with the stakeholders that contributed to the development of the design principles. The engagement carried out during Step 2A is detailed in the SER.

A summary of the design options described in the DOR and assessed in this DPE is provided in Table 2, below. This sets out the number of options assessed for each of the design envelopes, along with a basic description of those options. The options presented below are those which were assessed as 'viable and good fit' or 'viable but poor fit' in the DOR.

Each design option has been built and described in the DOR as a matching 'pair' that covers both runways in that particular direction. For example, option 2 for westerly operations covers the routes from both Runway 23L and Runway 23R. This has been done to provide a common termination point at 7,000ft for each pair of route designs, which is a feature of all current SIDs. It has also been done to provide a clear and understandable set of options for stakeholders to review and comment upon.

However, because of the slightly different track taken by each option, the assessment of the designs within this DPE and the IOA has been conducted using the individual routes for each runway. This has allowed a more accurate evaluation of the routes to be undertaken.

Procedure	Number of Options	Basic Description
SID Runways 05L/05R North	7	These design options have been created for traffic routing to the north from Runway 05L and Runway 05R. The options are based around the existing POL 4S/1Z SID and after departure, the design options turn left and route north towards POL, terminating at 7,000ft.
SID Runways 05L/05R East	12	These design options are based around current operations where aircraft routing to the east via a DESIG departure are vectored off the SID by ATC once they are above 4,000ft. These options then take a more direct track to either join the network to reduce fuel burn, or to resolve interactions with other traffic.
SID Runways 05L/05R South Right Turn	11	These options have been created for traffic routing to the south from Runway 05L and Runway 05R. These design options align to current operational practice by ATC where aircraft are taken off the LISTO 2S/2Z SID above 4,000ft and vectored on a track that allows them to gain height and be safely and efficiently separated from MAN arriving aircraft.
SID Runways 05L/05R South Left Turn	8	These design options are all new design options. They have been created as options to create additional capacity and to provide options for noise respite in line with the Design Principle Noise N2 when operated in conjunction with the 05 South Right Turn design options.
SID Runways 05L/05R West	12	These design options are based on the ASMIM 1S/1Z SID which currently serves two purposes, one is for traffic to the west and the other is the south-west. The design options seek to align with current operational practice and bilateral discussions with LPL
SID Runways 05L/05R South-west	11	These design options have been created in line with the design principles Policy and Emissions by creating a shorter route for flights to the south-west when compared to the current ASMIM 1S/1Z SID. As with the West design options, these design options seek to align with current

		operational practice and bilateral discussions with LVP.
SID Runways 23R/23L North	15	These design options have been created for traffic routing to the north from Runways 23R/23L and are based around the existing POL 5R/1Y SID. After departure, these design options turn right and route north towards POL, terminating at 7,000ft.
SID Runways 23R/23L East Right Turn	11	These design options have been created to align to current operational practice by ATC where aircraft are taken off the SONEX 1R/1Y SID above 4,000ft to provide a more direct and fuel-efficient track or to separate them safely and efficiently from MAN arriving aircraft from the north.
SID Runways 23R/23L East Left Turn	10	These design options have been created to provide additional capacity and as options for noise respite in line with the Design Principle Noise N2 when operated in conjunction with the 23 East Right Turn Design Envelope.
SID Runways 23R/23L South	17	These design options have been created for traffic routing to the south from Runways 23R/23L. The options are based around the existing LISTO 2R/2Y and SANBA 1R/1Y SIDs.
SID Runways 23R/23L South-west	23	These design options are based around the current KUXEM 1R/1Y, EKLAD 1R/1Y and MONTY 1R/1Y SIDs. These design options also seek to align with feedback received within Stage 2 engagement, including the Airspace Change Organising Group (ACOG) facilitated collaborative design review with technical experts from LPL, MAN and NERL.
SID Runways 23R/23L West	15	These design options are new options based around current operations where aircraft routing to the west via an EKLAD departure are vectored off the SID once they are above 3,000ft. This takes them on a more direct track to the west towards the Wallasey DVOR (WAL) which is done to reduce fuel burn. These design options also seek to align with feedback received within Stage 2 engagement, including the ACOG facilitated

		collaborative design review with technical experts from LPL, MAN and NERL.
Transitions Runways 05L/05R North 3,000ft FAF	10	These design options have been created for traffic routing to the RNP approach for Runway 05L/05R. It covers the transitions from the IAF at 7,000ft and the design of the final approach using a 3,000ft FAF. In current operations for arrivals from the north, ATC radar vector aircraft onto the final approach from either the MIRSI or ROSUN holds and route traffic downwind to the north and west of the airfield to a base leg to the north of Northwich.
Transitions Runways 05L/05R North 2,500ft FAF	11	These design options have been created for traffic routing to the RNP approach for Runway 05L/05R. It covers the transitions from the IAF at 7,000ft and the design of the final approach using a 2,500ft FAF. In current operations for arrivals from the north, ATC radar vector aircraft onto the final approach from either the MIRSI or ROSUN holds and route traffic downwind to the north and west of the airfield to a base leg to the north of Northwich.
Transitions Runways 05L/05R South 3,000ft FAF	9	These design options have been created for traffic routing to the RNP approach for Runway 05L/05R. It covers the transitions from the IAF at 7,000ft and the design of the final approach using a 3,000ft FAF. In current operations for arrivals from the south, ATC radar vector aircraft from the DAYNE hold to a base leg position to the north of Crewe.
Transitions Runways 05L/05R South 2,500ft FAF	9	These design options have been created for traffic routing to the RNP approach for Runway 05L/05R. It covers the transitions from the IAF at 7,000ft and the design of the final approach using a 2,500ft FAF. In current operations for arrivals from the south, ATC radar vector aircraft from the DAYNE hold to a base leg position to the north of Crewe.
Transitions Runways 05L/05R South 2,000ft FAF	3	These design options have been created for traffic routing to the RNP approach for Runway 05L/05R. It covers the transitions from the IAF at 7,000ft and the design of the final approach using a 2,000ft FAF. In current operations for arrivals from the south, ATC radar vector aircraft from the DAYNE hold to a base leg position to the north of Crewe.

		These design options seek to align with feedback received within Stage 2 engagement, including the ACOG facilitated collaborative design review with technical experts from LPL, MAN and NERL.
Transitions Runways 23R/23L North 3,500ft FAF	12	These design options have been created for traffic routing to the RNP approach for Runways 23R/23L. It covers transitions from the IAF at 7,000ft and the design of the final approach using a 3,500ft FAF. In current operations for arrivals from the north, ATC radar vector aircraft onto the final approach from either the MIRSI or ROSUN holds, and typically route aircraft downwind to the north and east of the city centre of Manchester to a base leg in the vicinity of Mossley.
Transitions Runways 23R/23L North 3,000ft FAF	12	These design options have been created for traffic routing to the RNP approach for Runways 23R/23L. It covers transitions from the IAF at 7,000ft and the design of the final approach using a 3,000ft FAF. In current operations for arrivals from the north, ATC radar vector aircraft onto the final approach from either the MIRSI or ROSUN holds, and typically route aircraft downwind to the north and east of the city centre of Manchester to a base leg in the vicinity of Mossley.
Transitions Runways 23R/23L South 3,500ft FAF	8	These design options have been created for traffic routing to the RNP approach for Runways 05L/05R. It covers transitions from the IAF at 7,000ft and the design of the final approach using a 3,500ft FAF. In current operations for arrivals from the south, ATC radar vector aircraft from the DAYNE hold and route to the east of Macclesfield to a base leg in the vicinity of Glossop.
Transitions Runways 23R/23L South 3,000ft FAF	7	These design options have been created for traffic routing to the RNP approach for Runways 05L/05R. It covers transitions from the IAF at 7,000ft and the design of the final approach using a 3,000ft FAF. In current operations for arrivals from the south, ATC radar vector aircraft from the DAYNE hold and route to the east of Macclesfield to a base leg in the vicinity of Glossop.

Table 2 – Summary of Existing Procedures and Numbers of Options Being Considered

3 Design Principle Evaluation

3.1 Evaluation of the Options against the Design Principles

Each option has been assessed against the list of design principles shown in Table 1 in Section 1.4 above.

The design principles have been examined to identify a process of evaluating each design option against a set of criteria which assesses the option's alignment with the design principles. The resulting evaluation matrices are shown below together with a full description of how the routes have been measured against the design principle. Where it has not been possible to fully evaluate each option at this stage, we have made this clear within the assessment. As described in further detail in section 30 Next Steps, of this DPE, further analysis will be undertaken if required.

Sections 4.4 to 4.12 below give an overview of the evaluation carried out for each design principle. Each table relates to a single design principle and shows a summary of the analysis conducted for each option against that design principle, together with a high-level assessment of whether the design principle is either not met, partially met, or fully met, as follows:

- A green box indicates that the design principle has been **met** by the specified option.
- An orange box means that the design principle has been **partially met** by the specified option.
- A red box indicates that the design principle has **not been met** by the specified option.
- Further detail on the criteria for the evaluation of each option is shown within sections 5 and 25. What constitutes 'not met', 'partially met' and 'fully met' for each design principle is explained in turn in relation to that principle. Sections 5 to then provide an analysis of each option against those criteria.

3.2 Description of Do Nothing and Do Minimum

The CAP1616 process requires a 'do nothing' scenario to be considered and, as is the case for MAN, where 'do nothing' is not a feasible option a 'do minimum' scenario too.

The 'do nothing' scenario is then used as the baseline for comparison in the Options Appraisals, including the IOA. The 'do minimum' option(s) describe the minimum changes required to address the issues identified in the SoN and are listed as design options for assessment in this DPE. As the 'do nothing' scenario fails to comply with the requirements of the AMS and does not align with the 'must have' design principles, it was not assessed as an option in this DPE.

However, the nature of the design principles, Emissions, Noise 1 and Noise 3 means that a baseline is required to inform the comparative nature of the evaluation. As such, for the evaluation of design options against these design principles, 'do nothing' has been used for comparative purposes. The way in which the 'do nothing' has been considered as part of the evaluation against each of these design principles is detailed in sections 4.2, 4.3, 4.7, 4.8 and 4.10. A description of and rationale for the 'do nothing' scenario and the 'do minimum' options for both arrivals and departures is provided in section 4.4 of the DOR and is not repeated here.

3.3 Overflight Assessment

When considering the number of people 'overflown', the definition of overflight provided in the CAA's definition of overflight (CAP1498) has been used. CAP1498 recognises that an aircraft does not have to pass directly overhead, to be considered an overflight. Instead, overflight should be defined to include aircraft that pass over and to the side of an observer (see section 4.8).

The geometry of this definition dictates that, the higher the aircraft, the broader the overflight footprint. It therefore follows that a shallower climb gradient will result in a longer, thinner footprint than a steeper climb gradient. A consequence of this can be that, despite there being little difference between the lateral tracks of design options, the population etc., overflown may, in some instances, differ markedly.

To estimate the size of the population affected by noise from current aircraft operations, a modal average path[3] (a single line that delineates those locations on the ground that have experienced the greatest number of overflights) has been created for each of the existing arrival patterns and SIDs and it has been assessed against the above overflight definition both to a height of 4,000ft, reflecting the point at which an aircraft flying the route is likely to result in noise exposure above the LOAELs, and to 7,000ft, the height up to which MAN are responsible for the route design. Further, to ensure that the impact of aircraft that have been tactically vectored, either away from the SID or prior to final approach, has been captured, the actual spread of tracks (to a height of 7,000ft) has been mapped. This was used to estimate the area and affected population beneath those tracks. This is known as the 'do nothing' scenario, for comparisons in this DPE and the Initial Options Appraisal (IOA).

The limitations of overflight assessment are described in CAP1498, which recognises that it does not set out to directly assess noise impacts. Instead, it provides a means to quantify the number of people, dwellings and sensitive areas overflown. This has been used to present the possible effect of proposals on local communities that are exposed to noise from aircraft up to 7,000 feet.

[3] Traffic data for the 92-day summer period (16/06/2019 to 15/09/2019), except Runway 05R departures and Runway 23L arrivals, where (due to low runway use) the period 01/01/2010 to 31/12/2019 was used.

4 Acceptance/Rejection Criteria

4.1 Introduction

In order to ensure consistent application of each design principle, a set of underlying criteria were developed. These are explained in this chapter. The criteria for each design principle are set out in sections 4.4 – 4.12, below. In applying these criteria to the departure design options, the acceptance and rejection criteria set out in section 4.2 were considered. The acceptance and rejection criteria for the arrival design options are set out in section 4.3.

4.2 Acceptance/Rejection Criteria for Departures Options

The nine-design principle RAG (red, amber, green) statuses for each design option were totalled. In order to qualify for further consideration, the following professional judgement was applied:

1. As a minimum, accepted options must at least partially meet the 'must have' design principles of Safety, Policy, and Capacity.
2. Within each design envelope the option with the greatest number of 'greens' was deemed to be 'best-performing' and was accepted. In the summary tables, this is denoted as 'Best'. Where multiple options had the same number of 'greens', then the number of 'ambers' was also considered. To illustrate, of the options below, option 'X' would be 'best-performing'.

	Green	Amber	Red
Option X	7	2	0
Option Y	7	1	1
Option Z	7	0	2

3. Any other options evaluated as equal to the 'best-performing' option were accepted. In the summary tables, this is denoted as 'Best'.
4. All 'do minimum' (Replication) departure options were accepted, to enable their continued consideration. In the summary tables, this is denoted as 'Do Minimum (Replication)'.
5. Design options not identified as 'best performing', equal to the 'best performing' or 'do minimum' were reconsidered to establish whether the population overflown up to 4,000ft was less than that of an option already accepted. Any identified options were subsequently accepted. In the summary tables, this is denoted as '4,000ft beneficial.

A hypothetical example is shown below.

	Accept / Reject under steps 1,2,3 and 4.	Approximate total population overflown up to 4,000ft	Additional options accepted under step 5
Option 1	'do minimum'	19,300	
Option 2	Equal best-performing	21,100	
Option 3	Best-performing	17,500	
Option 4		20,900	Yes as 20,900 is less than the 21,100 population over flown by Option 2
Option 5		28,200	
Option 6	Equal best-performing	19,200	

6. Any option which does not accord with the criteria above was rejected. In the summary tables, this is denoted as 'Rejected'.
7. Where options were accepted, these progressed to the IOA at Step 2B. The assessment of rejected options was not progressed.

This process provides the change sponsor with sufficient flexible and variable design options within each design envelope to undertake the IOA. This is because the options allow appropriate balance between need and the design principles to allow comparison between the design options.

CAP1616 provides guidance on the appropriate baseline for the options appraisal process, which has been closely followed by MAN at Step 2B as reported in the IOA. However, the DPE is not part of the options appraisal process. Rather, it forms part of Step 2A. As such, CAP1616 does not specify the appropriate baseline to inform the DPE where one is required. This is logical, given the extent to which a baseline is required for comparative purposes during the DPE will depend on the nature of the design principles selected by a particular sponsor. By way of an example at MAN, Design Principle Safety represents an absolute, such that it does not require comparison – a proposal will either be safe or not. In contrast, the design principles Noise N1, Noise N3 and Emissions all require a comparator in order to provide a meaningful evaluation of design options against the design principles. This allows design principles that reflect a degree of change to be understood. As the DPE is required to evaluate how the identified design options have responded to a sponsor's particular design principles, the choice of the baseline for the DPE is necessarily guided by those design principles.

The departures design options were evaluated in the following design envelopes:

- Runway 23:
  - East was compared against **SONEX** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	SONEX 'Do Nothing' Scenario
23L	Emissions	Estimated track length: 45km (24nm)
23L	Noise 1, 4,000ft	Estimate of total population overflown: 1,900
23L	Noise 1, 7,000ft	Estimate of total population overflown: 121,000
23L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 3
23L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 193
23R	Emissions	Estimated track length: 48km (26nm)
23R	Noise 1, 4,000ft	Estimate of total population overflown: 7,800
23R	Noise 1, 7,000ft	Estimate of total population overflown: 207,600
23R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 11
23R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 355

  - North was compared against **POL** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	POL 'Do Nothing' Scenario
23L	Emissions	Estimated track length: 39km (21nm)
23L	Noise 1, 4,000ft	Estimate of total population overflown: 7,500
23L	Noise 1, 7,000ft	Estimate of total population overflown: 115,200
23L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 10
23L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: [209]
23R	Emissions	Estimated track length: 41km (22nm)
23R	Noise 1, 4,000ft	Estimate of total population overflown: 3,900
23R	Noise 1, 7,000ft	Estimate of total population overflown: 222,400
23R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 6
23R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 390

- South was compared against **LISTO** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	LISTO 'Do Nothing' Scenario
23L	Emissions	Estimated track length: 39km (21nm)
23L	Noise 1, 4,000ft	Estimate of total population overflown: 2,500
23L	Noise 1, 7,000ft	Estimate of total population overflown: 33,300
23L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 5
23L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 70
23R	Emissions	Estimated track length: 40km (22nm)
23R	Noise 1, 4,000ft	Estimate of total population overflown: 3,300
23R	Noise 1, 7,000ft	Estimate of total population overflown: 33,700
23R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 12
23R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 70

- South was compared against **SANBA** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	SANBA 'Do Nothing' Scenario
23L	Emissions	Estimated track length: 48km (26nm)
23L	Noise 1, 4,000ft	Estimate of total population overflown: 3,900
23L	Noise 1, 7,000ft	Estimate of total population overflown: 8,300
23L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 6
23L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 12
23R	Emissions	Estimated track length: 49km (26nm)
23R	Noise 1, 4,000ft	Estimate of total population overflown: 3,400
23R	Noise 1, 7,000ft	Estimate of total population overflown: 16,200
23R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 2
23R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 42

- South-west was compared against **EKLAD** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	EKLAD 'Do Nothing' Scenario
23L	Emissions	Estimated track length: 41km (22nm)
23L	Noise 1, 4,000ft	Estimate of total population overflown: 1,500
23L	Noise 1, 7,000ft	Estimate of total population overflown: 7,100
23L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 3
23L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 21
23R	Emissions	Estimated track length: 42km (23nm)
23R	Noise 1, 4,000ft	Estimate of total population overflown: 800
23R	Noise 1, 7,000ft	Estimate of total population overflown: 13,200
23R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 6
23R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 36

- South-west was compared against **KUXEM** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	KUXEM 'Do Nothing' Scenario
23L	Emissions	Estimated track length: 40km (22nm)
23L	Noise 1, 4,000ft	Estimate of total population overflown: 1,200
23L	Noise 1, 7,000ft	Estimate of total population overflown: 17,300
23L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 5
23L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 51
23R	Emissions	Estimated track length: 42km (23nm)
23R	Noise 1, 4,000ft	Estimate of total population overflown: 500
23R	Noise 1, 7,000ft	Estimate of total population overflown: 16,400
23R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 2

23R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 51

- West was compared against **EKLAD** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	EKLAD 'Do Nothing' Scenario
23L	Emissions	Estimated track length: 41km (22nm)
23L	Noise 1, 4,000ft	Estimate of total population overflown: 1,500
23L	Noise 1, 7,000ft	Estimate of total population overflown: 7,100
23L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 3
23L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 21
23R	Emissions	Estimated track length: 42km (23nm)
23R	Noise 1, 4,000ft	Estimate of total population overflown: 800
23R	Noise 1, 7,000ft	Estimate of total population overflown: 13,200
23R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 6
23R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 36

- Runway 05:
  - East was compared against **DESIG** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	DESIG 'Do Nothing' Scenario
05L	Emissions	Estimated track length: 40km (22nm)
05L	Noise 1, 4,000ft	Estimate of total population overflown: 61,000
05L	Noise 1, 7,000ft	Estimate of total population overflown: 104,700
05L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 143
05L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 200
05R	Emissions	Estimated track length: 41km (22nm)
05R	Noise 1, 4,000ft	Estimate of total population overflown: 60,200
05R	Noise 1, 7,000ft	Estimate of total population overflown: 147,000
05R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 161
05R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 314

- North was compared against **POL** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	POL 'Do Nothing' Scenario
05L	Emissions	Estimated track length: 41km (22nm)
05L	Noise 1, 4,000ft	Estimate of total population overflown: 46,900
05L	Noise 1, 7,000ft	Estimate of total population overflown: 195,900
05L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 143
05L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 389
05R	Emissions	Estimated track length: 42km (23nm)
05R	Noise 1, 4,000ft	Estimate of total population overflown: 51,900
05R	Noise 1, 7,000ft	Estimate of total population overflown: 224,300
05R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 139
05R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 487

- South was compared against **LISTO** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	LISTO 'Do Nothing' Scenario
05L	Emissions	Estimated track length: 39km (21nm)
05L	Noise 1, 4,000ft	Estimate of total population overflown: 15,100
05L	Noise 1, 7,000ft	Estimate of total population overflown: 73,300
05L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 35
05L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 149
05R	Emissions	Estimated track length: 40km (22nm)
05R	Noise 1, 4,000ft	Estimate of total population overflown: 24,500
05R	Noise 1, 7,000ft	Estimate of total population overflown: 33,200
05R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 50
05R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 70

- South-west was compared against **ASMIM** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	ASMIM 'Do Nothing' Scenario
05L	Emissions	Estimated track length: 40km (22nm)
05L	Noise 1, 4,000ft	Estimate of total population overflown: 72,200
05L	Noise 1, 7,000ft	Estimate of total population overflown: 245,500
05L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 160
05L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 465
05R	Emissions	Estimated track length: 42km (23nm)
05R	Noise 1, 4,000ft	Estimate of total population overflown: 63,000
05R	Noise 1, 7,000ft	Estimate of total population overflown: 250,100
05R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 145
05R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 457

- West was compared against **ASMIM** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	ASMIM 'Do Nothing' Scenario
05L	Emissions	Estimated track length: 40km (22nm)
05L	Noise 1, 4,000ft	Estimate of total population overflown: 72,200
05L	Noise 1, 7,000ft	Estimate of total population overflown: 245,500
05L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 160
05L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 465
05R	Emissions	Estimated track length: 42km (23nm)
05R	Noise 1, 4,000ft	Estimate of total population overflown: 63,000
05R	Noise 1, 7,000ft	Estimate of total population overflown: 250,100
05R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 145
05R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 457

The 'do nothing' (baseline) scenarios are mapped in section 3.3 of the Initial Options Appraisal.

4.2.1 Additionally Qualified Options

To allow the ACP at MAN to retain sufficient flexibility to respond to other, emerging airspace change proposals and to avoid the premature rejection of any design options, considered likely to offer benefits (for example as a part of a network) not fully apparent at this stage, 23 additional design options have also been retained. These were based upon the qualitative judgement of the SME which examined the potential for options to make best use of runway capacity and to reduce the interaction with arrivals and departures at both MAN and adjacent airports. In this respect this SME judgement was aligned with the requirements of the design principle Capacity, and with the efficiency ends of the AMS (through the design principle Policy).

This SME judgement was based upon technical meetings with Manchester ATC and with NATS NERL. In particular the DOR sections 3.3 and 3.4 refer to discussions with NERL regarding the network interface and managing this airspace change within the national airspace master plan. This highlights the need to ensure connectivity to the network against the challenge of a NERL design that has not yet been finalised. It also highlights the potential for misalignment and the need to modify or restore options at a later date. The retention of these options is aimed at reducing or eliminating this likelihood. In the summary tables, options which have been additionally qualified are denoted as 'Add Qual.'

In addition, the MAN ACP is currently more advanced than the NERL network ACP and although the change sponsor has worked with NERL to develop their design options, the NERL process has not yet fully developed a comprehensive list of options. As a result, we do not have full visibility of the NERL design options in relation to:

- Route design option connectivity for departures within the MTMA, which may change as a result of the design work within NERL and at other airports, in particular LPL.
- The type and number of arrival structures envisaged for MAN operations above 7,000ft, or the options for where such an arrival structure or structures could be positioned.

In order to address this, the change sponsor has collaborated closely with colleagues in NERL to help create a comprehensive list of options that provide flexibility and have the ability to integrate with a new MTMA network. Discussions with NERL took account of;

- the current network traffic flows;
- the proposed routes to and from LPL;
- the requirement to safely deconflict MAN departures and arrivals from each other.

The output from these sessions has been captured in an Airspace Design Workshop Record (ADWR). This is a NERL document which details the design assumptions used by both parties long list of potential network concepts which the group considered and discussed. The ADWR document tells the story of how concepts, options and designs have been developed by NERL, and is the formal NERL record of the output from the meetings and will be used to support the ACP submissions for NERL for the airspace above 7,000ft.

We have also tested our designs with NERL and other change sponsors during the stakeholder engagement process.

As the NERL designs progress, it is possible that some of our design options will either be misaligned or conflict with their designs (or those of other airports). This may mean that some design options will not be progressed and that some design options will need to be further refined or modified in response to the progress of this work.

We will continue to engage in discussions across the MTMA and in partnership with NERL and other airports to respond to any such interactions in line with the developing national airspace masterplan.

Our proposed approach to address any such further information becoming available is described as part of the Next Steps in section 30.

4.3 Acceptance/Rejection Criteria for Arrivals Options

The nine design principle RAG statuses for each design option were totalled. In order to qualify for further consideration the following professional judgement was applied:

1. As a minimum, accepted options must at least partially meet the 'must have' design principles of Safety, Policy, and Capacity.

2. The option with the greatest number of 'greens' was deemed to be 'best-performing' and was shortlisted for acceptance. In the summary tables, this is denoted as 'Best'. Where multiple options had the same number of 'greens', then the number of 'ambers' was also considered. To illustrate, of the options below, option 'X' would be 'best performing'.

	Green	Amber	Red
Option X	7	2	0
Option Y	7	1	1
Option Z	7	0	2

3. Within each design envelope any other options evaluated as equal to the 'best-performing' option were also shortlisted for acceptance. In the summary tables, this is denoted as 'Best'.
4. Design options not identified as 'best performing', equal to the 'best performing' or 'do minimum' were reconsidered to establish whether the population overflown up to 4,000ft was less than that of an option already accepted. Any identified options were subsequently accepted. In the summary tables, this is denoted as '4,000ft beneficial'. A hypothetical example is shown below.

	Accept / Reject under steps 1,2, and 3	Approximate total population overflown up to 4,000ft	Additional options accepted under step 4
Option 1	'do minimum'	19,300	
Option 2	Equal best-performing	21,100	
Option 3	Best-performing	17,500	
Option 4		20,900	Yes as 20,900 is less than the 21,100 population over flown by Option 2
Option 5		28,200	
Option 6	Equal best-performing	19,200	

5. Any option which does not accord with the criteria above was rejected. In the summary tables, this is denoted as 'Rejected'.
6. The shortlist of 'best-performing' (steps 2 and 3 above) and beneficial up to 4,000ft (step 4 above) options were then grouped against their respective Initial Approach Fix (IAFs), as detailed in section 20 of the DOR. In order to progress to the IOA an IAF must consist of a design option to each Runways 23R, 23L, 05L and 05R. If an IAF was not complimented by each of these four options and a further qualitative professional judgement could not be applied, the shortlisted accepted option(s) were subsequently rejected. In the summary tables, this is denoted as either 'Best but incomplete IAF' or '4,000ft beneficial but incomplete IAF'. Options which were evaluated as 'best-performing' and also form part of a complete set within an IAF were accepted.
7. Where options were accepted, these progressed to the IOA at Step 2B. The assessment of rejected options was not progressed.

This process provides the change sponsor with sufficient flexible and variable design options within each Final Approach Fix (FAF) altitude group to undertake the IOA. This is because the options allow appropriate balance between need and the design principles to allow comparison between the design options.

Where the relevant design principle required a comparator, the arrivals design options were grouped and evaluated in the FAF altitude groups as follows:

- Runways 23R/23L:
  - North L 3,500ft and 3,000ft was compared against **MIRSI** and **ROSUN** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	MIRSI 'Do Nothing' Scenario
23L	Emissions	Estimated track length: 86km (46nm)
23L	Noise 1, 4,000ft	Estimate of total population overflown: 133,300
23L	Noise 1, 7,000ft	Estimate of total population overflown: 793,400
23L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 271
23L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 1604

Runway	Criteria	ROSUN 'Do Nothing' Scenario
23L	Emissions	Estimated track length: 54km (29nm)
23L	Noise 1, 4,000ft	Estimate of total population overflown: 113,300
23L	Noise 1, 7,000ft	Estimate of total population overflown: 427,200
23L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 192
23L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 812

  - North R 3,500ft and 3,000ft was compared against **MIRSI** and **ROSUN** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	MIRSI 'Do Nothing' Scenario
23R	Emissions	Estimated track length: 72km (39nm)
23R	Noise 1, 4,000ft	Estimate of total population overflown: 161,600
23R	Noise 1, 7,000ft	Estimate of total population overflown: 755,500
23R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 289
23R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 1,474

Runway	Criteria	ROSUN 'Do Nothing' Scenario
23R	Emissions	Estimated track length: 59km (32nm)
23R	Noise 1, 4,000ft	Estimate of total population overflown: 88,800
23R	Noise 1, 7,000ft	Estimate of total population overflown: 381,600
23R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 159
23R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 718

  - South L 3,500ft and 3,000ft was compared against **DAYNE** 'do nothing' scenario for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	DAYNE 'Do Nothing' Scenario
23L	Emissions	Estimated track length: 63km (34nm)
23L	Noise 1, 4,000ft	Estimate of total population overflown: 77,600
23L	Noise 1, 7,000ft	Estimate of total population overflown: 149,300
23L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 155
23L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 301

- South R 3,5000ft and 3,000ft was compared against **DAYNE** 'do nothing' scenario for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	DAYNE 'Do Nothing' Scenario
23R	Emissions	Estimated track length: 41km (22nm)
23R	Noise 1, 4,000ft	Estimate of total population overflown: 84,200
23R	Noise 1, 7,000ft	Estimate of total population overflown: 137,400
23R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 157
23R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 267

- Runways 05L/05R:
  - North L 3,000ft, 2,500ft and 2,000ft was compared against **MIRSI** and **ROSUN** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	MIRSI 'Do Nothing' Scenario
05L	Emissions	Estimated track length: 43km (23nm)
05L	Noise 1, 4,000ft	Estimate of total population overflown: 73,000
05L	Noise 1, 7,000ft	Estimate of total population overflown: 467,800
05L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 186
05L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 921

Runway	Criteria	ROSUN 'Do Nothing' Scenario
05L	Emissions	Estimated track length: 76km (41nm)
05L	Noise 1, 4,000ft	Estimate of total population overflown: 69,600
05L	Noise 1, 7,000ft	Estimate of total population overflown: 999,600
05L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 181
05L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 2,153

- North R 3,000ft, 2,500ft and 2,000ft was compared against **MIRSI** and **ROSUN** 'do nothing' scenarios for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	MIRSI 'Do Nothing' Scenario
05R	Emissions	Estimated track length: 55km (30nm)
05R	Noise 1, 4,000ft	Estimate of total population overflown: 45,700
05R	Noise 1, 7,000ft	Estimate of total population overflown: 389,900
05R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 118
05R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 907

Runway	Criteria	ROSUN 'Do Nothing' Scenario
05R	Emissions	Estimated track length: 79km (43nm)
05R	Noise 1, 4,000ft	Estimate of total population overflown: 52,500
05R	Noise 1, 7,000ft	Estimate of total population overflown: 1,003,500
05R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 138
05R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 2,243

- South L 3,000ft and 2,500ft was compared against **DAYNE** 'do nothing' scenario for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	DAYNE 'Do Nothing' Scenario
05L	Emissions	Estimated track length: 64km (35nm)
05L	Noise 1, 4,000ft	Estimate of total population overflown: 104,300
05L	Noise 1, 7,000ft	Estimate of total population overflown: 274,400
05L	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 235
05L	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 600

- South R 3,000ft and 2,500ft was compared against **DAYNE** 'do nothing' scenario for design principles Emissions, Noise N1 and Noise N3, as shown below.

Runway	Criteria	DAYNE 'Do Nothing' Scenario
05R	Emissions	Estimated track length: 66km (36nm)
05R	Noise 1, 4,000ft	Estimate of total population overflown: 68,900
05R	Noise 1, 7,000ft	Estimate of total population overflown: 182,000
05R	Noise 3, 4,000ft	Estimate of total noise sensitive areas overflown: 173
05R	Noise 3, 7,000ft	Estimate of total noise sensitive areas overflown: 407

For the evaluation in the DPE, arrivals from the North were compared against both the MIRSI and ROSUN 'do nothing' scenarios to reflect that traffic could flight plan via either hold.

The 'do nothing' (baseline) scenarios are mapped in section 3.3 of the Initial Options Appraisal.

The full DOE can be found in Stage 2 Summary Document Appendix A - Design Options Evolution (DOE) - V2.

4.4 Design Principle Criteria - Safety

<table>
<tr><td rowspan="2">Design Principle
S</td><td colspan="3">Safety

Our routes must be safe and must comply with industry standards and regulations.</td></tr>
<tr><td>Not met

When assessed in isolation, this option is designable however is not considered to be safe or to comply with industry standards and regulations.</td><td>Partial

When assessed in isolation, this option may be considered as safe, designable and meet with industry standards and regulations; however, additional safety mitigations or processes would be required.</td><td>Met

When assessed in isolation, this option is considered to be safe, designable and meet with industry standards and regulations, including PANS-OPS.</td></tr>
<tr><td>Evaluation assessment summary</td><td colspan="3">In order to deliver a high level of safety, all of the design options have been developed by UK CAA approved Instrument Flight Procedure designers. All our new or amended options have been designed to ICAO PANS-OPS criteria and therefore fulfil the regulatory requirements. As a result, each design option has initially been assumed to be safe, although as the process moves forward and further safety analysis is carried out (at Stage 3), some will present a better or poorer fit against this design principle. These options may require additional procedures or processes to be implemented to ensure that they fulfil the criteria of being ‘safe’.

For the purposes of this DPE, each option has been assessed in isolation. As part of Stage 3, Consult, the CAP1616 process requires route design options to be grouped together - for example, a suite of arrivals with a suite of departures. This may identify other hazards not considered at this stage, that may lead to options being rejected, or other mitigations being introduced. Our proposal to consider any such scenario is set out in section 30, Next Steps, of this DPE.

The primary means to provide safety assurance evidence, to support the introduction of the new procedures is a Safety Case. The Safety Case will be developed in accordance with the guidance provided in the CAA’s Guidance on the Conduct of Hazard Identification, Risk Assessment and the Production of Safety Cases (CAP760) as mandated in the Manchester Airport Safety Management Process and aligned to the CAP1616 process.

The first step in the development of the Safety Case was a Hazard Identification (HazID) held with relevant aviation stakeholders, including local and enroute ATC and airlines. This identified the safety requirements at an early stage of the design process, and it has been used to support early qualitative analysis of the design options. As the process moves forwards, a more quantitative methodology will be adopted using the Safety Case approach. This will initially evaluate routes in isolation but ultimately will evaluate combinations (families) of routes as a system.</td></tr>
</table>

Summary of evaluation	Each option has been assessed to ensure that it satisfies the Design Principle Safety. There will be further assessments conducted at a later stage of the ACP, see section 30, Next Steps, when we will consider whether combinations of routes still satisfy this design principle.

4.5 Design Principle Criteria - Policy

Design Principle P	Policy Any change must accord with the CAA's AMS. Any airspace change must also allow connection to the wider UK en route network and be aligned with the Future Airspace Strategy Implementation for the North (FASI-N) programme and take into consideration the needs of other airports.		
	Not met When assessed in isolation, the option does not meet the ends of the AMS. For the purpose of the DPE, an option will not meet the environmental ends of the AMS if it is expected to increase the population affected by noise both between 0ft and 4,000ft and 0ft and 7,000ft, as well as having a longer track length (and therefore assumed greater emissions) than the relevant 'do nothing' scenario. Increase is defined as being greater than 110% of the 'do nothing' value for the respective metric.	**Partial** Assessed in isolation, the option is considered likely to be consistent with some of the ends of the AMS. For the purpose of the DPE, an option will partially meet the environmental ends of the AMS if it is expected to reduce or limit the impact of no more than two of the following metrics: the population affected by noise between 0ft and 4,000ft; the population affected by noise between 0ft and 7,000ft; track length (and therefore assumed emissions) compared to the relevant 'do nothing' scenario. Limit is defined as being within plus or minus 10% of the 'do nothing' value for the respective metric. Reduce is defined as being less than 90% of the 'do nothing' value for the respective metric.	**Met** Assessed in isolation, this options accords with the ends of the AMS. For the purpose of the DPE, an option will meet the environmental ends of the AMS if it is expected to reduce or limit the population affected by noise both between 0ft and 4,000ft and 0ft and 7,000ft, as well as reducing the track length (and therefore assumed lesser emissions) than the relevant 'do nothing' scenario. Limit is defined as being within plus or minus 10% of the 'do nothing' value for the respective metric. Reduce is defined as being less than 90% of the 'do nothing' value for the respective metric.
Evaluation assessment summary	The CAA's AMS (CAP1711) sets out the 'Ends' that airspace modernisation must deliver to achieve the Government's objectives in relation to airspace modernisation. These ends cover six broad headings, of which MAN notes the following. • **Safety: maintaining a high standard of safety has priority over all other ends to be achieved by airspace modernisation.**		

	This highlights the priority that safety has in airspace change. However, in addition to the consideration of Safety within this design principle, MAN also have a stand-alone Design Principle Safety. Rather than considering safety twice, the approach that has been taken is to consider Safety in its own right as one of the 'must have' design principles. This ensured there was a clear focus on safety as the highest priority and that the risk of a "double evaluation", which may have caused confusion for stakeholders, was removed.
	
	This approach was initially applied within the DOR Viability filter and to ensure consistency, was also applied throughout the analysis within this DPE. As a result, Safety was not considered within the Design Principle Policy assessment, but as part of the Design Principle Safety assessment.
	
	• Efficiency: consistent with the safe operation of aircraft, airspace modernisation should secure the most efficient use of airspace and the expeditious flow of traffic. The provision of runway throughput to make best use of the capacity of the runways at MAN is captured within the "must have" Design Principle Capacity. Therefore, the consideration of the Efficiency end within this DPE focused on the potential for design options to:
	  • Align to the routes to and from adjacent airports or
	  • Align with the traffic flows within the wider NATS network and the airspace being developed within the FASI-N programme.
	
	• Integration: airspace modernisation should satisfy the requirements of operators and owners of all classes of aircraft across the commercial, General Aviation and military sectors. The AMS calls for a transition towards greater integration of air traffic including GA and the military. It should facilitate the greatest possible access to all users and seek to use of the minimum volume of controlled airspace consistent with safe and efficient air traffic operations.
	
	• Environmental performance: the interests of all stakeholders affected by the use of airspace should be taken into account when it is modernised, in line with guidance provided by the Government on environmental objectives, the Air Navigation Guidance 2017 (ANG), which sets out how carbon emissions, air quality and noise should be considered. This covers the creation of options that offer more efficient, shorter and cost-effective flightpaths, and options that seek to reduce noise impact in line with the Altitude Based Priorities within the ANG.
	
	Reducing carbon emissions was evaluated by identifying routes that had the shortest track length in relation to their joining or leaving point with the upper airspace network, resulting in lower fuel burn and emissions. Reducing noise impact was evaluated through the use of overflight analysis to identify the total population overflown in line with the criteria within the 'Altitude based priorities' within the ANG.
	
	• Defence and security: airspace modernisation should facilitate the integrated operation of air traffic services provided by or on behalf of the armed forces and take account of the interests of national security.

This recognises the changing requirements of the military in terms of their use of airspace. Misalignment to this end covered any option that had potential to impact military operations by interacting with existing military airspace.

- International alignment: airspace modernisation should take account of any international recommended practices or obligations related to the UK's air navigation functions, such as those from ICAO and the EU.
  This was considered by evaluating whether options are aligned to PANS-OPS and the wider industry requirement to implement PBN.

Of the AMS ends above, Safety is considered within its own right as part of the 'must have' Design Principles. In addition, four of the remaining five AMS ends were not distinguishing factors, as follows:

- Efficiency: The potential for options to interact with the routes to and from adjacent airports or be misaligned with the traffic flows within the wider NATS network has already been qualitatively assessed within the Viability filter within the DOR. Clear misalignment (including the result of any trade off analysis) has resulted in options not being progressed, but further detailed evaluation in this respect is not possible until networks of routes are created in stage 3a.
- Integration: The Viability Filter in the DOR, section 5.14.2, also looked at the vertical and horizontal profile of options and whether they had the potential to reduce airspace access for GA users or may require additional CAS. Clear misalignment (including the result of any trade off analysis) has already resulted in options not being progressed but further detailed evaluation in this respect is not possible until networks of routes are created in stage 3a.
- Defence and Security: There is no existing military airspace with which any of our routes may conflict. All options therefore fully comply with this end.
- International alignment: The Viability filter within the initial design process, and as described in the DOR, ensures that all options are designed to PBN standards including PANS-OPS requirements for design. All options are therefore fully aligned to this end.

The evaluation against the AMS therefore focusses on **Environmental Performance**, including the altitude based priorities on noise within the Air Navigation Guidance.

In evaluating environmental performance it is acknowledged that there is potential for the most direct and fuel efficient route to overfly more people. Equally the route overflying the least number of people may take a less fuel efficient route. The AMS recognises this potential trade-off between noise and fuel burn which creates a clear differentiator between the benefits of design options within this evaluation. A quantitative analysis has therefore been undertaken to ascertain the potential noise impact and track length of each design option in section 4.8 and 4.7 respectively.

The design principle also requires options to be aligned with the Future Airspace Strategy Implementation for the North (FASI-N) programme which is the initiative to deliver the requirements of the AMS through the re-design of airspace in the north of the UK. These requirements will be considered within the further detailed evaluation of the Efficiency 'End' once networks of routes are created in stage 3a.

	FASI-N requires coordination between various airspace change sponsors. This coordination will be delivered through the masterplan of airspace changes prepared and delivered by the Airspace Change Organising Group (ACOG). Other airspace users/considerations will be covered through regular bilateral (or if required, trilateral) meetings with airports and NATS. These meetings may also be attended by ACOG to align the airport work with the airspace masterplan, and within these meetings, discussion points will include: • The operating concepts being applied, such as climb gradients, PBN standard and the use of systemisation. • An analysis of the design options that have been developed, and where conflicts may occur. These conflicts may be related to any of the design principles but resolution will be primarily driven by the Design Principle Safety. • Agreement on options to resolve conflicts. These conflict resolution discussions and decisions will be formally recorded by both the airports and ACOG and will be used to support final submissions to CAA to demonstrate where concessions have been made. Where a conflict cannot be resolved, the ACOG resolution process will be triggered. • The potential for cumulative impact issues to arise from the routes, and how these should be addressed in engagement material. In addition, ACOG have created the Technical Coordination Group which meets to discuss and resolve policy and technical issues affecting airspace design across all airports.
Summary of evaluation	Each design option has been assessed against the Design Principle Policy to ensure that it satisfies our requirement for all new or existing PBN design options to meet the requirements of the AMS. The focus of the evaluation has been on the Environmental Performance (noise and fuel burn) ends of the AMS as these are the ends that can be evaluated for isolated routes and provide differentiators between options. The DOR Viability Filter has already excluded options which have been identified as being clearly misaligned to the 'Ends' of the AMS in terms of efficiency, integration, defence and security and international alignment. It is not possible to assess all CAS demands based upon individual design options at this present time. These assessments will be conducted at Stage 3 of the ACP process when further consideration will be given to what extent combinations of routes as part of a system satisfy this design principle. See section 30 for Next Steps.

4.6 Design Principle Criteria - Capacity

<table>
<tr><td rowspan="2">Design Principle
C</td><td colspan="3">Capacity

Our future airspace must enable best use of the capacity of our existing runways, in line with government policy.</td></tr>
<tr><td>Not met

Assessed in isolation, this design option could be used operationally in conjunction with another runway, or as a single runway operation, but will not enable the best use of the capacity of our existing runways.</td><td>Partial

Assessed in isolation, this design option could be used operationally in conjunction with another runway, or as a single runway operation but best use of the capacity of our existing runways may not be fully attained due to ATC operational procedures or restrictions required to address interactions as a result of the runway configurations.</td><td>Met

Assessed in isolation, this design option could be used operationally in conjunction with another runway, or as a single runway operation to enable the best use of the capacity of our existing runways.</td></tr>
<tr><td>Evaluation assessment summary</td><td colspan="3">The UK travel industry has been impacted by the global pandemic, but traffic levels are expected to fully recover. In the long term, demand at MAN is expected to continue to grow in line with Government policy and as supported by the Manchester Core Strategy.

This passenger demand also drives the number of aircraft using the airport, and this is constrained by the capacity of the terminal buildings, the taxiway infrastructure, the runways and the airspace.

As one of the elements impacting capacity, and in line with the words of this design principle, the chosen airspace solution must therefore enable the best use of existing runway capacity at Manchester Airport throughout a 24-hour period, as opposed to occasional peaks.

To achieve this will require departure routes that operate effectively as a system and in conjunction with other routes in directional peer groups. However, because at this stage this design principle is looking at individual routes (rather than the system) the analysis looks at the potential ability of the route to contribute to the achievement of a consistent movement rate against largely external factors.

The analysis therefore assesses the ability of the route to operate:
• Independently from the airborne holds, arrival routes and departure routes of adjacent airports.
• Independently from the arrival structure or arrival design options for MAN.
• To support optimal departure splits of no more than one minute which is the current CAA minimum.
• Arrivals and departures in compliance with comply with current ATC published operating procedures and/or safety restrictions to ensure that runway utilisation is maximised.</td></tr>
</table>

	If a route is not able to operate in accordance with any of the above, restrictions (typically in the form of departure flow rates) may be imposed by ATC, resulting in a reduced hourly runway capacity and a failure to meet the Design Principle Capacity.
Summary of evaluation	Each design option has been assessed against the Design Principle Capacity to ensure that it satisfies the requirement for all new design options to ensure that the airport can continue to meet its utilisation of aircraft numbers in accordance with current forecasts. There will be further assessments conducted at Stage 3 of the CAP1616 process that will consider if combinations of routes still satisfy this design principle. See section 30 for Next Steps.

4.7 Design Principle Criteria - Emissions

<table>
<tr><td rowspan="2">Design Principle
E</td><td colspan="3">Emissions

We will minimise and where possible reduce, emissions when we design routes. This may be achieved by selecting the most direct routes.</td></tr>
<tr><td>Not met

When assessed in isolation, this option performs worse than the ‘do nothing’ scenario with respect to track distance flown.</td><td>Partial

When assessed in isolation, this option performs similar (+/- 10%) to the ‘do nothing’ scenario with respect to track distance flown.</td><td>Met

When assessed in isolation, this option performs better than the ‘do nothing’ scenario with respect to track distance flown.</td></tr>
<tr><td>Evaluation assessment summary</td><td colspan="3">Each design option has been evaluated in terms of track distance flown, as a proxy for fuel burn/emissions generated. From the quantitative analysis made in the assessment of track distance flown, the track length has been rounded to the nearest 1,000m.

Existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy on the basis that the shorter the track mileage, the less greenhouse gases are emitted.</td></tr>
<tr><td>Summary of evaluation</td><td colspan="3">Each design option has been assessed against the Design Principle Emissions to ensure that track distance flown will be minimised or wherever possible reduced.

Further assessments will be conducted at a later stage of the ACP process that will consider if combining routes still satisfies this design principle. See section 30, Next Steps.</td></tr>
</table>

4.8 Design Principle Criteria - Noise N1

<table>
<tr><td rowspan="2">Design Principle
N1</td><td colspan="3">Noise

Our route designs should seek to minimise, and where possible reduce, the number of people affected by noise from our flights.</td></tr>
<tr><td>Not met

The estimated total future population overflown up to both 4,000ft and 7,000ft is increased when compared to the to the ‘do nothing’ scenario.

Increase is defined as being greater than 110% of the ‘do nothing’ value for the respective metric.</td><td>Partial

The estimate of total future population overflown up to either 4,000ft or 7,000ft is similar (+/- 10%) to the ‘do nothing’ scenario.</td><td>Met

The estimated total future population overflown up to both 4,000ft and 7,000ft is reduced when compared to the to the ‘do nothing’ scenario.

Reduce is defined as being less than 90% of the ‘do nothing’ value for the respective metric.</td></tr>
<tr><td>Evaluation assessment summary</td><td colspan="3">The CAA’s Airspace Change guidance (CAP1616) requires sponsors to assess the potential noise impact of any proposal being put forward, using a range of indicators. The level of assessment expected varies according to the scale of the change options being proposed and the stage of the change process that has been reached.

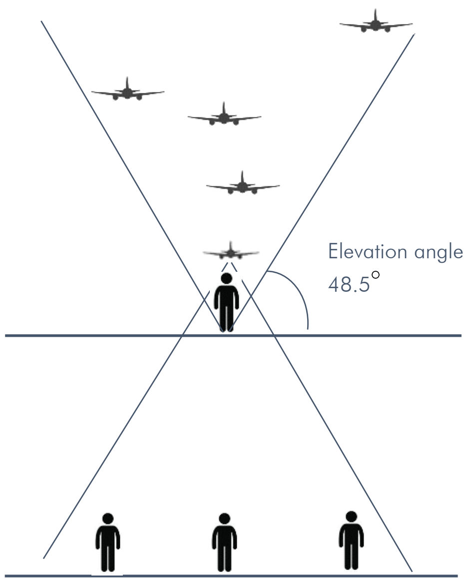
At this stage (Stage 2) in the ACP - the number of options to be assessed is significant and the level of refinement immature. CAP1616 therefore does not require the change sponsor to go into a full level of detail for every option on the ‘comprehensive list’. Instead, the scale of assessment should be proportionate, and the appraisal must as a minimum, contain qualitative assessments of the different options.

It is recognised however, that in assessing the comprehensive list, such a qualitative approach may not always adequately reflect the extent to which an option reflects the design principles. Therefore, the following quantitative assessment has been carried out on all the design options and these have been compared against that of a ‘do nothing’ scenario.

For stakeholder engagement purposes, L_{Aeq} contours remain the ‘primary’ indicator. The contours show a set of closed lines on a map – each contour shows places where people get the same amount of noise from aircraft, measured as an energy average (L_{Aeq}). However, there is a recognition that local communities situated outside these ‘standard’ contours, may still be adversely affected by passing aircraft. To represent people and communities affected in this way, a metric to quantify ‘overflight’ both inside and outside standard noise contours – up to a height of 7,000ft – has been produced by the CAA – Definition of overflight (CAP1498).

CAP1498 recognises that an aircraft does not have to pass directly overhead, to be considered an overflight. Instead, overflight should be defined to include aircraft that pass over and to the side of an observer. The distance that an aircraft can be to the side and still considered an overflight is set using an elevation angle. An aircraft flying directly</td></tr>
</table>

overhead would be at an elevation angle of 90°. An aircraft on the ground would be at an elevation angle of 0°.



CAP1616 recommends the use of 48.5° as an elevation angle. This is because for an aircraft to give a noise level approximately 3dB lower than if it had flown directly overhead, it would need to be at an elevation angle of 48.5°. 3dB is widely accepted as the smallest difference between two noise levels that the average person can perceive.

Alternatively, by looking at this from an aircraft's perspective, all locations within the cone are 'overflown'

*In this stage of evaluation, the overflight analysis provides an estimate for the total number of people overflown by taking into consideration:
- The number of households currently overflown.*
- The population currently overflown.**
- Known planned property developments at the time of undertaking the evaluation.***
- The number of proposed dwellings associated with the above developments.

*Provided by OS AddressBase
**Population figures based on CACI database using 2021 census.
*** Data was collated by CBRE on five-year housing plans. See "Future Housing Sites" in the Glossary for more information.

In order to estimate the future potential population:
- Divide the current population identified by the number of existing households; this gives an average population per household for each design option.
- Multiply the number of proposed dwellings by the average population per household for each design option.
- The sum of the existing population and the future potential population to get an estimate for the total number of people overflown.

From the quantitative analysis, the population count has been rounded to the nearest 100, households and planned property developments to the nearest 50.

Departures baseline - 'do nothing'

	The baseline 'do nothing' scenario reflects the present-day situation at MAN. Currently, departing aircraft are required to follow their planned SID until reaching a published release height, at which point they may be vectored away from the SID by ATC. The actual release height varies (dependent upon the SID) but in practice, is either 3,000ft, 4,000ft or 5,000ft. A consequence of such tactical vectoring by ATC, is that - since those aircraft are no longer flying a prescribed path – the tracks over the ground are less concentrated and far more widely spread. To estimate the size of the population affected by noise from departures, a modal average path* has been created for each of the existing SIDs and this has been assessed against the above overflight definition both to a height of 4,000ft, reflecting the point at which an aircraft flying the route is unlikely to result in noise exposure above the Lowest Observed Adverse Effect Level (LOAELs) and to 7,000ft, the height up to which MAN are responsible for the route design. Further, to ensure that the impact of aircraft that have been vectored away from the SID has also been captured, the actual spread of tracks (to a height 7,000ft) has been mapped. This was used to estimate the area and affected population beneath those tracks. * A single line that delineates those locations on the ground that have experienced the greatest number of overflights) for each of the current SIDs, during a given period (summer 2019). The modal average paths depict the line over the ground, most commonly followed by aircraft flying a particular route. Departures Design Options The centreline of each individual design option, (from our comprehensive list) has been taken and assessed against the above overflight definition. This has been done both to a height of 4,000ft, reflecting the point at which an aircraft flying the route is unlikely to result in noise exposure above the LOAELs, and to 7,000ft, the height up to which MAN is responsible for the route design. Arrivals baseline - 'do nothing' Currently arriving aircraft are tactically vectored by ATC from the airborne holding stacks in a sequence. This sequencing enables the most efficient spacing between arrivals on final approach. To estimate the size of the population affected by noise from arrivals, modal average path(s) have been created that reflect the typical concentrations of aircraft over the ground. Recognising, however, that this approach may not always fully capture the current picture – aircraft may be vectored over a much wider area, where there is little or no evidence of a common path. To take account of this, the actual spread of tracks (from a height of 7,000ft) has been mapped. This was used to estimate the area and affected population beneath those tracks. Arrivals Design Options The centreline of each individual design option, (from our comprehensive list) has been taken and assessed against the above overflight definition. This has been done both from a height of 4,000ft, reflecting the point at which an aircraft flying the route is unlikely to result in noise exposure above the LOAELs, and from 7,000ft, the height from which MAN is responsible for the route design.

	It is important to remember that, at this stage, the 'overflight' assessment is simply a mechanism to set out how each design option has responded to the design principles, in terms of populations overflown – it does not illustrate noise impacts.
Summary of evaluation	Each design option has been assessed against the Design Principle Noise N1 to ensure that it satisfies the requirement for all new design options to ensure that MAN satisfies the requirement to seek to minimise the number of people overflown There will be further assessments conducted at Stage 3 of the ACP process that will consider if combinations of routes still satisfy this design principle. See section 30 for Next Steps.

4.9 Design Principle Criteria - Noise N2

Design Principle N2	Noise N2 Where practical, noise effects should be shared. The use of dispersion and/or respite, especially at night, will be considered to achieve this.		
	Not met N/A	**Partial** N/A	**Met** At this stage, when considering individual design options in isolation, it is not possible to evaluate against this design principle. It has therefore been assumed that all options could be used as part of a network. Performance against this design principle will be assessed further at Stage 3. See section 30, Next Steps.

Evaluation assessment summary

The CAA's AMS (CAP 1711) sets out detailed initiatives that the aviation industry must deliver to achieve the Government's objectives in relation to airspace modernisation. CAP1711 details the outcomes that airspace modernisation must bring, under six broad headings:

- Safety
- Efficiency
- Integration
- Environmental performance:
- Defence and security
- International alignment:

In relation to environmental performance, CAP1711 states that the interests of all stakeholders affected by the use of airspace, should be taken into account when it is modernised. In line with guidance provided by the Government on environmental objectives, the Air Navigation Guidance 2017, sets out how carbon emissions, air quality and noise should be considered. This includes the consideration of more efficient, shorter and cost-effective flightpaths, enabling CCO and CDA, the re-design of arrival and departure routes allowing for noise impacts to be redistributed away from more noise sensitive areas and the introduction of respite (routes).

CAP1616 defines respite as 'Planned and notified periods where overflight or noise impact are reduced or halted to allow communities undisturbed time.'

CAP1616 expands upon the topic stating that - if multiple routes are considered in order to provide respite, then it is vital that the views of local communities and stakeholders are taken into consideration when deciding what might constitute a sufficient period of respite.

At this (Step 2A) point in the airspace change process, when considering individual design options, it has not been possible to assess an ability to deliver 'respite' - this will only

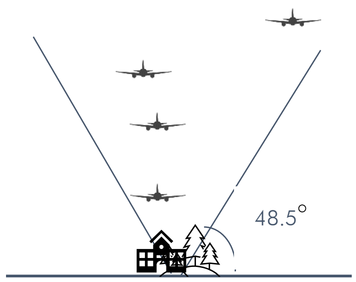
	become possible when the design options have been grouped into dependent networks. Therefore, no route will be excluded at this stage, on the basis of respite – all will pass, and the issue will be considered more fully later in the process when the design options are grouped into dependent networks. As described at sections [3, 4, 5 and 6] of the SER, MAN have engaged with local communities and other stakeholders to understand how respite and relief could be used to best effect.
Summary of Evaluation	As stated, there will be further assessments conducted at a later stage of the ACP, see section 30, Next Steps, when we will consider whether combinations of routes still satisfy this design principle.

4.10 Design Principle Criteria - Noise N3

Design Principle N3	Noise N3 Where practical, our route designs should avoid, or limit effects upon, noise sensitive areas. These may include cultural or historic assets, tranquil or rural areas, sites of care or education.		
	Not met The estimated number of noise sensitive areas overflown up to 4,000ft **and** 7,000ft is considered to be greater than the 'do nothing' scenario. Greater is defined as being greater than 110% of the 'do nothing' value for the respective metric.	**Partial** The estimated number of noise sensitive areas overflown up to 4,000ft **or** 7,000ft is less than or similar to (+/- 10%) the 'do nothing' scenario.	**Met** The number of noise sensitive areas overflown up to both 4,000ft **and** 7,000ft is less than or equal to the 'do nothing' scenario. Less than is defined as being less than 90% of the 'do nothing' value for the respective metric.

Evaluation assessment summary

We have applied the same overflight tool used in Design Principle Noise N1, to estimate the impact upon noise sensitive areas.



CAP 1616 recommends the use of 48.5° as an elevation angle. This is because for an aircraft to give a noise level approximately 3dB lower than if it had flown directly overhead, it would need to be at an elevation angle of 48.5°. 3dB is widely accepted as the smallest difference between two noise levels that the average person can perceive.

Alternatively, by looking at this from an aircraft's perspective, all buildings and locations within the cone are 'overflown'.

In this stage of evaluation, the overflight analysis will provide an estimate for the total number of noise sensitive areas overflown by taking into consideration:

- Educational facilities*
- Medical facilities*
- Places of Worship*

*Provided by OS AddressBase

Following the stakeholder engagement phases, no additional areas were accounted for in this evaluation. This includes cultural or historic assets, tranquil or rural areas. In the IOA, Tranquillity will be analysed and is detailed in section 2.6.5 of the Initial Options Appraisal.

	Departures baseline - 'do nothing' The baseline 'do nothing' scenario reflects the present-day situation, at MAN. Currently, departing aircraft are required to follow their planned SID until reaching a published release height, at which point they may be vectored away from the SID by ATC. The actual release height varies (dependent upon the SID) but in practice, is either 3,000ft, 4,000ft or 5,000ft. A consequence of such tactical vectoring by ATC, is that - since those aircraft are no longer flying a prescribed path – the tracks over the ground are less concentrated and far more widely spread. To estimate the size of the population affected by noise from departures, a modal average path* has been created for each of the existing SIDs and it has been assessed against the above overflight definition both to a height of 4,000ft, reflecting the point at which an aircraft flying the route is unlikely to result in noise exposure above the LOAELs, and to 7,000ft, the height up to which MAN are responsible for the route design. Further, to ensure that the impact of aircraft that have been vectored away from the SID has been captured, the actual spread of tracks (to a height 7,000ft) has been mapped. This was used to estimate the area and affected population beneath those tracks. Departures Design Options The centreline of each individual design option, (from our comprehensive list) has been taken and assessed against the above overflight definition. Both to a height of 4,000ft, reflecting the point at which an aircraft flying the route is unlikely to result in noise exposure above the LOAELs, and to 7,000ft, the height up to which MAN are responsible for the route design. Arrivals baseline - 'do nothing' Currently arriving aircraft are tactically vectored by ATC from the airborne holding stacks in a sequence. This sequencing enables the most efficient spacing between arrivals on final approach. Each individual viable design option, from our comprehensive list, has been taken and assessed against the above overflight definition. It is important to remember that, at this stage, this 'overflight' assessment is simply a mechanism to set out how each design option has responded to the design principles – it does not illustrate noise impacts.
Summary of evaluation	Each design option has been assessed against the Design Principle Noise N3 to ensure that it satisfies the requirement for all new design options to ensure that where practical, our route designs should avoid, or limit effects upon, noise sensitive areas. There will be further assessments conducted at Stage 3 of the ACP process that will consider if combinations of routes still satisfy this design principle. See section 30 for Next Steps.

4.11 Design Principle Criteria - Airspace

<table>
<tr><td rowspan="2">Design Principle
A</td><td colspan="3">Airspace

Our route designs should minimise the impacts on other airspace users by limiting Controlled Airspace.</td></tr>
<tr><td>Not met

The option is likely to require additional controlled airspace to provide containment in accordance with the CAA policy.</td><td>Partial

The option does not require additional controlled airspace but may require ATC intervention to resolve/deconflict the interactions with aircraft from other airports.</td><td>Met

The option does not require additional controlled airspace.</td></tr>
<tr><td>Evaluation assessment summary</td><td colspan="3">The CAA Controlled Airspace Containment Policy Statement (January 2014) sets out the minimum criteria applicable to containment of instrument flight procedures for airports already within CAS. Each option has been assessed against this policy statement to ensure that the minimum volume of airspace is used to contain the route within CAS. An assessment will also be made, at a during Stage 3 of the ACP process, as to whether it might be possible to reduce the current volume of CAS whilst still complying with the containment criteria.

In line with advice from the Secretary of State, the CAA has the power to review airspace classification. The classification of the airspace determines the flight rules that apply and the procedures that must be followed. The size and classification of the airspace around an airport is determined by the types of aircraft and the complexity of the route structure. Ultimately the establishment of controlled airspace is to provide a safe environment for passenger-carrying commercial aircraft.

In the vicinity of MAN, most airspace is classified as Class D (up to 3,500ft) and Class A above (forming part of the Manchester Terminal Manoeuvring Area [MTMA]), allowing operations to take place in a controlled environment but placing some restrictions on general aviation (or recreational flying). However, as changes are made to routes there is the possibility that some of the airspace may no longer be required to contain commercial aircraft and could be considered for re-classification as uncontrolled Class G airspace which could allow greater general aviation access.
Access to our airspace for the emergency services will always be given the highest priority. It is accepted that there may be disruptions to normal operations in order to accommodate access for Category A flights; the preservation of life is paramount.</td></tr>
<tr><td>Summary of evaluation</td><td colspan="3">Each option has been assessed to evaluate whether the design option is likely to alter the arrangements for controlled airspace at MAN. However, the full containment assessment will be undertaken at a later stage in the process, at that point therefore this initial evaluation may need to be updated. Further details on this process are contained in the DOR, section 4.5.

There will be further assessments conducted at a later stage of the ACP, see section 30, Next Steps, that will consider whether this initial assessment remains valid when considering combinations of routes.</td></tr>
</table>

4.12 Design Principle Criteria - Technology

<table>
<tr><td rowspan="2">Design Principle
T</td><td colspan="3">Technology

Our route designs should be based on the latest aircraft navigational technology widely available.</td></tr>
<tr><td>Not met

Assessed in isolation, this design option does not utilise latest aircraft technology and is not PBN compliant.</td><td>Partial

Assessed in isolation, this design option utilises latest aircraft technology and may not be PBN compliant.

Further work may be required to confirm that the route is flyable and/or it meets with route design rules.</td><td>Met

Assessed in isolation, this design option has been designed to utilise latest aircraft technology and is PBN compliant.</td></tr>
<tr><td>Evaluation assessment summary</td><td colspan="3">Aircraft taking off from or landing at MAN currently do so flying ‘conventional’ departure and arrival routes. Conventional routes use a network of ground-based DVOR navigation aids to provide guidance to aircraft on departure and arrival. However, this technology is becoming obsolete, and these DVORs are gradually being withdrawn from service. As a result, in the future, all guidance will be provided via satellites to on-board aircraft systems. This is known as Performance Based Navigation (PBN).

In its AMS (CAP1711), the CAA set out detailed initiatives that the aviation industry must deliver to achieve the Government’s objectives in relation to airspace modernisation. The strategy describes the outcomes that airspace modernisation must bring, under six broad headings: safety; efficiency; integration; environmental performance; defence and security and international alignment. Of these groups, ‘efficiency’ talks, in particular about the “removal of dependence upon ground-based navigation beacons.”

CAP1711 summarises the requirement by stating that modernisation in airspace at lower altitudes (up to 7,000ft), must deliver precision routes, separated by design – PBN.

PBN technology enables aircraft to fly along pre-determined flightpaths (including departure and arrival routes) more accurately and results in less dispersed tracks than those based on ground-based systems. However, to provide flexibility across aviation there are a range of PBN specifications that can be used, some of which result in greater accuracy of track keeping than others.

To understand which of those PBN specifications the aircraft operating into MAN are able to use, an airline fleet equipage survey was conducted, as detailed further in section 5.6 of the DOR. This survey confirmed that all commercial flights can operate to a specification known as RNAV1, with 97% capable of using the more advanced RNP1 specification. Our design options are therefore being designed to both of these standards.</td></tr>
</table>

Summary of Evaluation	Each option has been assessed against the above criteria to ensure that it satisfies the Design Principle Technology that design options should be designed to make use of the latest widely available aircraft navigation technology. Assessments will be conducted at Stage 3 of the ACP process that will consider to what extent design options satisfy this design principle. See section 30, Next Steps.

5 Standard Instrument Departures - Evaluation

6 Runways 05L/05R North

6.1 Runways 05L/05R North Option 1

Design Principle Evaluation	Option No: 1
Option Name: SID RW 05L NORTH Option 1	ACCEPT
Option Name: SID RW 05R NORTH Option 1	ACCEPT

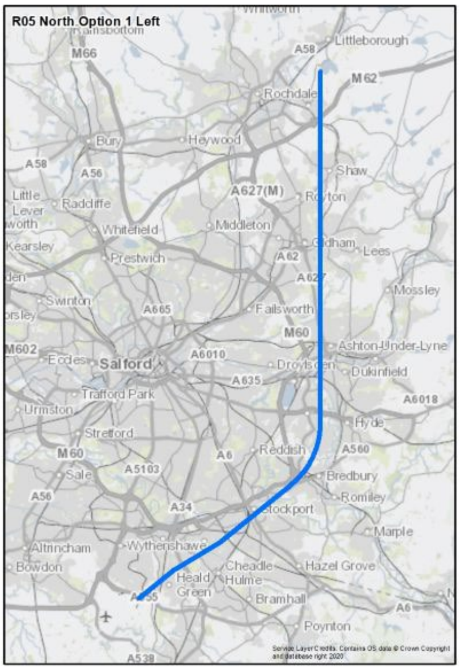
Option Description:

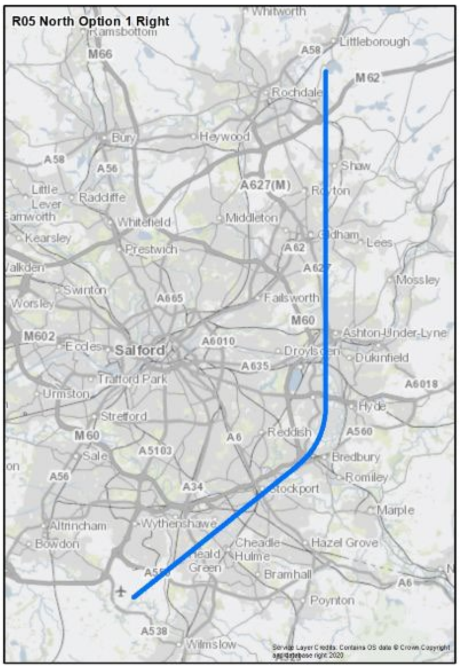
Option 1 is an RNAV1 *replication of the current departure to POL and uses fly-by waypoints to create a replication of the existing conventional POL 4S/1Z departure.*

As a replicated route it follows a similar track over the ground as the current published departure. The routes combine shortly after departure and fly straight ahead overflying Stockport where they commence a left turn to the north. This takes the routes west of Ashton-under-Lyne and close to Oldham and they terminate at 7,000ft to the east of Rochdale.

The design speed will permit a large number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply. Due to the track-to-fix coding and simplicity of the route, dispersion is likely to be low even with maximum speeds.





	05L	MET

Design Principle **Safety**	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide a RNAV1 replication of the current route. When assessed in isolation, both routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1 L is estimated to limit the total population affected by noise.
Option 1 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1 R is estimated to limit the total population affected by noise.
Option 1 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1 L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1 R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1 L is estimated to overfly approximately 36,750 households with an approximate population of 79,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 79,900.

Up to 7,000ft, option 1 L is estimated to overfly approximately 87,100 households with an approximate population of 206,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 213,600.

This is a similar population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1 R is estimated to overfly approximately 37,050 households with an approximate population of 80,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 80,700.

Up to 7,000ft, option 1 R is estimated to overfly approximately 91,100 households with an approximate population of 216,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 223,300.

This is a similar population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option1 L is estimated to overfly 180 noise sensitive areas.

Up to 7,000ft, this option1 L is estimated to overfly 425 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option1 R is estimated to overfly 195 noise sensitive areas.

Up to 7,000ft, this option1 R is estimated to overfly 450 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

6.2 Runways 05L/05R North Option 3

Design Principle Evaluation	Option No: 3
Option Name: SID RW 05L NORTH Option 3	REJECT
Option Name: SID RW 05R NORTH Option 3	REJECT

Option Description:

This is an **RNAV1** option that provides an earlier turn to the north than option 1 to avoid direct overflight of Stockport. This turn point is approximately half the distance when compared to option 1 and has been created to ensure safe separation from west and south-west options from Runway 05.

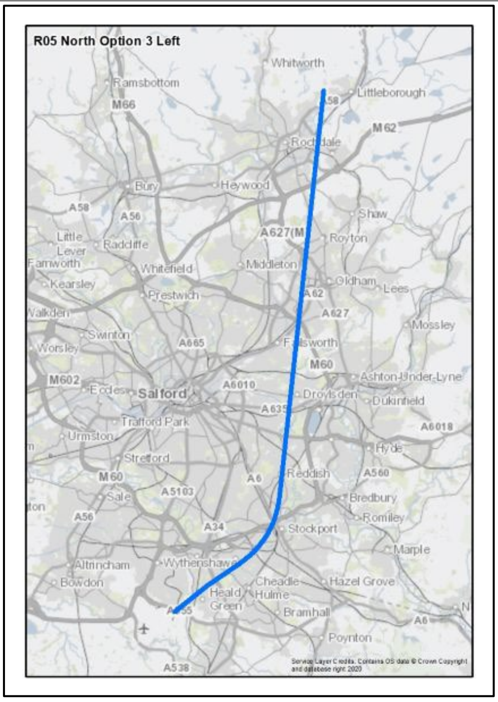
The option has a direct routing to the north following the initial turn, which due to the track-to-fix coding and a fly-by waypoint, would result in repeatable ground tracks and a low level of dispersal.

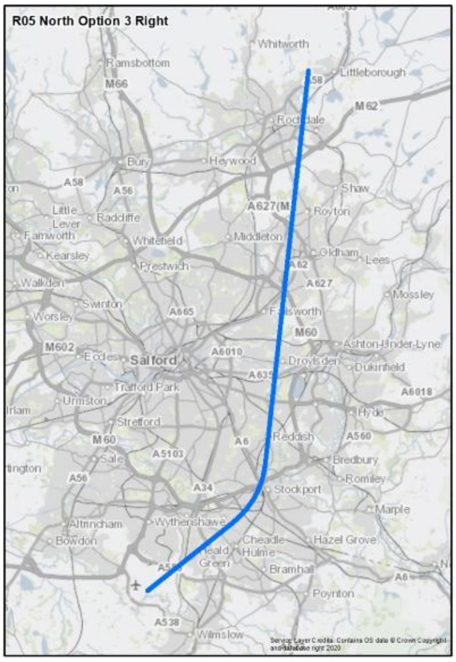
The design speed will permit a large number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

The route has been designed using fly-by waypoints.

- **05L**: After departure this route flies straight ahead and commences a left turn just to the west of Stockport, at which point it combines with the option for 05R. The routes continue north, flying to the west of Audenshaw reservoir, Ashton-under-Lyne and Oldham and terminate at 7,000ft just to the east of Rochdale.
- **05R**: After departure this route flies straight ahead and commences a left turn north just to the west of Stockport, at which point it combines with the option for 05L. The routes continue north, flying to the west of Audenshaw reservoir, Ashton-under-Lyne and Oldham and terminate at 7,000ft just to the east of Rochdale.

There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3 L is estimated to increase the total population affected by noise.
Option 3 L is similar in length and it is anticipated that emissions would be
limited.
At this stage of the process, option 3 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 3 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3 R is estimated to increase the total population affected by noise.
Option 3 R is similar in length and it is anticipated that emissions would be
limited.
At this stage of the process, option 3 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 3 L is 38km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 3 R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 3 L is estimated to overfly approximately 40,900 households with an approximate population of 93,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 95,000.

Up to 7,000ft, option 3 L is estimated to overfly approximately 94,950 households with an approximate population of 232,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 239,200.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 3 R is estimated to overfly approximately 42,450 households with an approximate population of 96,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 97,500.

Up to 7,000ft, option 3 R is estimated to overfly approximately 99,500 households with an approximate population of 242,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 249,700.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	NOT MET
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 3 L is estimated to overfly 205 noise sensitive areas.

Up to 7,000ft, this option 3 L is estimated to overfly 485 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 3 R is estimated to overfly 210 noise sensitive areas.

Up to 7,000ft, this option 3 R is estimated to overfly 510 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

6.3 Runways 05L/05R North Option 4

Design Principle Evaluation	Option No: 4
Option Name: SID RW 05L NORTH Option 4	ACCEPT
Option Name: SID RW 05R NORTH Option 4	ACCEPT

Option Description:
This is an **RNAV1** option that has a turn mid-way between options 1 and 3. It has been created in line with the Design Principle Noise N1 by following the course of the M60 motorway which already generates a level of ambient noise.

This option has a direct routing to the north following the initial turn, which due to the track-to-fix coding and a fly-by waypoint, would result in repeatable ground tracks and a low level of dispersal.

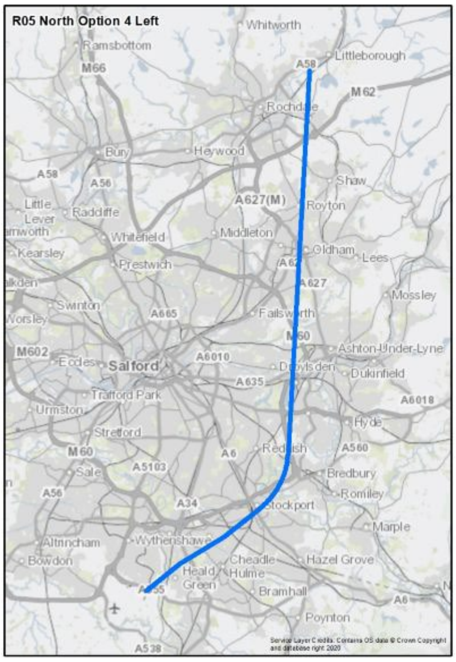
The design speed will permit a large number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

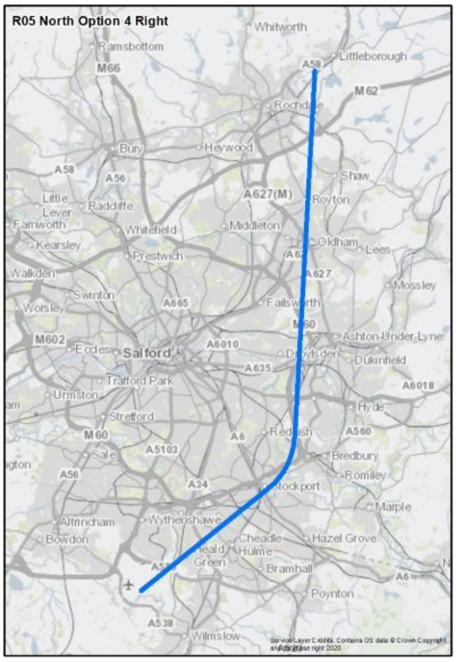
The route has been designed using fly-by waypoints.

- **05L**: After departure, this route combines with the option for 05R and flies straight ahead and commences a left turn just to the east of Stockport. It continues north, broadly following the route of the M60 motorway which takes it over Audenshaw reservoir and west of Ashton-under-Lyne. It passes overhead Oldham and terminates at 7,000ft just to the east of Rochdale.

- **05R**: After departure, this route combines with the option for 05L and flies straight ahead overflying Heald Green and commences a left turn just to the east of Stockport. It continues north, broadly following the route of the M60 motorway which takes it over Audenshaw reservoir and west of Ashton-under-Lyne. It passes overhead Oldham and terminates at 7,000ft just to the east of Rochdale

There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply. Due to the track-to-fix coding however, and simplicity of the route, dispersion is likely to be low even with maximum speeds.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4 L is estimated to limit the total population affected by noise.
Option 4 L is similar in length and it is anticipated that emissions would be
limited.
At this stage of the process, option 4 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4 R is estimated to limit the total population affected by noise.
Option 4 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4 R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4 L is estimated to overfly approximately 24,900 households with an approximate population of 55,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 55,800.

Up to 7,000ft, option 4 L is estimated to overfly approximately 84,550 households with an approximate population of 208,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 213,200.

This is a similar population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 4 R is estimated to overfly approximately 27,650 households with an approximate population of 61,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 61,400.

Up to 7,000ft, option 4 R is estimated to overfly approximately 88,850 households with an approximate population of 218,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 223,200.

This is a similar population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4 L is estimated to overfly 120 noise sensitive areas.

Up to 7,000ft, this option 4 L is estimated to overfly 435 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4 R is estimated to overfly 135 noise sensitive areas.

Up to 7,000ft, this option 4 R is estimated to overfly 455 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

6.4 Runways 05L/05R North Summary

	Option 1L	Option 3L	Option 4L
S	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET
E	PARTIAL	PARTIAL	PARTIAL
N1	PARTIAL	NOT MET	PARTIAL
N2	MET	MET	MET
N3	PARTIAL	NOT MET	PARTIAL
A	MET	MET	MET
T	MET	MET	MET
	Do Minimum (Replication)	Rejected	Best

	Option 1R	Option 3R	Option 4R
S	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	PARTIAL	PARTIAL
N1	PARTIAL	NOT MET	PARTIAL
N2	MET	MET	MET
N3	PARTIAL	PARTIAL	MET
A	MET	MET	MET
T	MET	MET	MET
	Do Minimum (Replication)	Rejected	Best

6.5 Runways 05L/05R North Viable but Poor Fit Options

Option	Safety	Policy	Capacity
A2 Early left turn	S	P	C
Originally designed as Option 2, this was considered to provide an early turn and a more direct route to POL. The route was designed as an RNAV 1 route using fly-over waypoints. Capacity: This option would interact with the Runway 05 West and South-west departure design envelopes and Runway 05 arrivals from the north. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			
B5 Straight ahead then gradual left turn north	S	P	C
After departure from Runways 05L/05R, aircraft would continue straight ahead to beyond Stockport before gradually turning left towards the north, towards the SID aiming point. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic east before turning it north leading to increased fuel burn and emissions. The trade-off assessment between emissions and noise, did not identify a material noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation. Capacity: This option would take the same track as most departure options in the Runway 05 East departure design envelope which would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			
C6 Left Wraparound	S	P	C
After departure from Runways 05L/05R, aircraft would make a left-hand turn, fly around the airport, through the overhead and then begin heading north towards the SID aiming point. Safety: This option is expected to interact with the Runway 05R Missed Approach Procedure (MAP). Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic south and east before turning it north leading to increased fuel burn and emissions. The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			

Capacity: This option would interact with the Runway 05 South departure design envelope and Runway 05 arrivals from the north. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			
D7 Right Wraparound	S	P	C
After departure from Runways 05L/05R, aircraft would make a right-hand turn, fly around the airport, through the overhead and then begin heading north towards the SID aiming point. Safety: This option is expected to conflict with the Runway 05R MAP. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic south and west before turning it north leading to increased fuel burn and emissions. The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation. Capacity: This option would interact with the Runway 05 South departure design envelope and Runway 05 arrivals from the south. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			

7 Runways 05L/05R East

7.1 Runways 05L/05R East Option 1

Design Principle Evaluation	Option No: 1
Option Name: SID RW 05L EAST Option 1	ACCEPT
Option Name: SID RW 05R EAST Option 1	ACCEPT

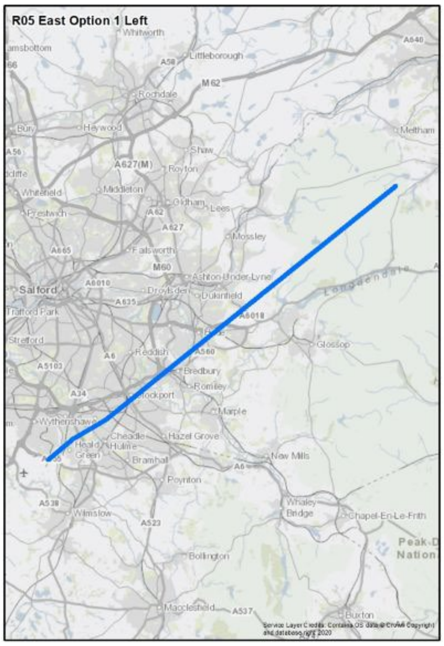
Option Description:

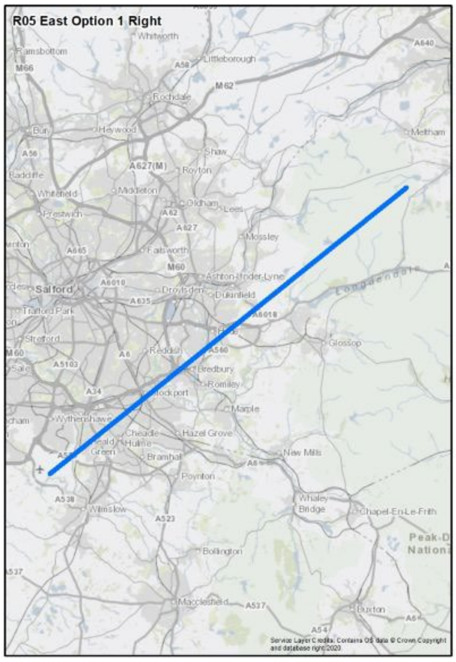
Option 1 is an RNAV1 replication of the current DESIG 1S/1Z SID and uses fly-over waypoints.

As a replicated route it follows a similar track over the ground as the current published route. After departure this takes it straight ahead on a runway heading in a straight line to 7,000ft. This takes it overhead Stockport and Hyde, and to the north of Glossop and it terminates south-west of Holmfirth.

There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply. This design speed will permit many aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

Due to the track-to-fix coding and simplicity of the route, dispersion is likely to be low even with maximum speeds.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide a RNAV1 replication of the current departure route to DESIG. When assessed in isolation, the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 1 L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 1 L is estimated to limit the total population affected by noise.
Option 1 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1 L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 1 R is estimated to limit the total population affected by noise.
Option 1 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1 R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1 L is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1 R is 44km (24nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 1 L is estimated to overfly approximately 25,950 households with an approximate population of 58,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 58,200.

Up to 7,000ft, option 1 L is estimated to overfly approximately 26,100 households with an approximate population of 58,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 58,600.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1 R is estimated to overfly approximately 28,850 households with an approximate population of 65,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 65,000.

Up to 7,000ft, option 1 R is estimated to overfly approximately 29,150 households with an approximate population of 65,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 65,700.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1 L is estimated to overfly 125 noise sensitive areas.

Up to 7,000ft, this option 1 L is estimated to overfly 125 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 1 R is estimated to overfly 150 noise sensitive areas.

Up to 7,000ft, this option 1 R is estimated to overfly 150 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and asmaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

7.2 Runways 05L/05R East Option 4

Design Principle Evaluation	Option No: 4
Option Name: SID RW 05L EAST Option 4	ACCEPT
Option Name: SID RW 05R EAST Option 4	ACCEPT

Option Description:

This is an **RNAV1** option to provide an initial route identical to the existing DESIG SID, but with an earlier turn towards the network joining point to the east. This has been done to align with current operational practice and routes it to the southern edge of route L975 in line with the NATS network traffic flow.

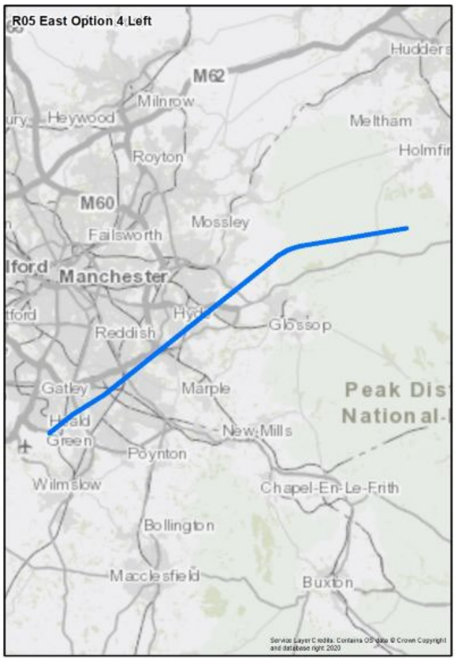
The design speed will permit many aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

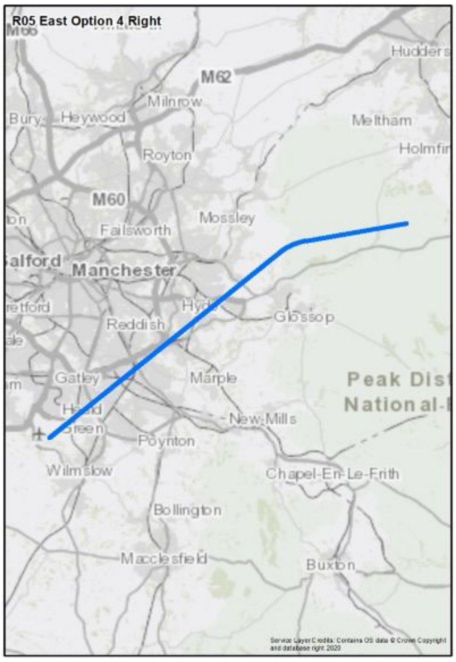
The route has been designed using fly-by waypoints.

05L: After departure this route combines with the option for 05R and flies straight ahead overflying Stockport and the southern edge of Hyde. It routes to the north-west of Glossop at which point it makes a right turn to route north of Glossop and terminates at 7,000ft just to the north and east of the Woodhead reservoir.

05R: After departure this route combines with the option for 05L and flies straight ahead overflying Stockport and the southern edge of Hyde. It routes to the north-west of Glossop at which point it makes a right turn to route north of Glossop and terminates at 7,000ft just to the north and east of the Woodhead reservoir.

There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 4 L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 4 L is estimated to limit the total population affected by noise.
Option 4 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4 L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 4 R is estimated to limit the total population affected by noise.
Option 4 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4 R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4 L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4 R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 4 L is estimated to overfly approximately 25,950 households with an approximate population of 58,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 58,200.

Up to 7,000ft, option 4 L is estimated to overfly approximately 25,950 households with an approximate population of 58,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 58,200.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 4 R is estimated to overfly approximately 28,850 households with an approximate population of 65,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 65,000.

Up to 7,000ft, option 4 R is estimated to overfly approximately 29,000 households with an approximate population of 65,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 65,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4 L is estimated to overfly 125 noise sensitive areas.

Up to 7,000ft, this option 4 L is estimated to overfly 125 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 4 R is estimated to overfly 150 noise sensitive areas.

Up to 7,000ft, this option 4 R is estimated to overfly 150 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and asmaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

7.3 Runways 05L/05R East Option 5

Design Principle Evaluation	Option No: 5
Option Name: SID RW 05L EAST Option 5	ACCEPT
Option Name: SID RW 05R EAST Option 5	ACCEPT

Option Description:
This is an **RNAV1** option which provides an initial 15° track adjustment from the runway heading before correcting back to the runway heading (parallel to the existing SID) before turning east north-east of Glossop and Hadfield. This track adjustment is intended to reduce the impact of noise for communities on the extended runway centreline that are also impacted by Runways 23R/23L arrivals.

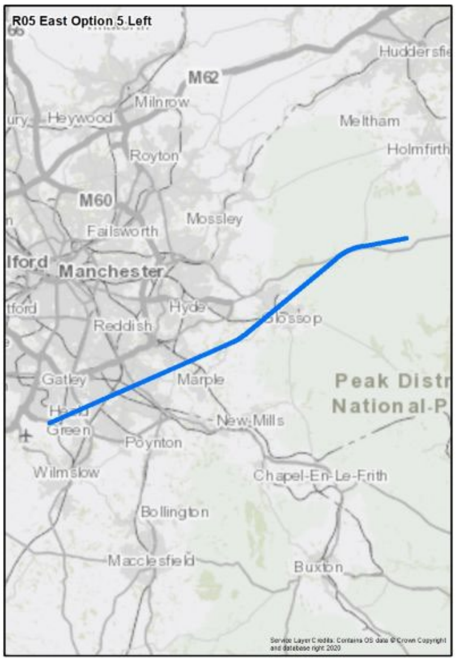
This 15° initial track adjustment from the extended centreline is to a width of 2.25nm parallel to the centreline. It extends to 9nm from the DER on Runway 05L and 8.5nm for Runway 05R.

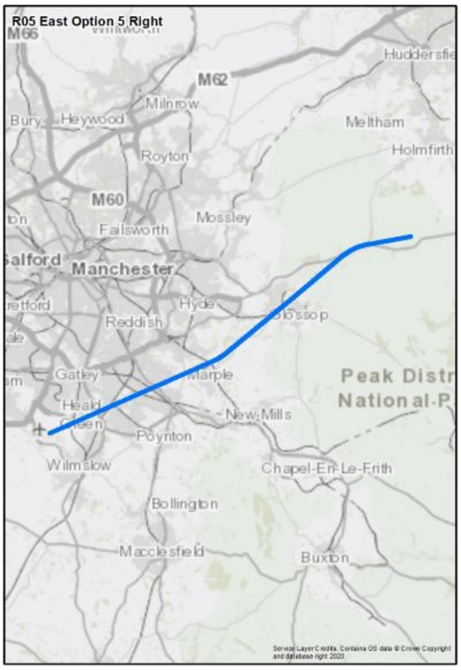
The design speed will permit a large number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise, and the option has been designed using track to fix coding.

05L: After passing the DER this route has a 15° track adjustment to the right which routes it south of Stockport. This track continues until just to the south-west of Glossop where it combines with the option for 05R returns to a runway heading. After overflying Glossop it makes a right turn to the east and terminates at 7,000ft just east of the Woodhead reservoir.

05R: After passing the DER this route has a 15° track adjustment to the right which routes it south of Stockport. This track continues until just to the south-west of Glossop where it combines with the option for 05L and returns to a runway heading. After overflying Glossop it makes a right turn to the east and terminates at 7,000ft just east of the Woodhead reservoir.

There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply. Due to the track-to-fix coding and simplicity of the route, dispersion is likely to be low even with maximum speeds.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS -OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 5 L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 5 L is estimated to limit the total population affected by noise.
Option 5 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5 L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 5 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 5 R is estimated to limit the total population affected by noise.
Option 5 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5 R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 5 L is 38km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 5 R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 5 L is estimated to overfly approximately 15,100 households with an approximate population of 34,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 36,100.

Up to 7,000ft, option 5 L is estimated to overfly approximately 21,450 households with an approximate population of 49,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 51,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 5 R is estimated to overfly approximately 15,800 households with an approximate population of 37,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 38,400.

Up to 7,000ft, option 5 R is estimated to overfly approximately 23,550 households with an approximate population of 55,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 56,900.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 5 L is estimated to overfly 105 noise sensitive areas.

Up to 7,000ft, this option 5 L is estimated to overfly 135 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 5 R is estimated to overfly 115 noise sensitive areas.

Up to 7,000ft, this option 5 R is estimated to overfly 155 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

7.4 Runways 05L/05R East Option 6

Design Principle Evaluation	Option No: 6
Option Name: SID RW 05L EAST Option 6	ACCEPT
Option Name: SID RW 05R EAST Option 6	ACCEPT

Option Description:

This is an **RNAV1** option to provide an initial route identical to the existing DESIG SID, but with an earlier turn towards the network joining point to the east. This has been done to align with current operational practice and routes it to the southern edge of route L975 in line with the NATS network traffic flow.

This option has a similar profile to option 4 but the right turn takes place approximately 2.5nm earlier.

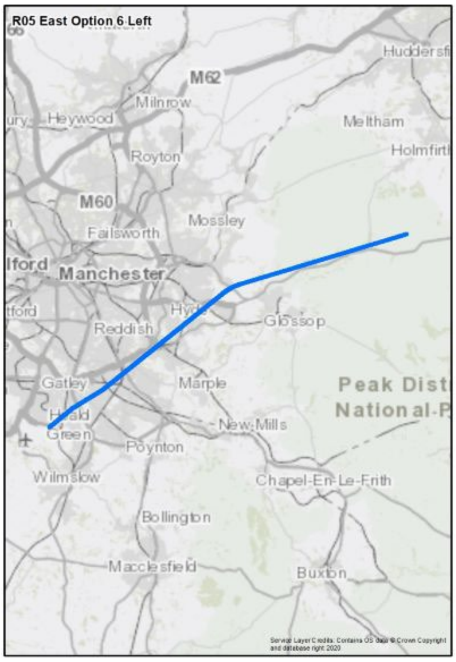
The design speed will permit many aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

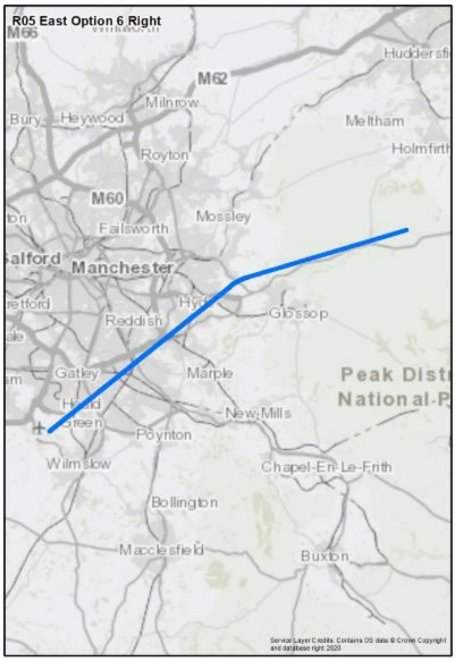
The route has been designed using fly-by waypoints.

05L: After departure, this route combines with the option for 05R and flies straight ahead overflying Stockport and the southern edge of Hyde. It routes to the west of Glossop at which point it makes a right turn to the east to the north of Glossop and terminates at 7,000ft overhead the Woodhead reservoir.

05R: After departure, this route combines with the option for 05L and flies straight ahead overflying Stockport and the southern edge of Hyde. It routes to the west of Glossop at which point it makes a right turn to the east to the north of Glossop and terminates at 7,000ft overhead the Woodhead reservoir.

There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply.





Design Principle		
Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle	Runway	Assessment
Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment: Up to 4,000ft, option 6 L is estimated to limit the total population affected by noise. Up to 7,000ft, option 6 L is estimated to limit the total population affected by noise. Option 6 L is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 6 L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 6 R is estimated to limit the total population affected by noise. Up to 7,000ft, option 6 R is estimated to limit the total population affected by noise. Option 6 R is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 6 R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle	Runway	Assessment
Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment: When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure. Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle	Runway	Assessment
Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 6 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 6 R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6 L is estimated to overfly approximately 25,950 households with an approximate population of 58,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 58,200.

Up to 7,000ft, option 6 L is estimated to overfly approximately 27,150 households with an approximate population of 60,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 60,900.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 6 R is estimated to overfly approximately 28,800 households with an approximate population of 65,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 65,000.

Up to 7,000ft, option 6 R is estimated to overfly approximately 30,200 households with an approximate population of 68,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 68,000.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6 L is estimated to overfly 125 noise sensitive areas.

Up to 7,000ft, this option 6 L is estimated to overfly 130 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 6 R is estimated to overfly 150 noise sensitive areas.

Up to 7,000ft, this option 6 R is estimated to overfly 150 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and asmaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

7.5 Runways 05L/05R East Option 7

Design Principle Evaluation	Option No: 7
Option Name: SID RW 05L EAST Option 7	ACCEPT
Option Name: SID RW 05R EAST Option 7	ACCEPT

Option Description:
This is an **RNAV1** option that seeks to provide the shortest (most fuel efficient) route to the network joining point by using the earliest turn to the east, taking account of the constraints created by the base of controlled airspace.

It has a similar profile to options 4 and 6 except aircraft make the first right turn just north of Stockport to route to the network joining point. The position of this first turn is dictated by the dimensions of the controlled airspace to the east of Glossop which do not permit a turn and a direct route from an earlier point.

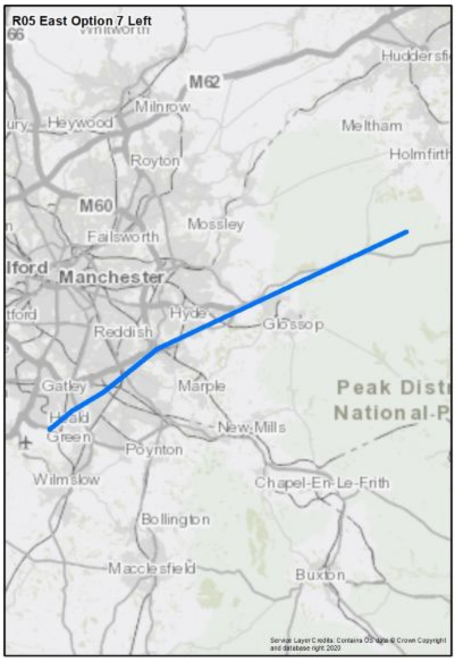
The design speed will permit many aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

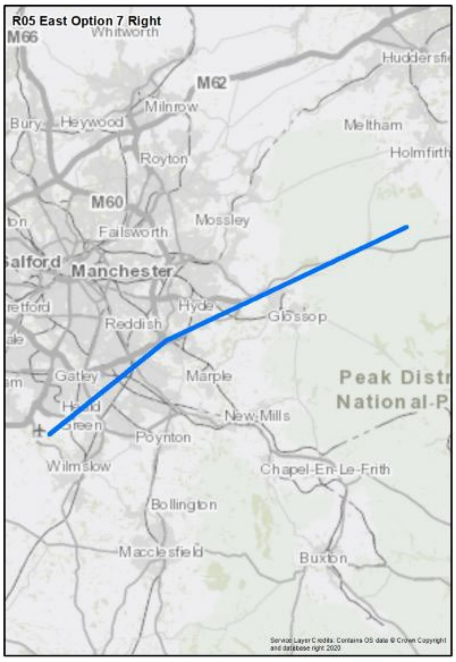
The route has been designed using fly-by waypoints.

05L: After departure, this route combines with the option for 05R and flies straight ahead overflying Stockport. Upon reaching Bredbury the route turns right to route south of Hyde and routes direct to the east to terminates at 7,000ft to the east of the Woodhead reservoir.

05R: After departure, this route combines with the option for 05L and flies straight ahead overflying Stockport. Upon reaching Bredbury the route turns right to route south of Hyde and routes direct to the east to terminates at 7,000ft to the east of the Woodhead reservoir.

There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.	

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 7 L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 7 L is estimated to limit the total population affected by noise.
Option 7 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7 L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 7 R is estimated to limit the total population affected by noise.
Option 7 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7 R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 7 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 7 R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 7 L is estimated to overfly approximately 23,550 households with an approximate population of 51,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 51,300.

Up to 7,000ft, option 7 L is estimated to overfly approximately 29,100 households with an approximate population of 63,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 64,200.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 7 R is estimated to overfly approximately 26,100 households with an approximate population of 57,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 57,400.

Up to 7,000ft, option 7 R is estimated to overfly approximately 32,150 households with an approximate population of 71,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 71,200.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a similar population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 7 L is estimated to overfly 115 noise sensitive areas.

Up to 7,000ft, this option 7 L is estimated to overfly 130 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 7 R is estimated to overfly 130 noise sensitive areas.

Up to 7,000ft, this option 7 R is estimated to overfly 150 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and asmaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

7.6 Runways 05L/05R East Option 8

Design Principle Evaluation	Option No: 8
Option Name: SID RW 05L EAST Option 8	ACCEPT
Option Name: SID RW 05R EAST Option 8	ACCEPT

Option Description:
This is an **RNAV1** option created to provide a 45° track divergence from northbound departures and enable a one-minute departure separation to align with the Design Principle Capacity. This one-minute separation between north and eastbound departures is not possible on other options within this design envelope all of which will all require two minutes separation.

In line with CAP493 Manual of Air Traffic Services Pt1, the minimum departure separation can be reduced to one minute provided that the aircraft fly on tracks diverging by 45° or more immediately after take-off.

This right turn also has a benefit in reducing the impact of noise for communities on the extended runway centreline that are impacted by Runways 23R/23L arrivals and Runways 05L/05R north departures. The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

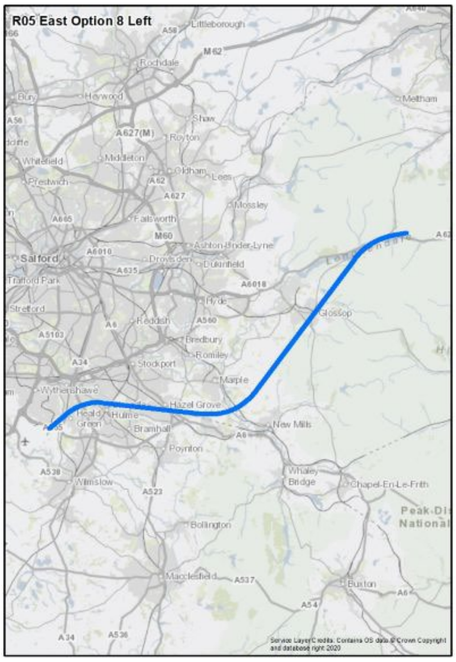
This option has a right turn no earlier than 1nm from DER, which is in accordance with CAP778.

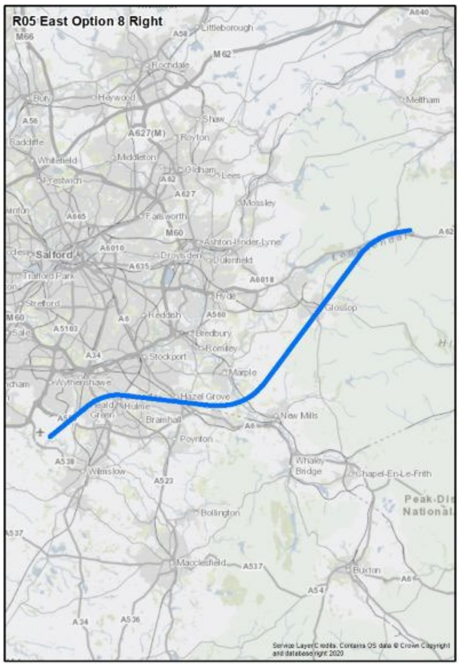
The route has been designed as an RNAV1 route using fly-over and fly-by waypoints.

05L: After departure, this route makes a 45° turn to the right at 1nm from the DER and combines with the option for 05R. This routes it overhead Hazel Grove after which it makes a second turn to the left to route in a north-easterly direction. It overflies Glossop before making a final right turn to the east and terminates at 7,000ft to the Woodhead reservoir.

05R After departure this route makes a 45° turn to the right at approximately 2.1nm from the DER and combines with the option for 05L. This routes it overhead Hazel Grove after which it makes a second turn to the left to route in a north-easterly direction. It overflies Glossop before making a final right turn to the east and terminates at 7,000ft to the Woodhead reservoir.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 8 L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 8 L is estimated to limit the total population affected by noise.
Option 8 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8 L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 8 R is estimated to limit the total population affected by noise.
Option 8 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8 R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 8 L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 8 R is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 8 L is estimated to overfly approximately 8,750 households with an approximate population of 21,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 21,300.

Up to 7,000ft, option 8 L is estimated to overfly approximately 16,900 households with an approximate population of 39,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 39,800.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 8 R is estimated to overfly approximately 10,700 households with an approximate population of 25,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 26,100.

Up to 7,000ft, option 8 R is estimated to overfly approximately 18,900 households with an approximate population of 44,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 44,700.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 8 L is estimated to overfly 55 noise sensitive areas.

Up to 7,000ft, this option 8 L is estimated to overfly 90 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 8 R is estimated to overfly 65 noise sensitive areas.

Up to 7,000ft, this option 8 R is estimated to overfly 100 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and asmaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

7.7 Runways 05L/05R East Summary

	Option 1L	Option 4L	Option 5L	Option 6L	Option 7L	Option 8L
S	MET	MET	MET	MET	MET	MET
P	MET	MET	MET	MET	MET	MET
C	MET	MET	MET	MET	MET	MET
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Best	Best	Best	Best	Best

	Option 1R	Option 4R	Option 5R	Option 6R	Option 7R	Option 8R
S	MET	MET	MET	MET	MET	MET
P	MET	MET	MET	MET	MET	MET
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Best	Best	Best	Best	Best

7.8 Runways 05L/05R East Viable but Poor Fit Options

Option	Safety	Policy	Capacity
A2 Track divergence 15° to the south then continue north-east.	S	P	C

Originally Option 2 this uses initial track adjustment of 15° right of the departure track, then routing directly north-east to terminate close to the current DESIG SID.

Safety: Inbound aircraft to both MAN and LPL are routed westbound in this narrow area towards the end of this option. This option would route traffic in conflict with this traffic flow. Because of this conflict, this option was replaced with option 5 which turns traffic south at the end of the SID to avoid the conflict.

Policy: This option fails to align with the ends of the AMS with respect to:

- Efficiency: This option would interact with inbound routes to LPL airport and route against the traffic flows within the NATS network

The trade-off analysis between emissions and noise, identified the potential for a material noise benefit below 4,000ft which resulted in an amber categorisation.

The trade-off analysis against other AMS ends did not identify other material benefits.

Option	Safety	Policy	Capacity
B3 Route directly to the east above 4,000ft	S	P	C

Originally Option 3, this was considered to formalise tracks that are representative of current tactical operations, where ATC provide a heading direct to the east following take off and reaching the correct altitude permitted for vectors.

Safety: The design of this option would not be compliant with airspace containment requirements, in particular for slower climbing aircraft. Systemising this tactical operational practice introduces the risk of conflicts between aircraft operating in Class D and Class G (uncontrolled) airspace which is not aligned to CAA Airspace Containment Policy.

Additional options that are fully contained were designed to mitigate this risk which resulted in this option offering no material benefits below 7,000ft ft if the containment restriction were not present.

Policy: This option fails to align with the ends of the AMS with respect to:

- Integration: This option has the potential to reduce airspace access for GA users because of the need to reduce the base of CAS to allow its use.

The trade-off analysis against noise, did not identify a material noise benefit below 4,000ft

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Option	Safety	Policy	Capacity
C9 Track divergence 15° to the north then route direct north-east.	S	P	C

An alternative version of this option was considered whereby the route diverges 15° to the north and then terminates to the north of the current route.

Safety: Inbound aircraft to MAN are routed westbound (in the opposite direction) in the area towards the end of this option. This option would route traffic in conflict with this traffic flow.

Policy: This option fails to align with the ends of the AMS with respect to:

- Efficiency: This option would interact with inbound routes to LPL and route against the traffic flows within the NATS network.

The trade-off analysis against noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

D10 Left-hand Wraparound	S	P	C

After departure from Runways 05L/05R, aircraft would make a left-hand turn, fly around the airport then begin heading north-east towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic north and west before turning it east leading to increased fuel burn and emissions.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: This option would interact with Runway 05 arrivals from the north, and options within the 05 West and South-west Departure Envelopes. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

E11 Right-hand Wraparound	S	P	C

After departure from Runways 05L/05R, aircraft would make a right-hand turn, fly around the airport then begin heading north-east towards the SID aiming point.

Safety: This option is expected to conflict with the Runway 05R MAP.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic south and west before turning it east leading to increased fuel burn and emissions.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: This option would interact with Runway 05 arrivals from the south, and options within the 05 South Departure Envelope. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			
F12: Left turn towards north then right-hand turn back to east	S	P	C
After departure from Runways 05L/05R, aircraft would make a left turn to head north before turning right to head east towards the SID aiming point. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic north before turning it east leading to increased fuel burn and emissions. The trade-off analysis between emissions and noise, did not identify a noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation. Capacity: This option would follow the same track as departures in the 05 North Design Envelope which would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			

8 Runways 05L/05R South

8.1 Runways 05L/05R South Option 1

Design Principle Evaluation	Option No: 1
Option Name: SID RW 05L SOUTH Right Turn Option 1	ACCEPT
Option Name: SID RW 05R SOUTH Right Turn Option 1	ACCEPT

Option Description:

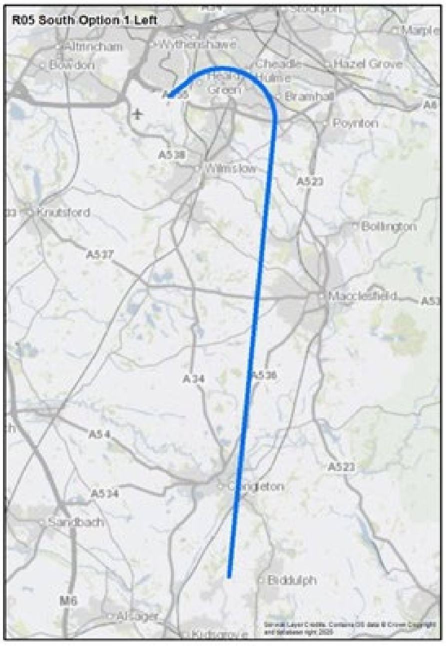
Option 1 is included to provide an **RNAV1** replication of the existing conventional LISTO 2S/2Z SID. As a replicated route it follows a similar track over the ground as the current route to connect to the NATS network.

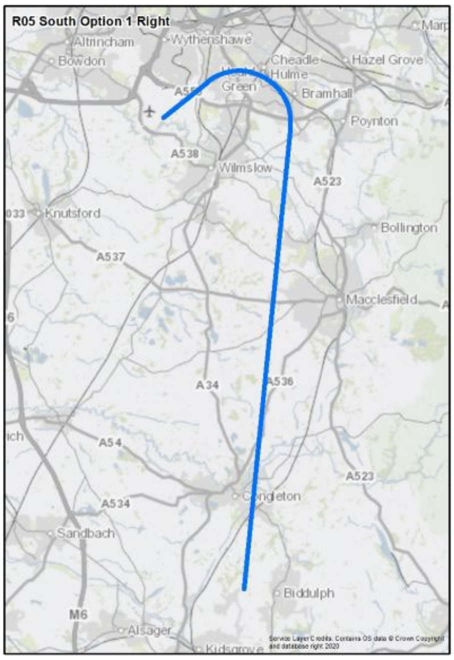
The fly-over waypoints for the right turn to the south are positioned at the position of the existing markers. For Runway 05L this is at the MCT D1.2 point which less than 1nm from DER but as this replicates the turn of the current procedure it aligns to the Design Principle Safety.

After departure the routes turn right to pass overhead Cheadle Hulme at which point they combine. They then pass just to the west of Woodford and Macclesfield and overfly Congleton and terminate at 7,000ft just west of Biddulph.

An element of dispersion will be present in the right turn to the south due to the fly-over coding and the variables that affect this. This is seen currently with the conventional procedure.

A speed restriction of 185 KIAS is used for the first turn.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide a RNAV1 replication of the existing conventional LISTO 2S 2Z SID. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1 L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 1 L is estimated to limit the total population affected by noise.
Option 1 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1 L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 1 R is estimated to increase the total population affected by noise.
Option 1 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1 L is 38km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1 R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1 L is estimated to overfly approximately 5,750 households with an approximate population of 13,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 15,000.

Up to 7,000ft, option 1 L is estimated to overfly approximately 17,950 households with an approximate population of 40,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 46,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1 R is estimated to overfly approximately 7,950 households with an approximate population of 19,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 21,000.

Up to 7,000ft, option 1 R is estimated to overfly approximately 20,150 households with an approximate population of 46,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 52,400.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1 L is estimated to overfly 40 noise sensitive areas.

Up to 7,000ft, this option 1 L is estimated to overfly 110 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 1 R is estimated to overfly 45 noise sensitive areas.

Up to 7,000ft, this option 1 R is estimated to overfly 115 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

8.2 Runways 05L/05R South Option 2A

Design Principle Evaluation	Option No: 2A
Option Name: SID RW 05L SOUTH Right Turn Option 2A	REJECT
Option Name: SID RW 05R SOUTH Right Turn Option 2A	REJECT

Option Description:

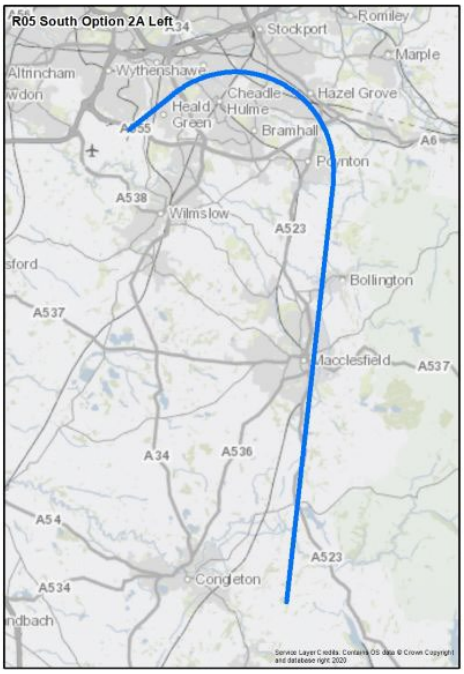
This is an **RNP1** option with RF coding that makes a turn at the recommended PANS-OPS distance from the end of the runway. This results in a wider turn and a track to the eastern edge of the envelope.

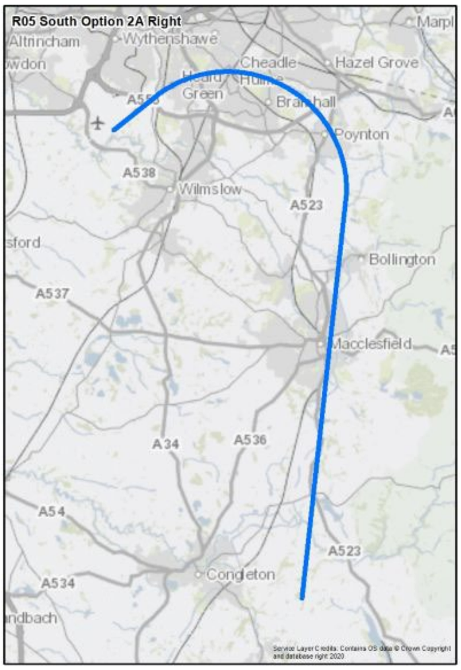
The wider track allows a greater speed in the turn which permits aircraft to be in a clean configuration (without the use of flaps). This has potential benefits in terms of noise. The wider arc may also aid vertical separation from MAN arriving traffic from the south by allowing aircraft to climb higher before any potential interaction.

05L: After departure, this route turns right shortly after Heald Green in a wide turn that routes it just east of Poynton where it combines with the route for 05R. The routes continue south passing overhead Macclesfield and terminate at 7,000ft to the east of Congleton.

05R: After departure, this route turns right in a track that is inside the route for 05L and that passes overhead Cheadle Hulme and Poynton where it combines with the route for 05L. The routes continue south passing overhead Macclesfield and terminate at 7,000ft to the east of Congleton.

A speed restriction of 220 KIAS is applied to the first turn.





Design Principle Safety		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2A L is estimated to limit the total population affected by noise.
Option 2A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2A R is estimated to increase the total population affected by noise.
Option 2A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 2A L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 2A R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 2A L is estimated to overfly approximately 15,550 households with an approximate population of 36,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 37,900.

Up to 7,000ft, option 2A L is estimated to overfly approximately 30,750 households with an approximate population of 68,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 73,300.

This is a similar population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 2A R is estimated to overfly approximately 12,800 households with an approximate population of 30,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 30,900.

Up to 7,000ft, option 2A R is estimated to overfly approximately 27,700 households with an approximate population of 61,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 65,500.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 2A L is estimated to overfly 95 noise sensitive areas.

Up to 7,000ft, this option 2A L is estimated to overfly 195 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 2A R is estimated to overfly 75 noise sensitive areas.

Up to 7,000ft, this option 2A R is estimated to overfly 175 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

8.3 Runways 05L/05R South Option 2B

Design Principle Evaluation	Option No: 2B
Option Name: SID RW 05L SOUTH Right Turn Option 2B	REJECT
Option Name: SID RW 05R SOUTH Right Turn Option 2B	REJECT

Option Description:
This is an **RNP1** option with RF coding that has the same first turn as option 2A but then routes south-west then south to avoid both Macclesfield and Congleton in line with the Design Principle Noise N1.

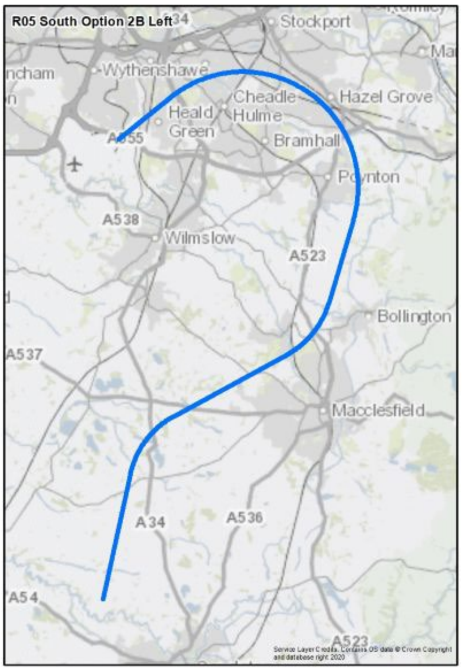
As with option 2A, the wider track allows a greater speed in the turn which permits aircraft to be in a clean configuration (without the use of flaps). This has potential benefits in terms of noise. The wider arc may also aid vertical separation from MAN arriving traffic from the south by re-creating common ATC operational practice to separate departures and arrivals above 4,000ft.

The design speed will permit many aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

05L: After departure, this route turns right shortly after Heald Green in a wide turn that routes it just east of Poynton where it combines with the route for 05R. The routes continue south passing overhead Macclesfield and terminate at 7,000ft to the east of Congleton.

05R: After departure this route turns right in a track that is inside the route for 05L and that passes overhead Cheadle Hulme and Poynton where it combines with the route for 05R. The routes continue south passing overhead Macclesfield and terminate at 7,000ft to the east of Congleton.

A speed restriction of 220 KIAS is applied to the first turn.



Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2B L is estimated to limit the total population affected by noise.
Option 2B L is longer in length and it is anticipated that emissions would be increased.
At this stage of the process, option 2B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2B R is estimated to limit the total population affected by noise.
Option 2B R is longer in length and it is anticipated that emissions would be increased.
At this stage of the process, option 2B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 2B L is 49km (26nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

The estimated track length of option 2B R is 48km (26nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2B L is estimated to overfly approximately 14,100 households with an approximate population of 33,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 34,500.

Up to 7,000ft, option 2B L is estimated to overfly approximately 17,550 households with an approximate population of 42,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 43,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 2B R is estimated to overfly approximately 12,100 households with an approximate population of 28,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 29,400.

Up to 7,000ft, option 2B R is estimated to overfly approximately 14,650 households with an approximate population of 35,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 36,100.

This is a similar population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 2B L is estimated to overfly 85 noise sensitive areas.

Up to 7,000ft, this option 2B L is estimated to overfly 105 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 2B R is estimated to overfly 70 noise sensitive areas.

Up to 7,000ft, this option 2B R is estimated to overfly 80 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and agreater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

8.4 Runways 05L/05R South Option 3

Design Principle Evaluation	Option No: 3
Option Name: SID RW 05 L SOUTH Right Turn Option 3	ACCEPT
Option Name: SID RW 05R SOUTH Right Turn Option 3	ACCEPT

Option Description:

This is an **RNP1** option with RF coding to provide a tight right turn then routing south-west to align with current operational practice.

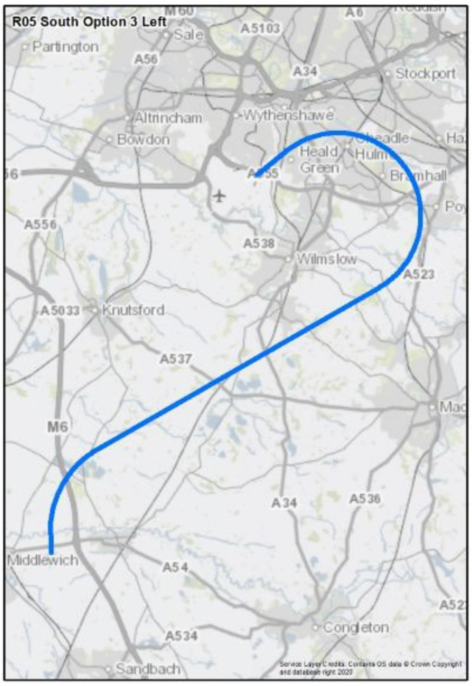
The track following the right turn is often used by ATC to resolve interactions between flights on the LISTO departure and MAN arrivals from the south. This option therefore re-creates common operational practice above 4,000ft.

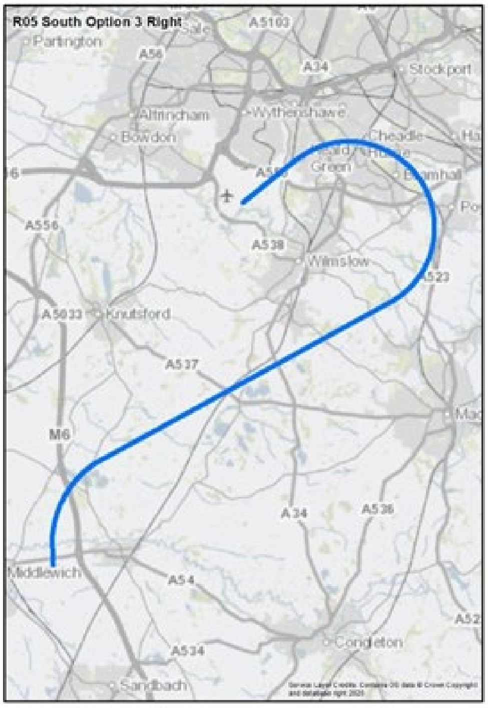
In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778. The turn point for 05R is located at a point roughly perpendicular to 05L, to create a similar ground track in the turn and subsequent leg.

05L: After departure this route turns right shortly after Heald Green in a tight radius turn that routes it inside of Poynton. This turn is continued onto a south-west heading to take it south of Wilmslow and Alderley Edge. It makes a left turn to head south to the north of Holmes Chapel and terminates at 7,000ft east of Middlewich.

05R: After departure this route turns right shortly after Heald Green in a tight radius turn that routes it inside of Poynton. This turn is continued onto a south-west heading to take it south of Wilmslow and Alderley Edge. It makes a left turn to head south to the north of Holmes Chapel and terminates at 7,000ft east of Middlewich.

A speed restriction of 190 KIAS is applied to the first turn which allows the smallest radius. Although PANS-OPS compliant it should be tested for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3 L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 3 L is estimated to limit the total population affected by noise.
Option 3 L is longer in length and it is anticipated that emissions would be increased.
At this stage of the process, option 3 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 3 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 3 R is estimated to limit the total population affected by noise.
Option 3 R is longer in length and it is anticipated that emissions would be increased.
At this stage of the process, option 3 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 3 L is 55km (30nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

The estimated track length of option 3 R is 56km (30nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 3 L is estimated to overfly approximately 4,900 households with an approximate population of 11,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,200.

Up to 7,000ft, option 3 L is estimated to overfly approximately 6,750 households with an approximate population of 16,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 17,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 3 R is estimated to overfly approximately 6,950 households with an approximate population of 16,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 17,300.

Up to 7,000ft, option 3 R is estimated to overfly approximately 8,800 households with an approximate population of 21,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 22,600.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 3 L is estimated to overfly 35 noise sensitive areas.

Up to 7,000ft, this option 3 L is estimated to overfly 50 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 3 R is estimated to overfly 110 noise sensitive areas.

Up to 7,000ft, this option 3 R is estimated to overfly 125 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

8.5 Runways 05L/05R South Option 4

Design Principle Evaluation	Option No: 4
Option Name: SID RW 05L SOUTH Right Turn Option 4	REJECT
Option Name: SID RW 05R SOUTH Right Turn Option 4	REJECT

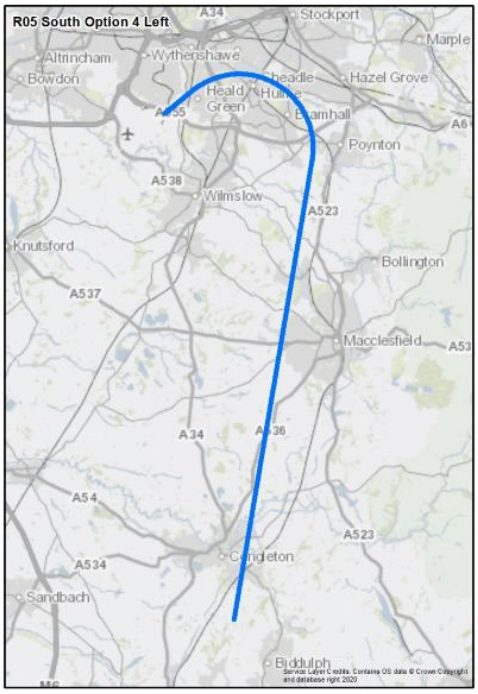
Option Description:
This is included as an **RNP1** route using RF coding that is similar to the current LISTO 2S/2Z SID. The use of RF coding results in a slightly wider first turn and a route slightly east of the 'do minimum' option which uses RNAV1.

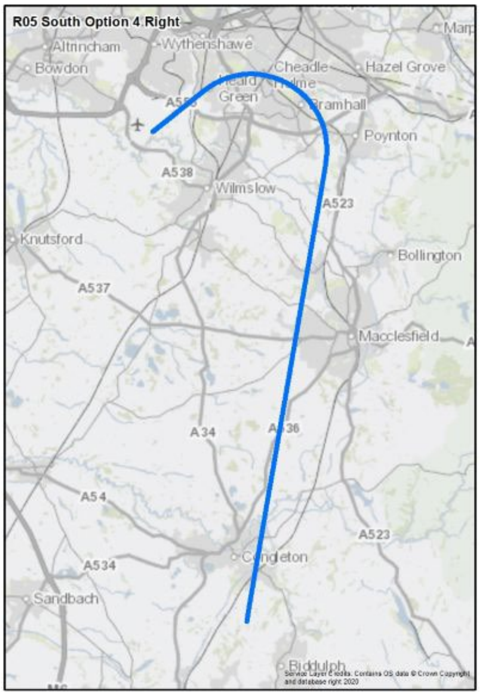
In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778. The turn point for Runway 05R is located at a point roughly perpendicular to Runway 05L, to create a similar ground track in the turn and subsequent leg.

05L: After departure, the route turns right to pass just north of Cheadle Hulme and combines with the option for 05R just west of Poynton. They then pass just to the west of Macclesfield and just east of Congleton and terminate at 7,000ft just north of Biddulph.

05R: After departure the route turns right to pass just north of Cheadle Hulme and combines with the option for 05L just west of Poynton. They then pass just to the west of Macclesfield and just east of Congleton and terminate at 7,000ft just north of Biddulph.

A speed restriction of 190 KIAS is applied to the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4 L is estimated to limit the total population affected by noise.
Option 4 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4 R is estimated to increase the total population affected by noise.
Option 4 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4 L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4 R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 4 L is estimated to overfly approximately 9,600 households with an approximate population of 23,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 25,100.

Up to 7,000ft, option 4 L is estimated to overfly approximately 21,300 households with an approximate population of 49,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 54,600.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 4 R is estimated to overfly approximately 11,450 households with an approximate population of 27,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 29,000.

Up to 7,000ft, option 4 R is estimated to overfly approximately 24,000 households with an approximate population of 55,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 60,900.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4 L is estimated to overfly 55 noise sensitive areas.

Up to 7,000ft, this option 4 L is estimated to overfly 120 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4 R is estimated to overfly 55 noise sensitive areas.

Up to 7,000ft, this option 4 R is estimated to overfly 120 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and agreater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

8.6 Runways 05L/05R South Option 5

Design Principle Evaluation	Option No: 5
Option Name: SID RW 05L SOUTH Right Turn Option 5	REJECT
Option Name: SID RW 05R SOUTH Right Turn Option 5	REJECT

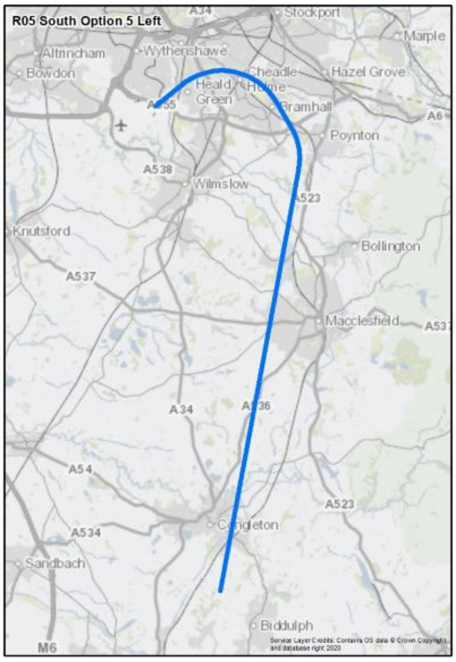
Option Description:
This option is included to provide a **RNAV1** route that is similar to that of the existing conventional LISTO 2S/2Z SID but with the first turn slightly later. This turn has been designed to be no earlier than 1nm from DER for Runway 05L and at the DME1.2 marker for Runway 05R, in line with CAA and PANS-OPS first turn recommendations. This results in a track that is almost identical to option 4 but using different technology.

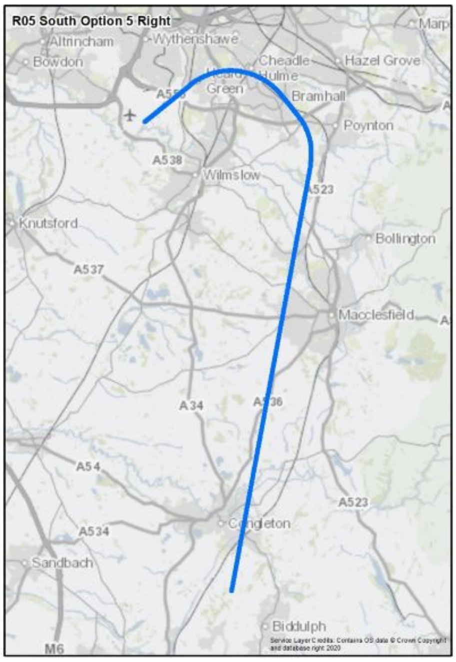
The route uses fly-by waypoints.

05L: After departure, the route turns right to pass just north of Cheadle Hulme and combines with the option for 05R just west of Poynton. They then pass just to the west of Macclesfield and just east of Congleton and terminate at 7,000ft just north of Biddulph.

05R: After departure the route turns right to pass just north of Cheadle Hulme and combines with the option for 05L just west of Poynton. They then pass just to the west of Macclesfield and just east of Congleton and terminate at 7,000ft just north of Biddulph.

A speed restriction of 200 KIAS for the first turn and 210 KIAS for the second turn is used to keep segment lengths and track miles to a minimum.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide RNAV1 routes. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.		
Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL
Summary of Qualitative Assessment: Up to 4,000ft, option 5 L is estimated to increase the total population affected by noise. Up to 7,000ft, option 5 L is estimated to limit the total population affected by noise. Option 5 L is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 5 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 5 R is estimated to increase the total population affected by noise. Up to 7,000ft, option 5 R is estimated to increase the total population affected by noise. Option 5 R is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 5 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.		
Design Principle **Capacity**	05L	MET
	05R	PARTIAL
Summary of Qualitative Assessment: When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure. Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.		
Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL
Summary of Qualitative Assessment:		

The estimated track length of option 5 L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 5 R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 5 L is estimated to overfly approximately 11,100 households with an approximate population of 26,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 27,300.

Up to 7,000ft, option 5 L is estimated to overfly approximately 22,350 households with an approximate population of 51,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 55,800.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 5 R is estimated to overfly approximately 12,150 households with an approximate population of 29,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 30,200.

Up to 7,000ft, option 5 R is estimated to overfly approximately 24,250 households with an approximate population of 56,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 60,700.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 5 L is estimated to overfly 55 noise sensitive areas.

Up to 7,000ft, this option 5 L is estimated to overfly 120 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 5 R is estimated to overfly 65 noise sensitive areas.

Up to 7,000ft, this option 5 R is estimated to overfly 125 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and agreater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

8.7 Runways 05L/05R South Option 6A

Design Principle Evaluation	Option No: 6
Option Name: SID RW 05L SOUTH Right Turn Option 6	ACCEPT
Option Name: SID RW 05R SOUTH Right Turn Option 6	ACCEPT

Option Description:

This is an **RNP1** option with RF coding to provide a tight right turn to route south-west to align with current operational practice. It is similar to option 3 initially but uses a higher speed in the initial turn which allow aircraft to climb more quickly, and it then turns south earlier.

This design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

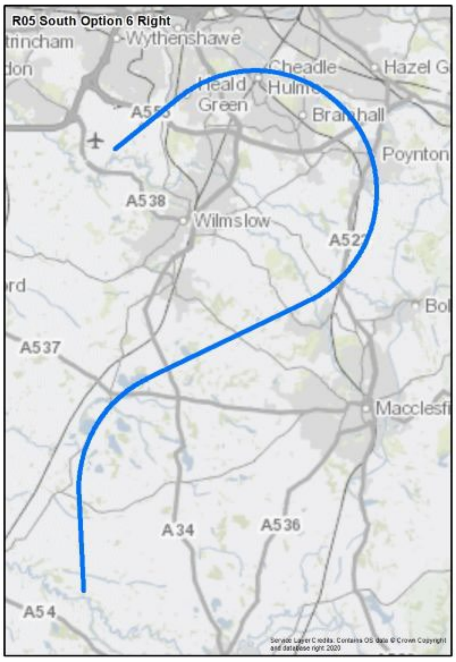
The track following the right turn is often used by ATC to resolve interactions between flights on the LISTO departure and MAN arrivals from the south. This option therefore re-creates common operational practice above 4,000ft.

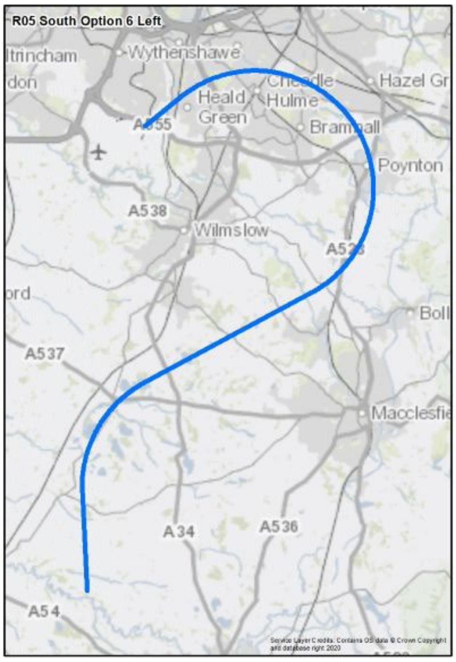
In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778. The turn point for Runway 05R is located at a point roughly perpendicular to Runway 05L, to create a similar ground track in the turn and subsequent leg.

05L: After departure, this route turns right shortly after Heald Green to route overhead Poynton. This turn is continued onto a south-west heading to take it south of Wilmslow and Alderley Edge and west of Macclesfield. It makes a left turn to head south at Chelford and terminates at 7,000ft east of Holmes Chapel.

05R: After departure, this route turns right shortly after Heald Green to route overhead Poynton. This turn is continued onto a south-west heading to take it south of Wilmslow and Alderley Edge and west of Macclesfield. It makes a left turn to head south at Chelford and terminates at 7,000ft east of Holmes Chapel.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6 L is estimated to limit the total population affected by noise.
Option 6 L is longer in length and it is anticipated that emissions would be increased.
At this stage of the process, option 6 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 6 R is estimated to limit the total population affected by noise.
Option 6 R is longer in length and it is anticipated that emissions would be increased.
At this stage of the process, option 6 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 6 L is 49km (26nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

The estimated track length of option 6 R is 50km (27nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6 L is estimated to overfly approximately 8,800 households with an approximate population of 20,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 21,300.

Up to 7,000ft, option 6 L is estimated to overfly approximately 10,300 households with an approximate population of 24,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 25,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 6 R is estimated to overfly approximately 9,500 households with an approximate population of 22,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 23,300.

Up to 7,000ft, option 6 R is estimated to overfly approximately 11,000 households with an approximate population of 26,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 27,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6 L is estimated to overfly 55 noise sensitive areas.

Up to 7,000ft, this option 6 L is estimated to overfly 145 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 6 R is estimated to overfly 60 noise sensitive areas.

Up to 7,000ft, this option 6 R is estimated to overfly 155 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and agreater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

8.8 Runways 05L/05R South Option 6B

Design Principle Evaluation	Option No: 6B
Option Name: SID RW 05L SOUTH Right Turn Option 6B	REJECT
Option Name: SID RW 05R SOUTH Right Turn Option 6B	ACCEPT

Option Description:
This is an **RNP1** option with RF coding to provide a tight right turn to route south-west to align with current operational practice. It is identical to option 6 in the speed and initial right turn but has a left turn to the south earlier to follow the course of the A34 which has a level of ambient noise.

This design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

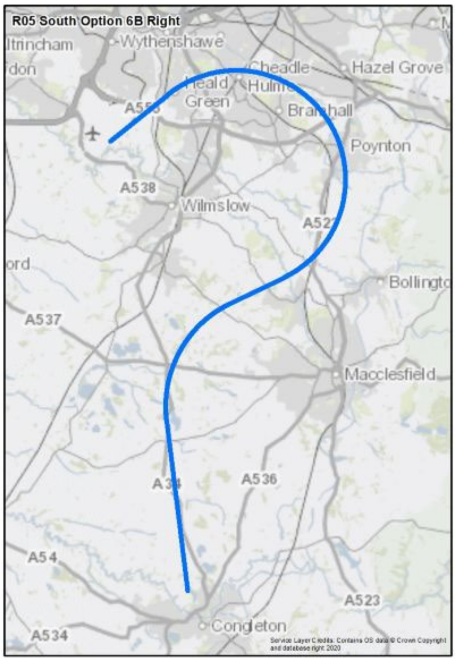
The track following the right turn is often used by ATC to resolve interactions between flights on the LISTO departure and MAN arrivals from the south. This option therefore re-creates common operational practice above 4,000ft.

In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778. The turn point for Runway 05R is located at a point roughly perpendicular to Runway 05L, to create a similar ground track in the turn and subsequent leg.

05L: After departure, this route turns right shortly after Heald Green to route overhead Poynton. This turn is continued onto a south-west heading to take it south of Wilmslow and Alderley Edge and west of Macclesfield. It makes a left turn to head south between Chelford and Macclesfield, roughly following the A34 road to terminate at 7,000ft just north of Congleton.

05R: After departure, this route turns right shortly after Heald Green to route overhead Poynton. This turn is continued onto a south-west heading to take it south of Wilmslow and Alderley Edge and west of Macclesfield. It makes a left turn to head south between Chelford and Macclesfield, roughly following the A34 road to terminate at 7,000ft just north of Congleton.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.



Design Principle Safety	05L	MET
	05R	MET

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment: Up to 4,000ft, option 6B L is estimated to increase the total population affected by noise. Up to 7,000ft, option 6B L is estimated to limit the total population affected by noise. Option 6B L is longer in length and it is anticipated that emissions would be increased. At this stage of the process, option 6B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 6B R is estimated to limit the total population affected by noise. Up to 7,000ft, option 6B R is estimated to increase the total population affected by noise. Option 6B R is longer in length and it is anticipated that emissions would be increased. At this stage of the process, option 6B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment: When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure. Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 6B L is 45km (24nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

The estimated track length of option 6B R is 46km (25nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6B L is estimated to overfly approximately 8,850 households with an approximate population of 20,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 21,300.

Up to 7,000ft, option 6B L is estimated to overfly approximately 15,950 households with an approximate population of 36,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 41,200.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 6B R is estimated to overfly approximately 9,550 households with an approximate population of 22,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 23,300.

Up to 7,000ft, option 6B R is estimated to overfly approximately 16,700 households with an approximate population of 38,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 43,400.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6B L is estimated to overfly 50 noise sensitive areas.

Up to 7,000ft, this option 6B L is estimated to overfly 190 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 6B R is estimated to overfly 60 noise sensitive areas.

Up to 7,000ft, this option 6B R is estimated to overfly 195 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and agreater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

8.9 Runways 05L/05R South Right Turn Summary

	Option 1L	Option 2AL	Option 2BL	Option 3L	Option 4L	Option 5L	Option 6AL	Option 6BL
S	MET	MET	MET	MET	MET	MET	MET	MET
P	MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET	MET	MET	MET	MET	MET
E	PARTIAL	PARTIAL	NOT MET	NOT MET	PARTIAL	PARTIAL	NOT MET	NOT MET
N1	MET	PARTIAL	PARTIAL	MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N2	MET	MET	MET	MET	MET	MET	MET	MET
N3	PARTIAL	NOT MET	PARTIAL	MET	PARTIAL	PARTIAL	PARTIAL	NOT MET
A	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Rejected	Rejected	Add. Qual.	Rejected	Rejected	Add. Qual.	Rejected

	Option 1R	Option 2AR	Option 2BR	Option 3R	Option 4R	Option 5R	Option 6AR	Option 6BR
S	MET	MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	PARTIAL	NOT MET	NOT MET	PARTIAL	PARTIAL	NOT MET	NOT MET
N1	PARTIAL	NOT MET	PARTIAL	MET	NOT MET	NOT MET	MET	PARTIAL
N2	MET	MET	MET	MET	MET	MET	MET	MET
N3	PARTIAL	NOT MET	NOT MET	NOT MET	PARTIAL	NOT MET	NOT MET	NOT MET
A	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Rejected	Rejected	Best	Rejected	Rejected	Best	4,000ft beneficial

8.10 Runways 05L/05R South Viable but Poor Fit Options

Note: Because the options development process for 05 South Right Turn and Left Turn took place simultaneously, the viable but poor fit options are identical and apply equally to both envelopes.

Option	Safety	Policy	Capacity
A11 Extended straight ahead then right towards south	S	P	C
After departure from Runways 05L/05R, aircraft would continue straight ahead to Stockport before making a 180-degree right-hand turn, south-west, towards the SID aiming point. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance east before turning it south leading to increased fuel burn and emissions. The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation. Capacity: This option would follow the same track as departures in the 05 East Design Envelope which would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			
B12 Extended straight ahead then left towards south	S	P	C
After departure from Runways 05L/05R, aircraft would continue straight ahead to Stockport before making a 180-degree left-hand turn, south-west, and then another left-hand turn to the south-west, towards the SID aiming point. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic east before turning it west leading to increased fuel burn and emissions. The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation. Capacity: This option would interact with Runway 05 arrivals from the north, and options within the 05 East and North Departure Envelopes. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			

C13 Extended straight ahead then extended left towards south	S	P	C
After departure from Runways 05L/05R, aircraft would continue straight ahead beyond Stockport before making a gradual 180-degree left-hand turn, heading south-west, and then another left-hand turn to the south-west, towards the SID aiming point. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance east before turning it west leading to increased fuel burn and emissions. The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation. Capacity: This option would interact with Runway 05 arrivals from the north, and options within the 05 East and North Departure Envelopes. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			

9 Runways 05L/05R South (Left Turn)

9.1 Runways 05L/05R South Option 7A Left Turn

Design Principle Evaluation	Option No: 7A
Option Name: SID RW 05L SOUTH Left Turn Option 7A	REJECT
Option Name: SID RW 05R SOUTH Left Turn Option 7A	REJECT

Option Description:

This is an **RNP1** option with RF coding that turns left after departure to route north of Sale and then head south-west before heading south.

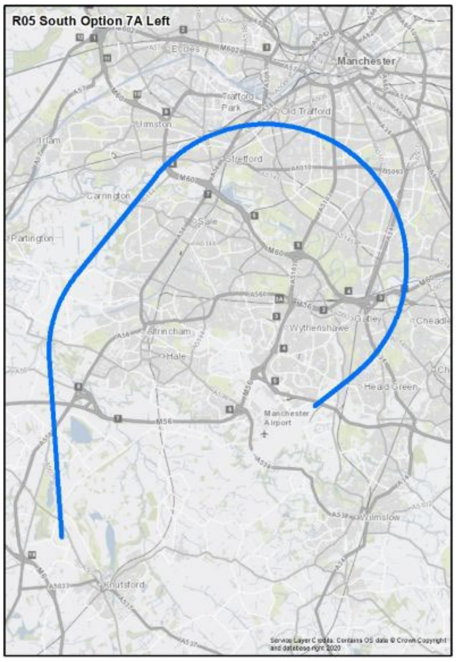
The design speed will permit many aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

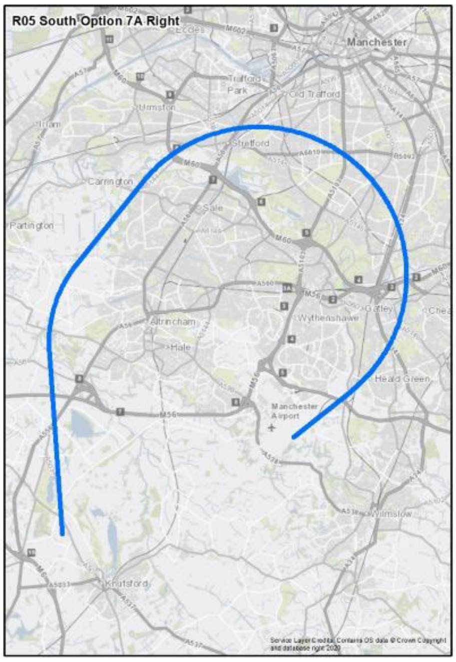
Although this option creates more track miles to route to the south, because of the large number of southbound departures it has potential to aid departure flow and achieving one-minute splits for southbound SIDs to align to the Design Principle Capacity.

05L: After departure this route turns left shortly after Heald Green to route overhead Cheadle. This turn is continued in a wide arc to the north of Chorlton and Sale and overhead Stretford where it combines with the option for 05R. It then heads south-west for a short straight segment and passes north of Altrincham where it makes a left turn to head south and terminates at 7,000ft west of Tatton Park.

05R: After departure this route turns left shortly after Heald Green to route overhead Cheadle. This turn is continued in a wide arc to the north of Chorlton and Sale and overhead Stretford where it combines with the option for 05L. It then heads south-west for a short straight segment and passes north of Altrincham where it makes a left turn to head south and terminates at 7,000ft west of Tatton Park.

A speed restriction of 220 KIAS has been applied to the first turn which allows most aircraft to fly in a clean configuration.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 7A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 7A L is estimated to increase the total population affected by noise.
Option 7A L is longer in length and it is anticipated that emissions would be increased.
At this stage of the process, option 7A L is evaluated to be not be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 7A R is estimated to increase the total population affected by noise.
Option 7A R is longer in length and it is anticipated that emissions would be increased.
At this stage of the process, option 7A R is evaluated to be not be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 7A L is 45km (24nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

The estimated track length of option 7A R is 45km (24nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 7A L is estimated to overfly approximately 44,250 households with an approximate population of 115,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 117,600.

Up to 7,000ft, option 7A L is estimated to overfly approximately 51,000 households with an approximate population of 130,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 134,300.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 7A R is estimated to overfly approximately 41,450 households with an approximate population of 106,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 106,100.

Up to 7,000ft, option 7A R is estimated to overfly approximately 48,150 households with an approximate population of 121,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 122,800.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 7A L is estimated to overfly 210 noise sensitive areas.

Up to 7,000ft, this option 7A L is estimated to overfly 235 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 7A R is estimated to overfly 185 noise sensitive areas.

Up to 7,000ft, this option 7A R is estimated to overfly 210 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and agreater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

9.2 Runways 05L/05R South Option 7B Left Turn

Design Principle Evaluation	Option No: 7B
Option Name: SID RW 05L SOUTH Left Turn Option 7B	REJECT
Option Name: SID RW 05R SOUTH Left Turn Option 7B	REJECT

Option Description:

This is an **RNP1** option with RF coding that turns left after departure to route north of Sale. It is initially the same as option 7A, except the track routes further south-west before making the left turn south.

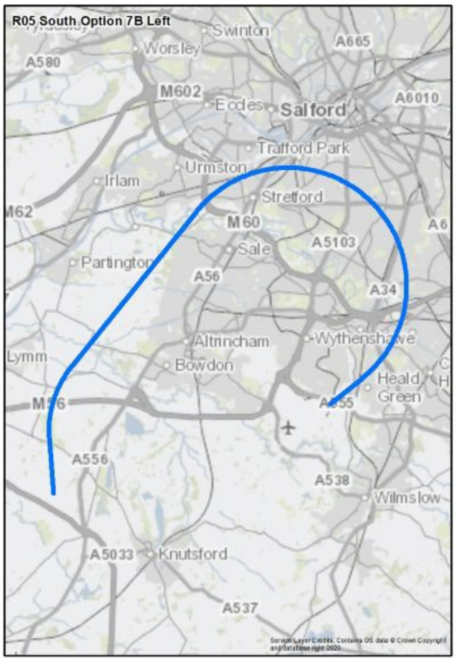
The design speed will permit many aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

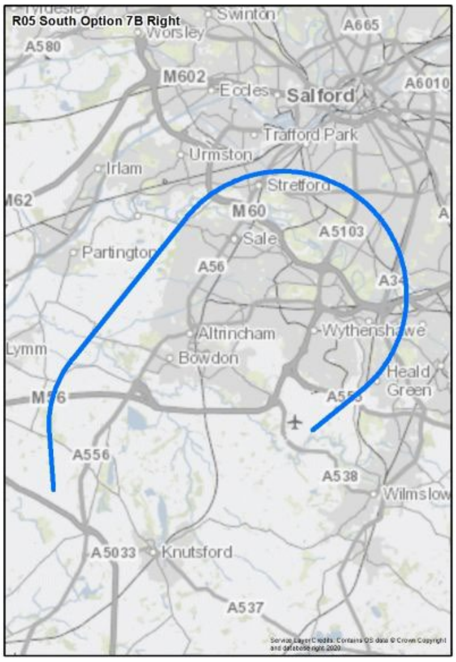
Although this option creates more track miles to route to the south, because of the large number of southbound departures it has potential to aid departure flow and achieving 1-minute splits for southbound SIDs to align to the Design Principle Capacity.

05L: After departure this route turns left shortly after Heald Green to route overhead Cheadle. This turn is continued in a wide arc to the north of Chorlton and Sale and overhead Stretford where it combines with the option for 05R. It then heads south-west for a straight segment and passes north of Altrincham and makes a left turn to head south between Boden and the Lymm Interchange on the M6. It terminates at 7,000ft close to Over Tabley.

05R: After departure this route turns left shortly after Heald Green to route overhead Cheadle. This turn is continued in a wide arc to the north of Chorlton and Sale and overhead Stretford where it combines with the option for 05L. It then heads south-west for a straight segment and passes north of Altrincham and makes a left turn to head south between Boden and the Lymm Interchange on the M6. It terminates at 7,000ft close to Over Tabley.

A speed restriction of 220 KIAS has been applied to the first turn which allows most aircraft to fly in a clean configuration.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle	Runway	Result
Design Principle **Policy**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 7B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 7B L is estimated to increase the total population affected by noise.
Option 7B L is longer in length and it is anticipated that emissions would be increased.
At this stage of the process, option 7B L is evaluated to be not be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 7B R is estimated to increase the total population affected by noise.
Option 7B R is longer in length and it is anticipated that emissions would be increased.
At this stage of the process, option 7B R is evaluated to be not be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle	Runway	Result
Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle	Runway	Result
Design Principle **Emissions**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 7B L is 47km (25nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

The estimated track length of option 7B R is 47km (25nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 7B L is estimated to overfly approximately 44,250 households with an approximate population of 115,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 117,600.

Up to 7,000ft, option 7B L is estimated to overfly approximately 50,950 households with an approximate population of 130,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 132,900.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 7B R is estimated to overfly approximately 41,450 households with an approximate population of 106,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 106,100.

Up to 7,000ft, option 7B R is estimated to overfly approximately 48,150 households with an approximate population of 121,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 121,500.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 7B L is estimated to overfly 210 noise sensitive areas.

Up to 7,000ft, this option 7B L is estimated to overfly 230 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 7B R is estimated to overfly 185 noise sensitive areas.

Up to 7,000ft, this option 7B R is estimated to overfly 205 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

9.3 Runways 05L/05R South Option 8 Left Turn

Design Principle Evaluation	Option No: 8
Option Name: SID RW 05L SOUTH Left Turn Option 8	ACCEPT
Option Name: SID RW 05R SOUTH Left Turn Option 8	ACCEPT

Option Description:

This is an **RNP1** option with RF coding that turns left after departure with the tightest radius possible to reduce track miles. This requires a speed restriction to allow the smaller turn radius.

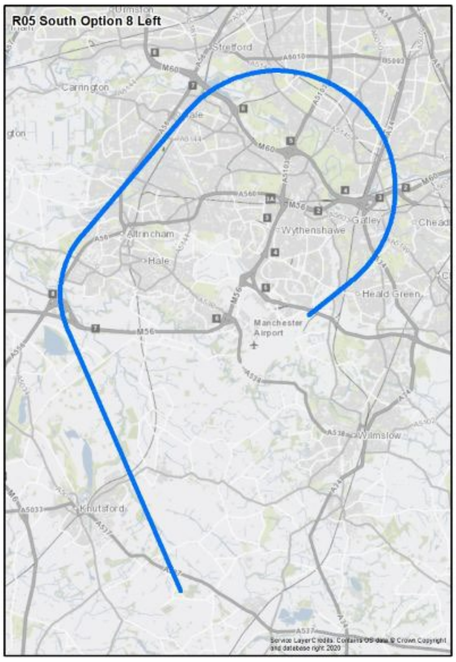
In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778 recommendation. The turn point for Runway 05R is located at a point roughly perpendicular to Runway 05L, to create a similar ground track in the turn and subsequent leg.

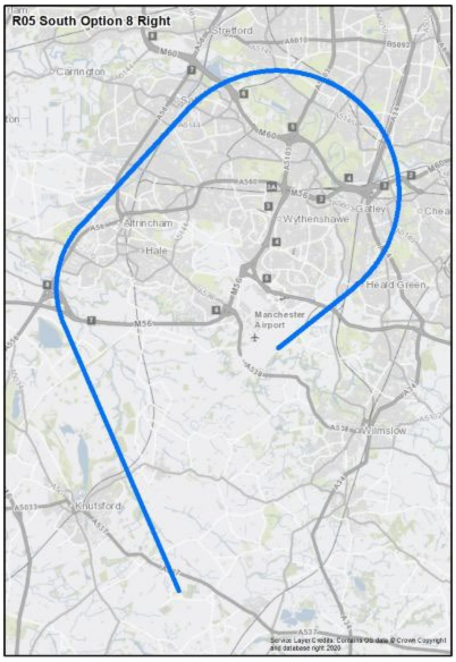
Although this option creates more track miles to route to the south, it is the shortest of the left turn options. In addition, because of the large number of southbound departures it has potential to aid departure flow and achieving 1-minute splits for southbound SIDs to align to the Design Principle Capacity.

05L: After departure this route turns left shortly after Heald Green to route overhead Cheadle, West Didsbury and Sale. It then heads south-west for a straight segment and passes just north of Altrincham where it turns slightly south-east and combines with the route for 05R to pass east of Knutsford and terminate at 7,000ft.

05R: After departure this route turns left shortly after Heald Green to route overhead Cheadle, West Didsbury and Sale. It then heads south-west for a straight segment and passes just north of Altrincham where it turns slightly south-east and combines with the route for 05L to pass east of Knutsford and terminates at 7,000ft.

A speed restriction of 190 KIAS has been applied to the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 8 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 8 L is estimated to increase the total population affected by noise.
Option 8 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 8 R is estimated to increase the total population affected by noise.
Option 8 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 8 L is 38km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 8 R is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 8 L is estimated to overfly approximately 41,500 households with an approximate population of 99,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 99,500.

Up to 7,000ft, option 8 L is estimated to overfly approximately 48,150 households with an approximate population of 115,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 116,100.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 8 R is estimated to overfly approximately 41,800 households with an approximate population of 98,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 98,200.

Up to 7,000ft, option 8 R is estimated to overfly approximately 49,850 households with an approximate population of 116,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 118,000.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 8 L is estimated to overfly 190 noise sensitive areas.

Up to 7,000ft, this option 8 L is estimated to overfly 220 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 8 R is estimated to overfly 190 noise sensitive areas.

Up to 7,000ft, this option 8 R is estimated to overfly 235 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

9.4 Runways 05L/05R South Option 9

Design Principle Evaluation	Option No: 9
Option Name: SID RW 05L SOUTH Left Turn Option 9	ACCEPT
Option Name: SID RW 05R SOUTH Left Turn Option 9	ACCEPT

Option Description:

This is an **RNP1** option with RF coding that turns left after departure with the tightest radius possible to reduce track miles. It is similar to option 8 but terminates slightly further west.

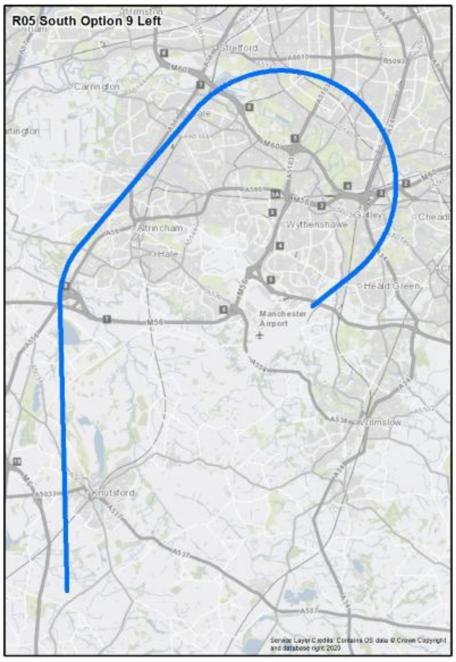
In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778. The turn point for Runway 05R is located at a point roughly perpendicular to Runway 05L, to create a similar ground track in the turn and subsequent leg.

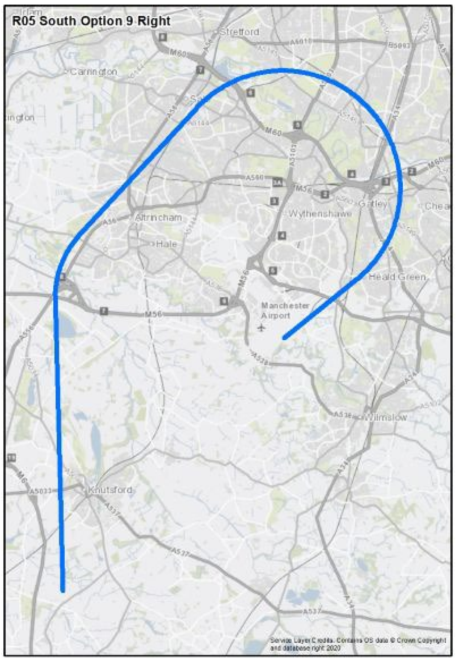
Although this option creates more track miles to route to the south, it is only slightly more track miles than option 8 which is shortest. Because of the large number of southbound departures it has potential to aid departure flow and achieving one minute splits for southbound SIDs.

05L: After departure this route turns left shortly after Heald Green to route overhead Cheadle, West Didsbury and Sale. It then heads south-west for a straight segment and passes just north of Altrincham where it turns south and combines with the route for 05R to pass west of Knutsford and terminates at 7,000ft.

05R: After departure this route turns left shortly after Heald Green to route overhead Cheadle, West Didsbury and Sale. It then heads south-west for a straight segment and passes just north of Altrincham where it turns south and combines with the route for 05L to pass west of Knutsford and terminates at 7,000ft.

A speed restriction of 190 KIAS applied to the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 9 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 9 L is estimated to increase the total population affected by noise.
Option 9 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 9 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 9 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 9 R is estimated to increase the total population affected by noise.
Option 9 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 9 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 9 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 9 R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 9 L is estimated to overfly approximately 41,550 households with an approximate population of 99,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 99,600.

Up to 7,000ft, option 9 L is estimated to overfly approximately 48,650 households with an approximate population of 115,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 117,000.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 9 R is estimated to overfly approximately 41,850 households with an approximate population of 98,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 98,500.

Up to 7,000ft, option 9 R is estimated to overfly approximately 50,200 households with an approximate population of 117,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 118,700.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 9 L is estimated to overfly 190 noise sensitive areas.

Up to 7,000ft, this option 9 L is estimated to overfly 250 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 9 R is estimated to overfly 190 noise sensitive areas.

Up to 7,000ft, this option 9 R is estimated to overfly 265 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

9.5 Runways 05L/05R South Option 10 Left Turn

Design Principle Evaluation	Option No: 10
Option Name: SID RW 05L SOUTH Left Turn Option 10	ACCEPT
Option Name: SID RW 05R SOUTH Left Turn Option 10	ACCEPT

Option Description:

This is an **RNP1** option with RF coding that turns left after departure. It routes mid-way between the other options in this envelope.

Although this option creates more track miles to route to the south, because of the large number of southbound departures it has potential to aid departure flow and achieving one minute splits for southbound SIDs.

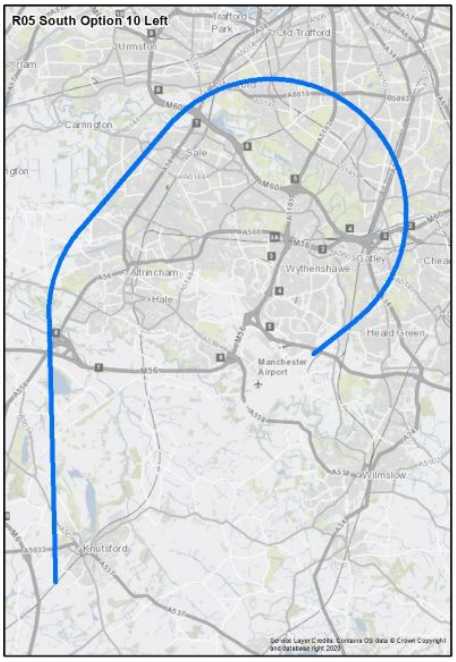
The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

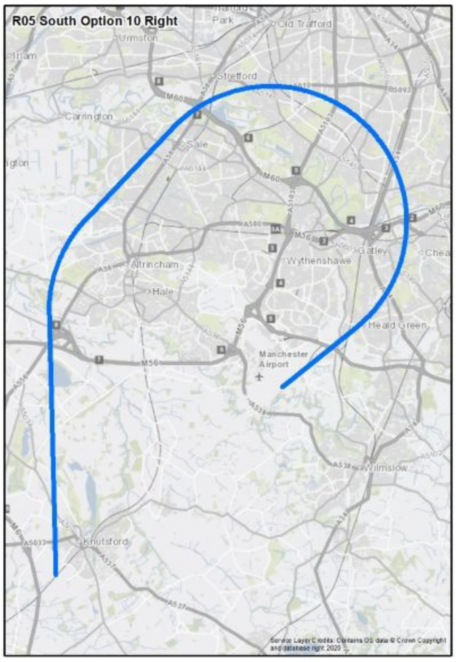
In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778. The turn point for Runway 05R is located at a point roughly perpendicular to Runway 05L, to create a similar ground track in the turn and subsequent leg.

05L: After departure this route turns left shortly after Heald Green to route overhead Cheadle, Chorlton and Sale. It then heads south-west for a straight segment and passes just north of Altrincham where it turns south and combines with the route for 05R to pass west of Knutsford and terminates at 7,000ft.

05R: After departure this route turns left shortly after Heald Green to route overhead Cheadle, Chorlton and Sale. It then heads south-west for a straight segment and passes just north of Altrincham where it turns south and combines with the route for 05L to pass west of Knutsford and terminates at 7,000ft.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 10 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 10 L is estimated to increase the total population affected by noise.
Option 10 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 10 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 10 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 10 R is estimated to increase the total population affected by noise.
Option 10 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 10 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 10 L is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 10 R is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 10 L is estimated to overfly approximately 42,800 households with an approximate population of 108,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 108,400.

Up to 7,000ft, option 10 L is estimated to overfly approximately 52,300 households with an approximate population of 130,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 132,200.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 10 R is estimated to overfly approximately 41,050 households with an approximate population of 101,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 101,200.

Up to 7,000ft, option 10 R is estimated to overfly approximately 52,600 households with an approximate population of 128,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 130,000.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	NOT MET
	05R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 10 L is estimated to overfly 180 noise sensitive areas.

Up to 7,000ft, this option 10 L is estimated to overfly 235 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 10 R is estimated to overfly 195 noise sensitive areas.

Up to 7,000ft, this option 10 R is estimated to overfly 250 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

9.6 Runways 05L/05R South Left Turn Summary

	Option 7AL	Option 7BL	Option 8L	Option 9L	Option 10L
S	MET	MET	MET	MET	MET
P	NOT MET	NOT MET	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET	MET	MET
E	NOT MET	NOT MET	PARTIAL	PARTIAL	PARTIAL
N1	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
N2	MET	MET	MET	MET	MET
N3	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
A	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET
	Rejected	Rejected	Best	Best	Best

	Option 7AR	Option 7BR	Option 8R	Option 9R	Option 10R
S	MET	MET	MET	MET	MET
P	NOT MET	NOT MET	PARTIAL	PARTIAL	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	NOT MET	NOT MET	PARTIAL	PARTIAL	PARTIAL
N1	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
N2	MET	MET	MET	MET	MET
N3	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
A	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET
	Rejected	Rejected	Best	Best	Best

9.7 Runways 05L/05R South Left Turn Viable but Poor Fit Options

Note: Because the options development process for 05 South Right Turn and Left Turn took place simultaneously, the viable but poor fit options are identical and apply equally to both envelopes.

Option	Safety	Policy	Capacity
A11 Extended straight ahead then right towards south	S	P	C
After departure from Runways 05L/05R, aircraft would continue straight ahead to Stockport before making a 180-degree right-hand turn, south-west, towards the SID aiming point. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance east before turning it south leading to increased fuel burn and emissions. The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation. Capacity: This option would follow the same track as departures in the 05 East Design Envelope which would limit the ability to achieve one minute departure splits and not enabling best use of runway capacity.			
B12 Extended straight ahead then left towards south	S	P	C
After departure from Runways 05L/05R, aircraft would continue straight ahead to Stockport before making a 180-degree left-hand turn, south-west, and then another left-hand turn to the south-west, towards the SID aiming point. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic east before turning it west leading to increased fuel burn and emissions. The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation. Capacity: This option would interact with Runway 05 arrivals from the north, and options within the 05 East and North Departure Envelopes. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			

C13 Extended straight ahead then extended left towards south	S	P	C
After departure from Runways 05L/05R, aircraft would continue straight ahead beyond Stockport before making a gradual 180-degree left-hand turn, heading south-west, and then another left-hand turn to the south-west, towards the SID aiming point. <u>Policy</u>: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance east before turning it west leading to increased fuel burn and emissions. The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation. <u>Capacity</u>: This option would interact with Runway 05 arrivals from the north, and options within the 05 East and North Departure Envelopes. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			

10 Runways 05L/05R West

10.1 Runways 05L/05R West Option 1

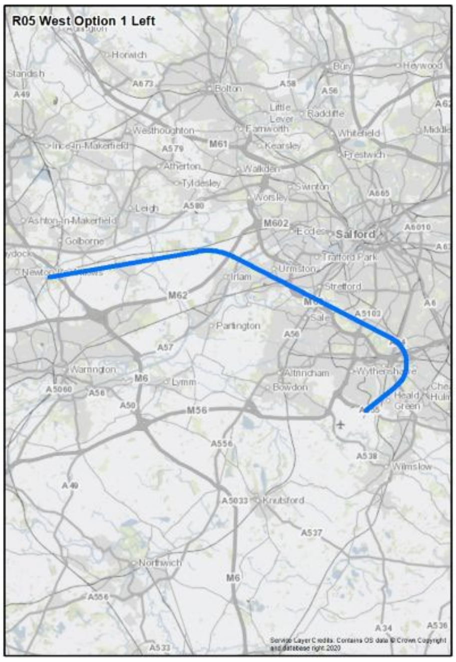
Design Principle Evaluation	Option No: 1
Option Name: SID RW 05L WEST Option 1	ACCEPT
Option Name: SID RW 05R WEST Option 1	ACCEPT

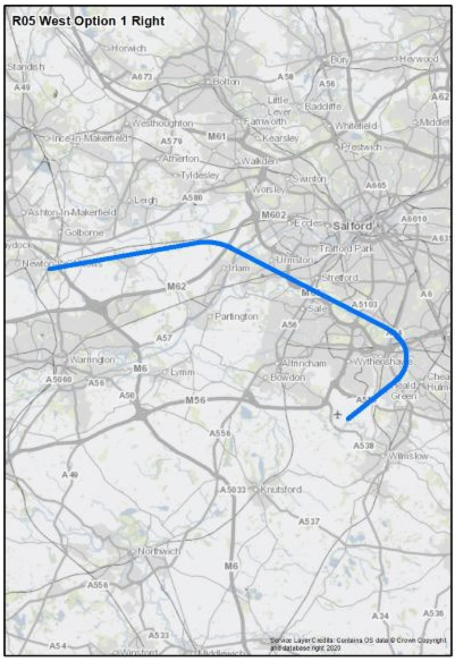
Option Description:

This option is included to provide a **RNAV1** replication of the existing conventional ASMIM 1S/1Z SID. It uses a fly-over waypoint with Course-to-Fix (CF) path terminator coding and an element of dispersion would be apparent in the turn due to this coding

As a replicated route it follows a similar track over the ground as the current route. After departure this involves a right turn to pass overhead Cheadle at which point the routes combine. They then pass just to the west of Didsbury and overfly Stretford and Urmston. The routes make a left turn just north of Irlam and route west to terminate at 7,000ft to the north of Warrington at Earlestown.

A speed restriction of 185 KIAS is used for the first turn to replicate the existing 298° course to XOBRO, although this can be increased if it proves flyability issues. A higher speed would result in greater track dispersal in the first turn. This flyability will be conducted as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide a RNAV1 replication of the current route. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 1 L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 1 L is estimated to limit the total population affected by noise.
Option 1 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1 L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 1 R is estimated to limit the total population affected by noise.
Option 1 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1 R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1 R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 1 L is estimated to overfly approximately 24,100 households with an approximate population of 57,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 57,300.

Up to 7,000ft, option 1 L is estimated to overfly approximately 36,550 households with an approximate population of 86,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 88,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1 R is estimated to overfly approximately 26,400 households with an approximate population of 63,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 63,000.

Up to 7,000ft, option 1 R is estimated to overfly approximately 39,500 households with an approximate population of 93,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 95,600.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1 L is estimated to overfly 120 noise sensitive areas.

Up to 7,000ft, this option 1 L is estimated to overfly 195 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 1 R is estimated to overfly 140 noise sensitive areas.

Up to 7,000ft, this option 1 R is estimated to overfly 210 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

10.2 Runways 05L/05R West Option 2

Design Principle Evaluation	Option No: 2
Option Name: SID RW 05L WEST Option 2	REJECT
Option Name: SID RW 05R WEST Option 2	REJECT

Option Description:

This is an **RNP1** that uses RF coding to provide a single wide initial turn to XOBRO before replicating the westerly track towards the ASMIM region.

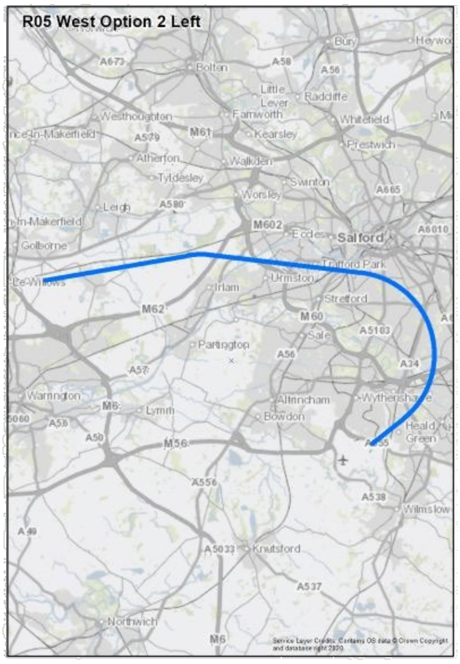
The greater speed results in a wider track, which may aid vertical separation from MAN arriving traffic from the north. It will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

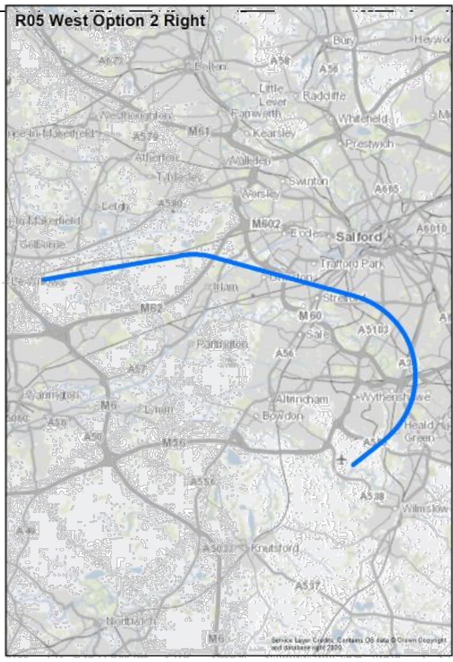
05L: After departure this route makes a single left turn over Cheadle which takes it overhead Burnage and Fallowfield. The left turn is completed heading north-westerly over Trafford Park to the existing reporting point XOBRO, where the routes combine to then route west.

05R: After departure this route makes a single left turn over Heald Green, west of Cheadle and then overhead Withington. The left turn is completed heading north-westerly, routing to the north of Urmston to the existing reporting point XOBRO, where the routes combine to then route west.

It terminates at 7,000ft north of Warrington to the east of Earlestown.

A speed restriction of 220 KIAS is used for the first turn which allows most aircraft to fly in a clean configuration.





	05L	MET

Design Principle **Safety**	05R	MET
Summary of Qualitative Assessment:		
Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage		

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL
Summary of Qualitative Assessment:		
Up to 4,000ft, option 2 L is estimated to increase the total population affected by noise. Up to 7,000ft, option 2 L is estimated to limit the total population affected by noise. Option 2 L is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 2 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 2 R is estimated to increase the total population affected by noise. Up to 7,000ft, option 2 R is estimated to limit the total population affected by noise. Option 2 R is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 2 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.		

Design Principle **Capacity**	05L	MET
	05R	PARTIAL
Summary of Qualitative Assessment:		
When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure. Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.		

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:
The estimated track length of option 2 L is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated. The estimated track length of option 2 R is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:
Up to 4,000ft, option 2 L is estimated to overfly approximately 37,150 households with an approximate population of 99,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 110,800. Up to 7,000ft, option 2 L is estimated to overfly approximately 48,450 households with an approximate population of 125,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 141,100. This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft. Up to 4,000ft, option 2 R is estimated to overfly approximately 39,950 households with an approximate population of 102,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 102,700. Up to 7,000ft, option 2 R is estimated to overfly approximately 49,000 households with an approximate population of 123,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 129,600. This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:
It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 2 L is estimated to overfly 210 noise sensitive areas. Up to 7,000ft, this option 2 L is estimated to overfly 255 noise sensitive areas. This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft. Up to 4,000ft, this option 2 R is estimated to overfly 195 noise sensitive areas. Up to 7,000ft, this option 2 R is estimated to overfly 235 noise sensitive areas. This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

10.3 Runways 05L/05R West Option 3

Design Principle Evaluation	Option No: 3
Option Name: SID RW 05L WEST Option 3	REJECT
Option Name: SID RW 05R WEST Option 3	REJECT

Option Description:

This is an RNAV1 option included to provide a shorter and more fuel-efficient route to the west and the network joining point at Wallasey. It has a wider track in the turn but avoids routing as far to the north.

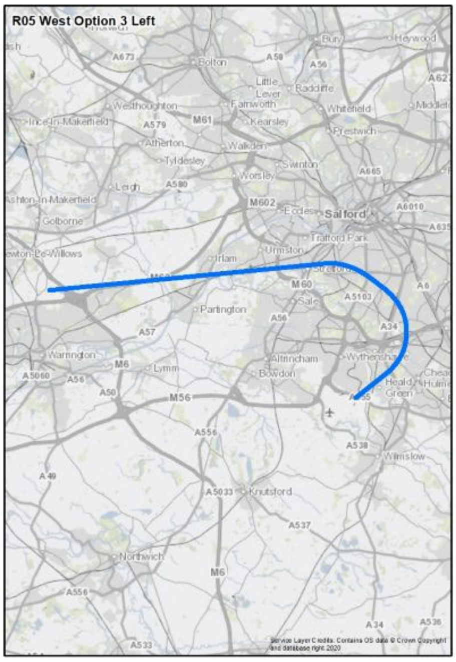
This design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

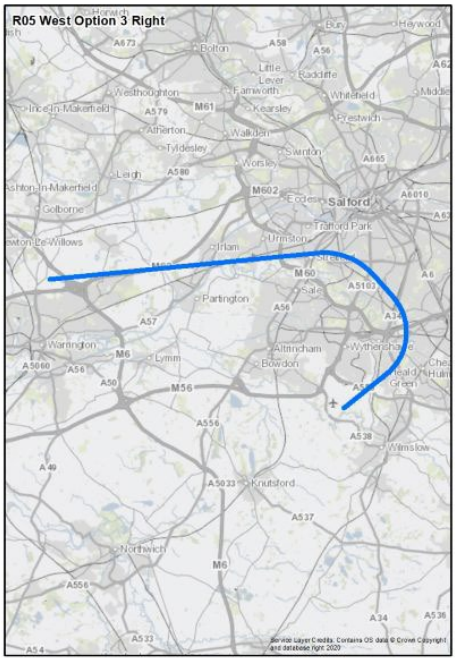
The option maximises fuel efficiency by removing the leg between the first turn to XOBRO and replacing it with a direct route to the west. The procedure uses fly-by waypoints, and the climb gradient has been set at 6%.

05L: After departure this route turns left shortly after Cheadle (at approximately MCT D2), and heads north in a track that takes it just west of Didsbury and Chorlton where the routes combine. At this point a left turn to the west is made to route overhead Urmston and Lower Irlam and terminates at 7,000ft north of Warrington.

05R: After departure this route turns left shortly after Cheadle, (at approximately MCT D2) and heads north, in a track that takes it just west of Didsbury and Chorlton where the routes combine. At this point a left turn to the west is made to route overhead Urmston and Lower Irlam and terminates at 7,000ft north of Warrington.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3 L is estimated to limit the total population affected by noise.
Option 3 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 3 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3 R is estimated to limit the total population affected by noise.
Option 3 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 3 L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 3 R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3 L is estimated to overfly approximately 42,900 households with an approximate population of 109,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 109,600.

Up to 7,000ft, option 3 L is estimated to overfly approximately 62,500 households with an approximate population of 155,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 159,100.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 3 R is estimated to overfly approximately 42,900 households with an approximate population of 106,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 106,400.

Up to 7,000ft, option 3 R is estimated to overfly approximately 63,550 households with an approximate population of 155,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 158,500.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 3 L is estimated to overfly 205 noise sensitive areas.

Up to 7,000ft, this option 3 L is estimated to overfly 285 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 3 R is estimated to overfly 210 noise sensitive areas.

Up to 7,000ft, this option 3 R is estimated to overfly 295 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

10.4 Runways 05L/05R West Option 4A

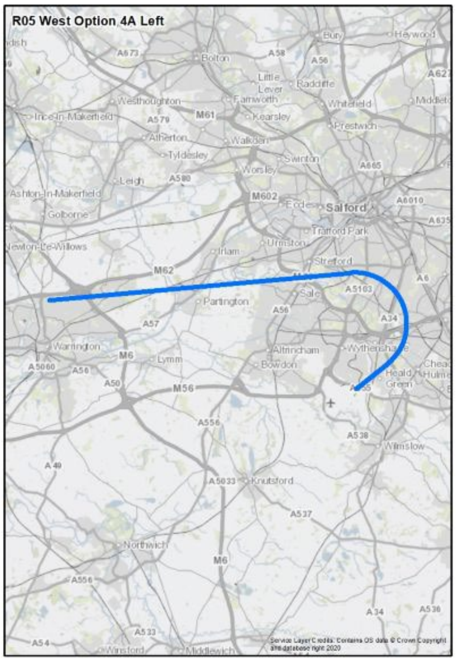
Design Principle Evaluation	Option No: 4A
Option Name: SID RW 05L WEST Option 4A	REJECT
Option Name: SID RW 05R WEST Option 4A	REJECT

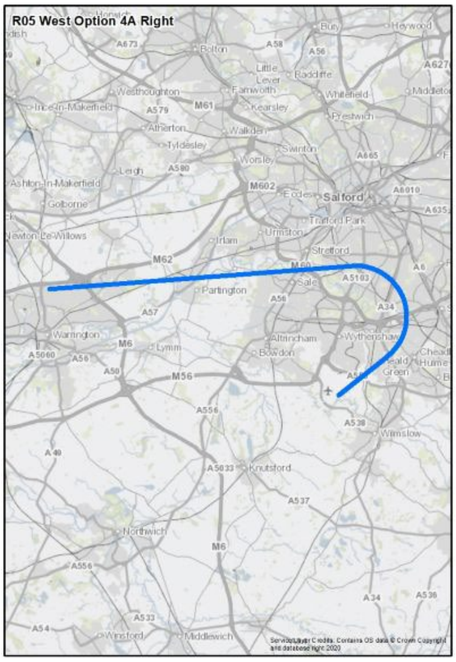
Option Description:
This is an **RNP1** that uses RF coding to provide a single initial turn starting at the position of the current turn to create a fuel-efficient route to the network joining point to the west. Because of the turn position used, the routes are separate for their duration and do not combine until the 7,000ft which creates a small element of dispersal.

05L: After departure this route makes a single left turn just after Cheadle which takes it overhead Burnage and Withington. The left turn is completed heading in a westerly direction to the south of Chorlton and it continues west to route just north of Sale and terminates at 7,000ft north of Warrington where the two routes combine.

05R: After departure this route makes a single left turn just after Cheadle which takes it overhead Burnage and Withington. The left turn is completed heading in a westerly direction to the south of Chorlton and it continues west to route just north of Sale and terminates at 7,000ft north of Warrington where the two routes combine.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4A L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 4A L is estimated to limit the total population affected by noise.
Option 4A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4A R is estimated to limit the total population affected by noise.
Option 4A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4A L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4A R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4A L is estimated to overfly approximately 29,200 households with an approximate population of 72,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 73,000.

Up to 7,000ft, option 4A L is estimated to overfly approximately 55,800 households with an approximate population of 133,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 139,600.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 4A R is estimated to overfly approximately 34,000 households with an approximate population of 84,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 84,100.

Up to 7,000ft, option 4A R is estimated to overfly approximately 61,500 households with an approximate population of 146,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 153,500.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4A L is estimated to overfly 155 noise sensitive areas.

Up to 7,000ft, this option 4A L is estimated to overfly 275 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4A R is estimated to overfly 165 noise sensitive areas.

Up to 7,000ft, this option 4A R is estimated to overfly 295 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

10.5 Runways 05L/05R West Option 4B

Design Principle Evaluation	Option No: 4B
Option Name: SID RW 05L WEST Option 4B	ACCEPT
Option Name: SID RW 05R WEST Option 4B	ACCEPT

Option Description:

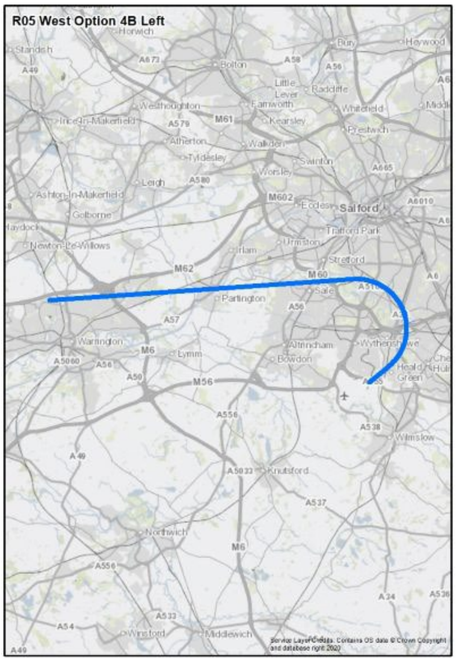
This is an RNP1 that uses RF coding to provide a single initial turn to create a fuel-efficient route to the network joining point to the west. It differs from option 4A in that the turn is at the earliest PANS-OPS compliant position from 05L to create the shortest route possible at this design speed.

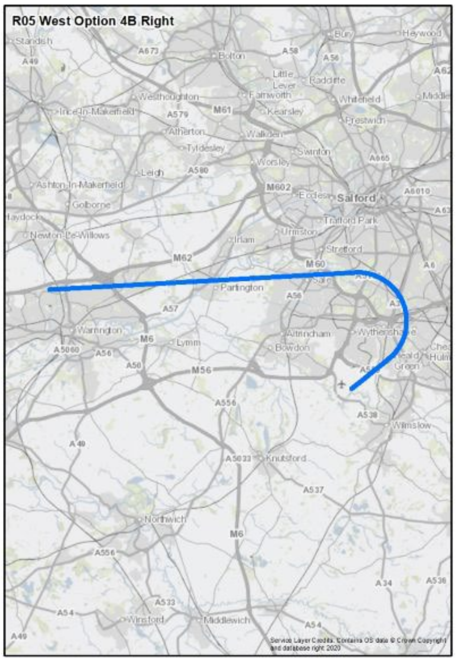
Because of the turn positions used, the routes are separate for their duration and do not combine until the 7,000ft which creates a small element of dispersal.

05L: After departure this route turns left at the earliest PANS-OPS compliant position (1nm from DER). This is a single left turn that takes it overhead Cheadle and West Didsbury before completing the left turn heading in a westerly direction to the south of Chorlton. It continues west to route just north of Sale and terminates at 7,000ft north of Warrington where the two routes combine.

05R: After departure this route turns left at a point that is perpendicular with the turn point for the 05L option. This is a single left turn that takes it overhead Cheadle and West Didsbury before completing the left turn heading in a westerly direction to the south of Chorlton. It continues west to route just north of Sale and terminates at 7,000ft north of Warrington where the two routes combine.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 4B L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 4B L is estimated to limit the total population affected by noise.
Option 4B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4B R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 4B R is estimated to limit the total population affected by noise.
Option 4B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4B L is 38km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4B R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 4B L is estimated to overfly approximately 23,950 households with an approximate population of 55,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 56,800.

Up to 7,000ft, option 4B L is estimated to overfly approximately 54,250 households with an approximate population of 125,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 132,500.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 4B R is estimated to overfly approximately 29,600 households with an approximate population of 67,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 68,700.

Up to 7,000ft, option 4B R is estimated to overfly approximately 60,850 households with an approximate population of 140,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 147,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4B L is estimated to overfly 110 noise sensitive areas.

Up to 7,000ft, this option 4B L is estimated to overfly 245 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4B R is estimated to overfly 140 noise sensitive areas.

Up to 7,000ft, this option 4B R is estimated to overfly 270 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

10.6 Runways 05L/05R West Option 5A

Design Principle Evaluation	Option No: 5A
Option Name: SID RW 05L WEST Option 5A	REJECT
Option Name: SID RW 05R WEST Option 5A	REJECT

Option Description:

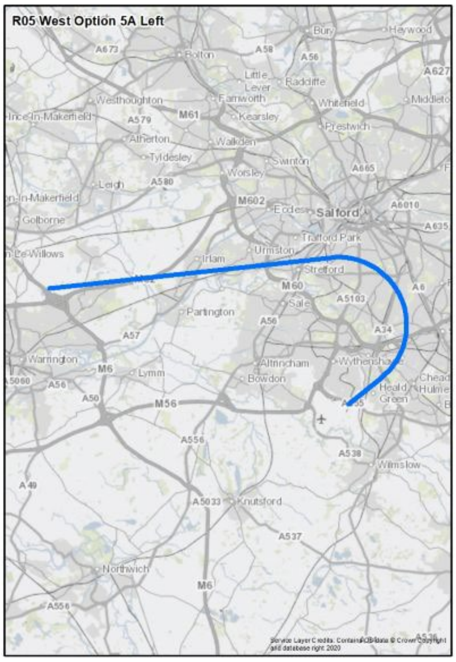
This is an **RNP1** that uses RF coding to provide a single initial turn based on the position of the current turn to create a fuel-efficient route to the network joining point to the west.

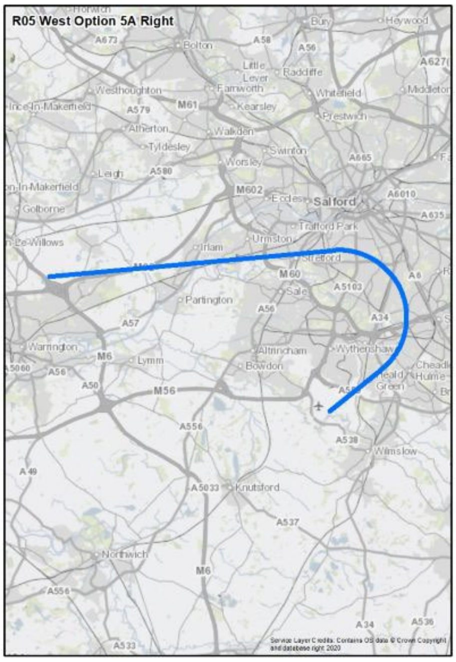
It is similar to option 4A but is designed with a higher speed of 210kts. The greater speed results in a wider track, which may aid vertical separation from MAN arriving traffic from the north. This design speed may also permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

05L: After departure this route makes a single left turn just after Cheadle which takes it east of Burnage and overhead Fallowfield. The left turn is completed heading in a westerly direction close to Old Trafford and it continues west to route via Urmston and terminates at 7,000ft north of Warrington close to the junction between the M62 and the M6 where the two routes combine.

05R: After departure this route makes a single left turn just after Cheadle which takes it east of Burnage and overhead Fallowfield. The left turn is completed heading in a westerly direction close to Old Trafford and it continues west to route via Urmston and terminates at 7,000ft north of Warrington close to the junction between the M62 and the M6 where the two routes combine.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 5A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 5A L is estimated to limit the total population affected by noise.
Option 5A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 5A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 5A R is estimated to limit the total population affected by noise.
Option 5A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 5A L is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 5A R is 44km (24nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 5A L is estimated to overfly approximately 50,850 households with an approximate population of 135,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 135,300.

Up to 7,000ft, option 5A L is estimated to overfly approximately 72,800 households with an approximate population of 187,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 189,600.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 5A R is estimated to overfly approximately 51,500 households with an approximate population of 137,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 137,200.

Up to 7,000ft, option 5A R is estimated to overfly approximately 75,800 households with an approximate population of 195,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 197,100.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 5A L is estimated to overfly 235 noise sensitive areas.

Up to 7,000ft, this option 5A L is estimated to overfly 330 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 5A R is estimated to overfly 215 noise sensitive areas.

Up to 7,000ft, this option 5A R is estimated to overfly 320 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

10.7 Runways 05L/05R West Option 5B

Design Principle Evaluation	Option No: 5B
Option Name: SID RW 05L WEST Option 5B	REJECT
Option Name: SID RW 05R WEST Option 5B	REJECT

Option Description:

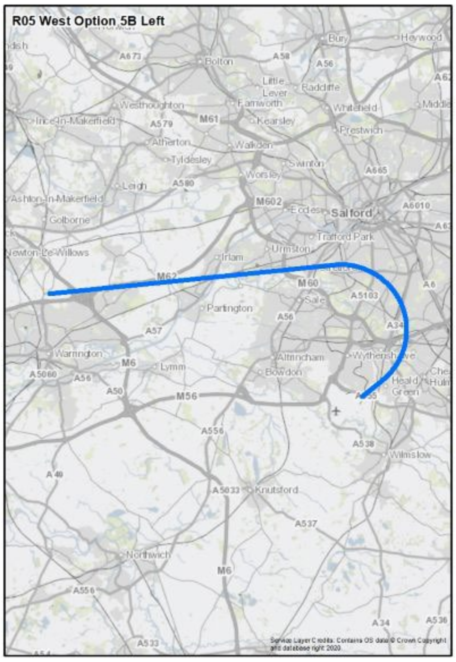
This is an **RNP1** that uses RF coding to provide a single initial turn to create a fuel-efficient route to the network joining point to the west. It differs from option 5A in that the turn is at the earliest PANS-OPS compliant position from Runway 05L to create a shorter route for this design speed.

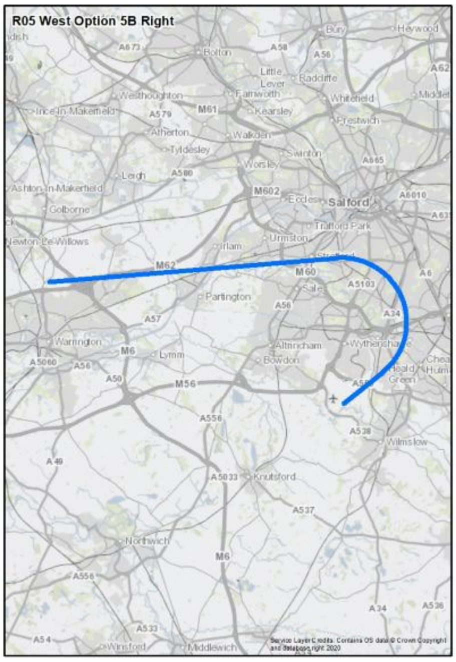
It is similar to option 4B but is designed with a higher speed of 210kts. The greater speed results in a wider track, which may aid vertical separation from MAN arriving traffic from the north. The design speed may also permit some aircraft to be in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

05L: After departure this route turns left at the earliest PANS-OPS compliant position (1nm from DER). This is a single left turn that takes it overhead Cheadle and Withington before completing the left turn heading in a westerly direction to the north of Chorlton. It continues west to route to be south of Stretford and Urmston and terminates at 7,000ft north of Warrington just beyond the junction between the M62 and the M6 where **the two routes combine.**

05R: After departure this route turns left at a point that is perpendicular with the turn point for the 05L option. This single left turn takes it overhead Cheadle and Withington before completing the left turn heading in a westerly direction to the north of Chorlton. It continues west to route to be south of Stretford and Urmston and terminates at 7,000ft north of Warrington just beyond the junction between the M62 and the M6 where the two routes combine.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 5B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 5B L is estimated to limit the total population affected by noise.
Option 5B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 5B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 5B R is estimated to limit the total population affected by noise.
Option 5B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 5B L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 5B R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 5B L is estimated to overfly approximately 40,600 households with an approximate population of 103,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 103,300.

Up to 7,000ft, option 5B L is estimated to overfly approximately 61,400 households with an approximate population of 152,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 156,600.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 5B R is estimated to overfly approximately 39,100 households with an approximate population of 99,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 99,500.

Up to 7,000ft, option 5B R is estimated to overfly approximately 61,050 households with an approximate population of 151,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 155,900.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 5B L is estimated to overfly 180 noise sensitive areas.

Up to 7,000ft, this option 5B L is estimated to overfly 260 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 5B R is estimated to overfly 200 noise sensitive areas.

Up to 7,000ft, this option 5B R is estimated to overfly 290 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

10.8 Runways 05L/05R West Option 6A

Design Principle Evaluation	Option No: 6A
Option Name: SID RW 05L WEST Option 6A	ACCEPT
Option Name: SID RW 05R WEST Option 6A	ACCEPT

Option Description:

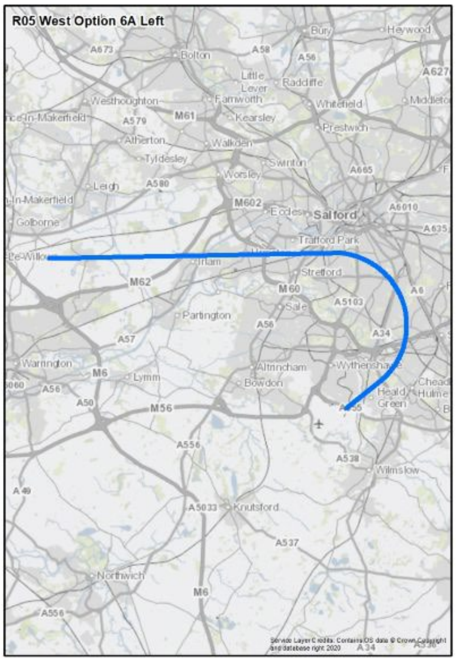
This is an **RNP1** that uses RF coding to provide a single initial turn based on the position of the current turn to create a fuel-efficient route to the network joining point to the west. It is similar to option 5A but is designed with a higher speed of 220kts speed intended to allow aircraft to use the route in a more aerodynamic configuration.

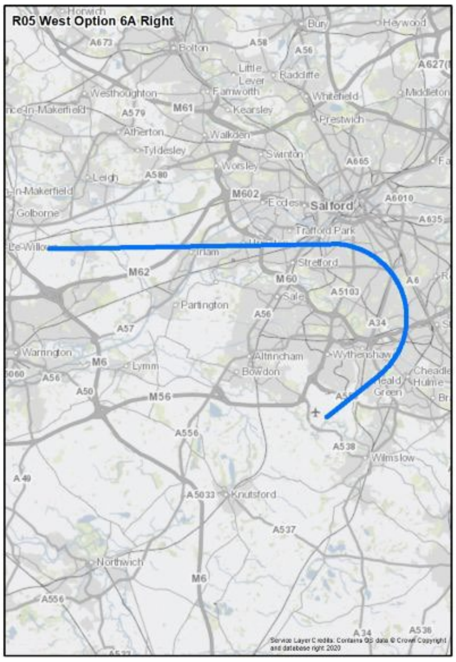
The greater speed results in a wider track, which may aid vertical separation from Manchester arriving traffic from the north. It will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

05L: After departure this route makes a single left turn just after Cheadle which takes it east of Burnage and overhead Fallowfield. The left turn is completed heading in a westerly direction overhead Old Trafford where the routes combine and continue west to route north of Stretford, Urmston and Irlam. It terminates at 7,000ft north of Warrington to the east of Earlestown.

05R: After departure this route makes a single left turn just after Cheadle which takes it east of Burnage and overhead Rusholme. The left turn is completed heading in a westerly direction overhead Old Trafford where the routes combine and continue west to route north of Stretford, Urmston and Irlam. It terminates at 7,000ft north of Warrington to the east of Earlestown.

A speed restriction of 220 KIAS is used for the first turn which allows most aircraft to fly in a clean configuration.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6A L is estimated to limit the total population affected by noise.
Option 6A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6A R is estimated to limit the total population affected by noise.
Option 6A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 6A L is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 6A R is 45km (24nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6A L is estimated to overfly approximately 45,300 households with an approximate population of 121,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 124,900.

Up to 7,000ft, option 6A L is estimated to overfly approximately 64,700 households with an approximate population of 168,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 173,300.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 6A R is estimated to overfly approximately 48,450 households with an approximate population of 130,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 133,800.

Up to 7,000ft, option 6A R is estimated to overfly approximately 71,650 households with an approximate population of 187,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 191,600.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6A L is estimated to overfly 250 noise sensitive areas.

Up to 7,000ft, this option 6A L is estimated to overfly 345 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 6A R is estimated to overfly 245 noise sensitive areas.

Up to 7,000ft, this option 6A R is estimated to overfly 355 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

10.9 Runways 05L/05R West Option 6B

Design Principle Evaluation	Option No: 6B
Option Name: SID RW 05L WEST Option 6B	REJECT
Option Name: SID RW 05R WEST Option 6B	REJECT

Option Description:

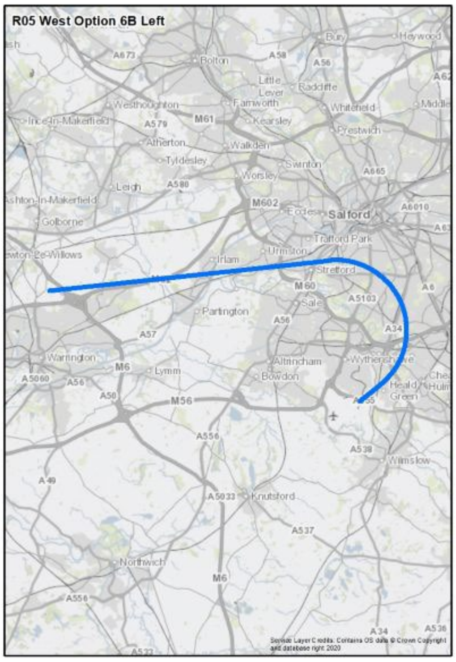
This is an **RNP1** that uses RF coding to provide a single initial turn to create a fuel-efficient route to the network joining point to the west. It differs from option 6A in that the turn is at the earliest PANS-OPS compliant position from Runway 05L to create a shorter route for this design speed.

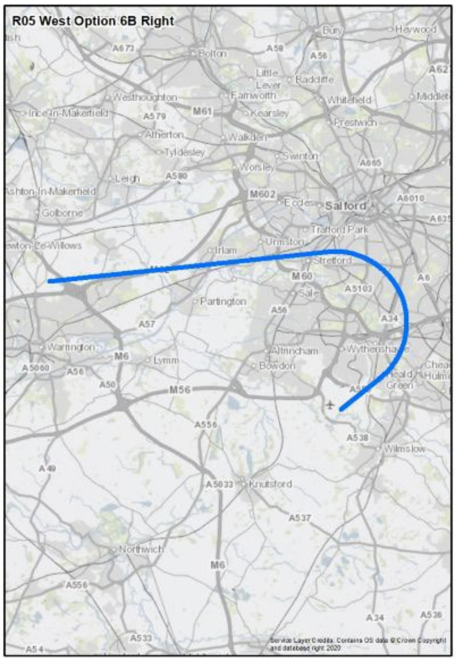
It is similar to option 5B but is designed with a higher speed of 220kts. The greater speed results in a wider track, which may aid vertical separation from Manchester arriving traffic from the north. The greater speed will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

05L: After departure this route turns left at the earliest PANS-OPS compliant position (1nm from DER). This is a single left turn that takes it overhead Cheadle and Burnage before completing the left turn heading in a westerly between Chorlton and Old Trafford. It continues west to route overhead Stretford and Urmston and terminates at 7,000ft north of Warrington just beyond the junction between the M62 and the M6.

05R: After departure this route turns left at a point that is perpendicular with the turn point for the 05L option. This single left turn takes it overhead Cheadle and Burnage before completing the left turn heading in a westerly between Chorlton and Old Trafford. It continues west to route overhead Stretford and Urmston and terminates at 7,000ft north of Warrington just beyond the junction between the M62 and the M6.

A speed restriction of 220 KIAS is used for the first turn which allows most aircraft to fly in a clean configuration.





Design Principle Safety	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6B L is estimated to limit the total population affected by noise.
Option 6B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6B R is estimated to limit the total population affected by noise.
Option 6B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 6B L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 6B R is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6B L is estimated to overfly approximately 47,550 households with an approximate population of 121,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 121,100.

Up to 7,000ft, option 6B L is estimated to overfly approximately 67,000 households with an approximate population of 167,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 170,200.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 6B R is estimated to overfly approximately 49,500 households with an approximate population of 127,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 127,700.

Up to 7,000ft, option 6B R is estimated to overfly approximately 72,150 households with an approximate population of 181,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 184,600.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6B L is estimated to overfly 215 noise sensitive areas.

Up to 7,000ft, this option 6B L is estimated to overfly 285 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 6B R is estimated to overfly 230 noise sensitive areas.

Up to 7,000ft, this option 6B R is estimated to overfly 320 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

10.10 Runways 05L/05R West Option 7

Design Principle Evaluation	Option No: 7
Option Name: SID RW 05L WEST Option 7	ACCEPT
Option Name: SID RW 05R WEST Option 7	ACCEPT

Option Description:

This is an **RNP1** option that uses RF coding to provide a similar route to that of option 4B, but it uses an initial 15° track adjustment to the left from the DER for Runway 05L, and a 5° adjustment for Runway 05R. This is to provide noise relief for the Cheadle area, which lies underneath the approach path for Runways 23R/23L arrivals. After this track adjustment it has a single initial turn at the earliest PANS-OPS compliant position to create a fuel-efficient route to the network joining point to the west.

05L: After passing the DER aircraft make a 15° track adjustment to the left (north) and then turn left at the earliest PANS-OPS compliant position (1nm from DER). This is a single left turn that takes it to the west side of Cheadle and then overhead West Didsbury before completing the left turn heading in a westerly direction to the south of Chorlton where the two routes combine. It continues west to route just north of Sale and terminates at 7,000ft north-west of Warrington.

05R: After passing the DER aircraft make a 5° track adjustment to the left (north) and then turn left at a point that is abeam the turn point for 05L. This is a single left turn that takes it to the west side of Cheadle and then overhead Didsbury before completing the left turn heading in a westerly direction to the south of Chorlton where the two routes combine. It continues west to route just north of Sale and terminates at 7,000ft north-west of Warrington.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 7 L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 7 L is estimated to limit the total population affected by noise.
Option 7 L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7 L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 7 R is estimated to limit the total population affected by noise.
Option 7 R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7 R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 7 L is 36km (19nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 7 R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 7 L is estimated to overfly approximately 22,800 households with an approximate population of 52,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 57,100.

Up to 7,000ft, option 7 L is estimated to overfly approximately 52,200 households with an approximate population of 121,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 131,600.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 7 R is estimated to overfly approximately 26,600 households with an approximate population of 60,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 63,200.

Up to 7,000ft, option 7 R is estimated to overfly approximately 59,900 households with an approximate population of 138,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 148,200.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 7 L is estimated to overfly 120 noise sensitive areas.

Up to 7,000ft, this option 7 L is estimated to overfly 230 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 7 R is estimated to overfly 140 noise sensitive areas.

Up to 7,000ft, this option 7 R is estimated to overfly 275 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

10.11 Runways 05L/05R West Summary

	Option 1L	Option 2L	Option 3L	Option 4AL	Option 4BL	Option 5AL	Option 5BL	Option 6AL	Option 6BL	Option 7L
S	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
P	MET	PARTIAL	PARTIAL	MET	MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL	MET
C	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	MET
N1	MET	PARTIAL	PARTIAL	MET	MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL	MET
N2	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
N3	MET	PARTIAL	PARTIAL	MET	MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL	MET
A	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Rejected	Rejected	Rejected	4,000ft beneficial	Rejected	Rejected	Add. Qual.	Rejected	Best

	Option 1R	Option 2R	Option 3R	Option 4AR	Option 4BR	Option 5AR	Option 5BR	Option 6AR	Option 6BR	Option 7R
S	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
P	MET	PARTIAL	PARTIAL	PARTIAL	MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL	MET
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	MET	PARTIAL	PARTIAL	PARTIAL	MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL	MET
N2	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
N3	MET	PARTIAL	PARTIAL	PARTIAL	MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL	MET
A	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Rejected	Rejected	Rejected	Best	Rejected	Rejected	Add. Qual.	Rejected	Best

10.12 Runways 05L/05R West Viable but Poor Fit Options

<table>
<tr><th>Option</th><th>Safety</th><th>Policy</th><th>Capacity</th></tr>
<tr><td>A8 Extended straight ahead then gradual left turn towards west</td><td>S</td><td>P</td><td>C</td></tr>
<tr><td colspan="4">After departure from Runways 05L/05R, aircraft would fly straight ahead beyond Stockport before making a left-hand turn, heading west towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:
• Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance east before turning it west leading to increased fuel burn and emissions.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: This option would initially take the same track as departure options within the 05 East envelope and would also interact with departures in the 05 North and South-west envelopes. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.</td></tr>
<tr><td>B9 Right-hand wraparound</td><td>S</td><td>P</td><td>C</td></tr>
<tr><td colspan="4">After departure from Runways 05L/05R, aircraft would make a right-hand turn, before making a second right-hand turn, passing to the south of the airport, and then turning west, towards the SID aiming point.

Safety: This option is expected to conflict with the Runway 05R MAP.

Policy: This option fails to align with the ends of the AMS with respect to:
• Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a south before turning it north and then west leading to increased fuel burn and emissions.

The trade-off analysis between emissions and noise, identified a potential noise benefit below 4,000ft which resulted in an amber categorisation.

The trade-off analysis against other AMS ends did not identify other benefits.

Capacity: This option interacts with departures in the 05 South Design Envelope and may also interact with arrivals from the south. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.</td></tr>
</table>

11 Runways 05L/05R South-west

11.1 Runways 05L/05R South-west Option 1

Design Principle Evaluation	Option No: 1
Option Name: SID RW 05L SOUTH-WEST Option 1	REJECT
Option Name: SID RW 05R SOUTH-WEST Option 1	ACCEPT

Option Description:

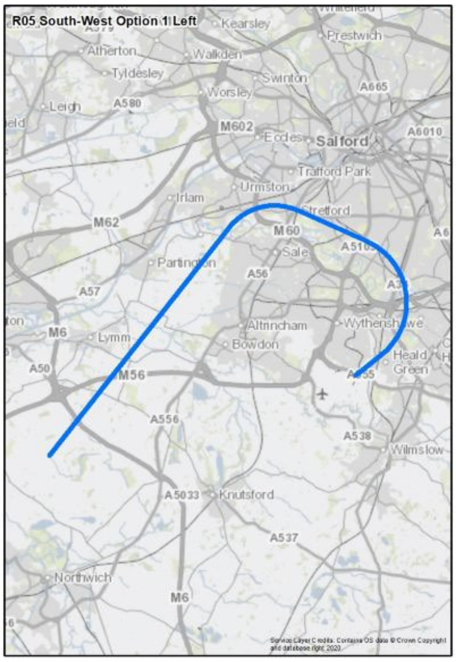
This is an **RNAV1** option that provides two left turns and then a track to join the NATS network to the south-west. The initial course is similar to the current ASMIM 1S/1Z SID, but it turns off this to the north of MAN.

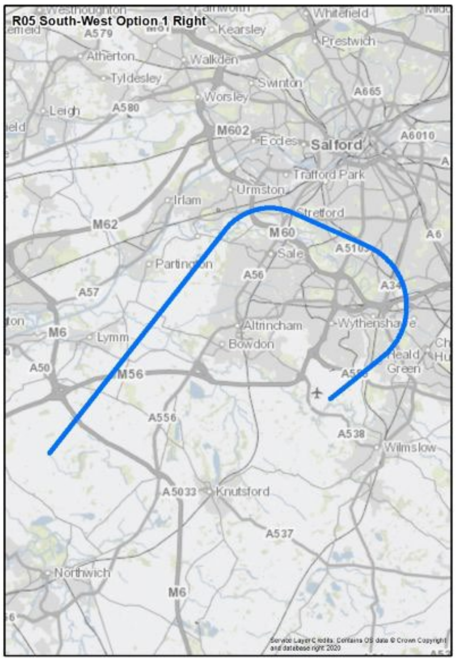
It has an initial turn at 1nm DER (05L) followed by a 117° left turn to head south-west. The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. The procedure uses fly-by waypoints.

05L: After departure this route turns left at the earliest PANS-OPS compliant position (1nm from DER). This takes it overhead Cheadle and West Didsbury where it combines with the option for 05R. There is then a short straight segment before a second turn is made over Stretford and it heads in a south-westerly direction over sparsely populated areas to terminate at 7,000ft south of the Lymm interchange between the M56 and the M6.

05R: After departure this route turns left at a point that is perpendicular with the turn point for the 05L option. This takes it overhead Cheadle and West Didsbury where it combines with the option for 05L. There is then a short straight segment before a second turn is made over Stretford and it heads in a south westerly direction over sparsely populated areas to terminate at 7,000ft south of the Lymm interchange between the M56 and the M6.

A speed restriction of 210 KIAS is used for the first turn and second turn, which is the CAP778 recommended speed.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1 L is estimated to limit the total population affected by noise.
Option 1 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1 R is estimated to limit the total population affected by noise.
Option 1 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1 L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1 R is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1 L is estimated to overfly approximately 33,800 households with an approximate population of 79,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 80,000.

Up to 7,000ft, option 1 L is estimated to overfly approximately 36,100 households with an approximate population of 85,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 86,000.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1 R is estimated to overfly approximately 38,250 households with an approximate population of 90,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 90,100.

Up to 7,000ft, option 1 R is estimated to overfly approximately 40,800 households with an approximate population of 96,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 97,300.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1 L is estimated to overfly 160 noise sensitive areas.

Up to 7,000ft, this option 1 L is estimated to overfly 175 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 1 R is estimated to overfly 190 noise sensitive areas.

Up to 7,000ft, this option 1 R is estimated to overfly 200 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

11.2 Runways 05L/05R South-west Option 2A

Design Principle Evaluation	Option No: 2A
Option Name: SID RW 05L SOUTH-WEST Option 2A	REJECT
Option Name: SID RW 05R SOUTH-WEST Option 2A	ACCEPT

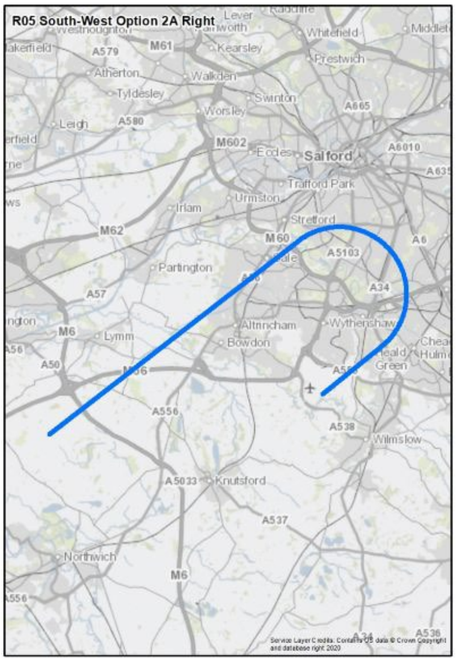
Option Description:

This is an **RNP1** option that uses RF coding to provide a single left turn starting at the position of the current turn to create a fuel-efficient route. The design speed results in a tight radius turn to create a short track length to join the NATS network to the south-west.

05L: After departure this route makes a single left turn just after Cheadle which takes it overhead Burnage and Withington where it combines with the option for 05R. The left turn is completed heading in a south-westerly direction in the vicinity of Chorlton and it continues in this direction to terminate at 7,000ft south of the Lymm interchange between the M56 and the M6.

05R: After departure this route makes a single left turn just after Cheadle which takes it overhead Burnage and Withington where it combines with the option for 05L. The left turn is completed heading in a south-westerly direction in the vicinity of Sale and it continues in this direction to terminate at 7,000ft south of the Lymm interchange between the M56 and the M6.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.



Design Principle		
Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2A L is estimated to limit the total population affected by noise.
Option 2A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2A R is estimated to limit the total population affected by noise.
Option 2A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 2A L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 2A R is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2A L is estimated to overfly approximately 43,850 households with an approximate population of 110,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 110,600.

Up to 7,000ft, option 2A L is estimated to overfly approximately 50,250 households with an approximate population of 125,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 125,800.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 2A R is estimated to overfly approximately 46,450 households with an approximate population of 118,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 118,500.

Up to 7,000ft, option 2A R is estimated to overfly approximately 57,700 households with an approximate population of 145,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 145,600.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 2A L is estimated to overfly 195 noise sensitive areas.

Up to 7,000ft, this option 2A L is estimated to overfly 220 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 2A R is estimated to overfly 205 noise sensitive areas.

Up to 7,000ft, this option 2A R is estimated to overfly 235 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

11.3 Runways 05L/05R South-west Option 2B

Design Principle Evaluation	Option No: 2B
Option Name: SID RW 05L SOUTH-WEST Option 2B	REJECT
Option Name: SID RW 05R SOUTH-WEST Option 2B	ACCEPT

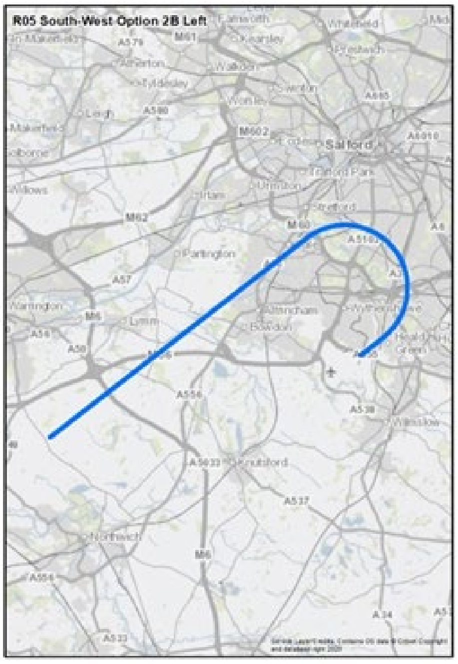
Option Description:

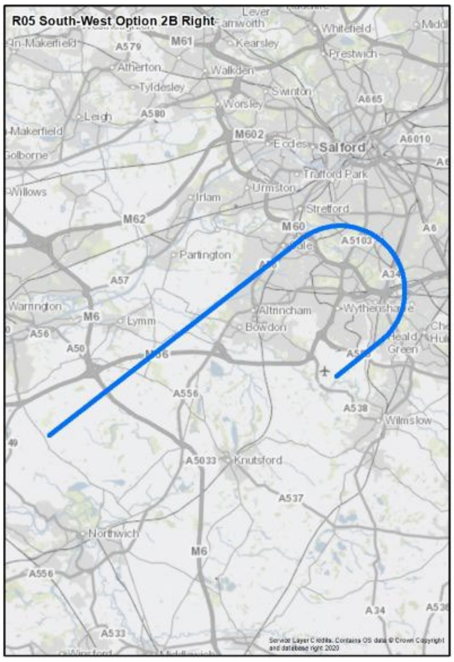
This is an **RNP1** that uses RF coding to provide a single initial turn to create a fuel-efficient route to the network joining point to the west. It differs from option 2A in that the turn is at the earliest PANS-OPS compliant position from Runway 05L to create the shortest route possible at this design speed.

05L: After departure this route turns left at the earliest PANS-OPS compliant position (1nm from DER). This is a single left turn that takes it overhead Cheadle and West Didsbury before completing the left turn heading in a south-westerly direction to the south of Sale where it combines with the option for 05R. It continues south-west to route just north of Altrincham and terminates at 7,000ft south of Warrington.

05R: After departure this route turns left at a point that is perpendicular with the turn point for the 05L option. This is a single left turn that takes it overhead Cheadle and West Didsbury before completing the left turn heading in a south-westerly direction to the south of Sale where it combines with the option for 05L. It continues south-west to route just north of Altrincham and terminates at 7,000ft south of Warrington.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2B L is estimated to limit the total population affected by noise.
Option 2B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2B R is estimated to limit the total population affected by noise.
Option 2B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 2B L is 38km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 2B R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2B L is estimated to overfly approximately 38,400 households with an approximate population of 91,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 91,300.

Up to 7,000ft, option 2B L is estimated to overfly approximately 40,200 households with an approximate population of 95,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 95,500.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 2B R is estimated to overfly approximately 42,650 households with an approximate population of 101,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 101,400.

Up to 7,000ft, option 2B R is estimated to overfly approximately 45,800 households with an approximate population of 109,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 109,200.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 2B L is estimated to overfly 160 noise sensitive areas.

Up to 7,000ft, this option 2B L is estimated to overfly 175 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 2B R is estimated to overfly 195 noise sensitive areas.

Up to 7,000ft, this option 2B R is estimated to overfly 215 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

11.4 Runways 05L/05R South-west Option 3A

Design Principle Evaluation	Option No: 3A
Option Name: SID RW 05L SOUTH-WEST Option 3A	REJECT
Option Name: SID RW 05R SOUTH-WEST Option 3A	ACCEPT

Option Description:

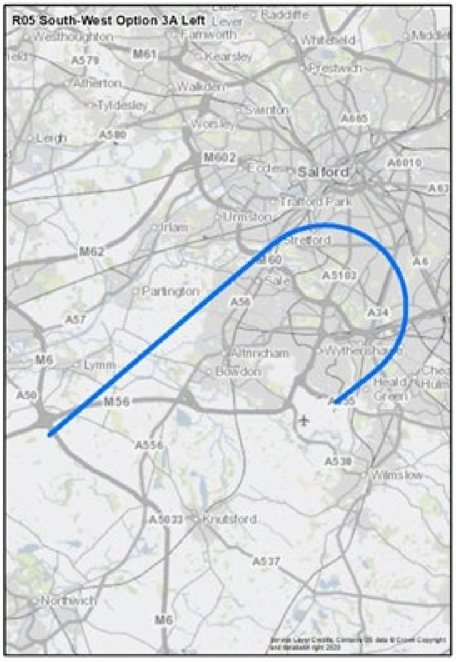
This is an **RNP1** that uses RF coding to provide a single initial turn starting at the position of the current turn to create a fuel-efficient route to the south-west. It is similar to option 2A but is designed with a higher design speed of 210kts.

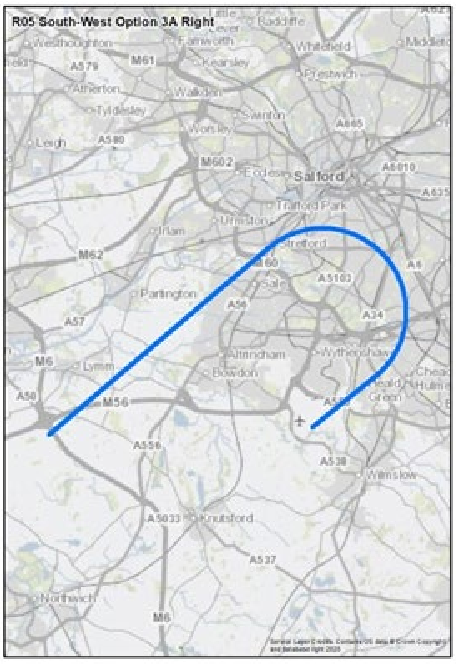
The greater speed results in a wider track, which may aid vertical separation from MAN arriving traffic from the north. The design speed may also permit some aircraft to be in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

05L: After departure this route makes a single left turn just after Cheadle which takes it overhead Burnage and Fallowfield where it combines with the option for 05R. The left turn is completed heading in a south-westerly direction between Chorlton and Stretford and it continues in this direction to terminate at 7,000ft south of the Lymm interchange between the M56 and the M6.

05R: After departure this route makes a single left turn just after Cheadle which takes it overhead Burnage and Fallowfield where it combines with the option for 05L. The left turn is completed heading in a south-westerly direction between Chorlton and Stretford and it continues in this direction to terminate at 7,000ft south of the Lymm interchange between the M56 and the M6.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3A L is estimated to limit the total population affected by noise.
Option 3A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 3A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3A R is estimated to limit the total population affected by noise.
Option 3A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 3A L is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 3A R is 45km (24nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3A L is estimated to overfly approximately 47,400 households with an approximate population of 126,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 126,300.

Up to 7,000ft, option 3A L is estimated to overfly approximately 58,450 households with an approximate population of 152,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 152,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 3A R is estimated to overfly approximately 50,650 households with an approximate population of 135,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 135,500.

Up to 7,000ft, option 3A R is estimated to overfly approximately 66,350 households with an approximate population of 172,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 172,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 3A L is estimated to overfly 225 noise sensitive areas.

Up to 7,000ft, this option 3A L is estimated to overfly 270 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 3A R is estimated to overfly 235 noise sensitive areas.

Up to 7,000ft, this option 3A R is estimated to overfly 300 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

11.5 Runways 05L/05R South-west Option 3B

Design Principle Evaluation	Option No: 3B
Option Name: SID RW 05L SOUTH-WEST Option 3B	REJECT
Option Name: SID RW 05R SOUTH-WEST Option 3B	ACCEPT

Option Description:

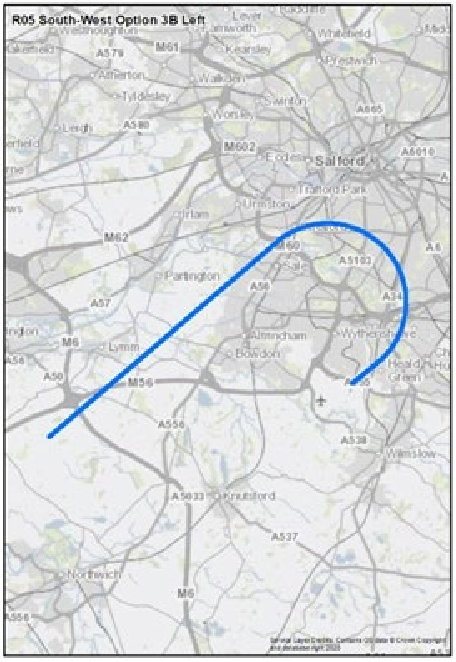
This is an **RNP1** option that uses RF coding to provide a single initial turn to create a fuel-efficient route to the network joining point to the west. It differs from option 3A in that the turn is at the earliest PANS-OPS compliant position from 05L to create a shorter route for this design speed.

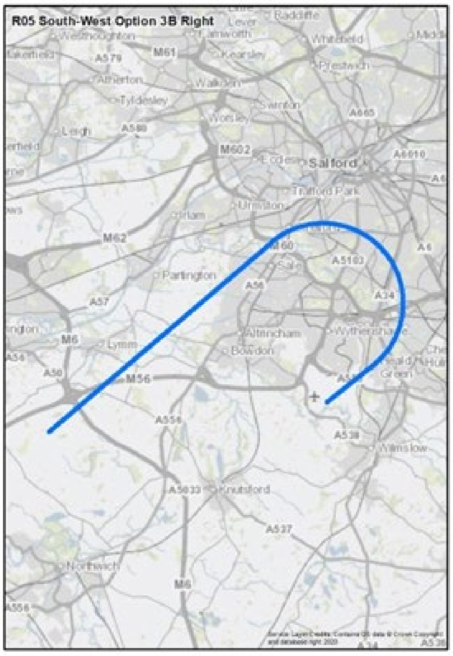
It is similar to option 2B but is designed with a higher speed of 210kts. The greater speed results in a wider track, which may aid vertical separation from MAN arriving traffic from the north. It may also permit some aircraft to be in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

05L: After departure this route turns left at the earliest PANS-OPS compliant position (1nm from DER). This is a single left turn that takes it overhead Cheadle and Withington before completing the left turn heading in a south-westerly direction to the south of Stretford where it combines with the option for 05R. It continues south-west to route to avoid Altrincham and terminates at 7,000ft west of the Lymm interchange between the M56 and the M6.

05R: After departure this route turns left at a point that is perpendicular with the turn point for the 05L option. This is a single left turn that takes it overhead Cheadle and Withington before completing the left turn heading in a south-westerly direction to the south of Stretford where it combines with the option for 05L. It continues south-west to route to avoid Altrincham and terminates at 7,000ft west of the Lymm interchange between the M56 and the M6.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3B L is estimated to limit the total population affected by noise.
Option 3B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 3B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3B R is estimated to limit the total population affected by noise.
Option 3B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 3B L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 3B R is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3B L is estimated to overfly approximately 40,600 households with an approximate population of 103,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 103,000.

Up to 7,000ft, option 3B L is estimated to overfly approximately 44,400 households with an approximate population of 112,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 112,000.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 3B R is estimated to overfly approximately 44,250 households with an approximate population of 112,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 112,500.

Up to 7,000ft, option 3B R is estimated to overfly approximately 50,950 households with an approximate population of 128,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 128,500.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 3B L is estimated to overfly 170 noise sensitive areas.

Up to 7,000ft, this option 3B L is estimated to overfly 185 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 3B R is estimated to overfly 215 noise sensitive areas.

Up to 7,000ft, this option 3B R is estimated to overfly 240 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

11.6 Runways 05L/05R South-west Option 4A

Design Principle Evaluation	Option No: 4A
Option Name: SID RW 05L SOUTH-WEST Option 4A	REJECT
Option Name: SID RW 05R SOUTH-WEST Option 4A	REJECT

Option Description:

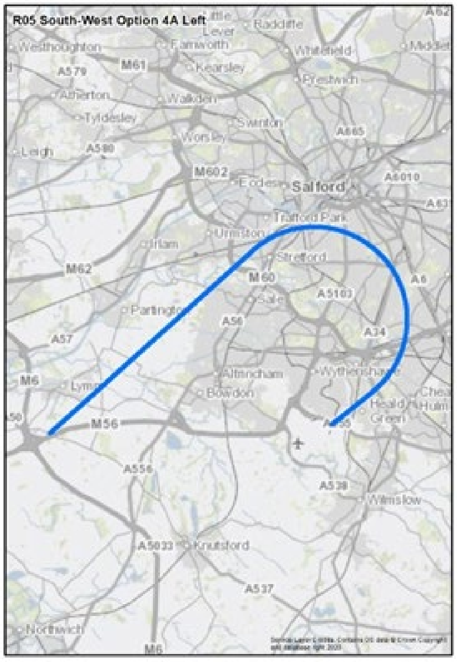
This is an RNP1 option that uses RF coding to provide a single initial turn based on the position of the current turn to create a route to the south-west. It is similar to option 2A and 3A but is designed with a higher speed of 220kts intended to allow aircraft to use the route in a more aerodynamic configuration.

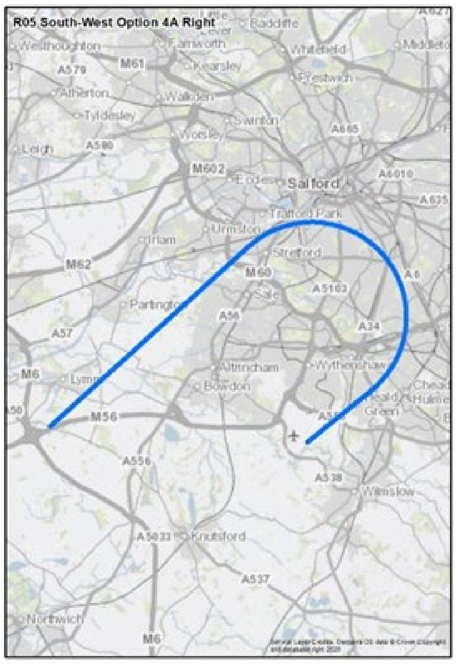
The greater speed results in a wider track, which may aid vertical separation from MAN arriving traffic from the north. It will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

05L: After departure this route makes a single left turn just after Cheadle which takes it overhead Rusholme and Old Trafford where it combines with the option for 05R. The left turn is completed heading in a south-westerly direction at Stretford and it continues in this direction to terminate at 7,000ft east of the Lymm interchange between the M56 and the M6.

05R: After departure this route makes a single left turn just after Cheadle which takes it overhead Rusholme and Old Trafford where it combines with the option for 05L. The left turn is completed heading in a south-westerly direction at Stretford and it continues in this direction to terminate at 7,000ft east of the Lymm interchange between the M56 and the M6.

A speed restriction of 220 KIAS is used for the first turn which allows most aircraft to fly in a clean configuration.





Design Principle Safety	05L	MET
	05R	MET

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment: Up to 4,000ft, option 4A L is estimated to increase the total population affected by noise. Up to 7,000ft, option 4A L is estimated to limit the total population affected by noise. Option 4A L is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 4A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 4A R is estimated to increase the total population affected by noise. Up to 7,000ft, option 4A R is estimated to limit the total population affected by noise. Option 4A R is similar in length and it is anticipated that emissions would be increased. At this stage of the process, option 4A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment: When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure. Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 4A L is 44km (24nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4A R is 47km (25nm). When compared to the 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4A L is estimated to overfly approximately 47,700 households with an approximate population of 127,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 132,400.

Up to 7,000ft, option 4A L is estimated to overfly approximately 59,800 households with an approximate population of 155,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 161,300.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 4A R is estimated to overfly approximately 51,650 households with an approximate population of 140,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 145,100.

Up to 7,000ft, option 4A R is estimated to overfly approximately 67,550 households with an approximate population of 176,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 182,800.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4A L is estimated to overfly 235 noise sensitive areas.

Up to 7,000ft, this option 4A L is estimated to overfly 290 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 4A R is estimated to overfly 275 noise sensitive areas.

Up to 7,000ft, this option 4A R is estimated to overfly 340 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

11.7 Runways 05L/05R South-west Option 4B

Design Principle Evaluation	Option No: 4B
Option Name: SID RW 05L SOUTH-WEST Option 4B	ACCEPT
Option Name: SID RW 05R SOUTH-WEST Option 4B	ACCEPT

Option Description:

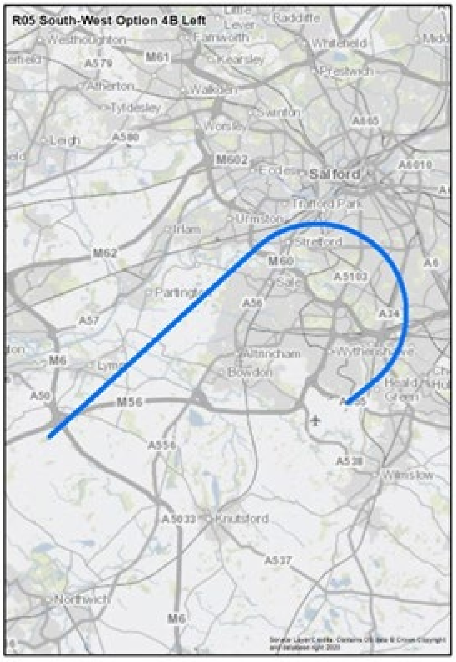
This is an **RNP1** option that uses RF coding to provide a single initial turn at the earliest PANS-OPS compliant position to create a route to the south-west. It differs from option 4A in that the turn is at the earliest PANS-OPS compliant position from Runway 05L to create a shorter route for this design speed.

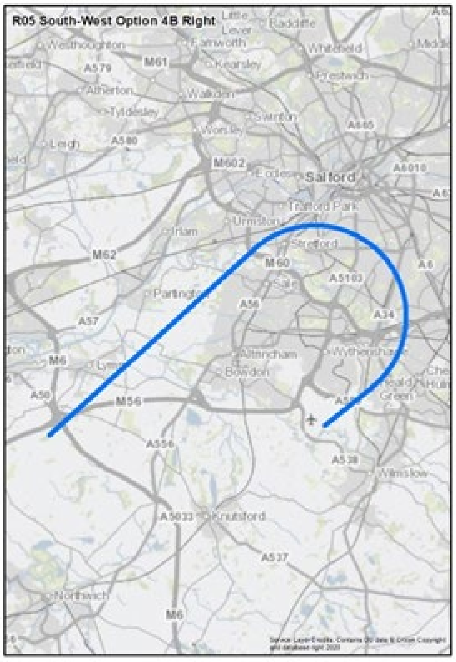
It is similar to options 2B and 3B but is designed with a higher speed of 220kts. The design speed results in a wider track, which may aid vertical separation from MAN arriving traffic from the north. It will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

05L: After departure this route turns left at the earliest PANS-OPS compliant position (1nm from DER). This is a single left turn that takes it overhead Cheadle, Burnage and Fallowfield before completing the left turn heading in a south-westerly direction at Stretford where it combines with the option for 05R. It continues in this direction to terminate at 7,000ft west of the Lymm interchange between the M56 and the M6.

05R: After departure this route turns left at a point that is perpendicular with the turn point for the 05L option. This single left turn takes it overhead Cheadle, Burnage and Fallowfield before completing the left turn heading in a south-westerly direction at Stretford where it combines with the option for 05L. It continues in this direction to terminate at 7,000ft west of the Lymm interchange between the M56 and the M6.

A speed restriction of 220 KIAS is used for the first turn which allows most aircraft to fly in a clean configuration.





Design Principle	Runway	Result
Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4B L is estimated to limit the total population affected by noise.
Option 4B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4B R is estimated to limit the total population affected by noise.
Option 4B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4B L is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4B R is 45km (24nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4B L is estimated to overfly approximately 44,300 households with an approximate population of 114,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 114,400.

Up to 7,000ft, option 4B L is estimated to overfly approximately 50,700 households with an approximate population of 129,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 129,700.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 4B R is estimated to overfly approximately 47,300 households with an approximate population of 126,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 126,700.

Up to 7,000ft, option 4B R is estimated to overfly approximately 56,600 households with an approximate population of 147,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 149,200.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4B L is estimated to overfly 195 noise sensitive areas.

Up to 7,000ft, this option 4B L is estimated to overfly 225 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4B R is estimated to overfly 225 noise sensitive areas.

Up to 7,000ft, this option 4B R is estimated to overfly 270 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

11.8 Runways 05L/05R South-west Option 5

Design Principle Evaluation	Option No: 5
Option Name: SID RW 05L SOUTH-WEST Option 5	ACCEPT
Option Name: SID RW 05R SOUTH-WEST Option 5	ACCEPT

Option Description:

This is an **RNAV1** option that provides two turns to the left to route south-west similar option 1 but uses an initial 15° track adjustment to the left from the DER for Runway 05L, and a 5° adjustment for Runway 05R. This is to provide noise relief for the Cheadle area, which lies underneath the approach path for Runways 23R/23L arrivals.

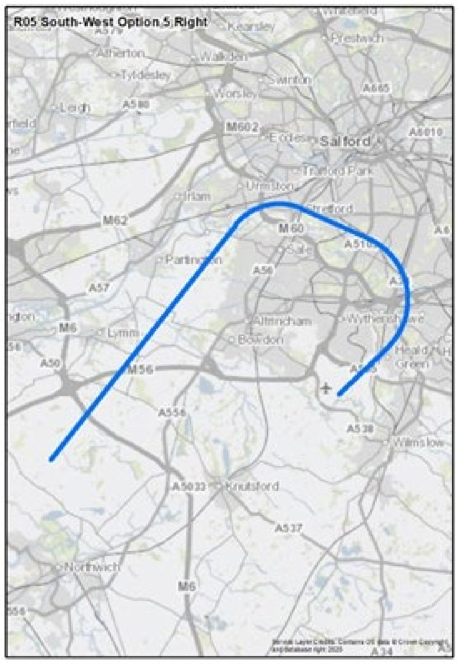
The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

The procedure uses fly-by waypoints.

05L: After passing the DER aircraft make a 15° track adjustment to the left (north) followed by a left turn that routes aircraft to the west of Cheadle. There is then a short straight segment where the routes combine before a second turn is made over Stretford and it heads in a south-westerly direction over sparsely populated areas to terminate at 7,000ft to the south-west of the junction between the M56 and M6.

05R: After passing the DER aircraft make a 5° track adjustment to the left (north) followed by a left turn that routes aircraft to the west of Cheadle. There is then a short straight segment where the routes combine before a second turn is made over Stretford and it heads in a south-westerly direction over sparsely populated areas to terminate at 7,000ft to the south-west of the junction between the M56 and M6.

A speed restriction of 210 KIAS is used for the first turn which is the CAP778 recommended speed.



Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNAV1 When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 5 L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 5 L is estimated to limit the total population affected by noise.
Option 5 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5 L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 5 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 5 R is estimated to limit the total population affected by noise.
Option 5 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 05R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 05R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 5 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 5 R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 5 L is estimated to overfly approximately 31,500 households with an approximate population of 73,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 74,100.

Up to 7,000ft, option 5 L is estimated to overfly approximately 33,800 households with an approximate population of 79,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 80,000.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 5 R is estimated to overfly approximately 36,800 households with an approximate population of 86,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 86,900.

Up to 7,000ft, option 5 R is estimated to overfly approximately 39,200 households with an approximate population of 92,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 93,200.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 5 L is estimated to overfly 150 noise sensitive areas.

Up to 7,000ft, this option 5 L is estimated to overfly 165 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 5 R is estimated to overfly 180 noise sensitive areas.

Up to 7,000ft, this option 5 R is estimated to overfly 195 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

11.9 Runways 05L/05R South-west Summary

	Option 1L	Option 2AL	Option 2BL	Option 3AL	Option 3BL	Option 4AL	Option 4BL	Option 5L
S	MET	MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	MET
C	MET	MET	MET	MET	MET	MET	MET	MET
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	MET
N2	MET	MET	MET	MET	MET	MET	MET	MET
N3	MET	PARTIAL	MET	PARTIAL	MET	PARTIAL	PARTIAL	MET
A	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET
	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Add. Qual.	Best

	Option 1R	Option 2AR	Option 2BR	Option 3AR	Option 3BR	Option 4AR	Option 4BR	Option 5R
S	MET	MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	NOT MET	PARTIAL	PARTIAL
N1	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N2	MET	MET	MET	MET	MET	MET	MET	MET
N3	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
A	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET
	Best	Best	Best	Best	Best	Rejected	Best	Best

11.10 Runways 05L/05R South-west Viable but Poor Fit Options

Option	Safety	Policy	Capacity
A6 Extended climb out then left turn	S	P	C

After departure from Runways 05L/05R, aircraft would continue straight ahead beyond Stockport before making a 180-degree left turn, south-west, towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance east before turning it south-west leading to increased fuel burn and emissions.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: This option would initially take the same track as departure options within the 05 East envelope and would also interact with departures in the 05 North and South-west envelopes. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

Option	Safety	Policy	Capacity
B7 Extended climb out, then right turn	S	P	C

After departure from Runways 05L/05R, aircraft would continue straight ahead beyond Stockport before making a 180-degree right-hand turn to the west and then south-west.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance east before turning it south-west leading to increased fuel burn and emissions.

The trade-off analysis between emissions and noise, did not identify a potential noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: This option would take the same track as departures to the east and to interact with departures in the south envelope. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

Option	Safety	Policy	Capacity
C8 Right-hand wraparound	S	P	C

After departure from Runways 05L/05R, aircraft would make a right-hand turn, fly around the airport to head north initially and then begin heading south-west towards the SID aiming point.

Safety: This option is expected to conflict with the Runways 05L/05R MAP.

Capacity: This option would interact with departures in the 05 South Design Envelope and 05 arrivals from the both the south and north. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

12 Runways 23R/23L North

12.1 Runways 23R/23L North Option 1A

Design Principle Evaluation	Option No: 1A
Option Name: SID RW 23L NORTH Option 1A	ACCEPT
Option Name: SID RW 23R NORTH Option 1A	ACCEPT

Option Description:

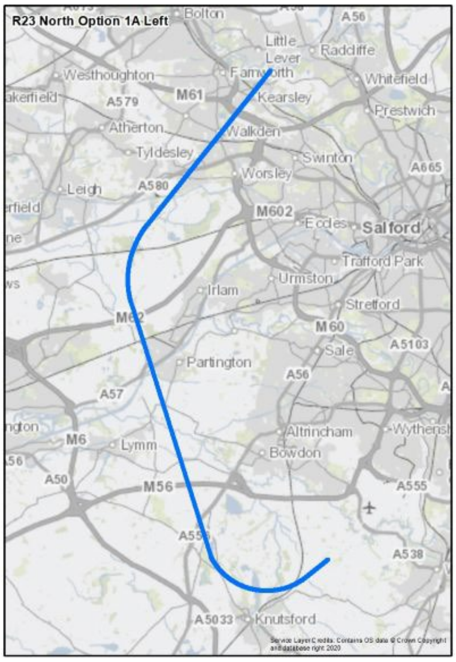
Option 1A is an **RNAV1** replication of the current departure to POL and uses fly-over waypoints with CF path terminator coding to create an approximate replication of the existing conventional POL 5R 1Y SID. An element of dispersion would be apparent in the turns due to the fly-over waypoint and CF coding.

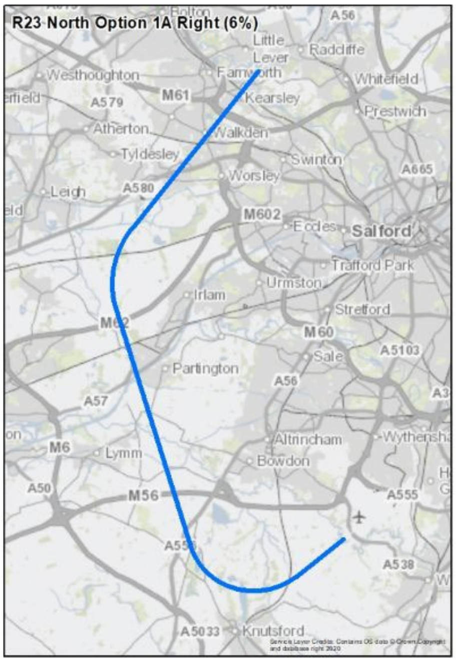
The fly-over waypoints are positioned at the existing markers.

- For Runway 23R this first turn is at MCT D3.
- For Runway 23L, this is at D3.2 which is less than 1nm from DER but replicates the current procedure.

As a replicated route it follows a similar track over the ground as the current published route. This takes both routes to the north of Knutsford at which point the tracks of the SIDs converge. The route heads north until turning right to the north-west of Irlam to head in a north-east direction and terminates at 7,000ft just east of Farnworth.

A speed restriction of 200 KIAS is used for the first turn.





Design Principle **Safety**		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide a RNAV1 replication of the current route. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1A L is estimated to limit the total population affected by noise.
Option 1A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1A R is estimated to limit the total population affected by noise.
Option 1A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1A L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1A R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1A L is estimated to overfly approximately 4,450 households with an approximate population of 10,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,400.

Up to 7,000ft, option 1A L is estimated to overfly approximately 38,850 households with an approximate population of 89,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 91,900.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1A R is estimated to overfly approximately 4,650 households with an approximate population of 11,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,500.

Up to 7,000ft, option 1A R is estimated to overfly approximately 39,200 households with an approximate population of 90,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 92,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1A L is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 1A L is estimated to overfly 155 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 1A R is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 1A R is estimated to overfly 155 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

12.2 Runways 23R/23L North Option 1B

Design Principle Evaluation	Option No: 1B
Option Name: SID RW 23L NORTH Option 1B	REJECT
Option Name: SID RW 23R NORTH Option 1B	ACCEPT

Option Description:

Option 1B is an RNAV1 option, similar to option 1A, using fly-over waypoints with CF path terminator coding. However, aircraft make a second right turn earlier to provide a more direct and fuel-efficient route.

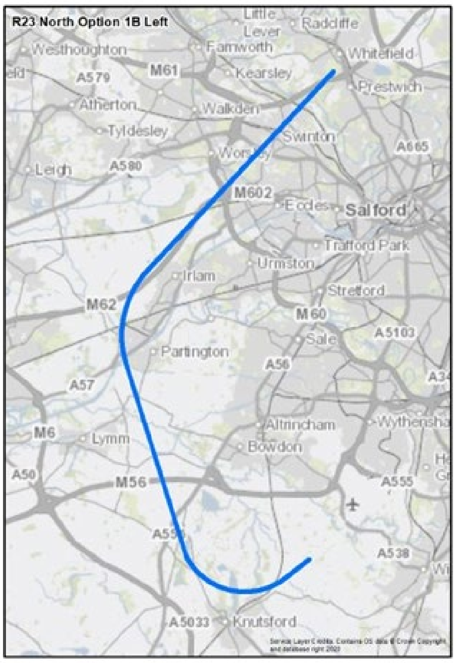
The fly-over waypoints are positioned at the existing markers:

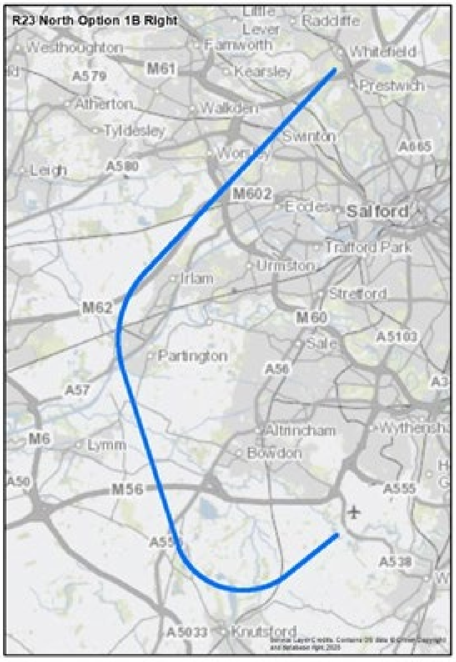
- For Runway 23R this first turn is at MCT D3.
- For Runway 23L, this is at D3.2 which is less than 1nm from DER, but this replicates the turn of the current procedure and therefore aligns to the Design Principle Safety.

23L: This route commences the RF turn to the north of Knutsford. This turn continues until Mere where it combines with the option for 23R and continues north until west of Partington at which point the route heads north-east following the line of the M62 initially and terminates at 7,000ft north of Prestwich.

23R: This route commences the RF turn to the north of Knutsford. This turn continues until Mere where it combines with the option for 23L and continues north until west of Partington at which point the route heads north-east following the line of the M62 initially and terminates at 7,000ft north of Prestwich.

An element of dispersion would be apparent in the turn due to the fly-over waypoint and CF coding.
To create replication with the existing procedure, a speed restriction of 200 KIAS is used for the first turn.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment: Up to 4,000ft, option 1B L is estimated to increase the total population affected by noise. Up to 7,000ft, option 1B L is estimated to limit the total population affected by noise. Option 1B L is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 1B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 1B R is estimated to increase the total population affected by noise. Up to 7,000ft, option 1B R is estimated to limit the total population affected by noise. Option 1B R is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 1B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment: When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure. Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1B L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1B R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1B L is estimated to overfly approximately 5,350 households with an approximate population of 12,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 14,400.

Up to 7,000ft, option 1B L is estimated to overfly approximately 51,500 households with an approximate population of 118,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 119,900.

This is a similar population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1B R is estimated to overfly approximately 5,500 households with an approximate population of 13,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 14,300.

Up to 7,000ft, option 1B R is estimated to overfly approximately 52,050 households with an approximate population of 119,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 120,800.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1B L is estimated to overfly 25 noise sensitive areas.

Up to 7,000ft, this option 1B L is estimated to overfly 235 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 1B R is estimated to overfly 25 noise sensitive areas.

Up to 7,000ft, this option 1B R is estimated to overfly 240 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

12.3 Runways 23R/23L North Option 2B

Design Principle Evaluation	Option No: 2B
Option Name: SID RW 23L NORTH Option 2B	ACCEPT
Option Name: SID RW 23R NORTH Option 2B	ACCEPT

Option Description:

This is an **RNP1** option with RF coding that is similar to option 1B but the use of RF coding results in a track slightly further west initially before heading north-east initially following the course of the M62 to provide a more direct and fuel-efficient route.

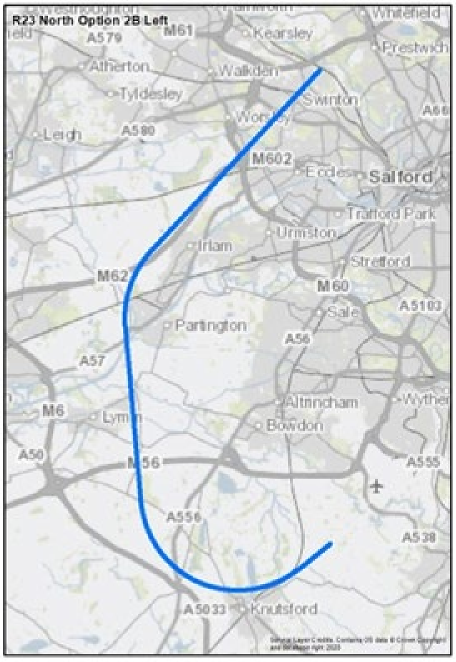
The option has been created to use the more modern technology and maximise fuel efficiency by making a second right turn earlier to head on a north-east trajectory where it terminates south of the existing POL SID.

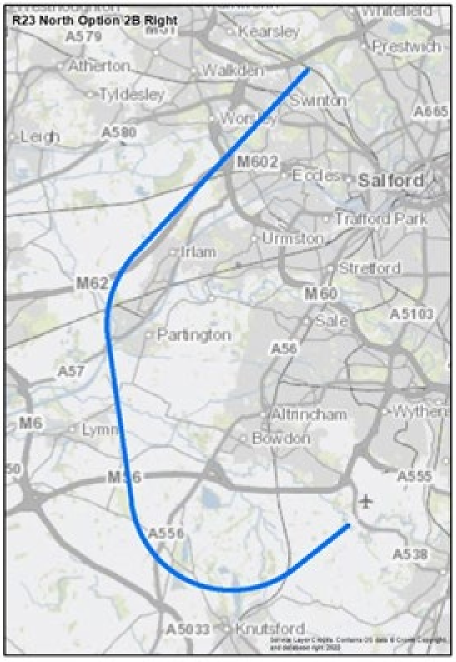
The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: This route commences the RF turn to the north of Knutsford. This turn continues via Over Tabley and routes north to the east of Lymm until west of Partington at which point the route heads north-east. It initially follows the route of the M62 and terminates at 7,000ft north of Prestwich.

23R: This route commences the RF turn to the north of Knutsford. This turn continues via Over Tabley and routes north to the east of Lymm until west of Partington at which point the route heads north-east. It initially follows the route of the M62 and terminates at 7,000ft north of Prestwich.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2B L is estimated to limit the total population affected by noise.
Option 2B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2B R is estimated to limit the total population affected by noise.
Option 2B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 2B L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 2B R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2B L is estimated to overfly approximately 4,750 households with an approximate population of 11,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,100.

Up to 7,000ft, option 2B L is estimated to overfly approximately 39,750 households with an approximate population of 92,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 93,400.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 2B R is estimated to overfly approximately 4,100 households with an approximate population of 9,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 10,200.

Up to 7,000ft, option 2B R is estimated to overfly approximately 39,600 households with an approximate population of 91,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 92,500.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 2B L is estimated to overfly 25 noise sensitive areas.

Up to 7,000ft, this option 2B L is estimated to overfly 175 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 2B R is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 2B R is estimated to overfly 170 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

12.4 Runways 23R/23L North Option 3

Design Principle Evaluation	Option No: 3
Option Name: SID RW 23L NORTH Option 3	ACCEPT
Option Name: SID RW 23R NORTH Option 3	ACCEPT

Option Description:

This provides an RNP1 option with RF coding using fly-by waypoints.

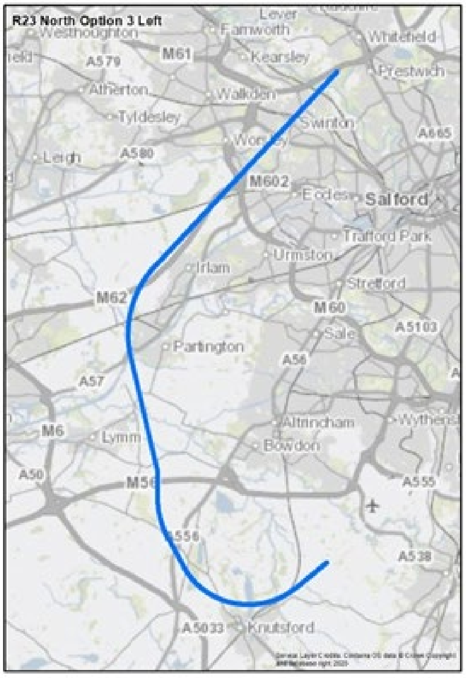
It has been created using fly-by waypoints with a tighter radius first turn than option 2B to reduce noise impact for Knutsford. It also aims to improve fuel efficiency by making a second right turn earlier than the current POL SID.

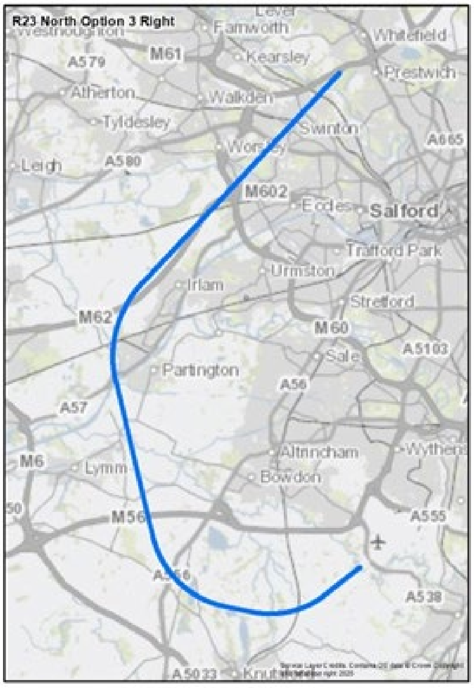
The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: This route commences the RF turn to the north of Knutsford. The radius of this turn takes it further north of Knutsford than option 2B to route between High Legh and Bucklow Hill. The route heads north and combine near Broomedge and continue until just west of Partington. At this point the route turns right to follow the course of the M62 in a north-easterly direction and terminates at 7,000ft west of Prestwich.

23R: This route commences the RF turn earlier than 23L, to route further to the north of Knutsford. This routes it between High Legh and Bucklow Hill and it converges with the option for 23L in the vicinity of Broomedge. The route heads north until just west of Partington. At this point the route turns right to follow the course of the M62 in a north-easterly direction and terminates at 7,000ft west of Prestwich.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3 L is estimated to limit the total population affected by noise.
Option 3 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 3 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3 R is estimated to limit the total population affected by noise.
Option 3 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 3 L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 3 R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3 L is estimated to overfly approximately 4,600 households with an approximate population of 10,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,200.

Up to 7,000ft, option 3 L is estimated to overfly approximately 43,150 households with an approximate population of 99,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 100,600.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 3 R is estimated to overfly approximately 4,650 households with an approximate population of 11,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 11,700.

Up to 7,000ft, option 3 R is estimated to overfly approximately 43,100 households with an approximate population of 98,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 99,700.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 3 L is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 3 L is estimated to overfly 200 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 3 R is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 3 R is estimated to overfly 200 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

12.5 Runways 23R/23L North Option 4A

Design Principle Evaluation	Option No: 4A
Option Name: SID RW 23L NORTH Option 4A	ACCEPT
Option Name: SID RW 23R NORTH Option 4A	ACCEPT

Option Description:

This is an **RNP1** option with RF coding included to replicate the existing conventional POL SID but using an RF turn. This results in a slightly wider initial turn than the conventional route and the RNAV1 replication options.

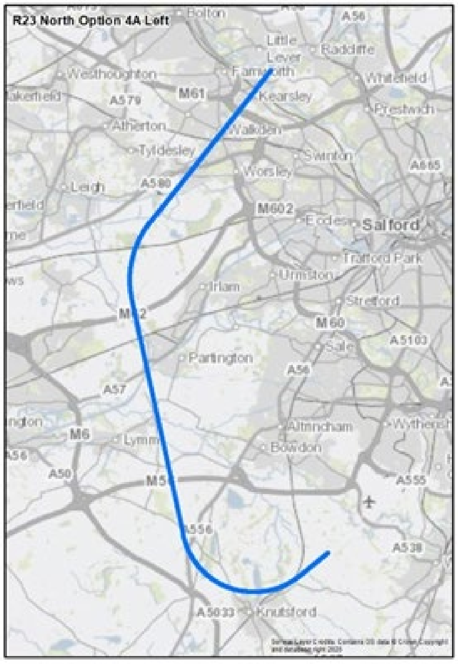
It has been created with the slightly tighter radius first turn similar to option 3 to reduce noise impact for Knutsford but does not have the second turn at the earlier point of that option because it replicates the current SID.

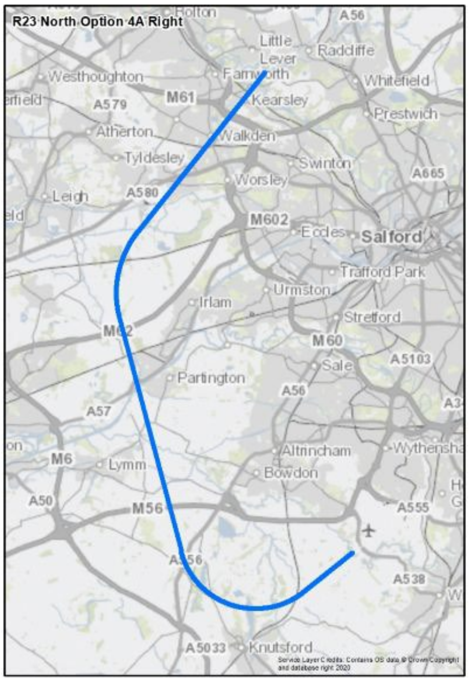
The design aims to have aircraft make the first right turn no closer than 1nm from DER after which both routes head in a northerly direction and converge just north of Cadishead.

23L: This route commences the RF turn to the north of Knutsford. The radius of this turn takes it further north of Knutsford than option 2B to route between High Legh and Bucklow Hill. The route heads north until turning right via a fly-by turn at XUMAT (north of Cadishead) to head in a north-east direction and terminates just east of Farnworth.

23R: This route commences the RF turn earlier than 23L, to route further to the north of Knutsford. This routes it between High Legh and Bucklow Hill and it converges with the option for 23L in the vicinity of Cadishead. At this point the route turns right to head in a north-east direction and terminates just east of Farnworth.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it may need to be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle		
Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4A L is estimated to limit the total population affected by noise.
Option 4A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4A R is estimated to limit the total population affected by noise.
Option 4A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4A L is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4A R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4A L is estimated to overfly approximately 3,500 households with an approximate population of 8,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 9,400.

Up to 7,000ft, option 4A L is estimated to overfly approximately 37,750 households with an approximate population of 86,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 88,700.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 4A R is estimated to overfly approximately 4,200 households with an approximate population of 10,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 10,800.

Up to 7,000ft, option 4A R is estimated to overfly approximately 38,550 households with an approximate population of 88,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 90,200.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4A L is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 4A L is estimated to overfly 150 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4A R is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 4A R is estimated to overfly 155 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

12.6 Runways 23R/23L North Option 4B

Design Principle Evaluation	Option No: 4B
Option Name: SID RW 23L NORTH Option 4B	ACCEPT
Option Name: SID RW 23R NORTH Option 4B	ACCEPT

Option Description:

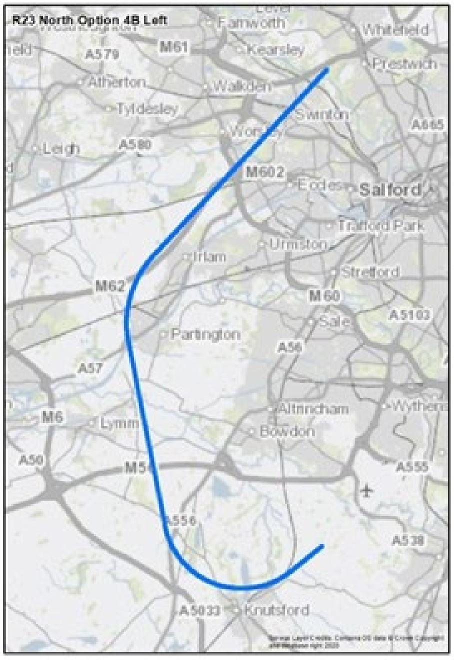
This is an **RNP1** option with RF coding included to replicate the existing conventional POL SID but using an RF turn. It has the same slightly tighter turn radius as option 4A to reduce noise impact for Knutsford but makes a second right turn earlier to head north-east to provide a more direct and fuel-efficient route.

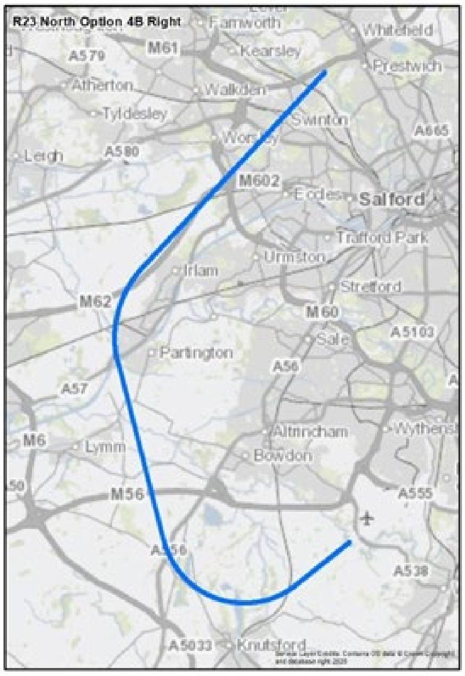
The design aims to have aircraft make the first right turn no closer than 1nm from DER.

23L: This route commences the RF turn to the north of Knutsford. The radius of this turn takes it further north of Knutsford than option 2B to route between High Legh and Bucklow Hill. The route heads north until just west of Partington where it combines with the option for 23R. At this point the route turns right to follow the course of the M62 in a north-easterly direction and terminates at 7,000ft west of Prestwich.

23R: This route commences the RF turn earlier than 23L, prior to Parkgate Industrial Area to route further to the north of Knutsford. This routes between High Legh and Bucklow Hill and it converges with the option for 23L in the vicinity of Partington. At this point the route turns right to follow the course of the M62 in a north-easterly direction and terminates at 7,000ft west of Prestwich.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle		
Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4B L is estimated to limit the total population affected by noise.
Option 4B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4B R is estimated to limit the total population affected by noise.
Option 4B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4B L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4B R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4B L is estimated to overfly approximately 4,800 households with an approximate population of 11,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,900.

Up to 7,000ft, option 4B L is estimated to overfly approximately 42,450 households with an approximate population of 97,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 99,700.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 4B R is estimated to overfly approximately 4,850 households with an approximate population of 11,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,700.

Up to 7,000ft, option 4B R is estimated to overfly approximately 42,900 households with an approximate population of 99,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 100,500.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4B L is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 4B L is estimated to overfly 175 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4B R is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 4B R is estimated to overfly 185 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

12.7 Runways 23R/23L North Option 6A

Design Principle Evaluation	Option No: 6A
Option Name: SID RW 23L NORTH Option 6A	ACCEPT
Option Name: SID RW 23R NORTH Option 6A	ACCEPT

Option Description:

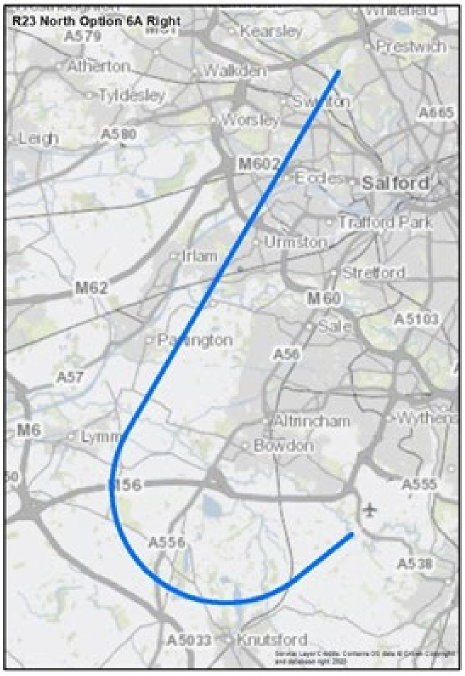
This is an **RNP1** option with RF coding that maximises fuel efficiency by removing the northbound leg between the first and second turns and replacing it with a single turn to the north-east. This provides the most direct route to POL.

The design aims to have aircraft make the first right turn no closer than 1nm from DER, and the speed applied to this option results in this option forming the westerly edge of the envelope in the initial turn along with option 6B. This speed will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: This route commences the single RF turn to the north of Knutsford. The turn continues north via Over Tabley before heading in a north easterly direction in the vicinity of Broomedge. The route then continues to the west of the Sale and Urmston before terminating at 7,000ft in the vicinity of Eccles.

23R: This route commences the single RF turn earlier than 23L, prior to route further to the north of Knutsford. The turn continues to route east of Over Tabley before converging with the option for 23L in the vicinity of Broomedge. The route then continues to the west of the Sale and Urmston before terminating at 7,000ft in the vicinity of Eccles.

A speed restriction of 220 KIAS is used for the first turn.



Design Principle **Safety**		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6A L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 6A L is estimated to increase the total population affected by noise.
Option 6A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6A R is estimated to limit the total population affected by noise.
Option 6A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 6A L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 6A R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6A L is estimated to overfly approximately 2,200 households with an approximate population of 5,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 6,200.

Up to 7,000ft, option 6A L is estimated to overfly approximately 56,750 households with an approximate population of 129,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 141,000.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 6A R is estimated to overfly approximately 1,900 households with an approximate population of 4,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 5,200.

Up to 7,000ft, option 6A R is estimated to overfly approximately 56,650 households with an approximate population of 129,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 140,500.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6A L is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 6A L is estimated to overfly 290 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 6A R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 6A R is estimated to overfly 285 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

12.8 Runways 23R/23L North Option 6B

Design Principle Evaluation	Option No: 6B
Option Name: SID RW 23L NORTH Option 6B	ACCEPT
Option Name: SID RW 23R NORTH Option 6B	ACCEPT

Option Description:

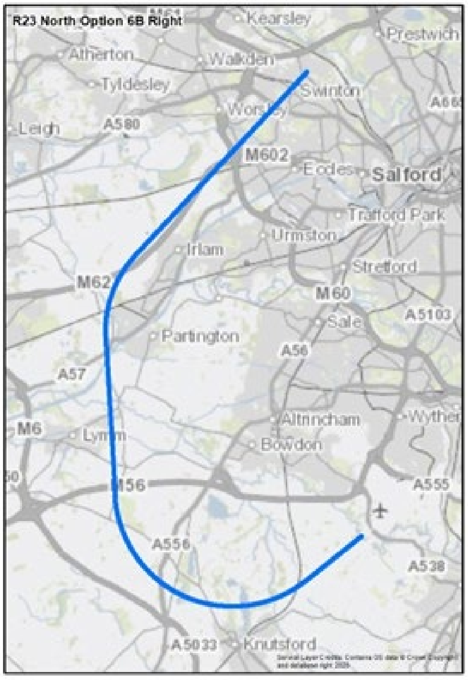
This is an RNP1 option with RF coding that is similar to option 2B but the use of a higher speed results in a track slightly further west before making the second turn to the north.

The design aims to have aircraft make the first right turn no closer than 1nm from DER, and the speed applied to this option results in this option forming the westerly edge of the envelope in the initial turn along with option 6A. This speed will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: This route commences the RF turn to the north of Knutsford. The radius of this turn takes it on the same track as option 6a via Over Tabley and east of Lymm, until west of Partington. At this point it combines with the option for 23R and heads north-east. They initially follow the route of the M62 and terminate at 7,000ft north of Prestwich.

23R: This route commences the RF turn earlier than 23L, to route further to the north of Knutsford. The radius of this turn takes it on the same track as option 6a via Over Tabley and east of Lymm, until west of Partington. At this point it combines with the option for 23L and heads north-east. They initially follow the route of the M62 and terminate at 7,000ft north of Prestwich.

A speed restriction of 220 KIAS is used for the first turn which allows most aircraft to fly in a clean configuration; however, this results in a wider turn radius than the replicated route.



Design Principle Safety		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6B L is estimated to limit the total population affected by noise.
Option 6B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6B R is estimated to limit the total population affected by noise.
Option 6B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 6B L is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 6B R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6B L is estimated to overfly approximately 4,200 households with an approximate population of 9,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 10,400.

Up to 7,000ft, option 6B L is estimated to overfly approximately 41,050 households with an approximate population of 93,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 95,100.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 6B R is estimated to overfly approximately 3,500 households with an approximate population of 8,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 8,600.

Up to 7,000ft, option 6B R is estimated to overfly approximately 40,800 households with an approximate population of 93,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 94,300.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6B L is estimated to overfly 25 noise sensitive areas.

Up to 7,000ft, this option 6B L is estimated to overfly 180 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 6B R is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 6B R is estimated to overfly 180 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

12.9 Runways 23R/23L North Option 7

Design Principle Evaluation	Option No: 7
Option Name: SID RW 23L NORTH Option 7	ACCEPT
Option Name: SID RW 23R NORTH Option 7	ACCEPT

Option Description:

This is an **RNP1** option that uses RF coding and an initial 15° track adjustment to the right from the DER for Runway 23L and a 5° adjustment for Runway 23R. This track adjustment is aimed to reduce noise impact on Knutsford. Thereafter this option has a similar route to that of option 4B.

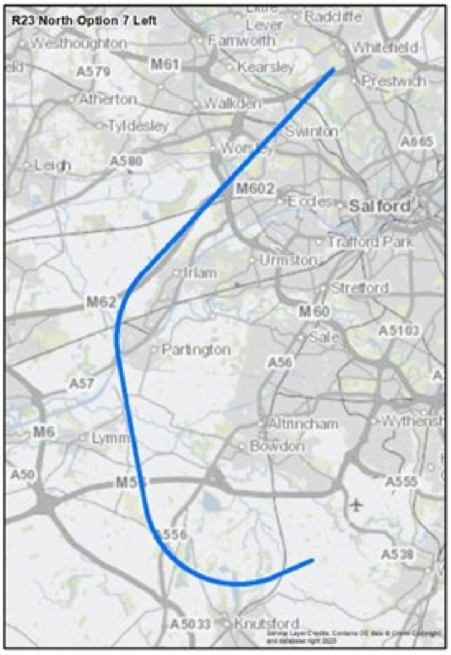
An RNP+RF turn follows the initial track adjustment, and this commences at 1nm from DER for Runway 23L.

The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: After passing DER this route has a 15° track adjustment to the north which continues until 1nm from DER. An RNP+RF turn is then commenced to the north of Knutsford. This is continued until heading north in the vicinity of High Legh at which point the route heads north until just west of Partington. It then turns right to follow the course of the M62 in a north-easterly direction and terminates at 7,000ft north of Prestwich.

23R: After passing DER this route has a 5° track adjustment to the north. An RNP+RF turn is then commenced to the north of Knutsford. This is continued until the vicinity of High Legh where the route converges with the option for 23L. After this point the route heads north until just west of Cadishead where it turns right to follow the course of the M62 in a north-easterly direction and terminates at 7,000ft north of Prestwich.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.



Design Principle Safety		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 7 L is estimated to limit the total population affected by noise.
Option 7 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 7 R is estimated to limit the total population affected by noise.
Option 7 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 7 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 7 R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7 L is estimated to overfly approximately 4,550 households with an approximate population of 10,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 11,200.

Up to 7,000ft, option 7 L is estimated to overfly approximately 48,200 households with an approximate population of 110,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 110,800.

This is a similar population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 7 R is estimated to overfly approximately 4,800 households with an approximate population of 11,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 11,800.

Up to 7,000ft, option 7 R is estimated to overfly approximately 49,000 households with an approximate population of 112,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 112,700.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 7 L is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 7 L is estimated to overfly 225 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 7 R is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 7 R is estimated to overfly 225 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

12.10 Runways 23R/23L North Summary

	Option 1AL	Option 1BL	Option 2BL	Option 3L	Option 4AL	Option 4BL	Option 6AL	Option 6BL	Option 7L
S	MET	MET	MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET	MET	MET	MET	MET	MET	MET
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N2	MET	MET	MET	MET	MET	MET	MET	MET	MET
N3	PARTIAL	NOT MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL	NOT MET	PARTIAL	PARTIAL
A	MET	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Rejected	Best	Best	Best	Best	4,000ft beneficial	Best	Best

	Option 1AL	Option 1BL	Option 2BL	Option 3L	Option 4AL	Option 4BL	Option 6AL	Option 6BL	Option 7L
S	MET	MET	MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N2	MET	MET	MET	MET	MET	MET	MET	MET	MET
N3	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
A	MET	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Best	Best	Best	Best	Best	Best	Best	Best

12.11 Runways 23R/23L North Viable but Poor Fit Options

Option	Safety	Policy	Capacity
A5 Tight right-hand turn 190kts	S	P	C
Originally Option 5, this was initially included as an RNAV1 option to provide a more direct route to POL following an initial tight turn at 190kts. Safety: This option is expected to conflict with the Runway 23R MAP and would result in both procedures routing to the north of the airfield in a similar location. Alternative options were created to mitigate this interaction.			
B8 Tight right-hand turn 210kts	S	P	C
Originally Option 2A this was initially included to provide a more direct route to POL following the initial turn using RNP1 + RF coding at 210kts. It is similar in track to 'viable but poor fit' option A5. Safety: This option is expected to conflict with the Runway 23R MAP and would result in both procedures routing to the north of the airfield in a similar location. Alternative options were created to mitigate this interaction.			
C9 Left-hand Wraparound	S	P	C
After departure from Runways 23L/23R, aircraft would make a left-hand turn, fly around the airport, and then begin heading north towards the SID aiming point. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance south before turning it north leading to increased fuel burn and emissions. The trade-off analysis between emissions and noise, identified a potential noise benefit below 4,000ft which resulted in an amber categorisation. The trade-off analysis against other AMS ends did not identify any other material benefits. Capacity: This option would interact with the 23 South and 23 East Left Turn Departure design envelopes and 23 arrivals from the north and south. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			

D10 Tight right-hand turn, route east then north	S	P	C

After departure from Runways 23L/23R, aircraft would make a tight right-hand turn, fly parallel to the airport then begin heading north towards the SID aiming point.

Safety: This option is expected to conflict with the Runway 23R MAP and would result in both procedures routing to the north of the airfield in a similar location._Alternative options were created to mitigate this interaction.

Capacity: This option would interact with departures in the 23 East Design Envelope and 23 arrivals from the north. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

E11 Extended straight ahead then right turn to north	S	P	C

After departure from Runways 23L/23R, aircraft would continue straight ahead to the vicinity of Knutsford before gradually turning right towards the north and the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance south before turning it north leading to increased fuel burn and emissions.
- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve.

The trade-off analysis between emissions and noise, did not identify a potential noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

F12 Sharp right-hand turn before heading north	S	P	C

Similar to 'viable but poor fit' option A5 and B8, after departure from Runways 23L/23R, aircraft would make a sharp right-hand turn before heading north, towards the SID aiming point.

Safety: This was classed as a poor fit against the Design Principle Safety, as it conflicts with the MAP for Runway 23R. This option would result in both procedures routing to the north of the airfield in a similar location.

Alternative options that avoided this conflict were created to mitigate this interaction.

13 Runways 23R/23L East

13.1 Runways 23R/23L East Option 1A

Design Principle Evaluation	Option No: 1A
Option Name: SID RW 23L EAST Right Turn Option 1A	ACCEPT
Option Name: SID RW 23R EAST Right Turn Option 1A	ACCEPT

Option Description:

Option 1A is an **RNAV1** replication of the current SONEX 1R/1Y SID and uses a fly-over waypoint with CF path terminator coding.

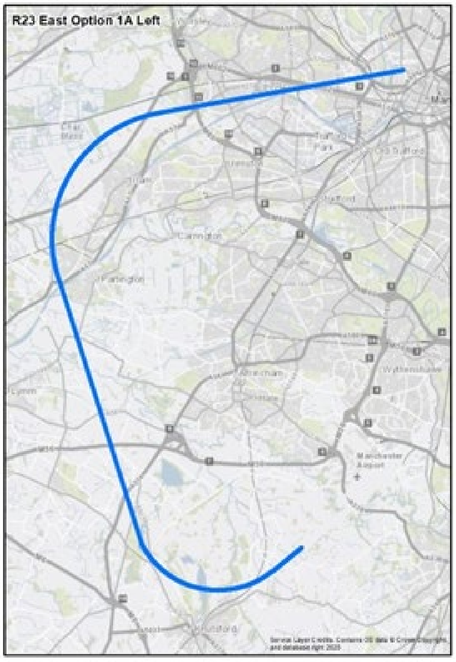
The fly-over waypoints are positioned at the existing markers.

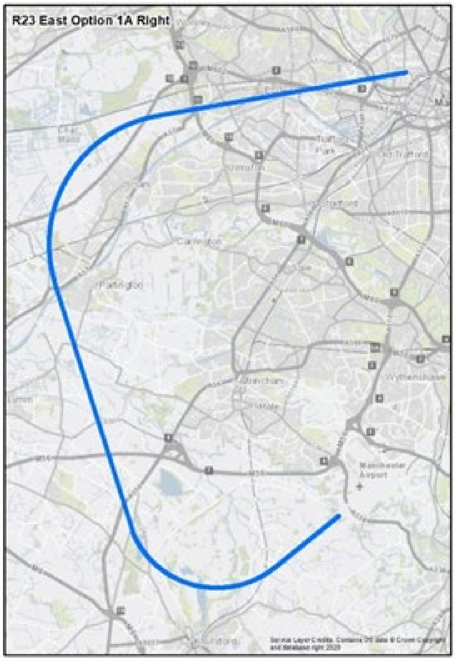
23R this first turn is at MCT D3.

23L this is at MCT D3.2 which less than 1nm from DER but as this replicates the turn of the current procedure it therefore aligns to the Design Principle Safety.

As a replicated route it follows a similar track over the ground as the current published route. The first turn commences to the north and east of Knutsford which takes both routes north of Knutsford at which point the tracks of the SIDs converge close to Mere. The routes head north until turning right to the north of Irlam, and then heads in an easterly direction south of Eccles and terminates at 7,000ft just east of Salford.

An element of dispersion would be apparent in the turns due to the fly-over waypoint and CF coding. A speed restriction of 200 KIAS is used for the first turn to create replication of the current route.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide a RNAV1 replication of the current route. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1A L is estimated to increase the total population affected by noise.
Option 1A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1A R is estimated to limit the total population affected by noise.
Option 1A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1A L is 46km (25nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1A R is 47km (25nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1A L is estimated to overfly approximately 4,650 households with an approximate population of 11,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,800.

Up to 7,000ft, option 1A L is estimated to overfly approximately 74,800 households with an approximate population of 154,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 168,500.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1A R is estimated to overfly approximately 4,850 households with an approximate population of 11,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,900.

Up to 7,000ft, option 1A R is estimated to overfly approximately 75,300 households with an approximate population of 155,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 169,500.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1A L is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 1A L is estimated to overfly 385 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 1A R is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 1A R is estimated to overfly 390 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

13.2 Runways 23R/23L East Option 1B

Design Principle Evaluation	Option No: 1B
Option Name: SID RW 23L EAST Right Turn Option 1B	REJECT
Option Name: SID RW 23R EAST Right Turn Option 1B	REJECT

Option Description:

This is an RNAV1 option similar to the existing conventional SID. However, aircraft will make the second right turn to head east at an earlier point to create a more direct and fuel-efficient route.

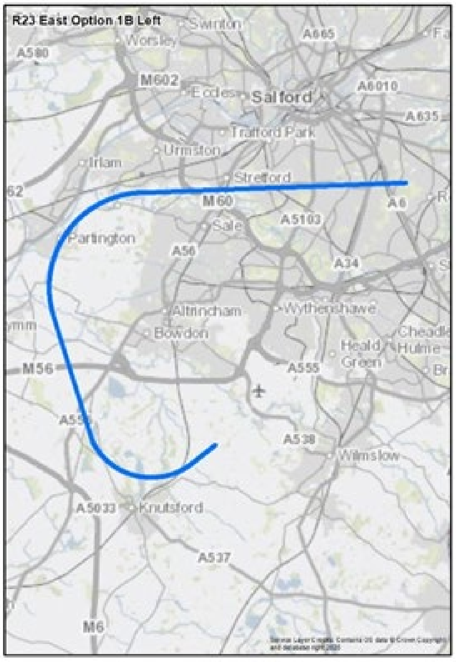
The fly-over waypoints are positioned at the existing markers:

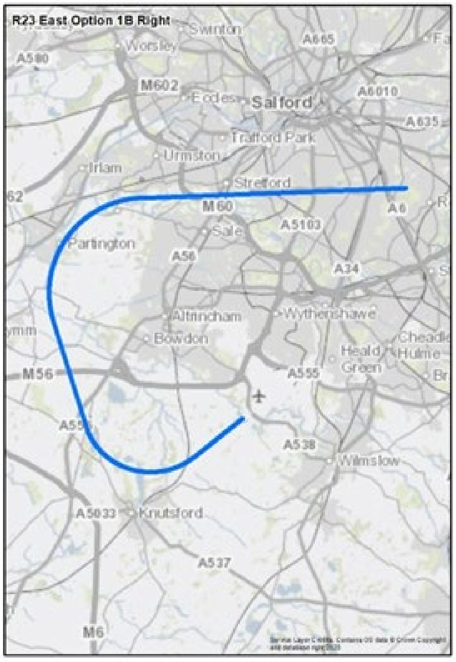
- For Runway 23R this first turn is at MCT D3.
- For Runway 23L, this is at D3.2 which is less than 1nm from DER, but this replicates the turn of the current procedure and therefore aligns to the Design Principle Safety.

23L: This follows an initial track over the ground that seeks to replicate the current route in the first right turn. This turn routes to the north of Knutsford and the route converges with the option for 23R close to Mere. The routes continue north until turning east to the south of Partington routing over Stretford and Urmston and terminating at 7,000ft overhead Levenshulme.

23R: This follows an initial track over the ground that seeks to replicate the current route in the first right turn. This turn routes to the north of Knutsford and the route converges with the option for 23L close to Mere. The routes continue north until turning east to the south of Partington routing over Stretford and Urmston and terminating at 7,000ft overhead Levenshulme.

An element of dispersion would be apparent in the turn due to the fly-over waypoint. A speed restriction of 200 KIAS is used for the first turn to create replication of the current route.





Design Principle	Runway	Result
Design Principle Safety	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide a RNAV1 current route. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1B L is estimated to increase the total population affected by noise.
Option 1B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1B R is estimated to increase the total population affected by noise.
Option 1B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 1B L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1B R is 42km (23nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 1B L is estimated to overfly approximately 4,400 households with an approximate population of 10,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 15,100.

Up to 7,000ft, option 1B L is estimated to overfly approximately 101,600 households with an approximate population of 269,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 275,000.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 1B R is estimated to overfly approximately 4,150 households with an approximate population of 10,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 13,900.

Up to 7,000ft, option 1B R is estimated to overfly approximately 102,500 households with an approximate population of 272,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 276,900.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1B L is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 1B L is estimated to overfly 470 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 1B R is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 1B R is estimated to overfly 470 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

13.3 Runways 23R/23L East Option 1C

Design Principle Evaluation	Option No: 1C
Option Name: SID RW 23L EAST Right Turn Option 1C	ACCEPT
Option Name: SID RW 23R EAST Right Turn Option 1C	ACCEPT

Option Description:

This option provides a similar initial **RNAV1** route to options 1A and 1B which are based on the existing conventional SID. However, aircraft will make the second right turn at an earlier point to route via an area of low population density to reduce noise impact.

This is aimed at recreating current ATC operational practice whereby aircraft are vectored to the east after passing 4,000ft.

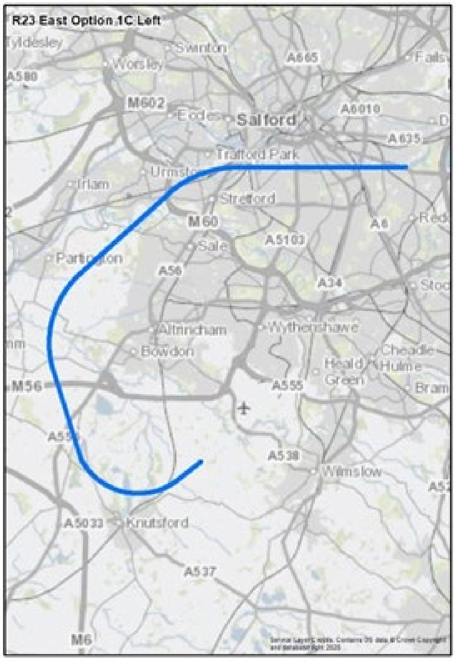
An element of dispersion would be apparent in the turn due to the fly-over waypoint. These fly-over waypoints are positioned at the existing markers:

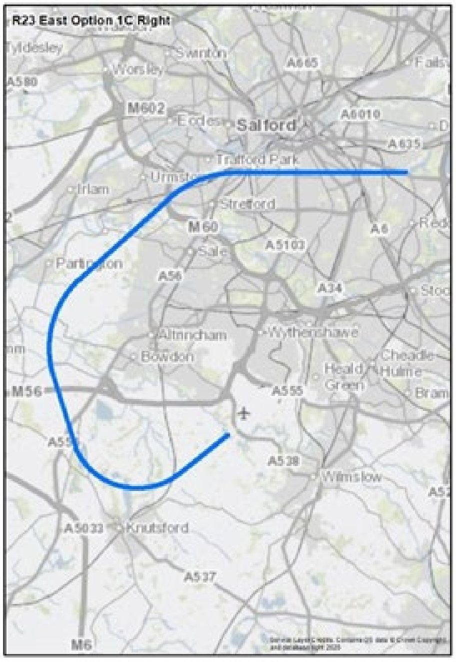
- For Runway 23R this first turn is at MCT D3.
- For Runway 23L, this is at D3.2 which is less than 1nm from DER, but this replicates the turn of the current procedure and therefore aligns to the Design Principle Safety.

23L: This follows an initial track over the ground that seeks to replicate the current route in the first right turn. This turn commences to the north of Knutsford and takes the route north where it converges with the option for 23R close to Mere. The routes continue north until turning right to the south of Partington through an area of low population density until Stretford and Urmston, where they turn right to head in an easterly direction routing south of Manchester City Centre and terminating at 7,000ft overhead Gorton.

23R: This follows an initial track over the ground that seeks to replicate the current route in the first right turn. This turn commences to the north of Knutsford which takes the route north where it converges with the option for 23L close to Mere. The routes continue north until turning right to the south of Partington through an area of low population density until Stretford and Urmston, where they turn right to head in an easterly direction routing south of Manchester City Centre and terminating at 7,000ft overhead Gorton.

A speed restriction of 200 KIAS is used for the first turn to create track replication of the current route.





Design Principle **Safety**		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide a RNAV1 current route. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1C L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1C L is estimated to increase the total population affected by noise.
Option 1C L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1C L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1C R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 1C R is estimated to increase the total population affected by noise.
Option 1C R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1C R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 1C L is 40km (22nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 1C R is 41km (22nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1C L is estimated to overfly approximately 1,250 households with an approximate population of 2,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,700.

Up to 7,000ft, option 1C L is estimated to overfly approximately 105,650 households with an approximate population of 276,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 287,000.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1C R is estimated to overfly approximately 500 households with an approximate population of 1,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 3,000.

Up to 7,000ft, option 1C R is estimated to overfly approximately 106,550 households with an approximate population of 279,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 289,700.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1C L is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 1C L is estimated to overfly 550 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 1C R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 1C R is estimated to overfly 555 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

13.4 Runways 23R/23L East Option 2

Design Principle Evaluation	Option No: 2
Option Name: SID RW 23L EAST Right Turn Option 2	REJECT
Option Name: SID RW 23R EAST Right Turn Option 2	REJECT

Option Description:

This option provides an **RNP1+RF** coded option that provides a more direct route to the east using a single right turn.

It has been created by using a turn with the lowest possible speed to create a tight radius turn to the north-east initially, before making a second smaller turn to head east. The design aims to have aircraft make the first right turn no closer than 1nm from DER.

23L: The first RF right turn starts to the north of Knutsford. This routes the aircraft between Mere and Over Tabley before heading in a north-easterly direction to avoid Bowdon and Altrincham. The route continues in this direction before making a second right turn to the east to route to the south of Sale before terminating at 7,000ft to the east of Reddish.

23R: This route commences the single RF turn earlier than 23L, prior to Parkgate Industrial Area to route further to the north of Knutsford. This results in a turn over Mere before heading in a north-easterly direction to avoid Bowdon and Altrincham. It converges with the option for 23L south of Sale where it heads east before terminating at 7,000ft to the east of Reddish.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2 L is estimated to increase the total population affected by noise.
Option 2 L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2 R is estimated to increase the total population affected by noise.
Option 2 R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 2 L is 39km (21nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 2 R is 39km (21nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 2 L is estimated to overfly approximately 9,650 households with an approximate population of 23,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 24,300.

Up to 7,000ft, option 2 L is estimated to overfly approximately 97,900 households with an approximate population of 242,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 243,200.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 2 R is estimated to overfly approximately 8,100 households with an approximate population of 19,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 19,700.

Up to 7,000ft, option 2 R is estimated to overfly approximately 97,500 households with an approximate population of 241,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 241,500.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 2 L is estimated to overfly 25 noise sensitive areas.

Up to 7,000ft, this option 2 L is estimated to overfly 395 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 2 R is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 2 R is estimated to overfly 395 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

13.5 Runways 23R/23L East Option 4A

Design Principle Evaluation	Option No: 4
Option Name: SID RW 23L EAST Right Turn Option 4	REJECT
Option Name: SID RW 23R EAST Right Turn Option 4	ACCEPT

Option Description:
This is an **RNP1** option using RF coding that provides a more direct route to the east using a single right turn.

It is similar to option 2A but at the CAP778 recommended speed of 210kts in the turn which results in a slightly wider track to the west and north. This speed may also permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. The design aims to have aircraft make the first right turn no closer than 1nm from DER.

23L: The first RF right turn starts to the north of Knutsford. This routes aircraft further west of Mere than option 2 but via Over Tabley before heading in a north-easterly direction to avoid Bowdon and Altrincham. The route continues in this direction before making a second right turn to the east to route to the south of Sale before terminating at 7,000ft near Heaton Chapel.

23R: This route commences the single RF turn earlier than 23L, prior to route further to the north of Knutsford. This results in a turn just west of Mere before heading in a north-easterly direction to avoid Bowdon and Altrincham. It converges with the option for 23L south of Sale where it heads east before terminating at 7,000ft near Heaton Chapel.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

Design Principle		
Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4 L is estimated to increase the total population affected by noise.
Option 4 L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 4 R is estimated to increase the total population affected by noise.
Option 4 R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 4 L is 41km (22nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 4 R is 41km (22nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4 L is estimated to overfly approximately 2,350 households with an approximate population of 5,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 6,200.

Up to 7,000ft, option 4 L is estimated to overfly approximately 94,450 households with an approximate population of 235,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 236,600.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 4 R is estimated to overfly approximately 1,150 households with an approximate population of 2,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,800.

Up to 7,000ft, option 4 R is estimated to overfly approximately 93,950 households with an approximate population of 234,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 234,800.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4 L is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 4 L is estimated to overfly 390 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4 R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 4 R is estimated to overfly 390 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

13.6 Runways 23R/23L East Option 4B

Design Principle Evaluation	Option No: 4B
Option Name: SID RW 23L EAST Right Turn Option 4B	ACCEPT
Option Name: SID RW 23R EAST Right Turn Option 4B	ACCEPT

Option Description:

Option 4B is and **RNP1** option using RF coding included to increase the distance of routes from Knutsford through the use of a track adjustment to the north commencing at the DER. A 5° adjustment is used for Runway 23R and 15° for Runway 23L.

An RNP+RF turn follows the initial track adjustment (1nm from DER for 23L), and it then follows a similar track to option 4A.

The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: After passing DER this route has a 15° track adjustment to the north which continues until 1nm from DER. An RNP+RF turn is then commenced which results in the route passing north of Knutsford. This RF turn takes aircraft over Mere where it combines with the option for 23R before heading in a north-easterly direction to avoid Bowdon and Altrincham. The route continues in this direction before making a second right turn to the east to route to the south of Sale before terminating at 7,000ft near Heaton Chapel.

23R: After passing DER this route has a 5° track adjustment to the north. An RNP+RF turn is then commenced which results in the route passing north of Knutsford. This is continued until the vicinity of Mere where the route converges with the option for 23L. The combined routes head in a north-easterly direction to avoid Bowdon and Altrincham and continue in this direction before making a second right turn to the east to route to the south of Sale before terminating at 7,000ft near Heaton Chapel.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

	23L	MET

Design Principle **Safety**	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4B L is estimated to increase the total population affected by noise.
Option 4B L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4B R is estimated to increase the total population affected by noise.
Option 4B R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4B L is 39km (21nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 4B R is 45km (24nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 4B L is estimated to overfly approximately 6,950 households with an approximate population of 16,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 16,800.

Up to 7,000ft, option 4B L is estimated to overfly approximately 95,250 households with an approximate population of 235,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 235,800.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 4B R is estimated to overfly approximately 4,500 households with an approximate population of 10,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 10,800.

Up to 7,000ft, option 4B R is estimated to overfly approximately 96,300 households with an approximate population of 238,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 238,500.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4B L is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 4B L is estimated to overfly 390 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4B R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 4B R is estimated to overfly 395 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

13.7 Runways 23R/23L East Option 5

Design Principle Evaluation	Option No: 5
Option Name: SID RW 23L EAST Right Turn Option 5	REJECT
Option Name: SID RW 23R EAST Right Turn Option 5	ACCEPT

Option Description:

This is an **RNP1** option using RF coding that provides a direct route to the east using a single right turn.

It is similar to option 4A but with an increased speed in the turn which results in this option forming the westerly edge of the envelope in the initial turn

The greater speed will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. The design aims to have aircraft make the first right turn no closer than 1nm from DER.

23L: This route commences the single RF turn to the north of Knutsford. The turn continues north via Over Tabley before heading in an easterly direction north of Altrincham. The route continues easterly heading and terminates at 7,000ft at Burnage.

23R: This route commences the single RF turn earlier than 23L, prior to Parkgate Industrial Area to route further to the north of Knutsford. The turn continues to route between Over Tabley and Mere before heading in an easterly direction north of Altrincham. It then continues easterly heading and terminates at 7,000ft at Burnage.

A speed restriction of 220 KIAS is used for the first turn which is 10kts higher than option 4A.

Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 5 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 5 L is estimated to increase the total population affected by noise.
Option 5 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 5 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 5 R is estimated to limit the total population affected by noise.
Option 5 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5 R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 5 L is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 5 R is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 5 L is estimated to overfly approximately 2,500 households with an approximate population of 5,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 6,200.

Up to 7,000ft, option 5 L is estimated to overfly approximately 85,350 households with an approximate population of 215,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 215,800.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 5 R is estimated to overfly approximately 2,450 households with an approximate population of 5,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 6,100.

Up to 7,000ft, option 5 R is estimated to overfly approximately 85,800 households with an approximate population of 216,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 217,400.

This is a similar population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 5 L is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 5 L is estimated to overfly 360 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 5 R is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 5 R is estimated to overfly 355 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

13.8 Runways 23R/23L East Right Turn Summary

	Option 1A L	Option 1B L	Option 1C L	Option 2 L	Option 4A L	Option 4B L	Option 5 L
S	MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET	MET	MET	MET	MET
E	PARTIAL	PARTIAL	MET	MET	MET	MET	PARTIAL
N1	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
N2	MET	MET	MET	MET	MET	MET	MET
N3	NOT MET	NOT MET	PARTIAL	NOT MET	NOT MET	NOT MET	NOT MET
A	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Rejected	Best	Rejected	Rejected	Add. Qual.	Rejected

	Option 1AR	Option 1BR	Option 1C R	Option 2R	Option 4AR	Option 4BR	Option 5R
S	MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	MET
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	MET	MET	MET	MET	PARTIAL	PARTIAL
N1	PARTIAL	NOT MET	PARTIAL	NOT MET	PARTIAL	NOT MET	MET
N2	MET	MET	MET	MET	MET	MET	MET
N3	PARTIAL	NOT MET	PARTIAL	NOT MET	MET	PARTIAL	MET
A	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Rejected	4,000ft beneficial	Rejected	4,000ft beneficial	Add. Qual.	Best

13.9 Runways 23R/23L East Viable but Poor Fit Options

Note: Because the options development process for 23 East Right Turn and Left Turn took place simultaneously, the viable but poor fit options are identical and apply equally to both envelopes.

Option	Safety	Policy	Capacity
A3 Extended straight ahead then left turn to north-east	S	P	C

Originally Option 3, after departure from Runways 23L/23R, aircraft would continue straight ahead until beyond Knutsford before turning left towards the north-east towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic west before turning it left to head east leading to increased fuel burn and emissions.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: This option would interact with the 23 South Departure design envelopes and 23 arrivals from the south. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

Option	Safety	Policy	Capacity
B7 Extended straight ahead then right turn to north-east	S	P	C

After departure from Runways 23L/23R, aircraft would continue straight ahead until beyond Knutsford before turning right towards the north-east, towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic west before turning it right to head east leading to increased fuel burn and emissions.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: This option would interact with traffic on the 23 West and 23 North departure envelopes and 23 arrivals from the north. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

C9 Further extended straight ahead then left turn to north-east	S	P	C

After departure from Runways 23L/23R, aircraft would continue straight ahead for 5-6nm until just before Northwich before turning left towards the north-east, towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance west before turning left to head north-east leading to increased fuel burn and emissions.
- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: In addition to the LPL interaction, this option would interact with the 23 South Departure design envelopes and 23 arrivals from the south. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

D10 Further extended straight ahead then right turn to north-east	S	P	C

After departure from Runways 23L/23R, aircraft would continue straight ahead for 5-6nm until just before Northwich before turning right towards the north-east, towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance west before turning right to head north-east leading to increased fuel burn and emissions.
- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: In addition to the LPL interaction, this option would interact with the 23 West and North Departure design envelopes and 23 arrivals from the north. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

14 Runways 23R/23L East

14.1 Runways 23R/23L East Option 6A Left Turn

Design Principle Evaluation	Option No: 6A
Option Name: SID RW 23L EAST Left Turn Option 6A	ACCEPT
Option Name: SID RW 23R EAST Left Turn Option 6A	ACCEPT

Option Description:

This is an **RNP1** left turn option using RF coding. It is included to provide a direct route to the east following an initial left turn and is intended to provide an alternative to the existing right turn departures.

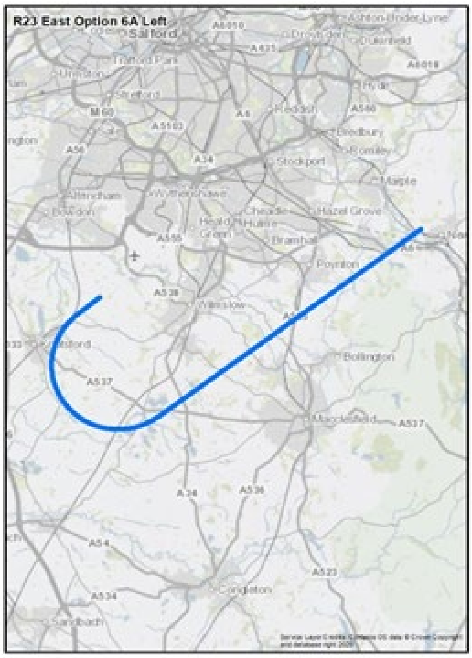
This route is already used tactically by ATC in adverse weather conditions and therefore formalises these routes. The speed of the initial left turn has been applied to create the smallest radius and reduce the noise impact on Knutsford.

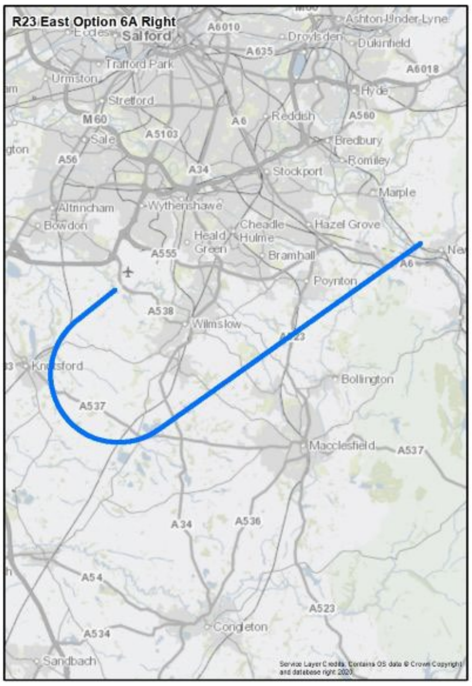
These routes do not converge until reaching 7,000ft.

23L: This route commences the single RF left turn close to Mobberley and routes aircraft to the south of Knutsford. The turn continues before heading in an easterly direction to the south of Alderley Edge and continues south of Poynton on an easterly heading to terminate at 7,000ft to the west of New Mills.

23R: This route commences the single RF turn slightly earlier than 23L, which results in a track slightly further south of Knutsford. The turn continues before heading in an easterly direction to the south of Alderley Edge and continues south of Poynton on an easterly heading to terminate and converge with the option for 23L at 7,000ft to the west of New Mills.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle		
Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:
Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6A L is estimated to limit the total population affected by noise.
Option 6A L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6A R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 6A R is estimated to limit the total population affected by noise.
Option 6A R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6A R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 6A L is 39km (21nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 6A R is 39km (21nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6A L is estimated to overfly approximately 1,650 households with an approximate population of 3,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,200.

Up to 7,000ft, option 6A L is estimated to overfly approximately 10,200 households with an approximate population of 23,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 24,100.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 6A R is estimated to overfly approximately 1,400 households with an approximate population of 3,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,100.

Up to 7,000ft, option 6A R is estimated to overfly approximately 10,650 households with an approximate population of 24,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 25,700.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6A L is estimated to overfly 95 noise sensitive areas.

Up to 7,000ft, this option 6A L is estimated to overfly 140 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 6A R is estimated to overfly 90 noise sensitive areas.

Up to 7,000ft, this option 6A R is estimated to overfly 140 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

14.2 Runways 23R/23L East Option 6B Left Turn

Design Principle Evaluation	Option No: 6B
Option Name: SID RW 23L EAST Left Turn Option 6B	ACCEPT
Option Name: SID RW 23R EAST Left Turn Option 6B	ACCEPT

Option Description:

This is an **RNP1** left turn option using RF coding that is identical to option 6A in the initial turn but terminates at 7,000ft further to the north. As with option 6A it is included to provide a direct route to the east following the initial left turn and to provide an alternative to the existing right turn departures. The speed of the initial left turn has been applied to create the smallest radius and reduce the noise impact on Knutsford.

23L: This route commences the single RF left turn close to Mobberley and routes aircraft to the south of Knutsford. The turn continues before heading in an easterly direction over Chelford to the south of Alderley Edge and continues via Woodford and Poynton to terminate at 7,000ft south of Marple.

23R: This route commences the single RF turn slightly earlier than 23L, which results in a track slightly further south of Knutsford. The turn continues before heading in an easterly direction over Chelford to the south of Alderley Edge and continues via Woodford and Poynton to terminate at 7,000ft south of Marple.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6B L is estimated to limit the total population affected by noise.
Option 6B L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6B R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 6B R is estimated to limit the total population affected by noise.
Option 6B R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 6B L is 40km (22nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 6B R is 40km (22nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6B L is estimated to overfly approximately 1,650 households with an approximate population of 3,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,300.

Up to 7,000ft, option 6B L is estimated to overfly approximately 18,400 households with an approximate population of 42,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 46,400.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 6B R is estimated to overfly approximately 1,450 households with an approximate population of 3,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,100.

Up to 7,000ft, option 6B R is estimated to overfly approximately 18,550 households with an approximate population of 43,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 47,400.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6B L is estimated to overfly 95 noise sensitive areas.

Up to 7,000ft, this option 6B L is estimated to overfly 180 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 6B R is estimated to overfly 90 noise sensitive areas.

Up to 7,000ft, this option 6B R is estimated to overfly 175 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

14.3 Runways 23R/23L East Option 6C Left Turn

Design Principle Evaluation	Option No: 6C
Option Name: SID RW 23L EAST Left Turn Option 6C	ACCEPT
Option Name: SID RW 23R EAST Left Turn Option 6C	ACCEPT

Option Description:

This is an **RNP1** left turn option using RF coding that has been created with an earlier turn point when compared to option 6A and 6B to increase the distance of routes from Knutsford. This turn point used is less than 1nm from the DER but is identical to that used by existing Runway 23 departures.

After the initial turn it routes in a similar direction to option 6B and is included to provide a direct route to the east following the initial turn and provide an alternative to the existing right turn departures. The speed of the initial left turn has been applied to create the smallest radius and reduce the noise impact on Knutsford.

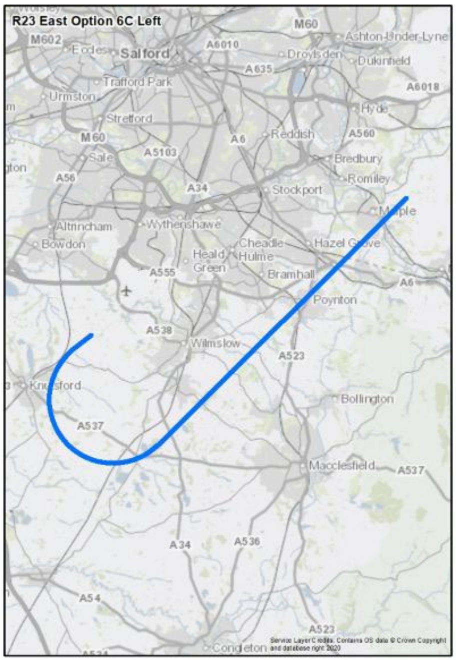
The waypoints for the first turn are positioned at the existing markers:

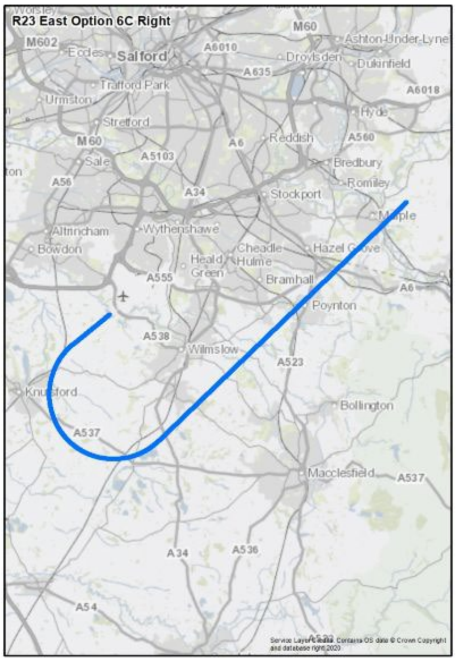
- For Runway 23R this first turn is at MCT D3.
- For Runway 23L, this is at D3.2 which is less than 1nm from DER, but this replicates the turn of the current procedure and therefore aligns to the Design Principle Safety.

23L: This route commences the single RF left turn close to Mobberley and routes aircraft further to the south of Knutsford when compared to option 6B. The turn continues before heading over Chelford in an easterly direction to the south of Alderley Edge and continues via Woodford and Poynton to terminate at 7,000ft at Marple.

23R: This route commences the single RF turn slightly earlier than 23L, which results in a track slightly further south of Knutsford when compared to option 6B. The turn continues before heading in an easterly direction over Chelford to the south of Alderley Edge and continues via Woodford and Poynton to terminate at 7,000ft at Marple.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6C L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6C L is estimated to limit the total population affected by noise.
Option 6C L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6C L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6C R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 6C R is estimated to limit the total population affected by noise.
Option 6C R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6C R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 6C L is 38km (21nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 6C R is 39km (21nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**		
	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6C L is estimated to overfly approximately 1,050 households with an approximate population of 2,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 3,100.

Up to 7,000ft, option 6C L is estimated to overfly approximately 19,150 households with an approximate population of 44,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 48,900.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 6C R is estimated to overfly approximately 1,800 households with an approximate population of 4,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,800.

Up to 7,000ft, option 6C R is estimated to overfly approximately 20,150 households with an approximate population of 47,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 51,200.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**		
	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6C L is estimated to overfly 85 noise sensitive areas.

Up to 7,000ft, this option 6C L is estimated to overfly 170 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 6C R is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 6C R is estimated to overfly 105 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

14.4 Runways 23R/23L East Option 8A Left Turn

Design Principle Evaluation	Option No: 8A
Option Name: SID RW 23L EAST Left Turn Option 8A	ACCEPT
Option Name: SID RW 23R EAST Left Turn Option 8A	ACCEPT

Option Description:

This is an **RNP1** left turn option using RF coding that uses a higher speed in the initial turn but terminates in a similar area to option 6A. As with option 6A it is included to provide a direct route to the east following the initial left turn and to provide an alternative to the existing right turn departures.

The speed of the initial left turn is the CAP778 recommended but this results in a track closer to Knutsford. The design speed may also permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: This route commences the single RF left turn close to Mobberley and routes aircraft close to the centre of Knutsford. The turn continues before heading in an easterly direction to the south of Chelford and Alderley Edge and continues to the north of Prestbury to terminate at 7,000ft close to Disley.

23R: This route commences the single RF turn slightly earlier than 23L, which results in a track to the southern edge of Knutsford. The turn continues before heading in an easterly direction to the south of Chelford and Alderley Edge and continues to the north of Prestbury to terminate and converge with the route for 23L at 7,000ft close to Disley.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

Design Principle		
Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 8A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 8A L is estimated to limit the total population affected by noise.
Option 8A L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8A R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 8A R is estimated to limit the total population affected by noise.
Option 8A R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8A R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 8A L is 40km (22nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 8A R is 41km (22nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 8A L is estimated to overfly approximately 1,550 households with an approximate population of 3,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,000.

Up to 7,000ft, option 8A L is estimated to overfly approximately 6,450 households with an approximate population of 14,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 15,200.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 8A R is estimated to overfly approximately 1,750 households with an approximate population of 3,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,800.

Up to 7,000ft, option 8A R is estimated to overfly approximately 6,700 households with an approximate population of 15,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 16,400.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 8A L is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 8A L is estimated to overfly 40 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 8A R is estimated to overfly 95 noise sensitive areas.

Up to 7,000ft, this option 8A R is estimated to overfly 115 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

14.5 Runways 23R/23L East Option 8B Left Turn

Design Principle Evaluation	Option No: 8B
Option Name: SID RW 23L EAST Left Turn Option 8B	ACCEPT
Option Name: SID RW 23R EAST Left Turn Option 8B	ACCEPT

Option Description:

This is an **RNP1** left turn option using RF coding that uses the same higher speed and identical initial turn as option 8A but terminates further north.

As with option 8A it is included to provide a direct route to the east following the initial left turn and to provide an alternative to the existing right turn departures.

The speed of the initial left turn is the CAP778 recommended but this results in a track closer to Knutsford. The design speed may also permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: This route commences the single RF left turn close to Mobberley and routes aircraft to the south of Knutsford. The turn continues before heading in an easterly direction to the south of Chelford and Alderley Edge and continues via Woodford and Poynton to terminate at 7,000ft south of Marple.

23R: This route commences the single RF turn slightly earlier than 23L, which results in a track slightly further south of Knutsford. The turn continues before heading in an easterly direction to the south of Chelford and Alderley Edge and continues via Woodford and Poynton to terminate at 7,000ft south of Marple.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 8B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 8B L is estimated to limit the total population affected by noise.
Option 8B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8B R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 8B R is estimated to limit the total population affected by noise.
Option 8B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 8B L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 8B R is 42km (23nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 8B L is estimated to overfly approximately 1,500 households with an approximate population of 3,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,100.

Up to 7,000ft, option 8B L is estimated to overfly approximately 12,250 households with an approximate population of 28,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 30,000.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 8B R is estimated to overfly approximately 1,750 households with an approximate population of 3,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,800.

Up to 7,000ft, option 8B R is estimated to overfly approximately 12,550 households with an approximate population of 29,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 31,300.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 8B L is estimated to overfly 95 noise sensitive areas.

Up to 7,000ft, this option 8B L is estimated to overfly 140 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 8B R is estimated to overfly 90 noise sensitive areas.

Up to 7,000ft, this option 8B R is estimated to overfly 140 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

14.6 Runways 23R/23L East Option 8C Left Turn

Design Principle Evaluation	Option No: 8C
Option Name: SID RW 23L EAST Left Turn Option 8C	ACCEPT
Option Name: SID RW 23R EAST Left Turn Option 8C	ACCEPT

Option Description:

This is an **RNP1** left turn option using RF coding that has the higher CAP778 turn speed as options 8A and 8B but with an earlier turn point that aims to reduce the impact of noise on Knutsford. This turn point used is less than 1nm from the DER but is identical to that used by existing Runway 23 departures.

After the initial turn it routes in a similar direction to option 8B and is included to provide a direct route to the east following the initial turn and provide an alternative to the existing right turn departures.

The design speed may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

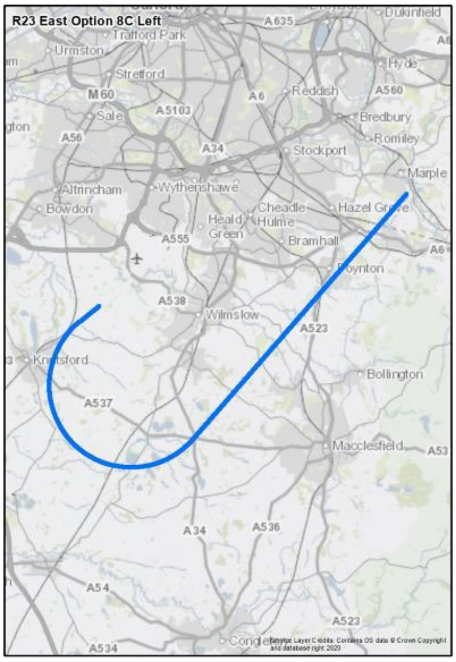
The waypoints for the first turn are positioned at the existing markers:

- For Runway 23R this first turn is at MCT D3.
- For Runway 23L, this is at D3.2 which is less than 1nm from DER, but this replicates the turn of the current procedure and therefore aligns with the Design Principle Safety.

23L: This route commences the single RF left turn close to Mobberley and routes aircraft just to the south of Knutsford. The turn continues before heading in an easterly direction to the south of Chelford and Alderley Edge and continues via Woodford and Poynton to terminate south of Marple.

23R: This route commences the single RF turn slightly earlier than 23L, which results in a track slightly further south of Knutsford than 23L. The turn continues before heading in an easterly direction to the south of Chelford and Alderley Edge and continues via Woodford and Poynton to terminate south of Marple.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.



Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 8C L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 8C L is estimated to limit the total population affected by noise.
Option 8C L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8C L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8C R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 8C R is estimated to limit the total population affected by noise.
Option 8C R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8C R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 8C L is 40km (22nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 8C R is 42km (23nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 8C L is estimated to overfly approximately 1,200 households with an approximate population of 2,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 3,600.

Up to 7,000ft, option 8C L is estimated to overfly approximately 16,950 households with an approximate population of 39,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 42,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 8C R is estimated to overfly approximately 1,350 households with an approximate population of 3,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,200.

Up to 7,000ft, option 8C R is estimated to overfly approximately 17,250 households with an approximate population of 40,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 43,500.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 8C L is estimated to overfly 95 noise sensitive areas.

Up to 7,000ft, this option 8C L is estimated to overfly 180 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 8C R is estimated to overfly 90 noise sensitive areas.

Up to 7,000ft, this option 8C R is estimated to overfly 175 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

14.7 Runways 23R/23L East Left Turn Summary

	Option 6AL	Option 6BL	Option 6CL	Option 8AL	Option 8BL	Option 8CL
S	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET	MET	MET	MET
E	MET	MET	MET	MET	PARTIAL	MET
N1	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N2	MET	MET	MET	MET	MET	MET
N3	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
A	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET
	Best	Best	Best	Best	4,000ft beneficial	Best

	Option 6AR	Option 6BR	Option 6CR	Option 8AR	Option 8BR	Option 8CR
S	MET	MET	MET	MET	MET	MET
P	MET	MET	MET	MET	MET	MET
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	MET	MET	MET	MET	MET	MET
N1	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET
N3	PARTIAL	PARTIAL	MET	PARTIAL	PARTIAL	PARTIAL
A	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET
	4,000ft beneficial	4,000ft beneficial	Best	4,000ft beneficial	4,000ft beneficial	4,000ft beneficial

14.8 Runways 23R/23L East Left Turn Viable but Poor Fit Options

Note: Because the options development process for 23 East Right Turn and Left Turn took place simultaneously, the viable but poor fit options are identical and apply equally to both envelopes.

Option	Safety	Policy	Capacity
A3 Extended straight ahead then left turn to north-east	S	P	C
Originally Option 3, after departure from Runways 23L/23R, aircraft would continue straight ahead until beyond Knutsford before turning left towards the north-east towards the SID aiming point. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic west before turning it left to head east leading to increased fuel burn and emissions. The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation. Capacity: This option would interact with the 23 South Departure design envelopes and 23 arrivals from the south. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			
B7 Extended straight ahead then right turn to north-east	S	P	C
After departure from Runways 23L/23R, aircraft would continue straight ahead until beyond Knutsford before turning right towards the north-east, towards the SID aiming point. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic west before turning it right to head east leading to increased fuel burn and emissions. The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation. Capacity: This option would interact with traffic on the 23 West and 23 North departure envelopes and 23 arrivals from the north. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			

C9 Further extended straight ahead then left turn to north-east	S	P	C

After departure from Runways 23L/23R, aircraft would continue straight ahead for 5-6nm until just before Northwich before turning left towards the north-east, towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance west before turning left to head north-east leading to increased fuel burn and emissions.
- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: In addition to the LPL interaction, this option would interact with the 23 South Departure design envelopes and 23 arrivals from the south. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

D10 Further extended straight ahead then right turn to north-east	S	P	C

After departure from Runways 23L/23R, aircraft would continue straight ahead for 5-6nm until just before Northwich before turning right towards the north-east, towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance west before turning right to head north-east leading to increased fuel burn and emissions.
- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: In addition to the LPL interaction, this option would interact with the 23 West and North Departure design envelopes and 23 arrivals from the north. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

15 Runways 23R/23L South

15.1 Runways 23R/23L South Option 1

Design Principle Evaluation	Option No: 1
Option Name: SID RW 23L SOUTH Option 1	ACCEPT
Option Name: SID RW 23R SOUTH Option 1	ACCEPT

Option Description:

Option 1 is an **RNAV1** replication of the current SANBA 1R/1Y SID and uses a fly-by to fly-over waypoint sequence with CF path terminator coding to create an approximate replication.

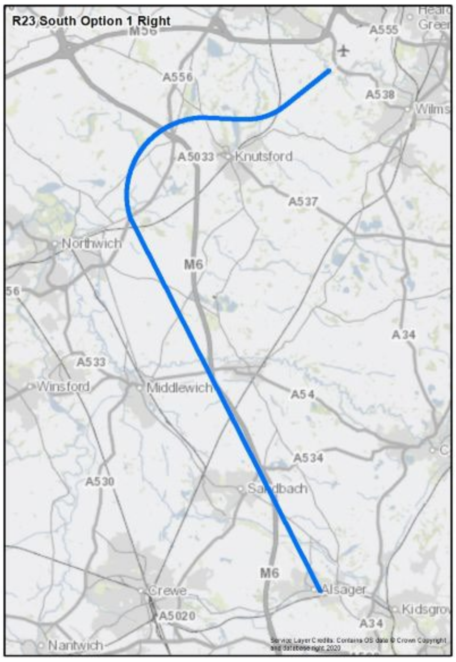
As a replication of the SANBA, this option routes to the west side of the envelope.

The fly-by waypoints are positioned to replicate the turn at the existing markers:

- **23R** this first turn is at MCT D3.
- **23L** this is at MCT D3.2 which less than 1nm from DER but as this replicates the turn of the current procedure it therefore aligns to the Design Principle Safety. This earlier turn is to avoid Knutsford.

As a replicated route it follows a similar track over the ground as the current published route. The first turn commences in the vicinity of Parkgate Industrial Area and the route kinks to the north of Knutsford before turning left to head south. The routes converge in the vicinity of Lostock Gralam and it then routes in a south easterly direction to pass west of Holmes Chapel and east of Sandbach and terminates at 7,000ft just west of Kidsgrove.

An element of dispersion would be apparent in the turns due to the fly-over waypoint and CF coding. A speed restriction of 200 KIAS, then 210 KIAS is used for the first and second turn to create replication of the current route.



Design Principle		
Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide a RNAV1 replication of the current route. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1 L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 1 L is estimated to increase the total population affected by noise.
Option 1 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 1 R is estimated to increase the total population affected by noise.
Option 1 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1 L is 47km (25nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1 R is 50km (27nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1 L is estimated to overfly approximately 500 households with an approximate population of 1,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,000.

Up to 7,000ft, option 1 L is estimated to overfly approximately 11,800 households with an approximate population of 25,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 29,800.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1 R is estimated to overfly approximately 1,150 households with an approximate population of 2,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,700.

Up to 7,000ft, option 1 R is estimated to overfly approximately 12,650 households with an approximate population of 27,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 31,100.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1 L is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 1 L is estimated to overfly 65 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 1 R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 1 R is estimated to overfly 65 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.2 Runways 23R/23L South Option 2A

Design Principle Evaluation	Option No: 2A
Option Name: SID RW 23L SOUTH Option 2A	ACCEPT
Option Name: SID RW 23R SOUTH Option 2A	ACCEPT

Option Description:

This is an **RNAV1** replication of the current LISTO 2R/2Y SID which turns south before Knutsford. It uses a fly-over waypoint with CF path terminator coding to create an approximate replication.

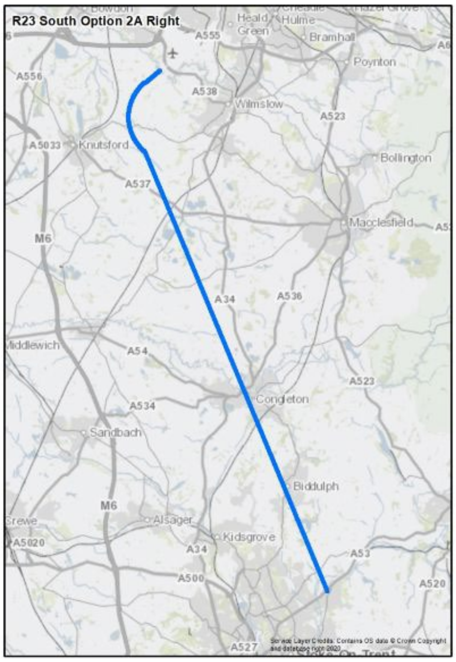
As a replication of the LISTO, this option routes to the east side of the envelope.

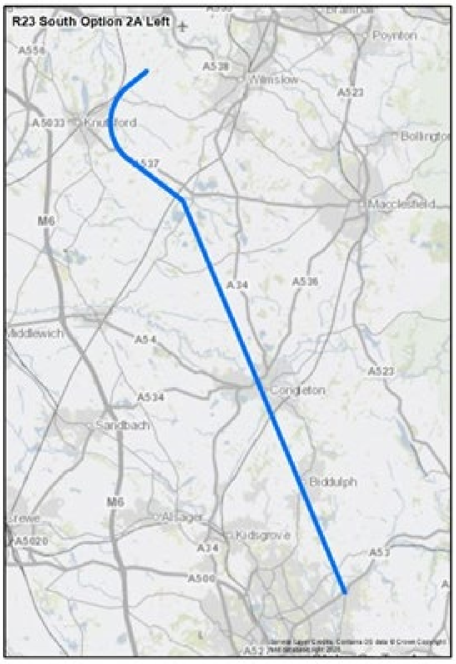
The fly-by waypoints are positioned to replicate the turn at the existing markers:

- **23R** this first turn is at MCT D3.
- **23L** this is at MCT D3.2 which less than 1nm from DER but as this replicates the turn of the current procedure it therefore aligns to the Design Principle Safety. This earlier turn is to avoid Knutsford.

The first turn results in both routes avoiding Knutsford to the south-east and they converge in the vicinity of Chelford. It routes in a south-easterly direction to pass over Congleton and terminate just east of Stoke-on-Trent.

An element of dispersion would be apparent in the turn due to the fly-over waypoint and CF coding. A speed restriction of 185kts is required for the initial turn for aircraft to avoid Knutsford.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide a RNAV1 replication of the current LISTO 2R/2Y SID route. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2A L is estimated to increase the total population affected by noise.
Option 2A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2A R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 2A R is estimated to increase the total population affected by noise.
Option 2A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 2A L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 2A R is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2A L is estimated to overfly approximately 500 households with an approximate population of 1,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 3,100.

Up to 7,000ft, option 2A L is estimated to overfly approximately 26,450 households with an approximate population of 59,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 66,400.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 2A R is estimated to overfly approximately 650 households with an approximate population of 1,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 3,100.

Up to 7,000ft, option 2A R is estimated to overfly approximately 26,750 households with an approximate population of 60,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 66,800.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 2A L is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 2A L is estimated to overfly 135 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 2A R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 2A R is estimated to overfly 135 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.3 Runways 23R/23L South Option 2B

Design Principle Evaluation	Option No: 2B
Option Name: SID RW 23L SOUTH Option 2B	ACCEPT
Option Name: SID RW 23R SOUTH Option 2B	ACCEPT

Option Description:

This is an **RNAV1** option is included that provides the same initial turn inside of Knutsford but then has a track to create the maximum divergence from other southbound routes and to avoid the overflight of Congleton.

The aim is to provide a 45° track divergence from other southbound SIDs when created as a network which would enable a one-minute departure separation to align with the Design Principle Capacity.

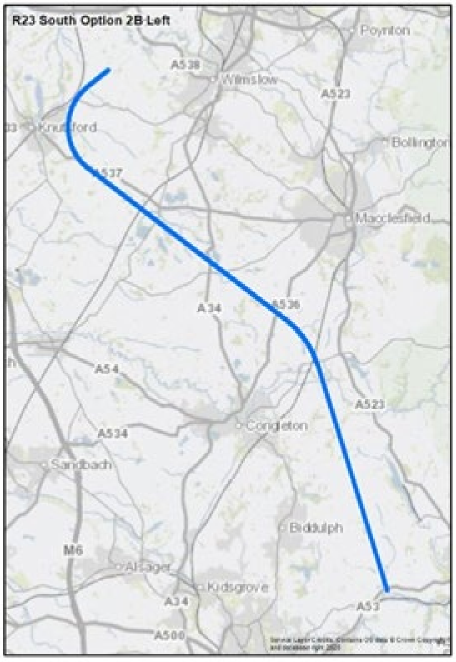
In line with CAP493 (Manual of Air Traffic Services Pt1), the minimum departure separation can be reduced to one minute provided that the aircraft fly on tracks diverging by 45° or more immediately after take-off.

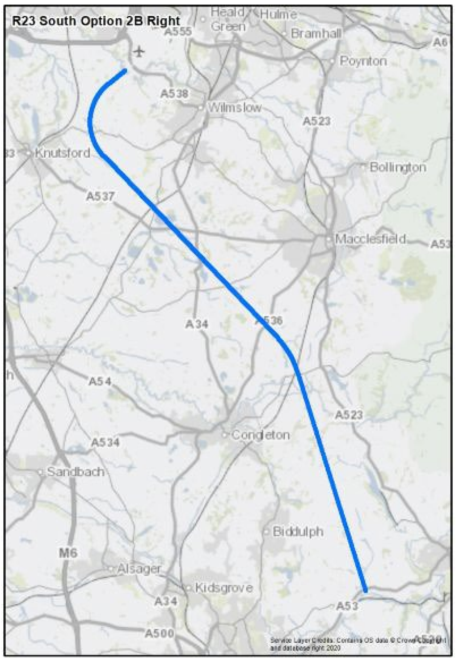
The option uses a fly-over waypoint with CF path terminator coding to create an approximate replication of the initial turn and a similar track over the ground as the current route. The waypoints are positioned to replicate the turn at the existing markers.

23L: After departure this route makes a left turn south at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the south-east of Knutsford and the route continues on a south-easterly heading to pass west of Chelford. A right turn to the south is made to the north-east of Congleton where the routes converge and terminate at 7,000ft to the east of Leek.

23R: After departure this route makes a left turn south at MCT D3 which creates a route that passes just east of Mobberley. The route continues on a south-easterly heading to pass east of Chelford. A right turn to the south is made to the north-east of Congleton where the routes converge and terminate at 7,000ft to the east of Leek. The combined routes avoid Congleton to the east.

A speed restriction of 185kts is required for the initial turn for aircraft to avoid Knutsford.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 2B L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 2B L is estimated to limit the total population affected by noise.
Option 2B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2B R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 2B R is estimated to limit the total population affected by noise.
Option 2B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 2B L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 2B R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 2B L is estimated to overfly approximately 400 households with an approximate population of 900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,100.

Up to 7,000ft, option 2B L is estimated to overfly approximately 1,850 households with an approximate population of 4,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,900.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 2B R is estimated to overfly approximately 300 households with an approximate population of 900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 900.

Up to 7,000ft, option 2B R is estimated to overfly approximately 1,750 households with an approximate population of 4,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,700.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 2B L is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 2B L is estimated to overfly 25 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 2B R is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 2B R is estimated to overfly 30 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.4 Runways 23R/23L South Option 3

Design Principle Evaluation	Option No: 3
Option Name: SID RW 23L SOUTH Option 3	REJECT
Option Name: SID RW 23R SOUTH Option 3	REJECT

Option Description:

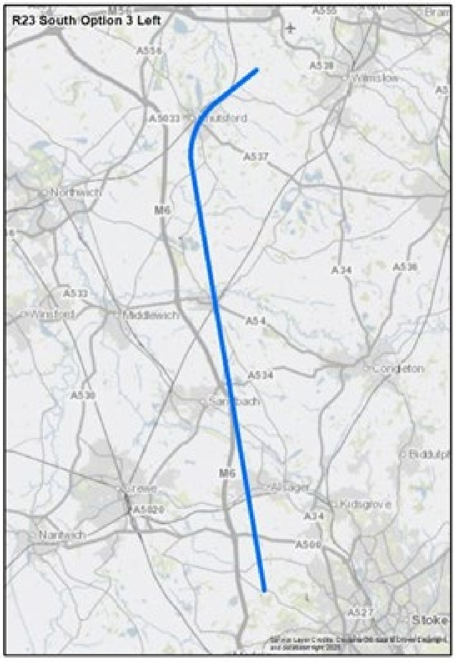
This is an RNAV1 option that provides a straight-ahead route with an extended climb out over the Knutsford area before routing aircraft south. It is similar to the existing SANBA SID but without the avoidance of Knutsford and it terminates on the west side of the envelope.

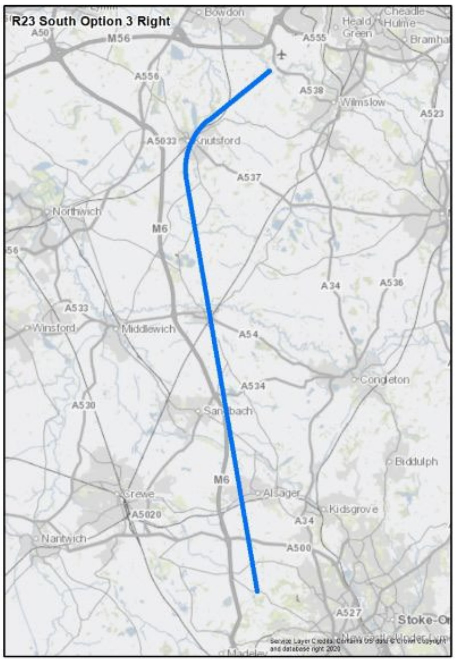
The procedure reduces fuel burn when compared to the current SANBA SID as it eliminates the kink to the north around Knutsford. This also has a positive impact on capacity by reducing interactions with other departure routes to the north and east that also follow the same initial track as the SANBA. The procedure uses a fly-by turn.

23L: After departure this route continues straight ahead before making a left turn south over Knutsford. It converges with the route for 23R to the south-west of Knutsford and then continues south, running parallel to the M6 motorway. It passes over Holmes Chapel and to the east of Sandbach and terminates at 7,000ft to the north-west of Newcastle-under-Lyme.

23R: After departure this route continues straight ahead before making a left turn south over Knutsford to converge with the route for 23L. The combined routes continue south, running parallel to the M6 motorway to pass over Holmes Chapel, to the east of Sandbach and terminates at 7,000ft to the north-west of Newcastle-under-Lyme.

A speed restriction of 220 KIAS is used for the first turn.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3 L is estimated to increase the total population affected by noise.
Option 3 L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 3 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3 R is estimated to increase the total population affected by noise.
Option 3 R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 3 L is 41km (22nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 3 R is 43km (23nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 3 L is estimated to overfly approximately 5,450 households with an approximate population of 12,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 13,400.

Up to 7,000ft, option 3 L is estimated to overfly approximately 15,250 households with an approximate population of 34,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 38,800.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 3 R is estimated to overfly approximately 5,300 households with an approximate population of 11,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 13,600.

Up to 7,000ft, option 3 R is estimated to overfly approximately 15,350 households with an approximate population of 34,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 39,700.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 3 L is estimated to overfly 35 noise sensitive areas.

Up to 7,000ft, this option 3 L is estimated to overfly 80 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 3 R is estimated to overfly 45 noise sensitive areas.

Up to 7,000ft, this option 3 R is estimated to overfly 90 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.5 Runways 23R/23L South Option 4A

Design Principle Evaluation	Option No: 4A
Option Name: SID RW 23L SOUTH Option 4A	ACCEPT
Option Name: SID RW 23R SOUTH Option 4A	ACCEPT

Option Description:

This **RNAV1** option provides an initial turn over the southern edge of Knutsford and heads in a south-west direction. It serves a similar purpose as the SANBA SID and terminates on the west side of the envelope.

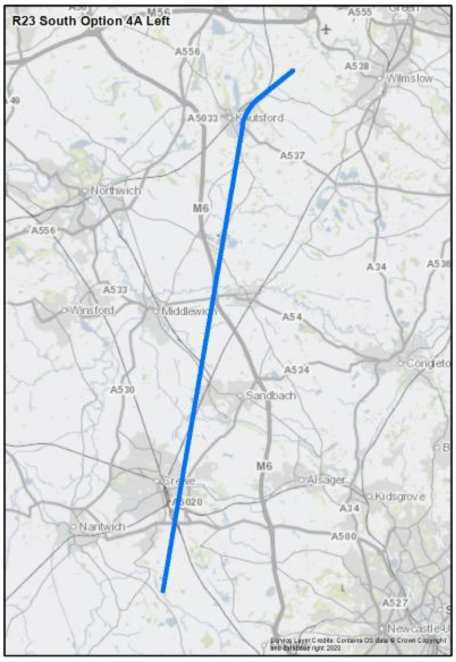
The procedure uses a fly-over waypoint and can be coded as either course-to-fix, track-to-fix, or direct-to-fix. The climb gradient has been set at 6%.

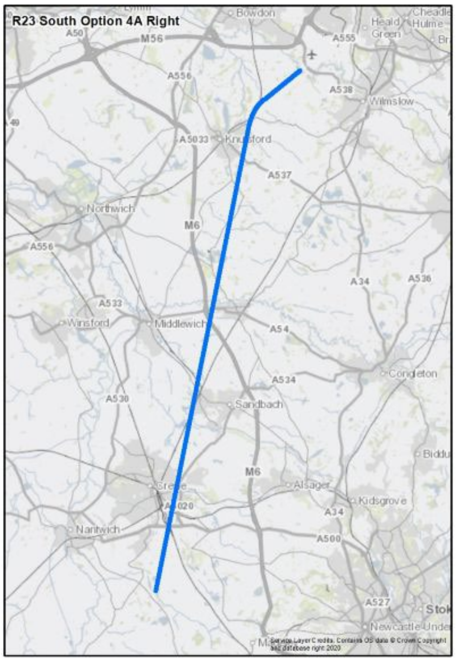
An element of dispersion would be apparent in the turn due to the path terminator coding.

23L: After departure this route continues straight ahead before making a left turn to the south-west over Knutsford. It continues in this direction to the west of Holmes Chapel and Sandbach. It passes over the eastern edge of Crewe and converges with the option for 23R at the 7,000ft termination point just south of Crewe.

23R: After departure this route makes a left turn to the south-west to route between Knutsford and Mobberley and continues in this direction just to the west of Holmes Chapel and Sandbach. It passes over the eastern edge of Crewe and both routes converge at the 7,000ft termination point just south of Crewe.

A speed restriction of 190 KIAS is applied to the first turn.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4A L is estimated to increase the total population affected by noise.
Option 4A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4A R is estimated to increase the total population affected by noise.
Option 4A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4A L is 44km (24nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4A R is 46km (25nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 4A L is estimated to overfly approximately 2,300 households with an approximate population of 5,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 6,400.

Up to 7,000ft, option 4A L is estimated to overfly approximately 18,100 households with an approximate population of 42,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 49,800.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 4A R is estimated to overfly approximately 1,400 households with an approximate population of 3,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,000.

Up to 7,000ft, option 4A R is estimated to overfly approximately 16,950 households with an approximate population of 39,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 48,700.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4A L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 4A L is estimated to overfly 75 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4A R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 4A R is estimated to overfly 65 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.6 Runways 23R/23L South Option 4B

Design Principle Evaluation	Option No: 4B
Option Name: SID RW 23L SOUTH Option 4B	REJECT
Option Name: SID RW 23R SOUTH Option 4B	REJECT

Option Description:

This RNAV1 option provides a route that heads to the south-south-west of the envelope, but with an earlier initial turn intended to avoid Knutsford.

The option terminates at the same point as 4A, but the initial turn is now at:

- For Runway 23L it is at MCT D3.2, which is 0.7nm from DER.
- For Runway 23R it is at 1nm from DER.

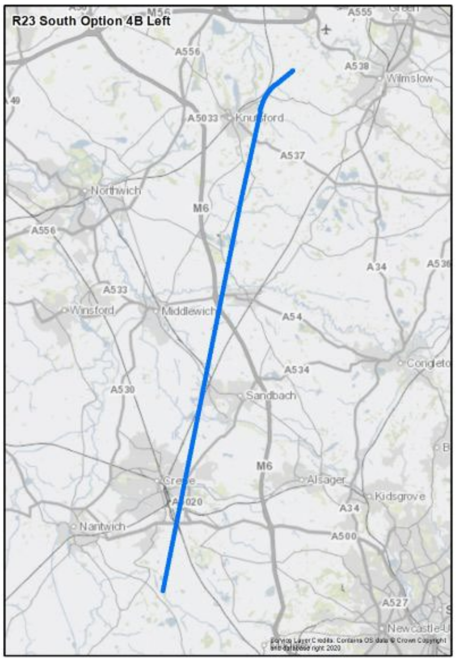
This combination allows the subsequent tracks to be further east than that of option 4A, creating more separation from Knutsford.

The procedure uses a fly-over waypoint and can be coded as either course-to-fix, track-to-fix, or direct-to-fix. The climb gradient has been set at 6%.

23L: After departure this route makes a left turn south-west at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the south of Knutsford and the route continues on a south-westerly heading to the west of Holmes Chapel and Sandbach. It passes over the eastern edge of Crewe and converges with the option for 23R at the 7,000ft termination point just south of Crewe.

23R: After departure this route makes a left turn to the south-west to route south of Knutsford and continues in this direction, passing just to the west of Holmes Chapel and Sandbach. It then routes over the eastern edge of Crewe and both routes converge at the 7,000ft termination point just south of Crewe.

A speed restriction of 190 KIAS is applied to the first turn.



Design Principle Safety		
Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4B L is estimated to increase the total population affected by noise.
Option 4B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4B R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 4B R is estimated to increase the total population affected by noise.
Option 4B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4B L is 44km (24nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4B R is 46km (25nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4B L is estimated to overfly approximately 1,150 households with an approximate population of 2,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,500.

Up to 7,000ft, option 4B L is estimated to overfly approximately 16,100 households with an approximate population of 37,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 46,300.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 4B R is estimated to overfly approximately 1,350 households with an approximate population of 3,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 3,300.

Up to 7,000ft, option 4B R is estimated to overfly approximately 16,950 households with an approximate population of 39,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 48,000.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a similar population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4B L is estimated to overfly noise sensitive areas.

Up to 7,000ft, this option 4B L is estimated to overfly 65 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4B R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 4B R is estimated to overfly 65 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.7 Runways 23R/23L South Option 4C

Design Principle Evaluation	Option No: 4C
Option Name: SID RW 23L SOUTH Option 4C	ACCEPT
Option Name: SID RW 23R SOUTH Option 4C	ACCEPT

Option Description:

This RNAV1 option provides a route that heads to the south-south-west of the envelope with the same earlier initial turn intended to avoid Knutsford as option 4B, and a left turn further down route to avoid Sandbach and Crewe.

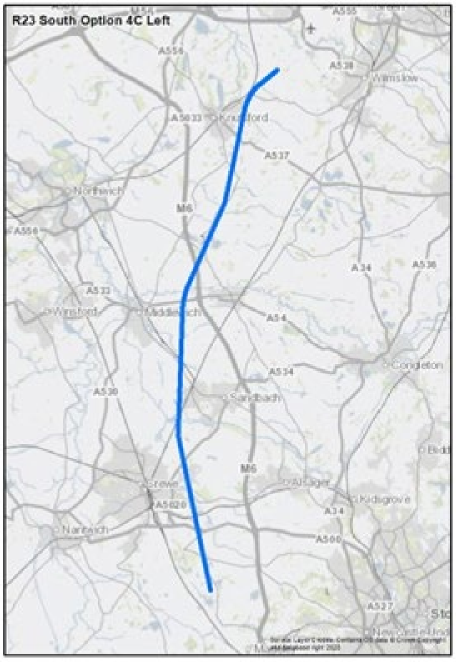
In common with option 4B the turn point for Runway 23L is at MCT D3.2, which is 0.7nm from DER. The turn point for Runway 23R is at 1nm from DER. This combination creates separation from Knutsford.

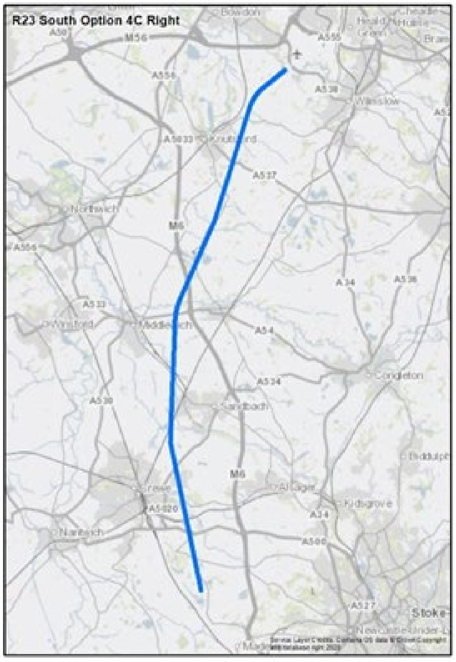
The procedure uses a fly-over waypoint and can be coded as either course-to-fix, track-to-fix, or direct-to-fix. The climb gradient has been set at 6%. An element of dispersion would be apparent in the turn due to the path terminator coding.

23L: After departure this route makes a left turn south-west at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the south of Knutsford and the route continues on a south-westerly heading and combines with the 23R option midway between Lower Peover and Over Peover. The combined routes pass to the west of Holmes Chapel and Sandbach and then make a slight right turn to avoid Crewe and terminate at 7,000ft in the vicinity of Betley.

23R: After departure this route makes a left turn to the south-west to route south of Knutsford and combines with the 23L option midway between Lower Peover and Over Peover. The combined routes pass to the west of Holmes Chapel and Sandbach and then make a slight right turn to avoid Crewe and terminate at 7,000ft in the vicinity of Betley.

A speed restriction of 190 KIAS is applied to the first turn.





	23L	MET

Design Principle **Safety**	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4C L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 4C L is estimated to increase the total population affected by noise.
Option 4C L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4C L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4C R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 4C R is estimated to increase the total population affected by noise.
Option 4C R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4C R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 4C L is 43km (23nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 4C R is 44km (24nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4C L is estimated to overfly approximately 700 households with an approximate population of 1,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 3,300.

Up to 7,000ft, option 4C L is estimated to overfly approximately 7,900 households with an approximate population of 19,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 26,300.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 4C R is estimated to overfly approximately 850 households with an approximate population of 2,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,100.

Up to 7,000ft, option 4C R is estimated to overfly approximately 8,550 households with an approximate population of 20,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 27,200.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4C L is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 4C L is estimated to overfly 35 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4C R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 4C R is estimated to overfly 35 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.8 Runways 23R/23L South Option 5A

Design Principle Evaluation	Option No: 5A
Option Name: SID RW 23L SOUTH Option 5A	ACCEPT
Option Name: SID RW 23R SOUTH Option 5A	ACCEPT

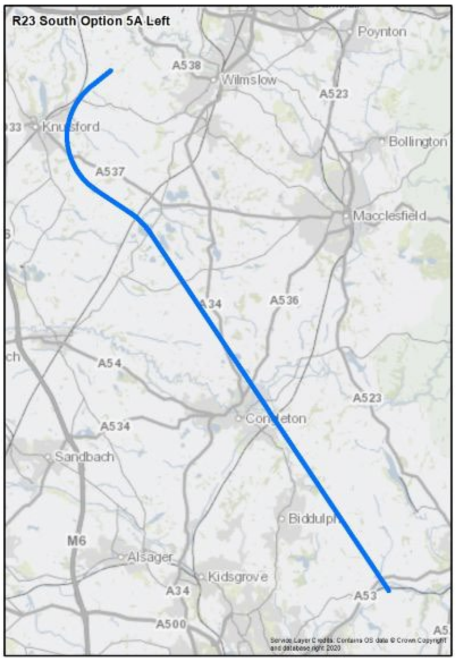
Option Description:
This is an **RNP1** option that uses RF coding and follows a similar initial track to the existing LISTO SID which turns south before Knutsford. However, the track following the initial turn routes further south-east than the existing LISTO SID once south of Chelford.

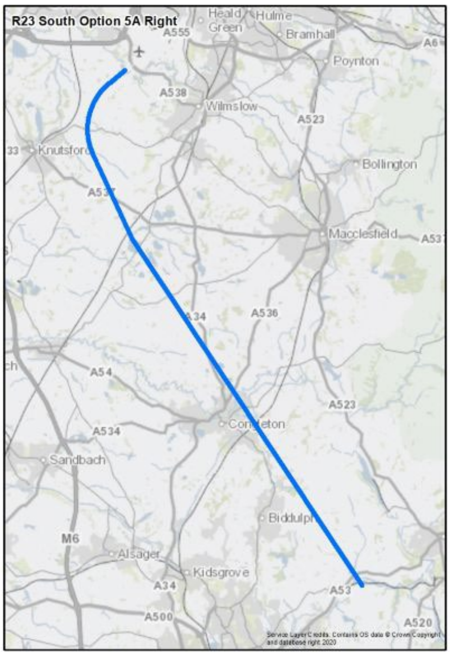
The aim is to provide a 45° track divergence from other southbound SIDs when created as a network which would enable a one-minute departure separation to align with the Design Principle Capacity.

23L: After departure, this route makes a left turn at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the south of Knutsford and the route continues on a south-easterly heading to route west of Chelford where it and combines with the 23R option. The combined routes avoid Congleton and Stoke-on-Trent and terminate at 7,000ft west of Leek.

23R: After departure this route makes a left turn to route south of Knutsford and combines with the 23L option to the west of Chelford. The combined routes avoid Congleton and Stoke-on-Trent and terminate at 7,000ft west of Leek.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius to avoid Knutsford. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 5A L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 5A L is estimated to limit the total population affected by noise.
Option 5A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 5A R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 5A R is estimated to limit the total population affected by noise.
Option 5A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5A R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 5A L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 5A R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 5A L is estimated to overfly approximately 450 households with an approximate population of 1,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,700.

Up to 7,000ft, option 5A L is estimated to overfly approximately 9,550 households with an approximate population of 22,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 26,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 5A R is estimated to overfly approximately 650 households with an approximate population of 1,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,500.

Up to 7,000ft, option 5A R is estimated to overfly approximately 9,800 households with an approximate population of 22,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 26,400.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 5A L is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 5A L is estimated to overfly 40 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, this option 5A R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 5A R is estimated to overfly 45 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.9 Runways 23R/23L South Option 5B

Design Principle Evaluation	Option No: 5B
Option Name: SID RW 23L SOUTH Option 5B	ACCEPT
Option Name: SID RW 23R SOUTH Option 5B	ACCEPT

Option Description:

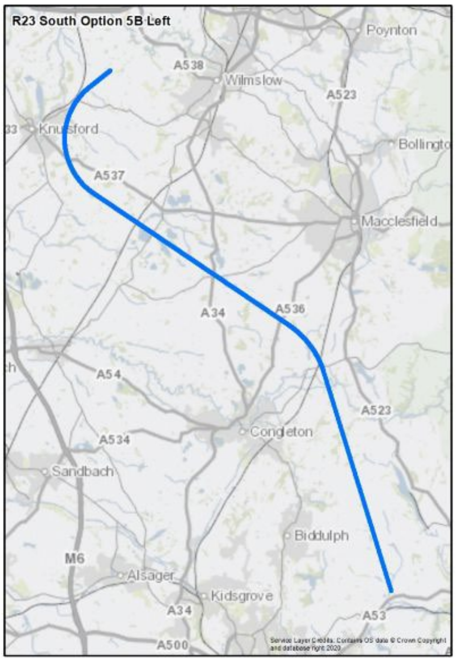
This is an **RNP1** option with RF coding that follows a similar initial track to option 5A and turns south before Knutsford. However, this left turn is continued to provide a route more to the east to avoid Congleton and Leek to aid capacity and departure separation.

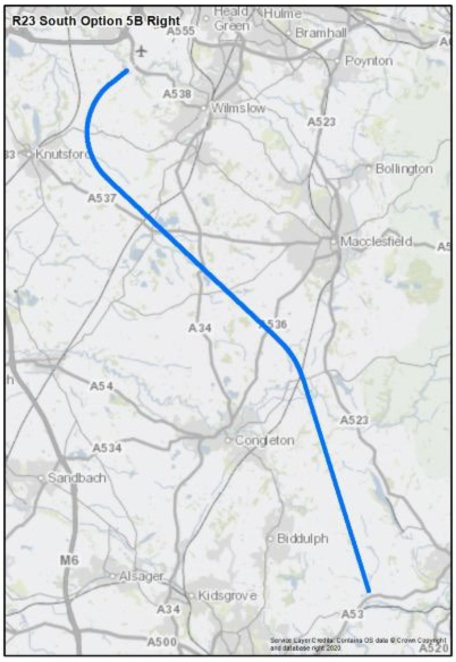
In a similar way to options 2B and 5A, the aim is to provide a 45° track divergence from other southbound SIDs when created as a network which would enable a one-minute departure separation to align with the Design Principle Capacity.

23L: After departure this route makes a left turn at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the south of Knutsford and the route continues on a south-easterly heading south-west of Chelford and then mid-way between Macclesfield and Congleton to avoid both towns. It combines with the 23R option south of Macclesfield and the combined routes turn south and terminate at 7,000ft between Stoke-on-Trent and Leek.

23R: After departure this route makes a left turn to route south of Knutsford and continues on a south-easterly heading over Chelford and then mid-way between Macclesfield and Congleton to avoid both towns. It combines with the 23L option south of Macclesfield and the combined routes turn south and terminate at 7,000ft between Stoke-on-Trent and Leek.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius to avoid Knutsford. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**		
	23L	MET
	23R	MET

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 5B L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 5B L is estimated to limit the total population affected by noise.
Option 5B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 5B R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 5B R is estimated to limit the total population affected by noise.
Option 5B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 5B L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 5B R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 5B L is estimated to overfly approximately 400 households with an approximate population of 900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,400.

Up to 7,000ft, option 5B L is estimated to overfly approximately 1,800 households with an approximate population of 4,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 5,100.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 5B R is estimated to overfly approximately 1,100 households with an approximate population of 2,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,500.

Up to 7,000ft, option 5B R is estimated to overfly approximately 2,550 households with an approximate population of 5,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 6,200.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 5B L is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 5B L is estimated to overfly 20 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 5B R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 5B R is estimated to overfly 20 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.10 Runways 23R/23L South Option 5C

Design Principle Evaluation	Option No: 5C
Option Name: SID RW 23L SOUTH Option 5C	ACCEPT
Option Name: SID RW 23R SOUTH Option 5C	ACCEPT

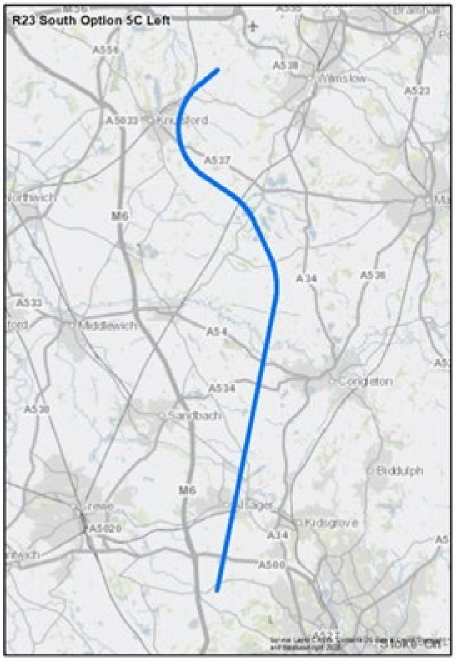
Option Description:

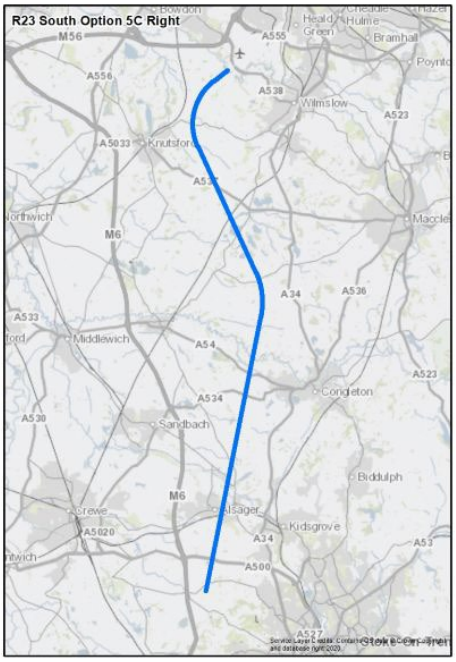
This is an **RNP1** option with RF coding that follows a similar initial track to the existing LISTO 2R/2Y SID. However, the turn is stopped earlier to provide a route to the south which passes west of Congleton to terminate in the vicinity of that for the current SANBA SID.

23L: After departure this route makes a left turn at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the south of Knutsford and the route continues on a south-easterly heading to the south of Chelford where it combines with the 23R option. The combined routes then turn south-west to avoid Congleton and Sandbach and terminate at 7,000ft west of Stoke-on-Trent.

23R: After departure this route makes a left turn to route south of Knutsford and continues on a south-easterly heading to the south of Chelford where it combines with the 23L option. The combined routes then turn south-west to avoid Congleton and Sandbach and terminate at 7,000ft west of Stoke-on-Trent.

A speed restriction of 190 KIAS is used for the first turn to avoid Knutsford. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 5C L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 5C L is estimated to increase the total population affected by noise.
Option 5C L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5C L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 5C R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 5C R is estimated to increase the total population affected by noise.
Option 5C R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5C R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 5C L is 42km (23nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 5C R is 43km (23nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 5C L is estimated to overfly approximately 450 households with an approximate population of 1,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,700.

Up to 7,000ft, option 5C L is estimated to overfly approximately 10,050 households with an approximate population of 22,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 24,000.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 5C R is estimated to overfly approximately 650 households with an approximate population of 1,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,400.

Up to 7,000ft, option 5C R is estimated to overfly approximately 10,300 households with an approximate population of 22,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 23,800.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 5C L is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 5C L is estimated to overfly 50 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 5C R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 5C R is estimated to overfly 50 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.11 Runways 23R/23L South Option 6

Design Principle Evaluation	Option No: 6
Option Name: SID RW 23L SOUTH Option 6	ACCEPT
Option Name: SID RW 23R SOUTH Option 6	ACCEPT

Option Description:

This option is included to provide a **RNAV1** replication of the existing conventional SANBA 1R/1Y SID to 7,000ft. However, unlike the 'do minimum' option 1 which uses fly-over waypoints, this option has been designed as an RNAV1 route using **fly-by** waypoints.

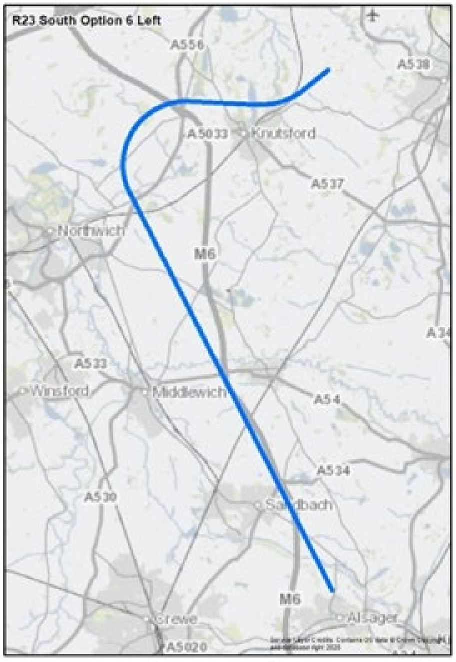
The benefit of fly over waypoints is more accurate track keeping. However, option 1 is more likely to be a better representation of existing operations with dispersion being apparent in the turn to the south.

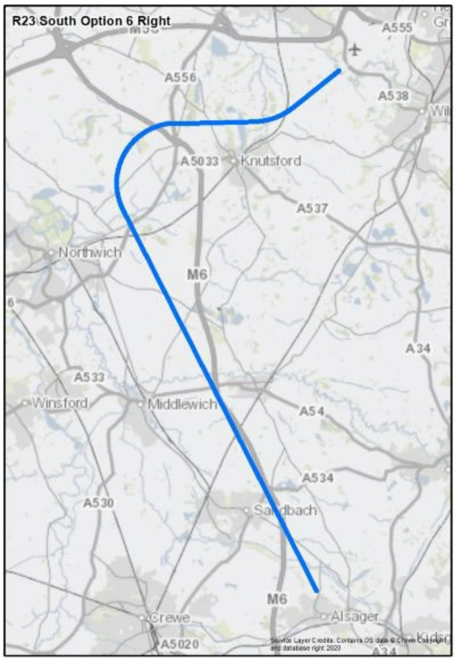
The route has been designed as an RNAV1 route and uses fly-by waypoints. The climb gradient has been set at 6%.

23L: After departure, this route makes a right turn at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the north of Knutsford and following a short straight segment, then turns left to route south between Knutsford and Northwich where it combines with the 23R option. The combined routes pass just to the west of Holmes Chapel and to the eastern edge of Sandbach and terminate at 7,000ft south-east of Sandbach.

23R: After departure, this route makes a right turn to route north of Knutsford and following a short straight segment, then turns left to route south between Knutsford and Northwich where it combines with the 23L option. The combined routes pass just to the west of Holmes Chapel and to the eastern edge of Sandbach and terminate at 7,000ft south-east of Sandbach.

A speed restriction of 200 KIAS then 210 KIAS is used for the first turn and second turn.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide a RNAV1 replication of the conventional SANBA 1R/1Y SID. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6 L is estimated to increase the total population affected by noise.
Option 6 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6 R is estimated to increase the total population affected by noise.
Option 6 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 6 L is 48km (26nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 6 R is 51km (28nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6 L is estimated to overfly approximately 1,500 households with an approximate population of 3,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,400.

Up to 7,000ft, option 6 L is estimated to overfly approximately 11,750 households with an approximate population of 26,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 29,700.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 6 R is estimated to overfly approximately 1,850 households with an approximate population of 4,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,600.

Up to 7,000ft, option 6 R is estimated to overfly approximately 12,300 households with an approximate population of 27,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 30,500.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6 L is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 6 L is estimated to overfly 65 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 6 R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 6 R is estimated to overfly 65 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.12 Runways 23R/23L South Option 7A

Design Principle Evaluation	Option No: 7A
Option Name: SID RW 23L SOUTH Option 7A	REJECT
Option Name: SID RW 23R SOUTH Option 7A	REJECT

Option Description:

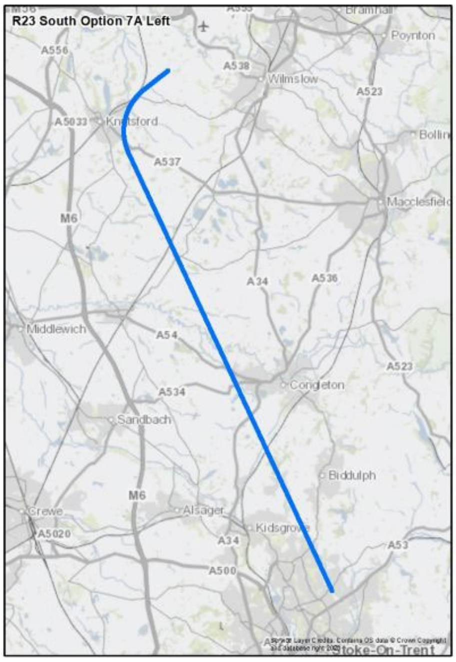
This is an **RNP1** option with RF coding that provides an alternative version of the existing LISTO 2R/2Y SID. It turns south before Knutsford but heads south slightly further west than option 2A (the LISTO replication) to terminate near Stoke-on-Trent.

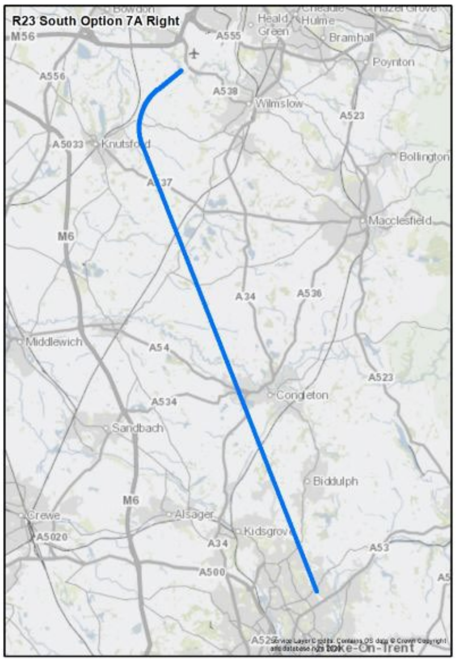
It uses an RF turn at 1nm DER in accordance with PANS-OPS/CAP778 which has the effect of routing this option closer to the centre of Knutsford.

23L: After departure this route makes a left turn south at 1nm from DER and routes to the south of Knutsford. It then routes to the west of Chelford and over the western edge of Congleton and terminates at 7,000ft to the north-east corner of Stoke-on-Trent.

23R: After departure this route makes a left turn south at 1nm from DER which routes it over the south-east edge of Knutsford. It then routes over the western edge of Congleton and terminates at 7,000ft to the north-east corner of Stoke-on-Trent.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 7A L is estimated to increase the total population affected by noise.
Option 7A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7A R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 7A R is estimated to increase the total population affected by noise.
Option 7A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 7A L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 7A R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7A L is estimated to overfly approximately 1,250 households with an approximate population of 3,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,300.

Up to 7,000ft, option 7A L is estimated to overfly approximately 29,850 households with an approximate population of 69,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 73,900.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 7A R is estimated to overfly approximately 900 households with an approximate population of 2,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 3,400.

Up to 7,000ft, option 7A R is estimated to overfly approximately 30,500 households with an approximate population of 70,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 76,600.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 7A L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 7A L is estimated to overfly 135 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 7A R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 7A R is estimated to overfly 140 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.13 Runways 23R/23L South Option 7B

Design Principle Evaluation	Option No: 7B
Option Name: SID RW 23L SOUTH Option 7B	ACCEPT
Option Name: SID RW 23R SOUTH Option 7B	ACCEPT

Option Description:

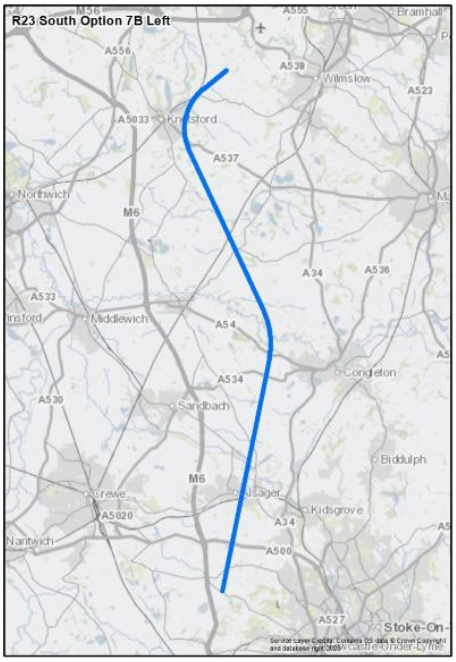
This is an **RNP1** option with RF coding that provides an alternative version of the existing LISTO 2R/2Y SID. It is similar to option 7A but makes a turn to the west of Congleton to avoid Stoke-on-Trent.

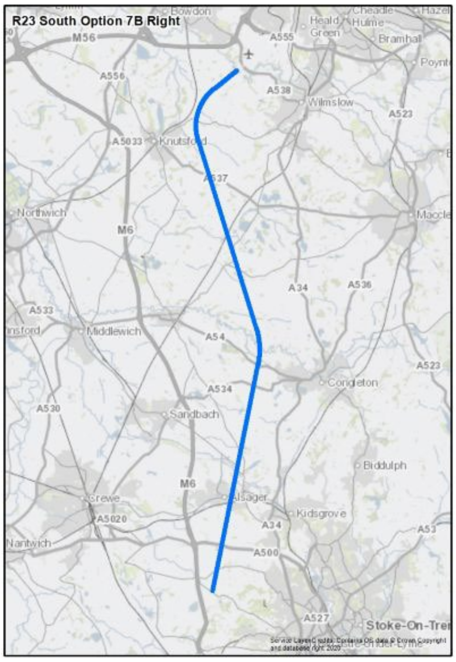
In common with option 7A, the RF turn is at 1nm DER in accordance with PANS-OPS/CAP778 which routes this option closer to the centre of Knutsford, however the final track is in a south-westerly direction.

23L: After departure, this route makes a left turn south at 1nm from DER and routes to the south of Knutsford. It then routes to the west of Chelford before turning south-west to avoid Congleton. This has the effect of avoiding Stoke-on-Trent and the route terminates at 7,000ft to the west of the town.

23R: After departure, this route makes a left turn south at 1nm from DER which routes it over the south-east edge of Knutsford. It then routes to the west of Chelford before turning south-west to avoid Congleton. This has the effect of avoiding Stoke-on-Trent and the route terminates at 7,000ft to the west of the town.

A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7B L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 7B L is estimated to increase the total population affected by noise.
Option 7B L is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7B R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 7B R is estimated to increase the total population affected by noise.
Option 7B R is shorter in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 7B L is 42km (23nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 7B R is 43km (23nm). When compared to the 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7B L is estimated to overfly approximately 900 households with an approximate population of 2,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,300.

Up to 7,000ft, option 7B L is estimated to overfly approximately 10,450 households with an approximate population of 23,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 24,500.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 7B R is estimated to overfly approximately 850 households with an approximate population of 1,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,900.

Up to 7,000ft, option 7B R is estimated to overfly approximately 10,350 households with an approximate population of 22,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 24,000.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 7B L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 7B L is estimated to overfly 60 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 7B R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 7B R is estimated to overfly 55 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

15.14 Runways 23R/23L South SANBA Summary

	Option 1L	Option 3L	Option 4AL	Option 4BL	Option 4CL	Option 5CL	Option 6L	Option 7BL
S	MET	MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET	MET	MET	MET	MET	MET
E	PARTIAL	MET	PARTIAL	PARTIAL	MET	MET	PARTIAL	MET
N1	PARTIAL	NOT MET	NOT MET	NOT MET	PARTIAL	PARTIAL	NOT MET	PARTIAL
N2	MET	MET	MET	MET	MET	MET	MET	MET
N3	PARTIAL	NOT MET	NOT MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL	NOT MET
A	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Rejected	Add. Qual.	Rejected	Best	Best	Add. Qual.	4,000ft beneficial

	Option 1R	Option 3R	Option 4AR	Option 4BR	Option 4CR	Option 5CR	Option 6R	Option 7BR
S	MET	MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	MET	PARTIAL	PARTIAL	MET	MET	PARTIAL	MET
N1	PARTIAL	NOT MET	NOT MET	PARTIAL	PARTIAL	PARTIAL	NOT MET	PARTIAL
N2	MET	MET	MET	MET	MET	MET	MET	MET
N3	NOT MET	NOT MET	NOT MET	NOT MET	MET	NOT MET	NOT MET	NOT MET
A	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Rejected	Add. Qual.	Rejected	Best	4,000ft beneficial	Add. Qual.	4,000ft beneficial

15.15 Runways 23R/23L South LISTO Summary

	Option O2AL	Option O2BL	Option O5AL	Option O5BL	Option O7AL
S	MET	MET	MET	MET	MET
P	PARTIAL	MET	MET	MET	PARTIAL
C	MET	MET	MET	MET	MET
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	NOT MET	MET	MET	MET	NOT MET
N2	MET	MET	MET	MET	MET
N3	PARTIAL	MET	MET	MET	NOT MET
A	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Best	Best	Best	Rejected

	Option O2AR	Option O2BR	Option O5AR	Option O5BR	Option O7AR
S	MET	MET	MET	MET	MET
P	PARTIAL	MET	MET	MET	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	PARTIAL	MET	MET	MET	PARTIAL
N2	MET	MET	MET	MET	MET
N3	PARTIAL	MET	MET	MET	PARTIAL
A	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET
	Do Minimum (Replication)	Best	Best	Best	Rejected

15.16 Runways 23R/23L South Viable but Poor Fit Options

Option	Safety	Policy	Capacity
A8 Left-hand wraparound	S	P	C

After departure from Runways 23L/23R, aircraft would make a left-hand turn, fly around the airport through the overhead and then begin heading south towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic east and north before turning it south leading to increased fuel burn and emissions.
- Environmental performance – Noise: This option may hinder the achievement of CDAs for arriving aircraft.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: This option would interact with departures in the 23 East Design Envelope and 23 arrivals from the south. This would limit the ability to achieve one minute departure splits and not enabling best use of runway capacity.

Option	Safety	Policy	Capacity
B9 Right-hand wraparound	S	P	C

After departure from Runways 23L/23R, aircraft would make a right-hand turn, fly around the airport through the overhead then begin heading south towards the SID aiming point.

Safety: This option is expected to conflict with the Runway 23R MAP.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic north and east before turning it south leading to increased fuel burn and emissions.
- Environmental performance – Noise: This option may hinder the achievement of CDAs for arriving aircraft.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: This option would interact with 23 East and North departure design envelopes and arrivals from the north. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

C10 Extended straight and then turn south	S	P	C

After departure from Runways 23L/23R, aircraft would continue straight ahead towards Northwich before turning south towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic a significant distance west before turning south leading to increased fuel burn and emissions.
- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity In addition to the LPL interaction, this option is likely to interact with options on the 23 South-west departure design envelope. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

D11 Slight right after departure then 90-degree left turn to the south	S	P	C

After departure from Runways 23L/23R, aircraft would make a slight right-hand turn due west before making a 90-degree turn towards the south, towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic northwest before turning south leading to increased fuel burn and emissions.
- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: In addition to the LPL interaction, this option is likely to interact with options on the 23 West and South-west departure design envelopes. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

16 Runways 23R/23L South-west

16.1 Runways 23R/23L South-west Option 1A

Design Principle Evaluation	Option No: 1A
Option Name: SID RW 23L SOUTH-WEST Option 1A	ACCEPT
Option Name: SID RW 23R SOUTH-WEST Option 1A	ACCEPT

Option Description:

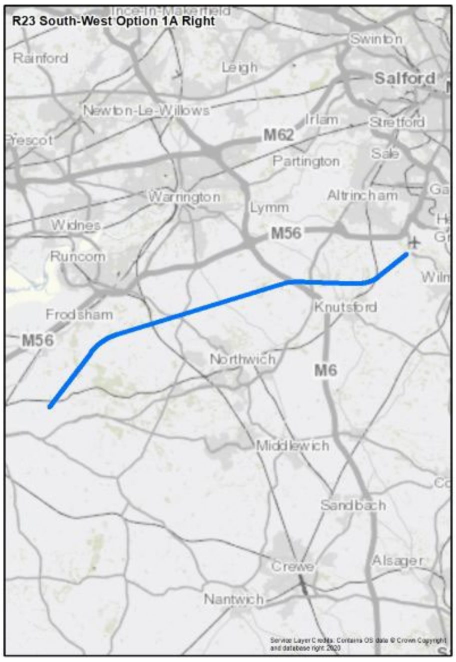
This option is included to provide a **RNAV1** replication of the **MONTY** 1R/1Y SIDs.

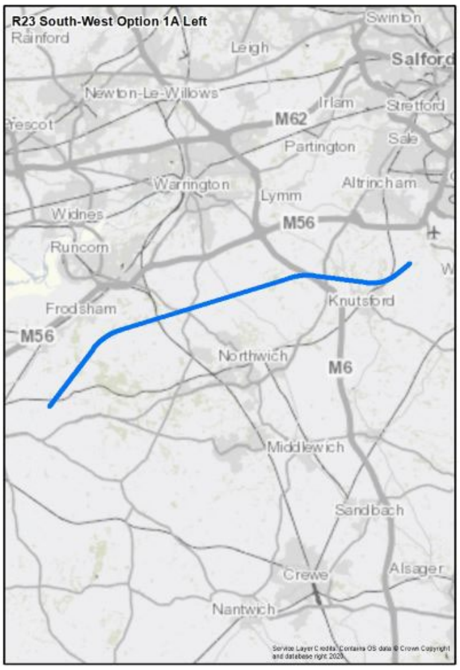
The procedure uses fly-by waypoints, positioned to replicate the turn at the existing markers:

- **23R** this first turn is at MCT D3.
- **23L** this is at MCT D3.2 which less than 1nm from DER but as this replicates the turn of the current procedure it therefore aligns to the Design Principle Safety. This earlier turn is to avoid Knutsford.

As a replicated route it follows a similar track over the ground as the current SID. This routes aircraft to the north of Knutsford, before making a left turn to the west to route north of Northwich and then making a left to the south of Frodsham to route south-west.

A speed restriction of 200 KIAS is used for the first turn, thereafter 250 KIAS would apply.





Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	MET
	23R	MET

Summary of Qualitative Assessment: Up to 4,000ft, option 1A L is estimated to limit the total population affected by noise. Up to 7,000ft, option 1A L is estimated to limit the total population affected by noise. Option 1A L is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 1A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 1A R is estimated to limit the total population affected by noise. Up to 7,000ft, option 1A R is estimated to limit the total population affected by noise. Option 1A R is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 1A R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment: When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure. Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment: The estimated track length of option 1A L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated. The estimated track length of option 1A R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 1A L is estimated to overfly approximately 350 households with an approximate population of 900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,500.

Up to 7,000ft, option 1A L is estimated to overfly approximately 2,200 households with an approximate population of 5,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 6,000.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1A R is estimated to overfly approximately 400 households with an approximate population of 1,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,000.

Up to 7,000ft, option 1A R is estimated to overfly approximately 2,300 households with an approximate population of 5,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 5,600.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1A L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 1A L is estimated to overfly 25 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 1A R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 1A R is estimated to overfly 25 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.2 Runways 23R/23L South-west Option 1B

Design Principle Evaluation	Option No: 1B
Option Name: SID RW 23L SOUTH-WEST Option 1B	REJECT
Option Name: SID RW 23R SOUTH-WEST Option 1B	ACCEPT

Option Description:

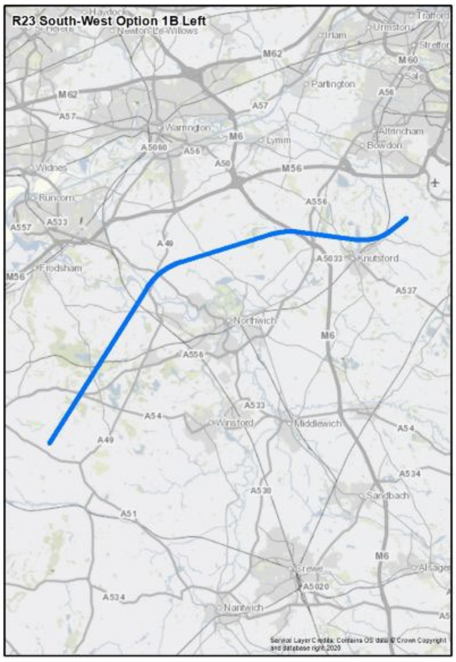
Option 1b is an RNAV1 option that avoids Knutsford in a similar way to the current KUXEM departure but the second turn to the south-west to join the network is earlier.

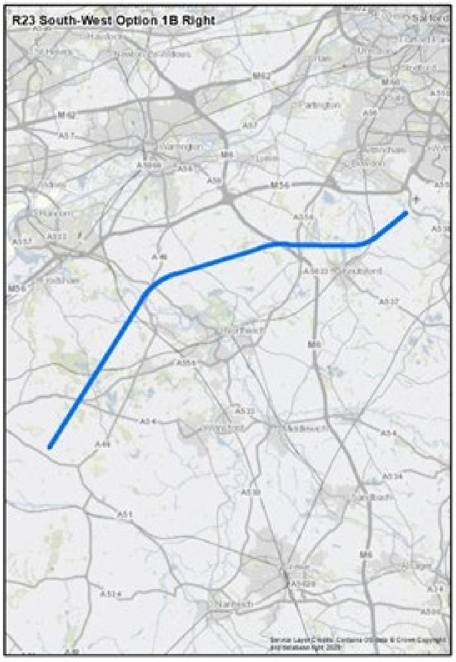
The procedure uses fly-by waypoints.

23L: After departure the route makes turn to the right to route to the north of Knutsford. This turn is at D3.2 which less than Design Principle Safety. Following a short straight segment, it then makes a left turn close to Over Tabley where it combines with the option for 23R. The combined routes continue in a south-westerly direction to avoid Northwich and then make a left turn to the south-west to terminate at 7,000ft south of Kelsall.

23R: After departure the route makes turn to the right to route to the north of Knutsford. Following a short straight segment it then makes a left turn close to Over Tabley where it combines with the option for 23L. The combined routes continue in a south-westerly direction to avoid Northwich and then make a left turn to the south-west to terminate at 7,000ft south of Kelsall.

A speed restriction of 200 KIAS is used for the first turn, thereafter 250 KIAS would apply.





Design Principle		
Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1B L is estimated to limit the total population affected by noise.
Option 1B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1B R is estimated to limit the total population affected by noise.
Option 1B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1B L is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1B R is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1B L is estimated to overfly approximately 450 households with an approximate population of 1,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,700.

Up to 7,000ft, option 1B L is estimated to overfly approximately 3,150 households with an approximate population of 7,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 8,500.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 1B R is estimated to overfly approximately 400 households with an approximate population of 1,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,000.

Up to 7,000ft, option 1B R is estimated to overfly approximately 3,200 households with an approximate population of 7,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 8,100.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1B L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 1B L is estimated to overfly 25 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 1B R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 1B R is estimated to overfly 25 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and as maller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:
These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.3 Runways 23R/23L South-west Option 1C

Design Principle Evaluation	Option No: 1C
Option Name: SID RW 23L SOUTH-WEST Option 1C	ACCEPT
Option Name: SID RW 23R SOUTH-WEST Option 1C	ACCEPT

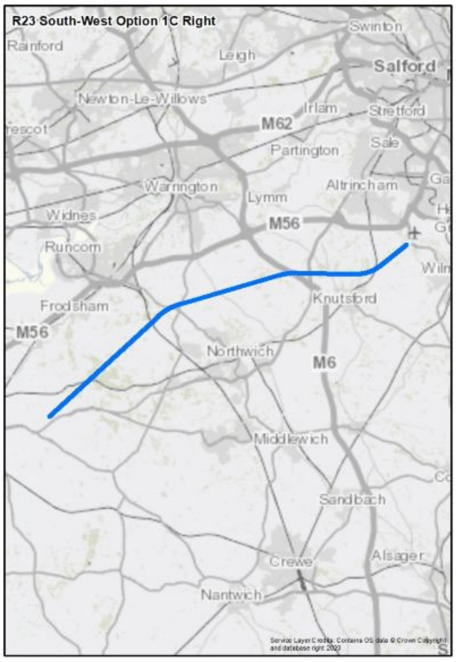
Option Description:
This is option is included to provide a RNAV1 replication of the **KUXEM** 1R/1Y SIDs.

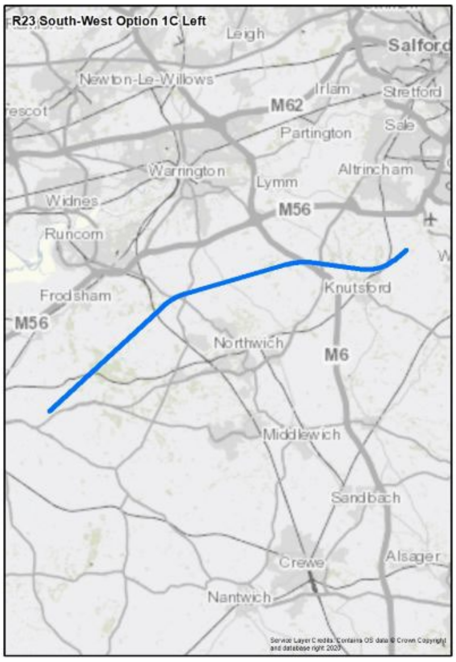
The procedure uses fly-by waypoints, positioned to replicate the turn at the existing markers:

- **23R** this first turn is at MCT D3.
- **23L** this is at MCT D3.2 which less than 1nm from DER but as this replicates the turn of the current procedure it therefore aligns to the Design Principle Safety. This earlier turn is to avoid Knutsford.

As a replicated route it follows a similar track over the ground as the current route. This routes aircraft to the north of Knutsford, before making a left turn to the west to route north of Northwich. It then then makes a second left turn to the north-west of Northwich to route south-west and terminates at 7,000ft to the east of Chester.

A speed restriction of 200 KIAS is used for the first turn, thereafter 250 KIAS would apply.





Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1C L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1C L is estimated to limit the total population affected by noise.
Option 1C L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1C L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1C R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 1C R is estimated to limit the total population impacted.
Option 1C R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1C R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1C L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1C R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1C L is estimated to overfly approximately 350 households with an approximate population of 800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,400.

Up to 7,000ft, option 1C L is estimated to overfly approximately 3,450 households with an approximate population of 8,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 9,000.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1C R is estimated to overfly approximately 400 households with an approximate population of 900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 900.

Up to 7,000ft, option 1C R is estimated to overfly approximately 3,550 households with an approximate population of 8,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 8,600.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1C L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 1C L is estimated to overfly 30 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 1C R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 1C R is estimated to overfly 25 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:
These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.4 Runways 23R/23L South-west Option 1D

Design Principle Evaluation	Option No: 1D
Option Name: SID RW 23L SOUTH-WEST Option 1D	ACCEPT
Option Name: SID RW 23R SOUTH-WEST Option 1D	ACCEPT

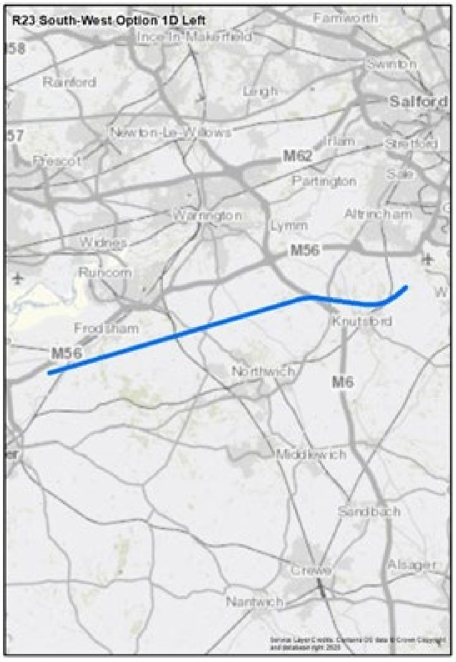
Option Description:
This option is included to provide a **RNAV1 replication** of the **EKLAD** 1R/1Y SIDs.

The procedure uses fly-by waypoints, positioned to replicate the turn at the existing markers:

- **23R** this first turn is at MCT D3.
- **23L** this is at MCT D3.2 which less than 1nm from DER but as this replicates the turn of the current procedure it therefore aligns to the Design Principle Safety. This earlier turn is to avoid Knutsford.

As a replicated route it follows a similar track over the ground as the current route. This routes aircraft to the north of Knutsford, before making a left turn to the west to route north of Northwich. The route continues in this direction until reaching 7,000ft to the north-east of Chester.

A speed restriction of 200 KIAS is used for the first turn, thereafter 250 KIAS would apply.



Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 1D L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 1D L is estimated to increase the total population affected by noise.
Option 1D L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1D L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1D R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 1D R is estimated to limit the total population affected by noise.
Option 1D R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 1D R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1D L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1D R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 1D L is estimated to overfly approximately 350 households with an approximate population of 800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,400.

Up to 7,000ft, option 1D L is estimated to overfly approximately 5,100 households with an approximate population of 11,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,400.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 1D R is estimated to overfly approximately 400 households with an approximate population of 900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 900.

Up to 7,000ft, option 1D R is estimated to overfly approximately 5,200 households with an approximate population of 12,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,100.

This is a similar population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 1D L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 1D L is estimated to overfly 30 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 1D R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 1D R is estimated to overfly 30 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.5 Runways 23R/23L South-west Option 2A

Design Principle Evaluation	Option No: 2A
Option Name: SID RW 23L SOUTH-WEST Option 2A	REJECT
Option Name: SID RW 23R SOUTH-WEST Option 2A	REJECT

Option Description:

This is an **RNAV1** option that is includes a 15° offset to the north (right) at the DER. The aim of this is to avoid overflight of built-up areas in a more fuel-efficient manner than the current KUXEM SID.

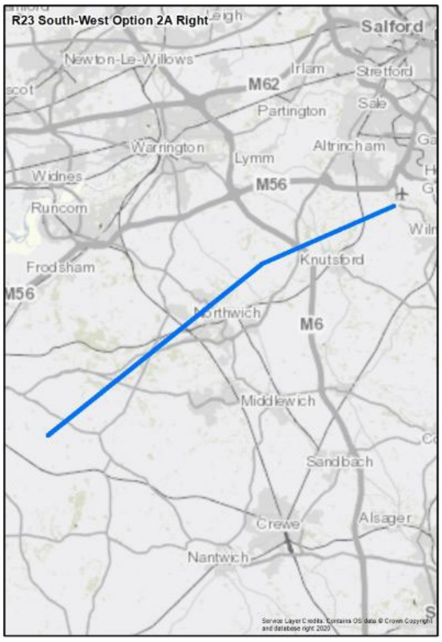
The higher design speed (when compared to the replicated route) will permit aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

The procedure uses track-to-fix coding.

23L: Upon reaching the DER this route has a 15° offset to the right that routes it to the north of Knutsford. It continues in this direction until north of Northwich where it combines with the 23R option and makes a left turn onto a slightly more south westerly track. The routes terminate at 7,000ft between Kelsall and Tarporley.

23R: Upon reaching the DER this route also has a 15° offset to the right that routes it to the north of Knutsford via Over Tabley. A 15° track adjustment to the left is then made to the north of Northwich in order to re-combine with the 23L option and the combined routes terminate at 7,000ft between Kelsall and Tarporley.

There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply. Some dispersion may be apparent close to the runway due to the track-to-fix coding although this is expected to be minimal.



Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2A L is estimated to increase the total population affected by noise.
Option 2A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2A R is estimated to increase the total population affected by noise.
Option 2A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 2A L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 2A R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 2A L is estimated to overfly approximately 5,550 households with an approximate population of 13,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 16,500.

Up to 7,000ft, option 2A L is estimated to overfly approximately 8,900 households with an approximate population of 21,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 25,400.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 2A R is estimated to overfly approximately 4,950 households with an approximate population of 11,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 14,300.

Up to 7,000ft, option 2A R is estimated to overfly approximately 8,550 households with an approximate population of 20,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 23,700.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 2A L is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 2A L is estimated to overfly 40 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 2A R is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 2A R is estimated to overfly 40 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.6 Runways 23R/23L South-west Option 2B

Design Principle Evaluation	Option No: 2B
Option Name: SID RW 23L SOUTH-WEST Option 2B	REJECT
Option Name: SID RW 23R SOUTH-WEST Option 2B	REJECT

Option Description:

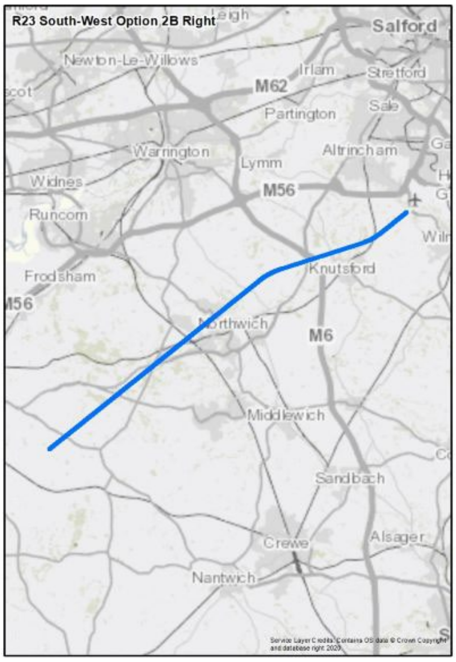
Option 2B uses an **RNP1** with RF coding, connecting to the same south-west track as shown in option 2A. The aim of this is to avoid overflight of built-up areas in a more fuel-efficient manner than the current KUXEM SID by removing the legs using the MCT and POL VOR.

The procedure uses radius-to-fix coding.

23L: After departure the route makes an RF turn to the right to route to the north of Knutsford. It continues in this direction until north-east of Northwich where it combines with the 23R option and makes a left turn onto a slightly more south-westerly track. The routes terminate at 7,000ft between Kelsall and Tarporley.

23R: After departure the route makes an RF turn to the right to route to the north of Knutsford. It continues in this direction until north-east of Northwich where it combines with the 23L option and makes a left turn onto a slightly more south-westerly track. The routes terminate at 7,000ft between Kelsall and Tarporley.

A speed restriction of 210 knots would be applied to the first turn to ensure aircraft avoid the centre of Knutsford.



Design Principle Safety		
	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment: Up to 4,000ft, option 2B L is estimated to increase the total population affected by noise. Up to 7,000ft, option 2B L is estimated to increase the total population affected by noise. Option 2B L is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 2B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 2B R is estimated to increase the total population affected by noise. Up to 7,000ft, option 2B R is estimated to increase the total population affected by noise. Option 2B R is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 2B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment: When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure. Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 2B L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 2B R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 2B L is estimated to overfly approximately 5,200 households with an approximate population of 12,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 15,600.

Up to 7,000ft, option 2B L is estimated to overfly approximately 8,550 households with an approximate population of 20,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 24,500.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 2B R is estimated to overfly approximately 5,000 households with an approximate population of 11,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 15,000.

Up to 7,000ft, option 2B R is estimated to overfly approximately 8,700 households with an approximate population of 20,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 24,800.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 2B L is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 2B L is estimated to overfly 35 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 2B R is estimated to overfly 20 noise sensitive areas.

Up to 7,000ft, this option 2B R is estimated to overfly 40 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.7 Runways 23R/23L South-west Option 3A

Design Principle Evaluation	Option No: 3A
Option Name: SID RW 23L SOUTH-WEST Option 3A	REJECT
Option Name: SID RW 23R SOUTH-WEST Option 3A	REJECT

Option Description:

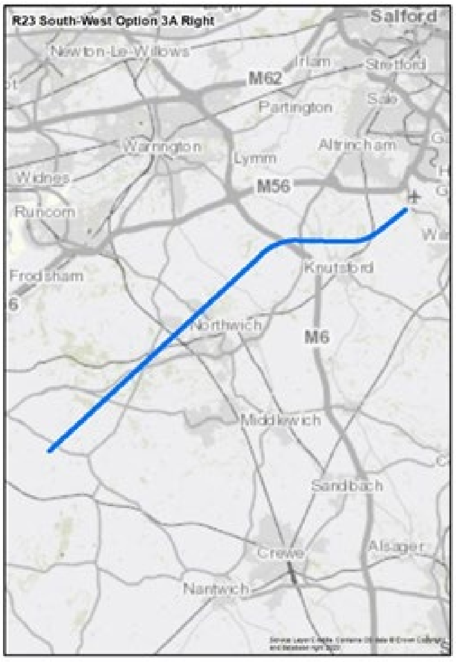
This is an **RNAV1** option that that replicates the initial track of the current KUXEM SID but then turns south-west earlier to make this a more fuel-efficient route than the existing departure. This routes it towards the centre of the design envelope.

The procedure uses a fly-over to fly-by sequence. An element of dispersion would be apparent in the turn due to the fly-over waypoint and DF coding.

23L: After departure, the route makes turn to the right to route to the north of Knutsford. Following a short straight segment, it then makes a left turn close to Over Tabley where it combines with the option for 23R. The combined routes continue in a south-westerly direction to avoid Northwich and terminate at 7,000ft between Kelsall and Tarporley.

23R: After departure, the route makes turn to the right to route to the north of Knutsford. Following a short straight segment, it then makes a left turn close to Over Tabley where it combines with the option for 23L. The combined routes continue in a south-westerly direction to avoid Northwich and terminate at 7,000ft between Kelsall and Tarporley.

A speed restriction of 200 KIAS then 220 KIAS is used for the first turn and second turn.



Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3A L is estimated to increase the total population affected by noise.
Option 3A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 3A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3A R is estimated to increase the total population affected by noise.
Option 3A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 3A L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 3A R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 3A L is estimated to overfly approximately 5,500 households with an approximate population of 12,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 16,300.

Up to 7,000ft, option 3A L is estimated to overfly approximately 9,150 households with an approximate population of 21,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 25,700.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 3A R is estimated to overfly approximately 4,600 households with an approximate population of 10,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 13,500.

Up to 7,000ft, option 3A R is estimated to overfly approximately 9,450 households with an approximate population of 22,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 25,900.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 3A L is estimated to overfly 35 noise sensitive areas.

Up to 7,000ft, this option 3A L is estimated to overfly 55 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 3A R is estimated to overfly 25 noise sensitive areas.

Up to 7,000ft, this option 3A R is estimated to overfly 55 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.8 Runways 23R/23L South-west Option 3B

<table>
<tr><td>Design Principle Evaluation</td><td>Option No: 3B</td></tr>
<tr><td>Option Name: SID RW 23L SOUTH-WEST Option 3B</td><td>REJECT</td></tr>
<tr><td>Option Name: SID RW 23R SOUTH-WEST Option 3B</td><td>ACCEPT</td></tr>
</table>

Option Description:

This option uses an RNP1 with RF coding right turn initially (1nm DER for Runway 23L) to avoid Knutsford. It is similar to option 3A initially, but the track after the first turn is further north to provide greater avoidance from Northwich.

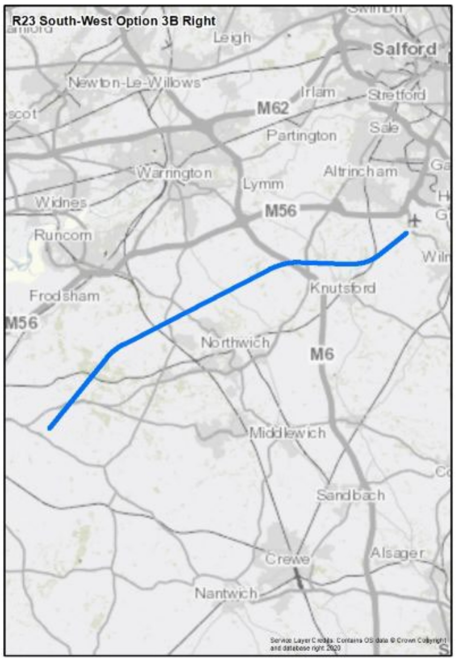
This route increases fuel efficiency when compared to the replicated route by removing the legs using the MCT and POL VOR and routes towards the centre of the design envelope.

The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: After departure, the route makes an RF turn to the right to route to the north of Knutsford at 1nm from DER. Following a short straight segment, it combines with the option for 23R and turns left on a track that takes it well to the north of Northwich. It continues in this direction until north of Delamere and then turns left onto a more south-westerly track and terminates at 7,000ft close to Kelsall.

23R: After departure the route makes an RF turn to the right to route to the north of Knutsford at 1nm from DER. Following a short straight segment it combines with the option for 23L and turns left on a track that takes it well to the north of Northwich. It continues in this direction until north of Delamere and then turns left onto a more south-westerly track and terminates at 7,000ft close to Kelsall.

A speed restriction of 210 KIAS is applied to the first turn which is the PANS-OPS/CAP778 recommended speed.



Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3B L is estimated to limit the total population affected by noise.
Option 3B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 3B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 3B R is estimated to limit the total population affected by noise.
Option 3B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 3B L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 3B R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3B L is estimated to overfly approximately 900 households with an approximate population of 2,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 3,000.

Up to 7,000ft, option 3B L is estimated to overfly approximately 5,050 households with an approximate population of 11,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 13,200.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 3B R is estimated to overfly approximately 800 households with an approximate population of 1,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,000.

Up to 7,000ft, option 3B R is estimated to overfly approximately 5,050 households with an approximate population of 11,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,300.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 3B L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 3B L is estimated to overfly 35 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 3B R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 3B R is estimated to overfly 35 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:
These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.9 Runways 23R/23L South-west Option 3C

Design Principle Evaluation	Option No: 3C
Option Name: SID RW 23L SOUTH-WEST Option 3C	REJECT
Option Name: SID RW 23R SOUTH-WEST Option 3C	ACCEPT

Option Description:

This option uses an **RNP1** with RF coding right turn in the same way as option 3B, except that the turn point for Runway 23L is earlier and replicates the current turn position of MCT D3.2 position (0.7nm DER). This provides greater avoidance of Knutsford.

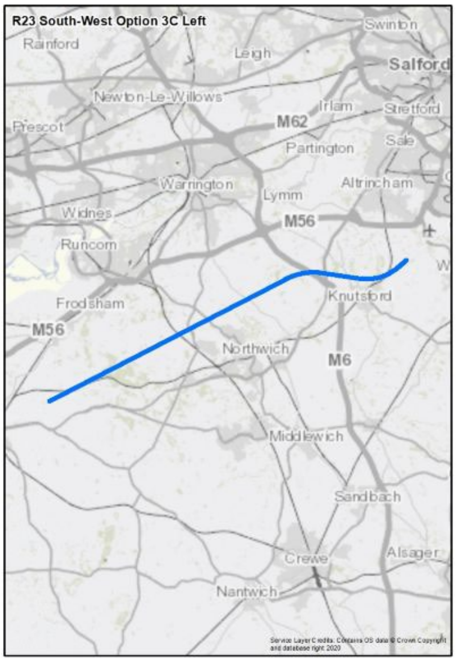
This route is intended as an alternative to the EKLAD SID and routes towards the centre of the design envelope.

The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: After departure the route makes an RF turn to the right at 0.7nm from DER which replicates the turn of the current procedure and therefore aligns to the Design Principle Safety. It routes to the north of Knutsford and following a short straight segment it combines with the option for 23R and turns left on a track that takes it well to the north of Northwich and Kelsall and terminates at 7,000ft east of Chester.

23R: After departure the route makes an RF turn to the right to route to the north of Knutsford. Following a short straight segment it combines with the option for 23L and turns left on a track that takes it well to the north of Northwich. It continues in this direction until north of Delamere and then turns left onto a more south-westerly track and terminates at 7,000ft close to Kelsall.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.



Design Principle		
Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.		
Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL
Summary of Qualitative Assessment: Up to 4,000ft, option 3C L is estimated to increase the total population affected by noise. Up to 7,000ft, option 3C L is estimated to limit the total population affected by noise. Option 3C L is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 3C L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 3C R is estimated to increase the total population affected by noise. Up to 7,000ft, option 3C R is estimated to limit the total population affected by noise. Option 3C R is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 3C R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.		
Design Principle **Capacity**	23L	MET
	23R	PARTIAL
Summary of Qualitative Assessment: When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure. Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.		
Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL
Summary of Qualitative Assessment:		

The estimated track length of option 3C L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 3C R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3C L is estimated to overfly approximately 850 households with an approximate population of 2,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,800.

Up to 7,000ft, option 3C L is estimated to overfly approximately 3,150 households with an approximate population of 7,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 8,200.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 3C R is estimated to overfly approximately 800 households with an approximate population of 1,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,000.

Up to 7,000ft, option 3C R is estimated to overfly approximately 3,200 households with an approximate population of 7,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 7,700.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 3C L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 3C L is estimated to overfly 30 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 3C R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 3C R is estimated to overfly 30 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.10 Runways 23R/23L South-west Option 4B

Design Principle Evaluation	Option No: 4B
Option Name: SID RW 23L SOUTH-WEST Option 4B	REJECT
Option Name: SID RW 23R SOUTH-WEST Option 4B	REJECT

Option Description:

This option routes fully around Knutsford and is **RNP1** with RF coding initially (1nm DER for Runway 23L), followed by a left turn and right turn, routing over Northwich.

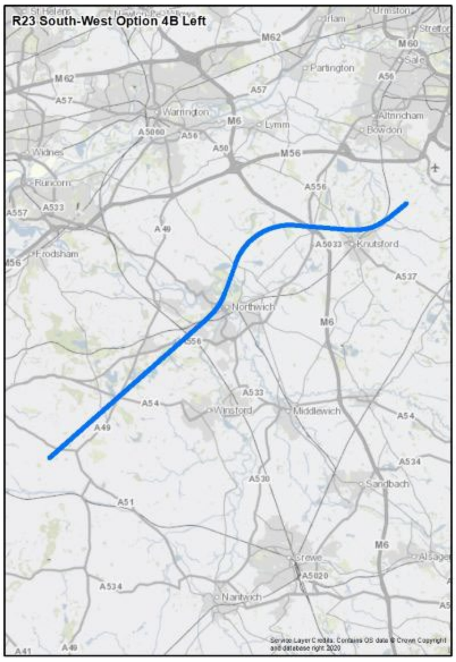
This route is similar to option 3A but routes slightly further south and is intended as an alternative to the EKLAD SID.

The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: After departure the route makes an RF turn to the right 1nm from DER to the north of Knutsford and following a short straight segment it then turns left and combines with the option for 23R. After a further short segment it then turns right to route over the northern edge of Northwich. It terminates at 7,000ft west of Tarporley.

23R: After departure the route makes an RF turn to the right to the north of Knutsford and following a short straight segment it then turns left and combines with the option for 23L. After a further short segment it then turns right to route over the northern edge of Northwich. It terminates at 7,000ft west of Tarporley.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.



Design Principle **Safety**		
	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4B L is estimated to increase the total population affected by noise.
Option 4B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4B R is estimated to increase the total population affected by noise.
Option 4B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4B L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4B R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 4B L is estimated to overfly approximately 7,950 households with an approximate population of 17,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 19,500.

Up to 7,000ft, option 4B L is estimated to overfly approximately 10,450 households with an approximate population of 24,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 27,200.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 4B R is estimated to overfly approximately 6,650 households with an approximate population of 14,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 15,700.

Up to 7,000ft, option 4B R is estimated to overfly approximately 10,700 households with an approximate population of 24,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 27,100.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 4B L is estimated to overfly 60 noise sensitive areas.

Up to 7,000ft, this option 4B L is estimated to overfly 65 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 4B R is estimated to overfly 55 noise sensitive areas.

Up to 7,000ft, this option 4B R is estimated to overfly 70 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.11 Runways 23R/23L South-west Option 5

Design Principle Evaluation	Option No: 5
Option Name: SID RW 23L SOUTH-WEST Option 5	REJECT
Option Name: SID RW 23R SOUTH-WEST Option 5	REJECT

Option Description:

This is an **RNAV1** option which is a straight climb from the DER out to 7,000ft. There is no turn in this option which results in the option overflying Knutsford.

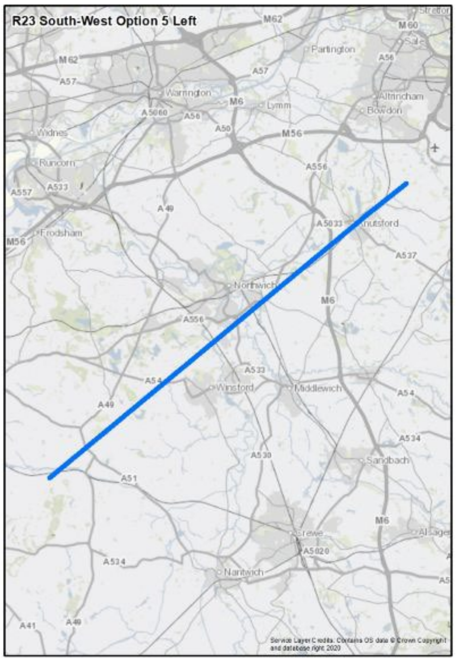
The higher design speed (when compared to the replicated route) will permit aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

The option maximises fuel efficiency by removing the turnaround Knutsford which use the MCT and POL VOR.

23L: After departure, the route continues straight ahead on runway heading to 7,000ft. This routes it overhead Knutsford and it then continues to the south of Northwich and just north of Winsford. It terminates at 7,000ft just east of Tattenhall.

23R: After departure, the route makes a slight track adjustment to combine with the 23L option. This routes it overhead Knutsford and it then continues to the south of Northwich and just north of Winsford. It terminates at 7,000ft just east of Tattenhall.

There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply. No dispersion would be apparent as the track is straight ahead and track keeping should be optimum.



Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.		
Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL
Summary of Qualitative Assessment: Up to 4,000ft, option 5 L is estimated to increase the total population affected by noise. Up to 7,000ft, option 5 L is estimated to increase the total population affected by noise. Option 5 L is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 5 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 5 R is estimated to increase the total population affected by noise. Up to 7,000ft, option 5 R is estimated to increase the total population affected by noise. Option 5 R is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 5 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.		
Design Principle **Capacity**	23L	MET
	23R	PARTIAL
Summary of Qualitative Assessment: When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure. Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.		
Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL
Summary of Qualitative Assessment:		

The estimated track length of option 5 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 5 R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 5 L is estimated to overfly approximately 7,050 households with an approximate population of 16,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 16,300.

Up to 7,000ft, option 5 L is estimated to overfly approximately 9,750 households with an approximate population of 22,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 27,000.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 5 R is estimated to overfly approximately 8,000 households with an approximate population of 18,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 18,500.

Up to 7,000ft, option 5 R is estimated to overfly approximately 10,850 households with an approximate population of 24,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 29,500.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 5 L is estimated to overfly 40 noise sensitive areas.

Up to 7,000ft, this option 5 L is estimated to overfly 60 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 5 R is estimated to overfly 55 noise sensitive areas.

Up to 7,000ft, this option 5 R is estimated to overfly 75 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:
These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.12 Runways 23R/23L South-west Option 6

Design Principle Evaluation	Option No: 6
Option Name: SID RW 23L SOUTH-WEST Option 6	ACCEPT
Option Name: SID RW 23R SOUTH-WEST Option 6	ACCEPT

Option Description:

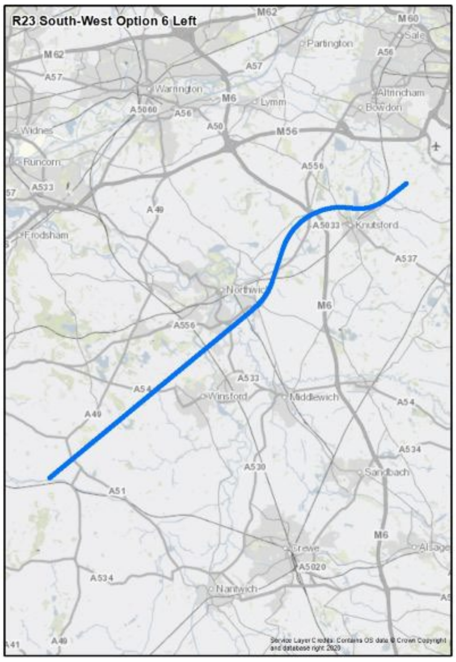
This is an **RNP1** with RF coding initially (1nm DER for Runway 23L) to make a kink around Knutsford before tracking back on the extended runway centreline. It is similar to option 4B except that the radius of the turn is shorter resulting in a track that is more to the south of Northwich.

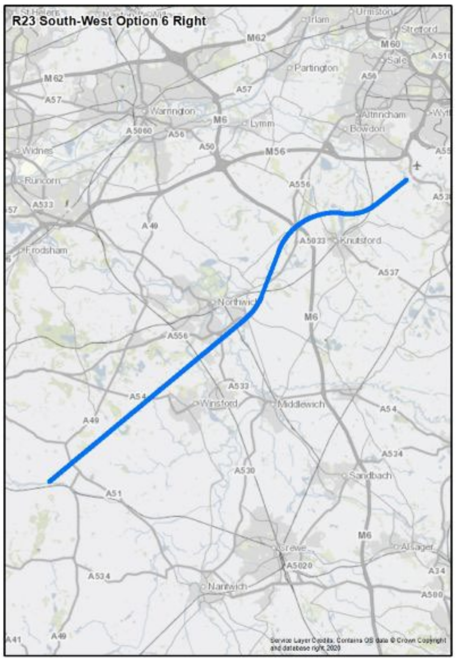
This route is intended as an alternative to the KUXEM SID and routes towards the south of the design envelope.

23L: After departure, the route makes an RF turn to the right 1nm from DER which takes it just to the north of Knutsford. It then turns left and then right to return the route onto the extended runway centreline where it combines with the option for 23R. It continues to the south of Northwich and just north of Winsford and terminates at 7,000ft just east of Tattenhall.

23R: After departure, the route makes an RF turn to the right which takes it just to the north of Knutsford. It then turns left and then right to return the route onto the extended runway centreline where it combines with the option for 23L. It continues to the south of Northwich and just north of Winsford and terminates at 7,000ft just east of Tattenhall.

A speed restriction of 190 KIAS is applied to the first turn, 210 KIAS to the second turn and 250 KIAS thereafter.





Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL, and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6 L is estimated to increase the total population affected by noise.
Option 6 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6 R is estimated to increase the total population affected by noise.
Option 6 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 6 L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 6 R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle Noise N1	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6 L is estimated to overfly approximately 6,100 households with an approximate population of 14,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 15,800.

Up to 7,000ft, option 6 L is estimated to overfly approximately 9,000 households with an approximate population of 21,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 27,100.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 6 R is estimated to overfly approximately 6,250 households with an approximate population of 14,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 15,300.

Up to 7,000ft, option 6 R is estimated to overfly approximately 9,400 households with an approximate population of 22,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 27,500.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle Noise N2	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle Noise N3	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6 L is estimated to overfly 30 noise sensitive areas.

Up to 7,000ft, this option 6 L is estimated to overfly 50 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 6 R is estimated to overfly 30 noise sensitive areas.

Up to 7,000ft, this option 6 R is estimated to overfly 50 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.13 Runways 23R/23L South-west Option 7A

Design Principle Evaluation	Option No: 7A
Option Name: SID RW 23L SOUTH-WEST Option 7A	ACCEPT
Option Name: SID RW 23R SOUTH-WEST Option 7A	ACCEPT

Option Description:

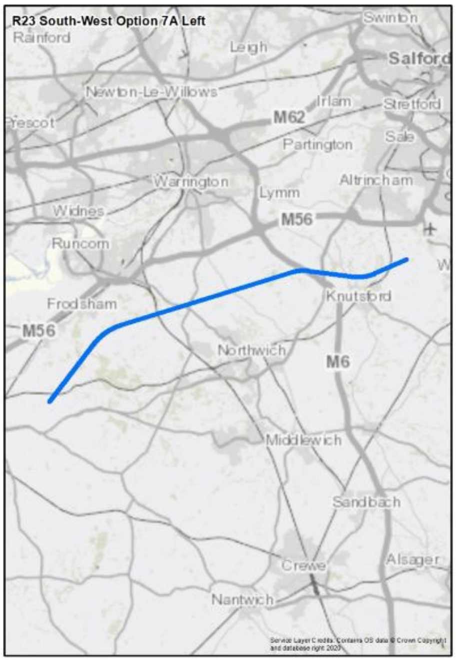
This is an RNAV1 option included to provide a similar route to that of option 1A (the MONTY 1R /1Y SID) however, it uses an initial 15° track adjustment to the right (north) from the DER to reduce the impact of noise on Knutsford. It then follows the same route as the replicated route once beyond Mere.

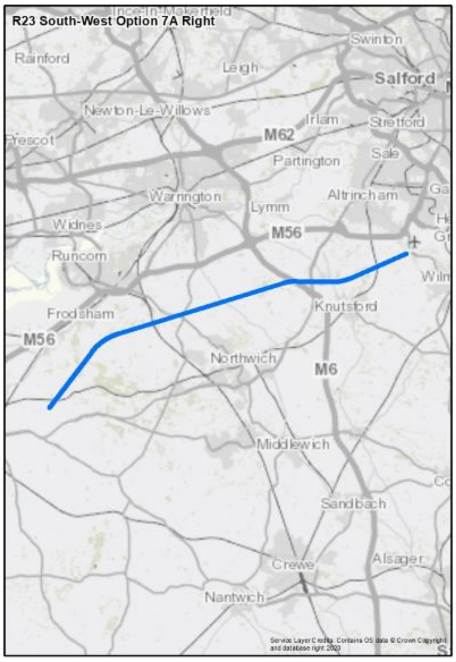
The procedure uses fly-by waypoints.

23L: Aircraft make a 15° track adjustment at DER to the right to route to the north of Knutsford and to the south of Mere. It then follows the same track as 1A and routes west to combine with the option for 23R just west of Over Tabley. The routes continue in a south-westerly direction to avoid Northwich and then makes a left turn to the south of Frodsham to terminate at 7,000ft north of Tarvin.

23R: Aircraft make a 15° track adjustment at DER to the right to route to the north of Knutsford. It then follows the same track as 1A just north of Knutsford and routes west to combine with the option for 23L around Bate Heath. The combined routes continue in a south-westerly direction to avoid Northwich and then makes a left turn to the south of Frodsham to terminate at 7,000ft north-west of Kelsall.

A speed restriction of 200/210 KIAS is used for the first and second turn, thereafter 250 KIAS would apply.





Design Principle Safety		
	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7A L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 7A L is estimated to limit the total population affected by noise.
Option 7A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 7A R is estimated to limit the total population affected by noise.
Option 7A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 7A L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 7A R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7A L is estimated to overfly approximately 450 households with an approximate population of 1,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,200.

Up to 7,000ft, option 7A L is estimated to overfly approximately 2,350 households with an approximate population of 5,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 5,800.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 7A R is estimated to overfly approximately 400 households with an approximate population of 1,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,000.

Up to 7,000ft, option 7A R is estimated to overfly approximately 2,400 households with an approximate population of 5,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 5,800.

This is a smaller population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 7A L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 7A L is estimated to overfly 25 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 7A R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 7A R is estimated to overfly 30 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.14 Runways 23R/23L South-west Option 7B

Design Principle Evaluation	Option No: 7B
Option Name: SID RW 23L SOUTH-WEST Option 7B	ACCEPT
Option Name: SID RW 23R SOUTH-WEST Option 7B	ACCEPT

Option Description:
This is an **RNAV1** option included to provide a similar route to that of option 1A (the MONTY 1R /1Y SID) however, it uses an initial 15° track adjustment to the right (north) from the DER to reduce the impact of noise on Knutsford. It then follows the same route as the replicated route once beyond Mere.

The procedure uses fly-by waypoints.

23L: Aircraft make a 15° track adjustment at DER to the right to route to the north of Knutsford and to the south of Mere. It then follows the same track as 1A and routes west to combine with the option for 23R just west of Over Tabley. The routes continue in a south-westerly direction to avoid Northwich and then makes a left turn to the south of Frodsham to terminate at 7,000ft north of Tarvin.

23R: Aircraft make a 15° track adjustment at DER to the right to route to the north of Knutsford. It then follows the same track as 1A just north of Knutsford and routes west to combine with the option for 23L around Bate Heath. The combined routes continue in a south-westerly direction to avoid Northwich and then makes a left turn to the south of Frodsham to terminate at 7,000ft north-west of Kelsall.

A speed restriction of 200/210 KIAS is used for the first and second turn, thereafter 250 KIAS would apply.

Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide RNAV1 routes. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7B L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 7B L is estimated to limit the total population affected by noise.
Option 7B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 7B R is estimated to limit the total population affected by noise.
Option 7B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 7B L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 7B R is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7B L is estimated to overfly approximately 450 households with an approximate population of 1,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,200.

Up to 7,000ft, option 7B L is estimated to overfly approximately 3,150 households with an approximate population of 7,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 8,100.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a similar population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 7B R is estimated to overfly approximately 400 households with an approximate population of 1,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,000.

Up to 7,000ft, option 7B R is estimated to overfly approximately 3,200 households with an approximate population of 7,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 8,100.

This is a smaller population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 7B L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 7B L is estimated to overfly 25 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 7B R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 7B R is estimated to overfly 25 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.15 Runways 23R/23L South-west Option 8

Design Principle Evaluation	Option No: 8
Option Name: SID RW 23L SOUTH-WEST Option 8	ACCEPT
Option Name: SID RW 23R SOUTH-WEST Option 8	ACCEPT

Option Description:

This is as an alternative **RNP1** with RF coding option to the current KUXEM SID. This option has been designed following bilateral engagement with LPL that identified interactions with the proposed LPL Runway 27 VEGUN arrival route from the south, with the intention of resolving those interactions.

This option has been assessed against a 4.2nm buffer from this arrival route in line with minimum radar separation criteria of 3nm plus a buffer of 1.2nm (in line with CAP1385) and seeks to eliminate the interaction using vertical separation.

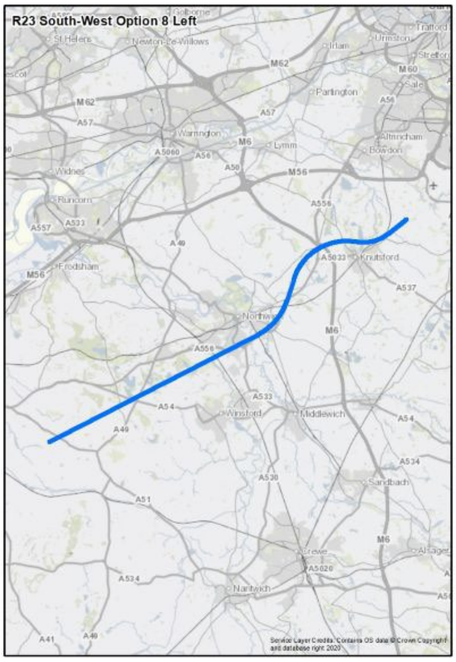
This option uses an RNP1 RF turn initially (1nm DER for Runway 23L) to make a kink around Knutsford. This is like other options, but the radius of the turn is shorter to create a track that is more to the south of Northwich. A third turn to the right routes aircraft north of the extended centreline by approximately 12° which creates a route to the expected network joining point and ensures containment within controlled airspace.

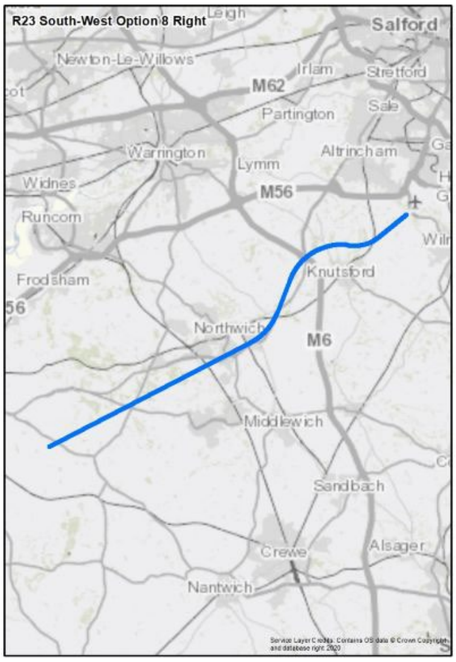
The assessment of the route identifies that a PDG of less than 6% is required for both 23R/23L to achieve 3,500ft (the required vertical separation) at the 4.2nm buffer zone therefore aligning this option with the design principles Safety and Policy.

Initially, a route south of the buffer line was considered to achieve the satisfactory lateral separation; however, this would not offer great flexibility to design options within this envelope, and so a route that achieved the required 1,000ft vertical separation was investigated.

23L: After departure, the route makes an RF turn to the right 1nm from DER which takes it just to the north of Knutsford. It then turns left and then right to return the route north of the extended runway centreline where it combines with the option for 23R. It continues just to the south of Northwich and north of Winsford and terminates at 7,000ft south of Kelsall.

23R: After departure, the route makes an RF turn to the right which takes it just to the north of Knutsford. It then turns left and then right to return the route north of the extended runway centreline where it combines with the option for 23L. It continues to the south of Northwich





and north of Winsford and terminates at 7,000ft just south of Kelsall. A speed restriction of 190 KIAS is applied to the first turn, 210 KIAS to the second turn and 250 KIAS thereafter.	

Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. However, some additional protocols or mitigations may be required to confirm safe operation with LPL and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 8 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 8 L is estimated to increase the total population affected by noise.
Option 8 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 8 R is estimated to increase the total population affected by noise.
Option 8 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:
When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 8 L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 8 R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 8 L is estimated to overfly approximately 7,800 households with an approximate population of 18,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 20,800.

Up to 7,000ft, option 8 L is estimated to overfly approximately 9,150 households with an approximate population of 22,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 24,700.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 8 R is estimated to overfly approximately 7,700 households with an approximate population of 18,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 19,700.

Up to 7,000ft, option 8 R is estimated to overfly approximately 9,300 households with an approximate population of 22,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 24,300.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 8 L is estimated to overfly 35 noise sensitive areas.

Up to 7,000ft, this option 8 L is estimated to overfly 40 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 8 R is estimated to overfly 35 noise sensitive areas.

Up to 7,000ft, this option 8 R is estimated to overfly 45 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.16 Runways 23R/23L South-west Option 9

Design Principle Evaluation	Option No: 9
Option Name: SID RW 23L SOUTH-WEST Option 9	REJECT
Option Name: SID RW 23R SOUTH-WEST Option 9	REJECT

Option Description:

This is as an alternative **RNP1** with RF coding option to the current KUXEM SID that aims to minimise the interactions with the proposed LPL Runway 27 VEGUN arrival route from the south.

This option has been assessed against a 4.2nm buffer from this arrival route in line with minimum radar separation criteria of 3nm plus a buffer of 1.2nm (in line with CAP1385) and seeks to resolve the interaction using vertical separation.

This option uses an RNP1 RF turn initially (1nm DER for Runway 23L) to make a kink around Knutsford, but then routes directly to the south-west after making the second turn. This track results in the need for a higher climb gradient on this option compared to option 8. The assessment of the route identifies a required PDG of 5.98% for 23R and 6.74% for Runway 23L to achieve 3,500ft (the required vertical separation) at the 4.2nm buffer zone.

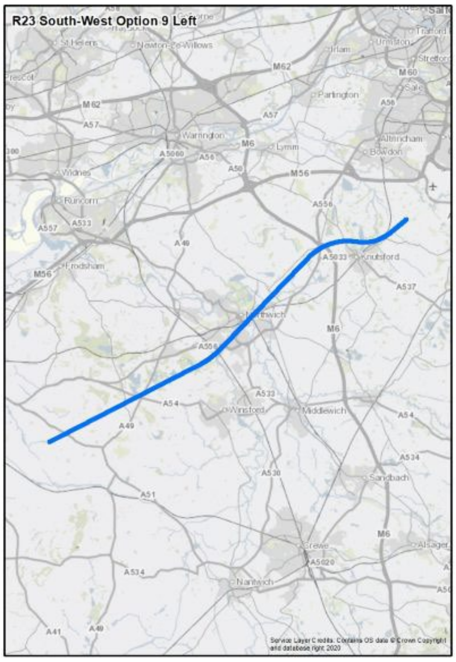
It terminates in the same position as option 8 to align to the expected network joining point and ensure containment within controlled airspace.

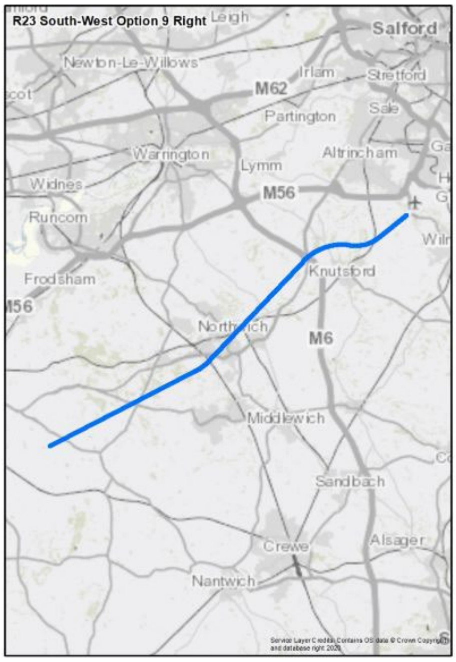
The procedure uses radius-to-fix coding.

Initially, a route south of the buffer line was considered to achieve the satisfactory lateral separation; however, this would not offer great flexibility to design options within this envelope, and so a route that achieved the required 1,000ft vertical separation was investigated.

23L: After departure, the route makes an RF turn to the right 1nm from DER which takes it just to the north of Knutsford. It then turns left onto a direct track to the south-west which takes the route overhead Northwich after which it combines with the option for 23R. It then makes a slight right turn to head south-west and terminates at 7,000ft south of Kelsall.

23R: After departure, the route makes an RF turn to the which takes it just to the north of Knutsford. It then turns left and then right to return the route north of the extended runway centreline where it combines with the option for 23L. It continues to the south of Northwich after which it combines with the option for 23L. It then makes a slight right turn to head south-west and terminates at 7,000ft south of Kelsall.





A speed restriction of 190 KIAS is applied to the first turn, 210 KIAS to the second turn and 250 KIAS thereafter.	

Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL, and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 9 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 9 L is estimated to increase the total population affected by noise.
Option 9 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 9 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 9 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 9 R is estimated to increase the total population affected by noise.
Option 9 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 9 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:
When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 9 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 9 R is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 9 L is estimated to overfly approximately 11,200 households with an approximate population of 25,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 29,500.

Up to 7,000ft, option 9 L is estimated to overfly approximately 12,400 households with an approximate population of 28,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 33,200.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 9 R is estimated to overfly approximately 11,850 households with an approximate population of 27,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 30,300.

Up to 7,000ft, option 9 R is estimated to overfly approximately 13,350 households with an approximate population of 30,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 34,500.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 9 L is estimated to overfly 70 noise sensitive areas.

Up to 7,000ft, this option 9 L is estimated to overfly 75 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 9 R is estimated to overfly 75 noise sensitive areas.

Up to 7,000ft, this option 9 R is estimated to overfly 80 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.17 Runways 23R/23L South-west Option 10

Design Principle Evaluation	Option No: 10
Option Name: SID RW 23L SOUTH-WEST Option 10	REJECT
Option Name: SID RW 23R SOUTH-WEST Option 10	ACCEPT

Option Description:

This is as an **RNP1** option with RF coding as an alternative to the current KUXEM SID. It aims to minimise the interactions with the proposed LPL Runway 27 VEGUN arrival route from the south following stakeholder feedback It is similar to option 8 but routes further south after Knutsford to reduce noise impact on Northwich.

This option has been assessed against a 4.2nm buffer from this arrival route in line with minimum radar separation criteria of 3nm plus a buffer of 1.2nm (in line with CAP1385) and seeks to resolve the interaction using vertical separation.

This option uses an RNP1 RF turn initially (1nm DER for Runway 23L) to make a kink around Knutsford before tracking back north of the extended runway centreline. This is like other options, but the radius of the turn is shorter and the subsequent track to the south is longer to create an option that fully avoids Northwich.

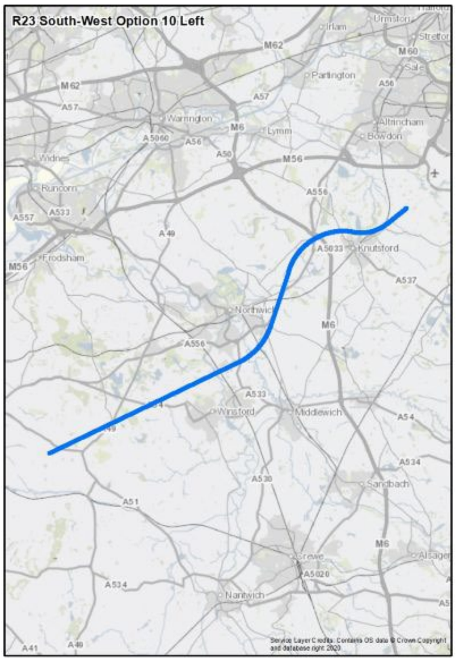
The assessment of the route identifies that a PDG of less than 6% is required for both Runways 23R/23L to achieve 3,500ft at the 4.2nm buffer zone.

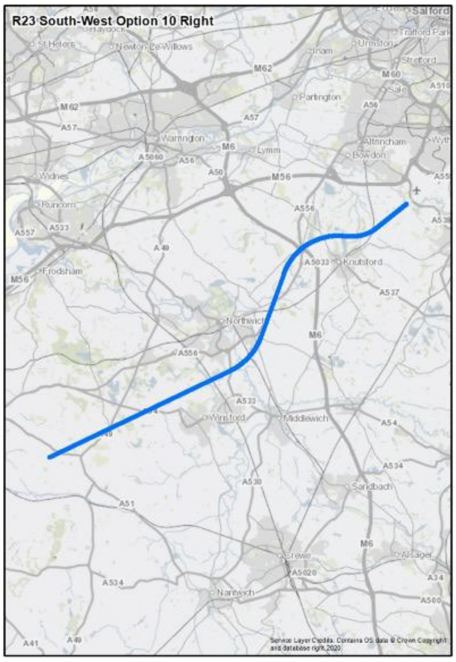
The procedure uses radius-to-fix coding, and the climb gradient has been set at 6%.

23L: After departure, the route makes an RF turn to the right 1nm from DER which takes it just to the north of Knutsford. It then turns left and routes south of Northwich where it combines with the option for 23R. It then turns left and routes to the south-west and terminates at 7,000ft south of Kelsall.

23R: After departure, the route makes an RF turn to the right which takes it just to the north of Knutsford. It then turns left and routes south of Northwich where it combines with the option for 23L. It then turns left and routes to the south-west and terminates at 7,000ft south of Kelsall.

A speed restriction of 190 KIAS is applied to the first turn, 210 KIAS to the second turn and 250 KIAS thereafter.





Design Principle **Safety**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both these routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, some additional protocols or mitigations may be required to confirm safe operation with LPL, and an assessment against the other FASI-N airports and other MAN routes may be required to confirm safe operation at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 10 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 10 L is estimated to limit the total population affected by noise.
Option 10 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 10 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 10 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 10 R is estimated to limit the total population affected by noise.
Option 10 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 10 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 10 L is 41km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 10 R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 10 L is estimated to overfly approximately 3,150 households with an approximate population of 7,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 9,300.

Up to 7,000ft, option 10 L is estimated to overfly approximately 5,050 households with an approximate population of 12,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 17,300.

This is a similar population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 10 R is estimated to overfly approximately 2,700 households with an approximate population of 6,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 7,600.

Up to 7,000ft, option 10 R is estimated to overfly approximately 5,050 households with an approximate population of 12,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 16,700.

This is a similar population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 10 L is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 10 L is estimated to overfly 25 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 10 R is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 10 R is estimated to overfly 25 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

16.18 Runways 23R/23L South-west MONTY Summary

	Option 1AL
S	PARTIAL
P	MET
C	MET
E	PARTIAL
N1	MET
N2	MET
N3	PARTIAL
A	MET
T	MET
	Do Minimum (Replication)

	Option 1AR
S	PARTIAL
P	MET
C	PARTIAL
E	PARTIAL
N1	MET
N2	MET
N3	MET
A	MET
T	MET
	Do Minimum (Replication)

16.19 Runways 23R/23L South-west EKLAD Summary

	Option 1DL
S	PARTIAL
P	PARTIAL
C	MET
E	PARTIAL
N1	PARTIAL
N2	MET
N3	NOT MET
A	MET
T	MET
	Do Minimum (Replication)

	Option 1DR
S	PARTIAL
P	MET
C	PARTIAL
E	PARTIAL
N1	MET
N2	MET
N3	MET
A	MET
T	MET
	Do Minimum (Replication)

16.20 Runways 23R/23L South-west KUXEM Summary

	Option 1BL	Option 1CL	Option 2AL	Option 2BL	Option 3AL	Option 3BL	Option 3CL	Option 4BL	Option 5L	Option 6L	Option 7AL	Option 7BL	Option 8L	Option 9L	Option 10L
S	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	MET	MET	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	PARTIAL	PARTIAL	NOT MET	NOT MET	NOT MET	PARTIAL	PARTIAL	NOT MET	NOT MET	NOT MET	MET	MET	NOT MET	NOT MET	PARTIAL
N2	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
N3	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	NOT MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	NOT MET	PARTIAL
A	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
	Rejected	Do Minimum (Replication)	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Add. Qual.	Best	Best	Add. Qual.	Rejected	Rejected

	Option 1BR	Option 1CR	Option 2AR	Option 2BR	Option 3AR	Option 3BR	Option 3CR	Option 4BR	Option 5R	Option 6R	Option 7AR	Option 7BR	Option 8R	Option 9R	Option 10R
S	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N 1	PARTIAL	PARTIAL	NOT MET	NOT MET	NOT MET	PARTIAL	PARTIAL	NOT MET	NOT MET	NOT MET	PARTIAL	PARTIAL	NOT MET	NOT MET	PARTIAL
N 2	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
N 3	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	NOT MET	NOT MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL	NOT MET	PARTIAL
A	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
	Best	Do Minimum (Replication)	Rejected	Rejected	Rejected	Best	Best	Rejected	Rejected	Add. Qual.	Best	Best	Add. Qual.	Rejected	Best

16.21 Runways 23R/23L South-west Viable but Poor Fit Options

Option	Safety	Policy	Capacity
A11 Replicate the current KUXEM SID but with a termination point further south.	S	P	C
Originally designed as Option 4A, this followed the initial tracks of the KUXEM SID and then routed more directly to the south-west on a track towards Whitchurch and Shrewsbury. Safety: The design of this option would not be compliant with airspace containment requirements, in particular for slower climbing aircraft. Design of this option would result in the SID terminating outside of CAS which is not aligned to CAA Airspace Containment Policy. Additional options that are fully contained were designed to mitigate this risk which resulted in this option offering no benefits if the containment restriction were not present. Capacity: This option is likely to interact with options on the 23 West departure design envelope. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.			
B12: Route south-west earlier after departure.	S	P	C
Routes could turn left off departure and then route more south-westerly (to provide a more direct route) shortly after departure to track between Winsford and Sandbach. Safety: This would involve the route option crossing a NERL sector boundary and flying in the opposite direction to other traffic within this sector. Feedback from NERL judged this to create an unacceptable safety risk. Policy: This option fails to align with the ends of the AMS with respect to: • Efficiency: This option would route against the traffic flows within the NATS network The trade-off analysis between emissions and noise, did not identify a potential noise benefit below 4,000ft. Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			

C13 Left-hand wraparound	S	P	C

After departure from Runways 23L/23R, aircraft would make a left-hand turn, fly around the airport and route back through the overhead then begin heading south-west towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic east before turning it south-west leading to increased fuel burn and emissions.
- Environmental performance – Noise: This option may hinder the achievement of CDAs for arriving aircraft from the south.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: This option is likely to interact with options on the 23 East departure design envelope and 23 arrivals from the south. This would limit the ability to achieve one minute departure splits and not enabling best use of runway capacity.

D14 Right-hand wraparound.	S	P	C

After departure from Runways 23L/23R, aircraft would make a right-hand turn, fly around the airport and through the overhead and then begin heading south-west towards the SID aiming point.

Safety: This option would conflict with the Runway 23R MAP.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic north and east before turning it south-west leading to increased fuel burn and emissions.
- Environmental performance – Noise: This option may hinder the achievement of CDAs for arriving aircraft from the north.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: This option is likely to interact with options on the 23 East and North departure design envelopes and 23 arrivals from the north. This would limit the ability to achieve one minute departure splits and not enabling best use of runway capacity.

E15: Slight right turn after departure, then south-west.	S	P	C

After departure from Runways 23L/23R, aircraft would make a slight right-hand turn in a north-westerly direction, towards LPL before heading south-west, towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve.

The trade-off analysis against noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: In addition to the Liverpool interaction, this option would interact with 23 East and North departure design envelopes, both of which would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

F16 Left turn after departure, head direct south then turn west	S	P	C

After departure from Runways 23L/23R, aircraft would make a left-hand turn and fly south towards Chelford before making a right-hand turn, south-west, towards the SID aiming point.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Emissions: This option would involve greater track mileage than is necessary by taking traffic south before turning west and south-west leading to increased fuel burn and emissions.

The trade-off analysis between emissions and noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Capacity: This option would interact with the 23 south departure design envelope. This would limit the ability to achieve one minute departure splits and not enable best use of runway capacity.

17 Runways 23R/23L West

17.1 Runways 23R/23L West Option 2

Design Principle Evaluation	Option No: 2
Option Name: SID RW 23L WEST Option 2	REJECT
Option Name: SID RW 23R WEST Option 2	REJECT

Option Description:

Option 2 is an **RNAV1** option which provides an initial climb out to a fly-over waypoint and then a right turn to route north of Knutsford and direct towards Wallasey. It has been created to provide the most direct (fuel-efficient) route to the network joining point for westbound traffic at Wallasey.

The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

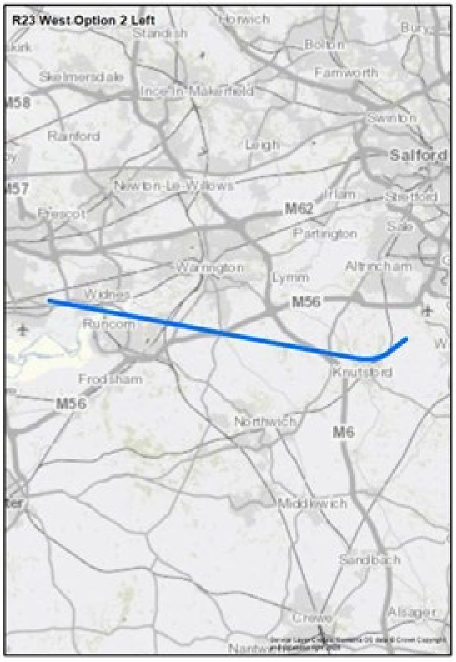
The climb gradient has been set at 6% to design the envelope.

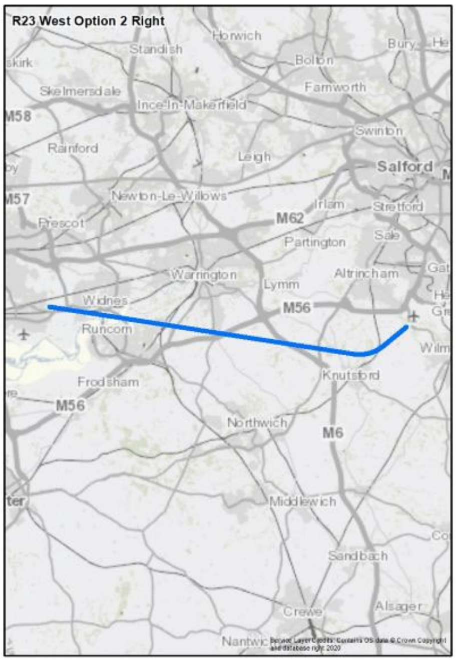
23L: After departure, the route makes a turn to the right 1nm from DER which takes it just to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington, passing south of Widnes and north of Runcorn and terminates at 7,000ft to the south-east of Liverpool.

23R: Similar to option for 23L, this route makes a right turn following take-off to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington, passes south of Widnes and north of Runcorn and terminates at 7,000ft to the south-east of Liverpool.

An element of dispersion would be apparent in the turn due to the fly-over waypoint and either CF or DF coding.

A speed restriction of 210 KIAS is applied to the first turn.





Design Principle	Runway	Result
Design Principle **Safety**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria as RNAV1 routes. When assessed in isolation, both the routes are designable; however, by maintaining a 6% climb gradient they are likely to infringe controlled airspace delegated to LPL and safety could be compromised. This will not comply with industry standards and regulations.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2 L is estimated to increase the total population affected by noise.
Option 2 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 2 R is estimated to increase the total population affected by noise.
Option 2 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 2 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 2 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 2 R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 2 L is estimated to overfly approximately 550 households with an approximate population of 1,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,500.

Up to 7,000ft, option 2 L is estimated to overfly approximately 24,100 households with an approximate population of 55,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 65,400.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 2 R is estimated to overfly approximately 1,100 households with an approximate population of 2,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 3,300.

Up to 7,000ft, option 2 R is estimated to overfly approximately 23,900 households with an approximate population of 55,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 63,500.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 2 L is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 2 L is estimated to overfly 120 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 2 R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 2 R is estimated to overfly 115 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

17.2 Runways 23R/23L West Option 3B

Design Principle Evaluation	Option No: 3B
Option Name: SID RW 23L WEST Option 3B	REJECT
Option Name: SID RW 23R WEST Option 3B	REJECT

Option Description:

This is an **RNAV1** option that aims to mimic the tracks taken by aircraft once they have been vectored off the EKLAD SID by ATC. This is done on the existing westerly SIDs once they have reached 3,000ft and so this option formalises the vectored routes flown today.

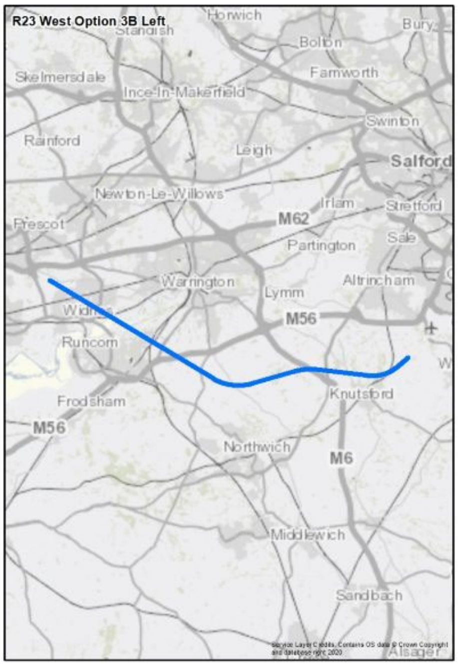
The procedure uses a fly-over to fly-by sequence and the climb gradient has been set at 6%. The fly-over waypoints are positioned to replicate the turn at the existing MCT D3 and D3.2 markers.

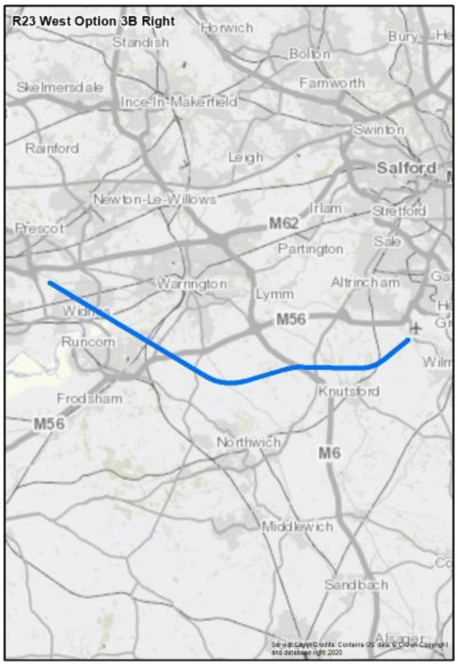
23L: After departure, the route makes a turn to the right at 0.7nm from DER which replicates the turn of the current EKLAD procedure and therefore aligns to the Design Principle Safety. It continues to replicate the EKLAD SID through Mere to the north of Knutsford and Northwich at which point it turns right onto a westerly heading which takes it overhead Widnes where it terminates at 7,000ft.

23R: After departure, the route makes a turn to the right at 1nm from DER and replicates the track of the current EKLAD SID through Mere to the north of Knutsford where it combines with the route for 23L. It then routes north of Northwich at which point it turns right onto a westerly heading which takes it overhead Widnes where it terminates at 7,000ft.

An element of dispersion would be apparent in the turn due to the fly-over waypoint and either CF or DF coding.

A speed restriction of 200 KIAS then 250 KIAS is used for the first turn and second turn.





Design Principle **Safety**		
	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide a RNAV1 replication of the current EKLAD procedure. When assessed in isolation, both the routes are designable; however, by maintaining a 6% climb gradient they are likely to infringe controlled airspace delegated to LPL and safety could be compromised. This will not comply with industry standards and regulations.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3B L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 3B L is estimated to increase the total population affected by noise.
Option 3B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 3B R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 3B R is estimated to increase the total population affected by noise.
Option 3B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 3B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 3B L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 3B R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3B L is estimated to overfly approximately 400 households with an approximate population of 1,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,500.

Up to 7,000ft, option 3B L is estimated to overfly approximately 25,900 households with an approximate population of 60,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 67,900.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 3B R is estimated to overfly approximately 400 households with an approximate population of 1,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,000.

Up to 7,000ft, option 3B R is estimated to overfly approximately 26,100 households with an approximate population of 60,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 67,900.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a similar population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 3B L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 3B L is estimated to overfly 110 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 3B R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 3B R is estimated to overfly 105 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

17.3 Runways 23R/23L West Option 4

Design Principle Evaluation	Option No: 4
Option Name: SID RW 23L WEST Option 4	REJECT
Option Name: SID RW 23R WEST Option 4	REJECT

Option Description:

This is option is an **RNP1** option with an RF turn that routes north of Knutsford and then direct towards Wallasey. It has been created to provide a direct (fuel-efficient) route to the network joining point for westbound traffic at Wallasey.

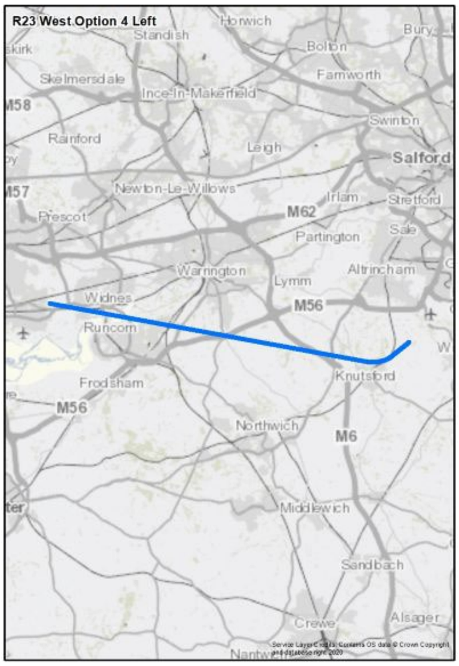
It has an almost identical track across the ground as option 2 but to a higher navigation standard to provide more accurate track keeping.

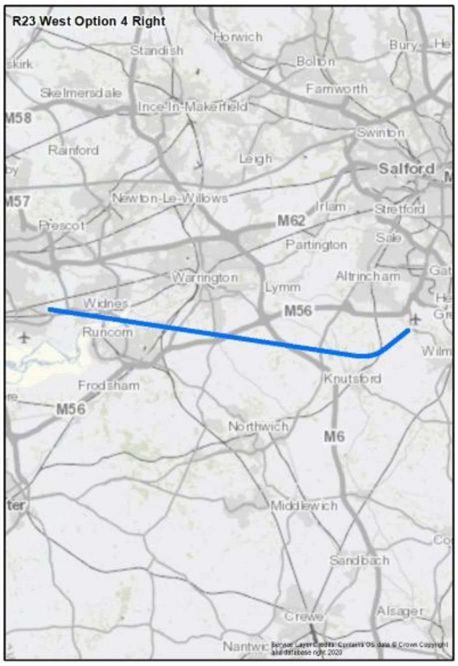
The climb gradient is set at 6%.

23L: After departure, the route makes a turn to the right 1nm from DER which takes it just to the north of Knutsford. It then heads in a north-westerly direction routing to the south of Warrington, passes south of Widnes and north of Runcorn and terminates at 7,000ft to the south-east of Liverpool.

23R: Similar to option for 23L, this route makes a turn to the right which takes it just to the north of Knutsford. It then heads in a north-westerly direction routing to the south of Warrington, passes south of Widnes and north of Runcorn and terminates at 7,000ft to the south-east of Liverpool.

A speed restriction of 190 KIAS is used for the first turn, thereafter 250 KIAS would apply. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.





Design Principle **Safety**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are designable; however, by maintaining a 6% climb gradient they are likely to infringe controlled airspace delegated to LPL and safety could be compromised. This will not comply with industry standards and regulations.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 4 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4 L is estimated to increase the total population affected by noise.
Option 4 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 4 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 4 R is estimated to increase the total population affected by noise.
Option 4 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 4 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 4 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 4 R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 4 L is estimated to overfly approximately 750 households with an approximate population of 1,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,900.

Up to 7,000ft, option 4 L is estimated to overfly approximately 23,950 households with an approximate population of 55,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 64,700.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 4 R is estimated to overfly approximately 1,450 households with an approximate population of 3,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 4,300.

Up to 7,000ft, option 4 R is estimated to overfly approximately 24,100 households with an approximate population of 56,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 63,900.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option4 L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option4 L is estimated to overfly 120 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option4 R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option4 R is estimated to overfly 115 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:
These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

17.4 Runways 23R/23L West Option 5A

Design Principle Evaluation	Option No: 5A
Option Name: SID RW 23L WEST Option 5A	REJECT
Option Name: SID RW 23R WEST Option 5A	REJECT

Option Description:

This is an **RNP1** option with an RF turn that routes north of Knutsford and then direct towards Wallasey. It is slightly further north than option 4 to route north of LPL and below the current MIRSI hold for Manchester. It has been created to provide a direct (fuel-efficient) route to the network joining point for westbound traffic at Wallasey.

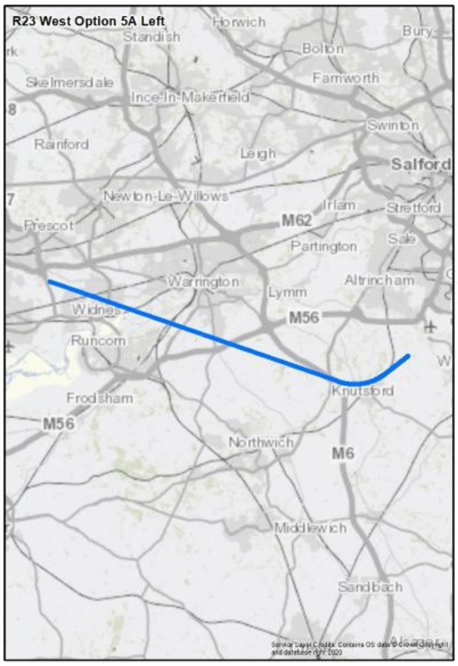
The design speed will permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

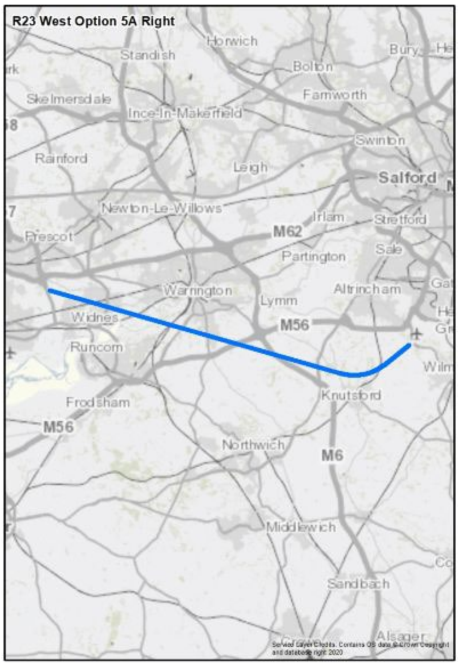
The climb gradient is set at 6%.

23L: After departure, the route makes a turn to the right at 1nm from DER which takes it just to the north of Knutsford. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft just west of Widnes.

23R: After departure, the route makes a turn to the right which takes it over the northern edge of Knutsford. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft just west of Widnes.

A speed restriction of 220 KIAS is used for the first turn, thereafter 250 KIAS would apply.





Design Principle **Safety**		
	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are designable; however, by maintaining a 6% climb gradient they are likely to infringe controlled airspace delegated to LPL and safety could be compromised. This will not comply with industry standards and regulations.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 5A L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 5A L is estimated to increase the total population affected by noise.
Option 5A L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 5A R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 5A R is estimated to increase the total population affected by noise.
Option 5A R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 5A L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 5A R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 5A L is estimated to overfly approximately 3,100 households with an approximate population of 7,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 8,000.

Up to 7,000ft, option 5A L is estimated to overfly approximately 29,000 households with an approximate population of 67,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 69,700.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 5A R is estimated to overfly approximately 2,850 households with an approximate population of 7,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 9,000.

Up to 7,000ft, option 5A R is estimated to overfly approximately 28,350 households with an approximate population of 66,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 69,200.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 5A L is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 5A L is estimated to overfly 110 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 5A R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 5A R is estimated to overfly 95 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

17.5 Runways 23R/23L West Option 5B

Design Principle Evaluation	Option No: 5B
Option Name: SID RW 23L WEST Option 5B	REJECT
Option Name: SID RW 23R WEST Option 5B	REJECT

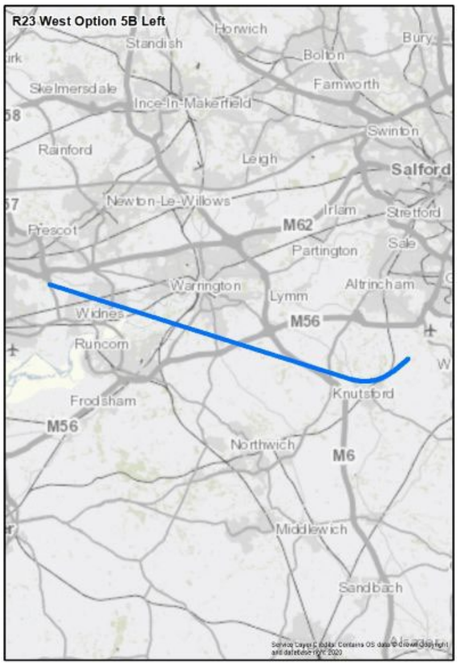
Option Description:
This is an **RNP1** option with an RF turn like option 5A, except that the turn point for Runway 23L is closer to the DER to increase the separation from Knutsford. It has been created to provide a direct (fuel-efficient) route to the network joining point for westbound traffic at Wallasey but with greater emphasis on limiting noise. This earlier turn results in a track for 23L that is slightly further north than option 5A.

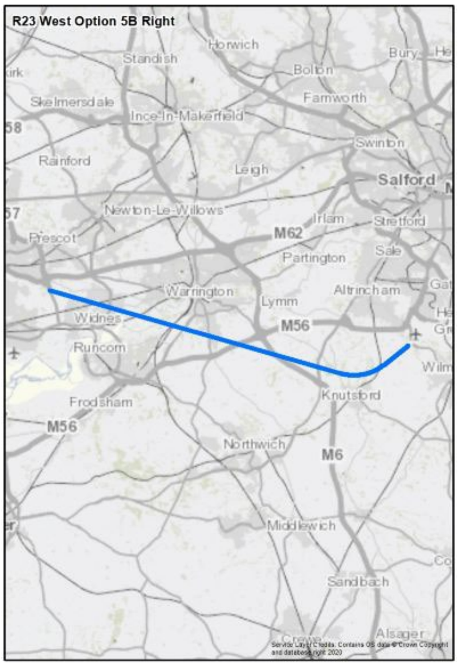
The design speed will permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: After departure, the route makes a turn to the right at 1nm from DER which takes it to the north of Knutsford. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft just west of Widnes.

23R: After departure, the route makes a turn to the right which takes it just to the north of Knutsford. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft just west of Widnes.

A speed restriction of 220 KIAS is used for the first turn, thereafter 250 KIAS would apply.





Design Principle		
Design Principle **Safety**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are designable; however, by maintaining a 6% climb gradient they are likely to infringe controlled airspace delegated to LPL and safety could be compromised. This will not comply with industry standards and regulations.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 5B L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 5B L is estimated to increase the total population affected by noise.
Option 5B L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 5B R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 5B R is estimated to increase the total population affected by noise.
Option 5B R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 5B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 5B L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 5B R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 5B L is estimated to overfly approximately 2,400 households with an approximate population of 6,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 8,600.

Up to 7,000ft, option 5B L is estimated to overfly approximately 28,900 households with an approximate population of 67,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 71,200.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 5B R is estimated to overfly approximately 2,850 households with an approximate population of 7,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 9,000.

Up to 7,000ft, option 5B R is estimated to overfly approximately 29,200 households with an approximate population of 68,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 71,500.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 5B L is estimated to overfly 15 noise sensitive areas.

Up to 7,000ft, this option 5B L is estimated to overfly 105 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 5B R is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 5B R is estimated to overfly 90 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:
These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

17.6 Runways 23R/23L West Option 6

Design Principle Evaluation	Option No: 6
Option Name: SID RW 23L WEST Option 6	REJECT
Option Name: SID RW 23R WEST Option 6	REJECT

Option Description:

This is an **RNP1** option with an RF turn that initially routes north before making a left turn direct to Wallasey. It has been created as an option that seeks to deconflict MAN westbound departures from traffic to and LPL. This is achieved through an initial north bound route to gain altitude, before turning left towards the network joining point at Wallasey.

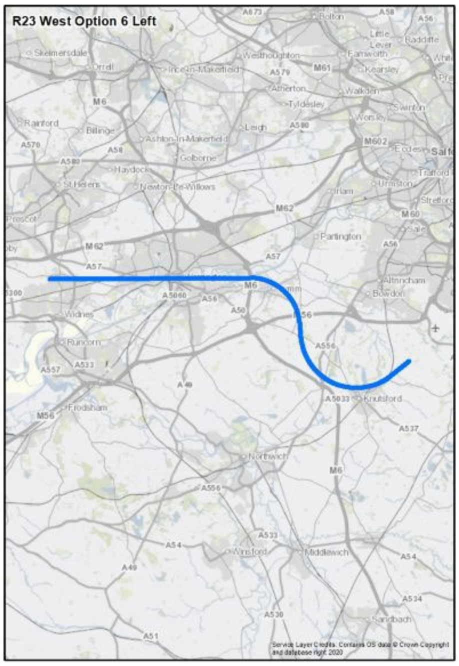
The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

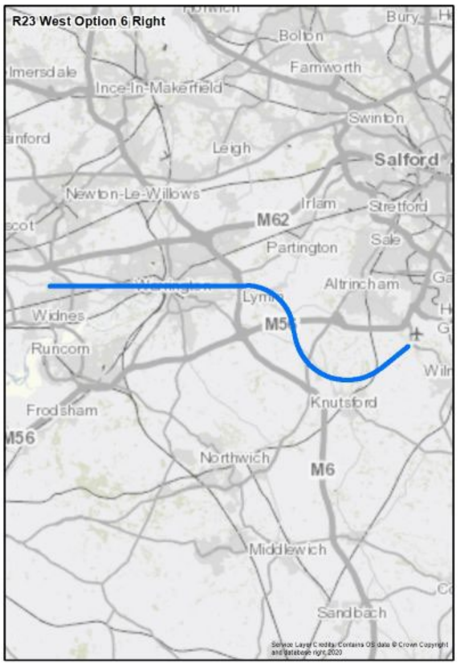
The procedure uses RF coding, and the climb gradient has been set at 6%.

23L: After departure, the route makes a turn to the right at 1nm from DER which takes it to the north of Knutsford through Mere. It then heads north on a short straight segment before making a left turn to the west, just to the north of Lymm where it combines with the option from 23R. The combined routes continue in a westerly direction routing overhead Warrington and terminate at 7,000ft just north of Widnes.

23R: After departure, the route makes a turn to the right which takes it to the north of Knutsford through Mere. It then heads north on a short straight segment before making a left turn to the west, just to the north of Lymm where it combines with the option from 23L. The combined routes continue in a westerly direction routing overhead Warrington and terminate at 7,000ft just north of Widnes.

A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.





Design Principle **Safety**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are designable; however, by maintaining a 6% climb gradient they are likely to infringe controlled airspace delegated to LPL and safety could be compromised. This will not comply with industry standards and regulations.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6 L is estimated to increase the total population affected by noise.
Option 6 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 6 R is estimated to increase the total population affected by noise.
Option 6 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 6 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 6 L is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 6 R is 44km (24nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**		
	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6 L is estimated to overfly approximately 6,450 households with an approximate population of 14,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 15,800.

Up to 7,000ft, option 6 L is estimated to overfly approximately 57,550 households with an approximate population of 129,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 134,000.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 6 R is estimated to overfly approximately 5,450 households with an approximate population of 12,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,700.

Up to 7,000ft, option 6 R is estimated to overfly approximately 57,550 households with an approximate population of 129,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 133,400.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**		
	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, this option 6 L is estimated to overfly 40 noise sensitive areas.

Up to 7,000ft, this option 6 L is estimated to overfly 285 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 6 R is estimated to overfly 30 noise sensitive areas.

Up to 7,000ft, this option 6 R is estimated to overfly 275 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:
These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

17.7 Runways 23R/23L West Option 7

Design Principle Evaluation	Option No: 7
Option Name: SID RW 23L WEST Option 7	ACCEPT
Option Name: SID RW 23R WEST Option 7	ACCEPT

Option Description:

This is an RNAV1 option that modifies option 2 to minimise the interactions with LPL airspace following stakeholder feedback.

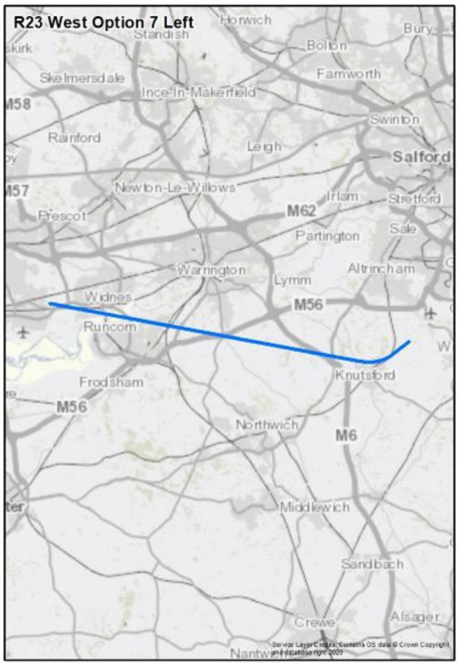
It provides an initial climb out to a fly-over waypoint and then a right turn to route north of Knutsford and direct towards Wallasey to align with current operational practice. It follows the same lateral track as option 2 but following stakeholder feedback to eliminate interactions with LPL inbound traffic to Runway 27, it has an increased climb gradient up to the point the LPL delegated airspace is overflown. Thereafter the gradient is reduced to one that will result in the route terminating in the same location as option 2, which has been designed to a constant 6% gradient.

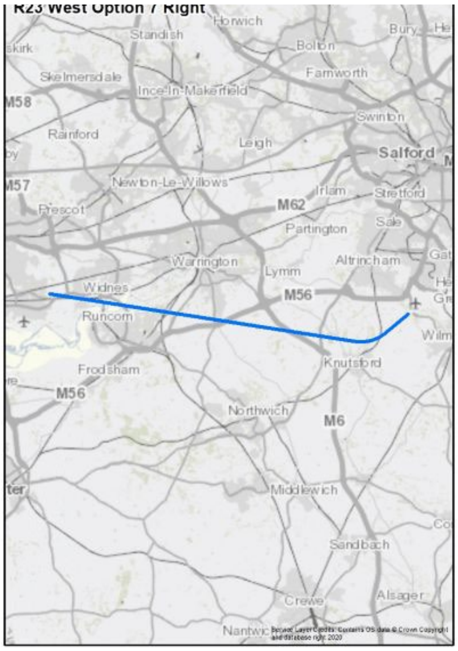
The initial climb gradient in this option is greater than the 6% to 7,000ft that has been adopted for other routes and which was identified as flyable by all aircraft within the fleet equipage survey described in the DOR This survey identified that some aircraft could exceed this 6% gradient, and because this initial climb gradient is only required to 3,500ft it will be assessed with the airlines to confirm viability should it be taken forward.

The initial climb gradient has been set at 11.64% for 23L / 9.81% for 23R for the portion of the SID prior to where the route meets the 3nm buffer of the LPL delegated airspace. Thereafter a maximum climb gradient of 4.2% is applied to terminate at 7,000ft at the same end position as option 2 to give an average gradient of 6%. Waypoints will be placed at the location of the 3nm boundary to specify that an altitude of 'at or above 3,500ft' is required to ensure safe separation.

The design speed may allow aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: After departure, the route makes a turn to the right 1nm from DER which takes it just to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft to the south-east of Liverpool.





23R: Similar to option for 23L, this route makes a right turn following take-off to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft to the south-east of Liverpool.

An element of dispersion would be apparent in the turn due to the fly-over waypoint and either CF or DF coding.

A speed restriction of 210 KIAS is applied to the first turn.

Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNAV1. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 7 L is estimated to increase the total population affected by noise.
Option 7 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 7 R is estimated to increase the total population affected by noise.
Option 7 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 7 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 7 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 7 R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7 L is estimated to overfly approximately 750 households with an approximate population of 1,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,900.

Up to 7,000ft, option 7 L is estimated to overfly approximately 27,450 households with an approximate population of 63,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 73,900.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 7 R is estimated to overfly approximately 250 households with an approximate population of 600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 700.

Up to 7,000ft, option 7 R is estimated to overfly approximately 26,300 households with an approximate population of 61,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 69,900.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 7 L is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 7 L is estimated to overfly 135 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 7 R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 7 R is estimated to overfly 125 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:
These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

17.8 Runways 23R/23L West Option 8

Design Principle Evaluation	Option No: 8
Option Name: SID RW 23L WEST Option 8	ACCEPT
Option Name: SID RW 23R WEST Option 8	ACCEPT

Option Description:

This is an RNAV1 option that modifies option 3B to minimise the interactions with LPL airspace following stakeholder feedback.

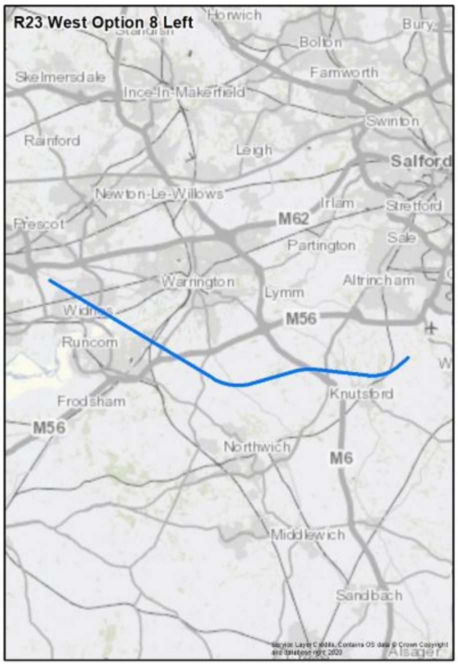
It follows the same lateral track as option 3B but following stakeholder feedback to eliminate interactions with LPL inbound traffic to Runway 27, it has an increased climb gradient up to the point the LPL delegated airspace is overflown. Thereafter the gradient is reduced to one that will result in the route terminating in the same location as option 3B.

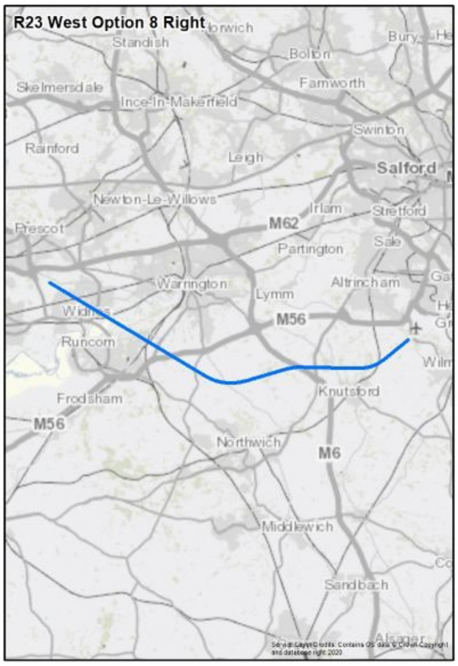
The initial climb gradient in this option is greater than the 6% to 7,000ft that has been adopted for other routes and which was identified as flyable by all aircraft within the fleet equipage survey described in the DOR. This survey identified that some aircraft could exceed this 6% gradient, and because this initial climb gradient is only required to 3,500ft it will be assessed with the airlines to confirm viability should it be taken forward.

The initial climb gradient has been set at 12.1% for 23L / 10.3% for 23R for the portion of the SID prior to where the route meets the 3nm buffer of the LPL delegated airspace. Thereafter a maximum climb gradient of 3.7% is applied to terminate at 7,000ft at the same end position as option 3B to give an average gradient of 6%. As the option is within a turn segment at the location of the airspace boundary, a waypoint cannot be placed on the intersection of the nominal track and the boundary. A restriction greater than 3,500 ft would need to be placed upon the second waypoint to follow the profile of the required climb to ensure that the correct altitude is met at the boundary.

23L: After departure, the route makes a turn to the right at 0.7nm from DER which replicates the turn of the current EKLAD procedure and therefore aligns to the Design Principle Safety. It continues to replicate the EKLAD SID to the north of Knutsford through Mere and passes north of Northwich at which point it turns right onto a westerly heading which takes it overhead Widnes where it terminates at 7,000ft.

23R: After departure, the route makes a turn to the right and replicates the track of the current EKLAD SID to the north of Knutsford through Mere where it combines with





the route for 23L. It then routes north of Northwich at which point it turns right onto a westerly heading which takes it overhead Widnes where it terminates at 7,000ft An element of dispersion would be apparent in the turn due to the fly-over waypoint and either CF or DF coding. A speed restriction of 200 KIAS then 250 KIAS is used for the first turn and second turn.	

Design Principle **Safety**		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNAV1. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**		
	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 8 L is estimated to limit the total population affected by noise.
Up to 7,000ft, option 8 L is estimated to increase the total population affected by noise.
Option 8 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 8 R is estimated to increase the total population affected by noise.
Option 8 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 8 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**		
	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 8 L is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 8 R is 42km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 8 L is estimated to overfly approximately 100 households with an approximate population of 200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,000.

Up to 7,000ft, option 8 L is estimated to overfly approximately 27,850 households with an approximate population of 65,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 73,500.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 8 R is estimated to overfly approximately 150 households with an approximate population of 400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 500.

Up to 7,000ft, option 8 R is estimated to overfly approximately 27,950 households with an approximate population of 65,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 72,900.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a smaller population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment: It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment: Up to 4,000ft, this option 8 L is estimated to overfly 5 noise sensitive areas. Up to 7,000ft, this option 8 L is estimated to overfly 120 noise sensitive areas. This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft. Up to 4,000ft, this option 8 R is estimated to overfly 5 noise sensitive areas. Up to 7,000ft, this option 8 R is estimated to overfly 120 noise sensitive areas. This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment: These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment: These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

17.9 Runways 23R/23L West Option 9

Design Principle Evaluation	Option No: 9
Option Name: SID RW 23L WEST Option 9	ACCEPT
Option Name: SID RW 23R WEST Option 9	ACCEPT

Option Description:
This is an **RNP1** option that modifies option 4 to minimise the interactions with LPL airspace following stakeholder feedback.

It follows the same lateral track as option 4 but following stakeholder feedback to eliminate interactions with LPL inbound traffic to Runway 27, it has an increased climb gradient up to the point the LPL delegated airspace is overflown. Thereafter the gradient is reduced to one that will result in the route terminating in the same location as option 4.

It has an almost identical track across the ground as option 2 but to a higher navigation standard to provide more accurate track keeping.

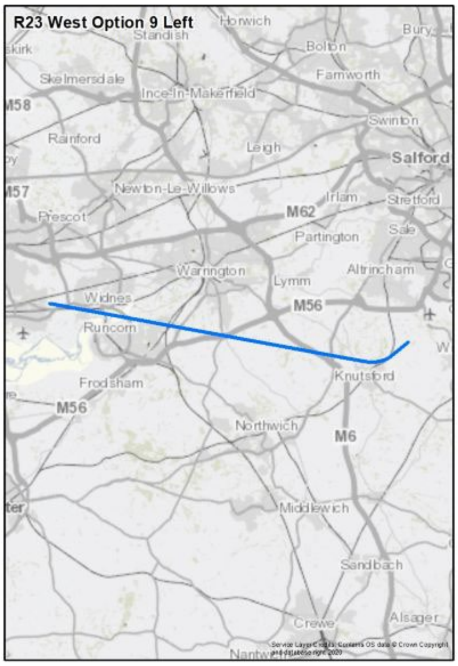
The initial climb gradient in this option is greater than the 6% to 7,000ft that has been adopted for other routes and which was identified as flyable by all aircraft within the fleet equipage survey described in the DOR. This survey identified that some aircraft could exceed this 6% gradient, and because this initial climb gradient is only required to 3,500ft it will be assessed with the airlines to confirm viability should it be taken forward.

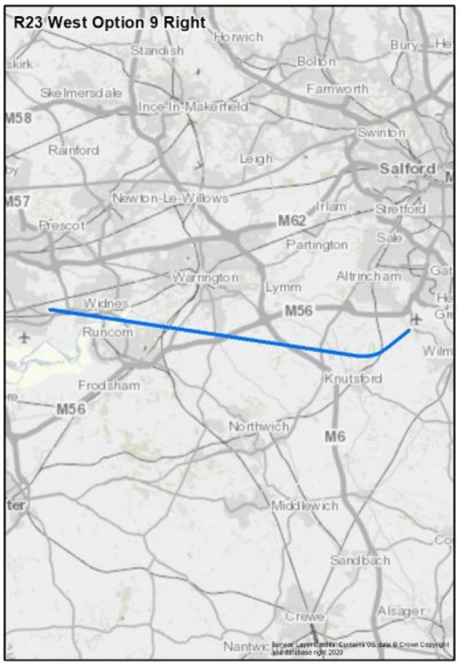
The initial climb gradient has been set at 11.7% for 23L / 9.9% for 23R for the portion of the SID prior to where the route meets the 3nm buffer of the LPL delegated airspace. Thereafter a maximum climb gradient of 4.2% is applied to terminate at 7,000ft at the same end position as option 4 to give an average gradient of 6%. Waypoints will be placed at the location of the 3nm boundary to specify that an altitude of 'at or above 3,500ft' is required to ensure safe separation.

23L: After departure, the route makes a turn to the right 1nm from DER which takes it just to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft to the south-east of Liverpool.

23R: Similar to option for 23L, this route makes a turn to the right which takes it just to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft to the south-east of Liverpool.

A speed restriction of 190 KIAS is used for the first turn, thereafter 250 KIAS would apply. Although PANS-OPS





compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.	

Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 9 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 9 L is estimated to increase the total population affected by noise.
Option 9 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 9 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 9 R is estimated to limit the total population affected by noise.
Up to 7,000ft, option 9 R is estimated to increase the total population affected by noise.
Option 9 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 9 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 9 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 9 R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 9 L is estimated to overfly approximately 450 households with an approximate population of 1,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,200.

Up to 7,000ft, option 9 L is estimated to overfly approximately 26,650 households with an approximate population of 61,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 72,100.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 9 R is estimated to overfly approximately 250 households with an approximate population of 600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 800.

Up to 7,000ft, option 9 R is estimated to overfly approximately 30,700 households with an approximate population of 72,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 75,000.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a smaller population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 9 L is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 9 L is estimated to overfly 130 noise sensitive areas.

This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 9 R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 9 R is estimated to overfly 110 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

17.10 Runways 23R/23L West Option 10

Design Principle Evaluation	Option No: 10
Option Name: SID RW 23L WEST Option 10	ACCEPT
Option Name: SID RW 23R WEST Option 10	ACCEPT

Option Description:

This is an **RNP1** option that modifies option 5A to minimise the interactions with LPL airspace following stakeholder feedback.

It follows the same lateral track as option 5A with an RF right turn that routes north of Knutsford and then direct towards Wallasey to align with current operational practice. However, to eliminate interactions with LPL inbound traffic to Runway 27, it has an increased climb gradient up to the point the LPL delegated airspace is overflown. Thereafter the gradient is reduced to one that will result in the route terminating in the same position as option 5A, which has been designed to a constant 6% gradient.

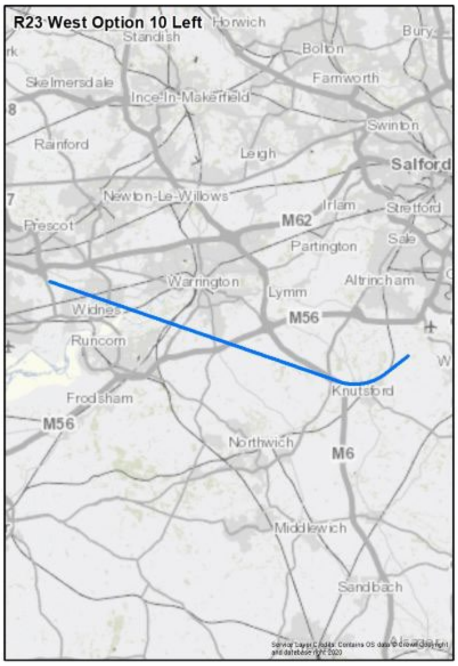
The initial climb gradient in this option is greater than the 6% to 7,000ft that has been adopted for other routes and which was identified as flyable by all aircraft within the fleet equipage survey as described in the DOR. This survey identified that some aircraft could exceed this 6% gradient, and because this initial climb gradient is only required to 3,500ft it will be assessed with the airlines to confirm viability should it be taken forward.

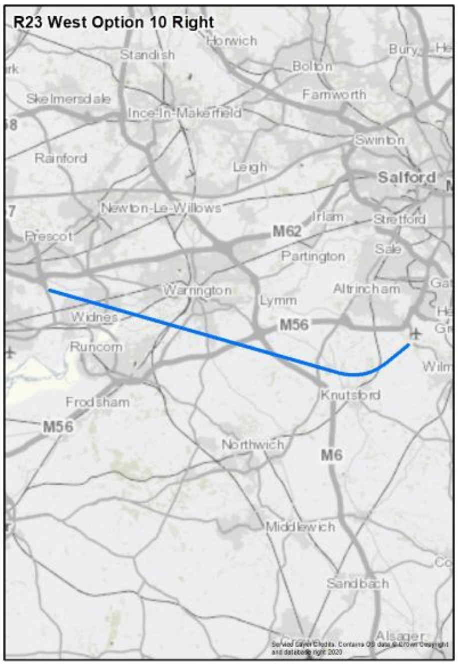
The initial climb gradient has been set at 11.3% for 23L / 9.7% for 23R for the portion of the SID prior to where the route meets the 3nm buffer of the LPL delegated airspace. Thereafter a maximum climb gradient of 4.2% is applied to terminate at 7,000ft at the same end position as option 5A to give an average gradient of 6%.

Waypoints will be placed at the location of the 3nm boundary to specify that an altitude of 'at or above 3,500ft' is required to ensure safe separation. For 23L, placing a waypoint on this boundary may result in a segment length that is too short between the RF turn and the 3nm boundary (in accordance with PANS-OPS requirements). This could either be:

assessed in flight validation for FMS anomalies, or the waypoint can be located at the necessary distance from the RF turn and specified with a higher altitude than 3,500ft to follow the profile of the required climb to ensure that the correct altitude is met at the boundary.

The route followed by the options is as follows:





23L: After departure, the route makes a turn to the right at 1nm from DER which takes it just to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft just west of Widnes. **23R:** After departure, the route makes a turn to the right which takes it over the northern edge of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft just west of Widnes. A speed restriction of 220 KIAS is used for the first turn, thereafter 250 KIAS would apply.	

Design Principle **Safety**		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide RNP1+RF routes . When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**		
	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 10 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 10 L is estimated to increase the total population affected by noise.
Option 10 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 10 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 10 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 10 R is estimated to increase the total population affected by noise.
Option 10 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 10 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**		
	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 10 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 10 R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 10 L is estimated to overfly approximately 2,550 households with an approximate population of 5,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 6,000.

Up to 7,000ft, option 10 L is estimated to overfly approximately 31,350 households with an approximate population of 72,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 76,200.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Up to 4,000ft, option 10 R is estimated to overfly approximately 250 households with an approximate population of 600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,200.

Up to 7,000ft, option 10 R is estimated to overfly approximately 29,900 households with an approximate population of 70,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 73,500.

This is a greater population compared to the ‘do nothing’ scenario up to 7,000ft, and a greater population compared to the ‘do nothing’ scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 10 L is estimated to overfly 25 noise sensitive areas.

Up to 7,000ft, this option 10 L is estimated to overfly 125 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 10 R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 10 R is estimated to overfly 110 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

17.11 Runways 23R/23L West Option 11

Design Principle Evaluation	Option No: 11
Option Name: SID RW 23L WEST Option 11	ACCEPT
Option Name: SID RW 23R WEST Option 11	ACCEPT

Option Description:

This is an **RNP1** option that modifies option 5B to minimise the interactions with LPL airspace following stakeholder feedback.

It follows the same lateral track as option 5B with an RF right turn that routes north of Knutsford and then direct towards Wallasey to align with current operational practice. However, to eliminate interactions with LPL inbound traffic to Runway 27, it has an increased climb gradient up to the point the LPL delegated airspace is overflown. Thereafter the gradient is reduced to one that will result in the route terminating in the same position as option 5B.

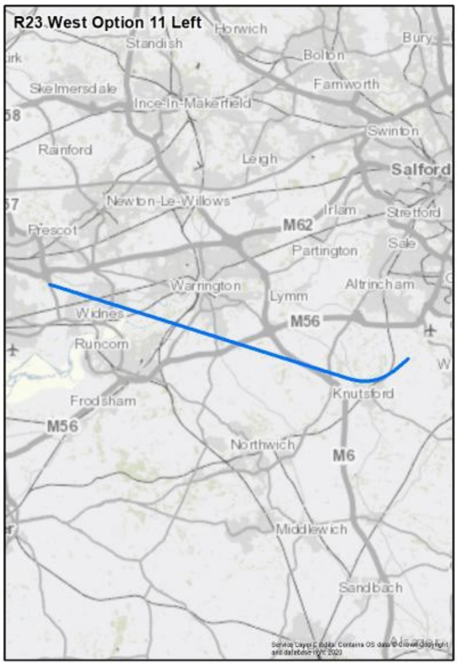
The initial climb gradient in this option is greater than the 6% to 7,000ft that has been adopted for other routes and which was identified as flyable by all aircraft within the fleet equipage survey described within the DOR.. This survey identified that some aircraft could exceed this 6% gradient, and because this initial climb gradient is only required to 3,500ft it will be assessed with the airlines to confirm viability should it be taken forward.

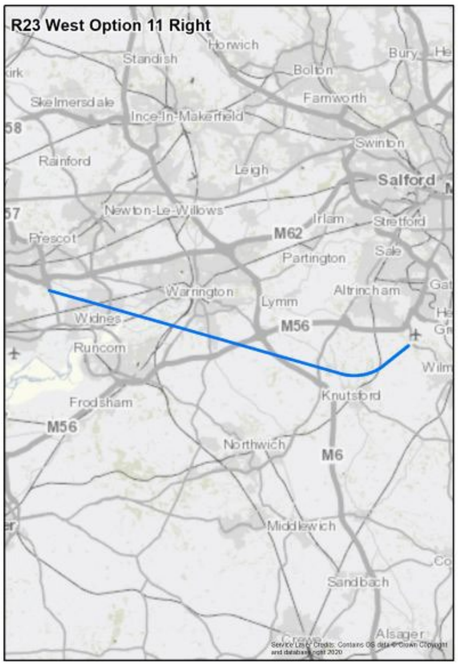
The initial climb gradient has been set at 11.5% for 23L / 9.7% for 23R for the portion of the SID prior to where the route meets the 3nm buffer of the LPL delegated airspace; thereafter a maximum climb gradient of 4.2% would be required to terminate at 7,000ft at the same end position as option 5B to give an average gradient of 6%. Waypoints will be placed at the location of the 3nm boundary to specify that an altitude of 'at or above 3,500ft' is required to ensure safe separation.

The design speed will permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: After departure, the route makes a turn to the right at 1nm from DER which takes it to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft just west of Widnes.

23R: After departure, the route makes a turn to the right which takes it just to the north of Knutsford through Mere. It then heads in a north-westerly direction routing





to the south of Warrington and terminates at 7,000ft just west of Widnes. A speed restriction of 220 KIAS is used for the first turn, thereafter 250 KIAS would apply.		
Design Principle **Safety**	23L	MET
	23R	MET
Summary of Qualitative Assessment: Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide routes that use RNP1+RF coding. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.		
Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL
Summary of Qualitative Assessment: Up to 4,000ft, option 11 L is estimated to increase the total population affected by noise. Up to 7,000ft, option 11 L is estimated to increase the total population affected by noise. Option 11 L is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 11 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 11 R is estimated to increase the total population affected by noise. Up to 7,000ft, option 11 R is estimated to increase the total population affected by noise. Option 11 R is similar in length and it is anticipated that emissions would be limited. At this stage of the process, option 11 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.		
Design Principle **Capacity**	23L	MET
	23R	PARTIAL
Summary of Qualitative Assessment: When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure. Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.		
Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 11 L is 39km (21nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 11 R is 40km (22nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 11 L is estimated to overfly approximately 1,000 households with an approximate population of 2,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 3,400.

Up to 7,000ft, option 11 L is estimated to overfly approximately 31,050 households with an approximate population of 72,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 76,900.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 11 R is estimated to overfly approximately 250 households with an approximate population of 600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 1,200.

Up to 7,000ft, option 11 R is estimated to overfly approximately 26,200 households with an approximate population of 61,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 70,200.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	NOT MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, this option 11 L is estimated to overfly 10 noise sensitive areas.

Up to 7,000ft, this option 11 L is estimated to overfly 115 noise sensitive areas.

This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, this option 11 R is estimated to overfly 5 noise sensitive areas.

Up to 7,000ft, this option 11 R is estimated to overfly 125 noise sensitive areas.

This is a smaller number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

17.12 Runways 23R/23L West Option 12

Design Principle Evaluation	Option No: 12
Option Name: SID RW 23L WEST Option 12	ACCEPT
Option Name: SID RW 23R WEST Option 12	ACCEPT

Option Description:
This is an **RNP1** option that modifies option 6 to minimise the interactions with LPL airspace following stakeholder feedback.

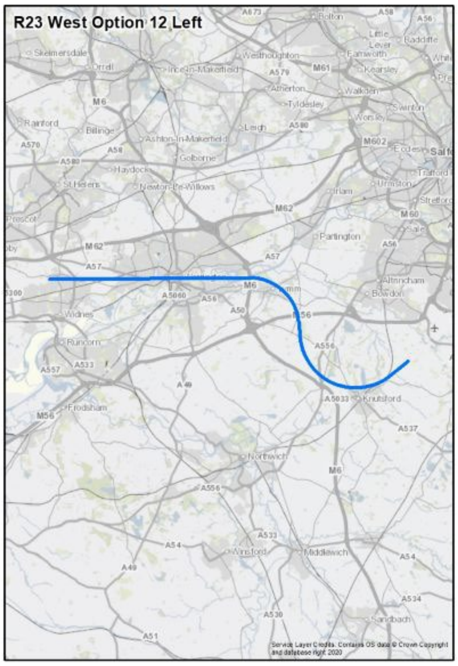
It follows the same lateral track as option 6 with an RF right turn that routes north before turning towards Wallasey. However, to eliminate interactions with LPL inbound traffic to Runway 27, it has an increased climb gradient up to the point the LPL delegated airspace is overflown. Thereafter the gradient is reduced to one that will result in the route terminating in the same position as option 6.

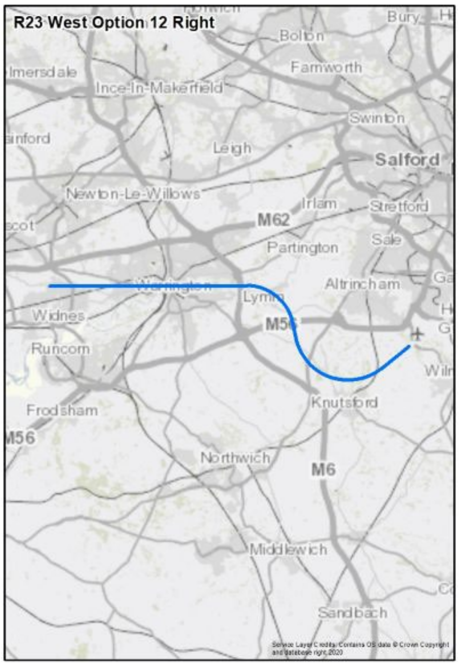
The initial climb gradient in this option is greater than the 6% to 7,000ft that has been adopted for other routes and which was identified as flyable by all aircraft within the fleet equipage survey described within the DOR. This survey identified that some aircraft could exceed this 6% gradient, and because this initial climb gradient is only required to 3,500ft it will be assessed with the airlines to confirm viability should it be taken forward.

The initial climb gradient has been set at 11.0% 23L / 8.9% 23R for the portion of the SID prior to where the route meets the 3nm buffer of the LPL delegated airspace. Thereafter a maximum climb gradient of 3.6% 23L/4.4% is applied to terminate at 7,000ft at the same end position as option 6 to give an average gradient of 6%. As the option is within a turn segment at the location of the airspace boundary, a waypoint cannot be placed on the intersection of the nominal track and the boundary. A restriction greater than 3,500ft would need to be placed upon the waypoints at the end of the RF turns to follow the profile of the required climb to ensure that the correct altitude is met at the boundary.

The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.

23L: After departure, the route makes a turn to the right at 1nm from DER which takes it to the north of Knutsford through Mere. It then heads north on a short straight segment before making a left turn to the west, just to the north of Lymm where it combines with the





option from 23R. The combined routes continue in a westerly direction routing overhead Warrington and terminate at 7,000ft just north of Widnes. **23R:** After departure, the route makes a turn to the right which takes it to the north of Knutsford through Mere. It then heads north on a short straight segment before making a left turn to the west, just to the north of Lymm where it combines with the option from 23L. The combined routes continue in a westerly direction routing overhead Warrington and terminate at 7,000ft just north of Widnes. A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.	

Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these routes have been designed by CAA Approved IFP designers in accordance with PANS-OPS criteria to provide RNP1+RF routes. When assessed in isolation, both the routes are considered to be safe, designable and meets with industry standards and regulations. At this stage, we do not believe that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports and other MAN routes may be required to confirm this at a later stage.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 12 L is estimated to increase the total population affected by noise.
Up to 7,000ft, option 12 L is estimated to increase the total population affected by noise.
Option 12 L is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 12 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 12 R is estimated to increase the total population affected by noise.
Up to 7,000ft, option 12 R is estimated to increase the total population affected by noise.
Option 12 R is similar in length and it is anticipated that emissions would be limited.
At this stage of the process, option 12 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

When assessed in isolation for Runway 23L, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

When assessed in isolation for Runway 23R there is a greater likelihood that best use of capacity may not be fully attained due to ground movement limitations and the time taken for aircraft to enter and backtrack the runway for a Runway 23R departure.

Based on current information, these options should not adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 12 L is 43km (23nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 12 R is 44km (24nm). When compared to the 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	NOT MET
	23R	NOT MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 12 L is estimated to overfly approximately 1,200 households with an approximate population of 2,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 3,600.

Up to 7,000ft, option 12 L is estimated to overfly approximately 66,500 households with an approximate population of 149,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 155,400.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Up to 4,000ft, option 12 R is estimated to overfly approximately 1,100 households with an approximate population of 2,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 2,900.

Up to 7,000ft, option 12 R is estimated to overfly approximately 63,800 households with an approximate population of 143,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 148,300.

This is a greater population compared to the 'do nothing' scenario up to 7,000ft, and a greater population compared to the 'do nothing' scenario up to 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment: It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.		
Design Principle **Noise N3**	23L	NOT MET
	23R	PARTIAL
Summary of Qualitative Assessment: Up to 4,000ft, this option 12 L is estimated to overfly 5 noise sensitive areas. Up to 7,000ft, this option 12 L is estimated to overfly 330 noise sensitive areas. This is a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft. Up to 4,000ft, this option 12 R is estimated to overfly 10 noise sensitive areas. Up to 7,000ft, this option 12 R is estimated to overfly 320 noise sensitive areas. This is a similar number of noise sensitive areas compared to the 'do nothing' scenario up to 7,000ft, and a greater number of noise sensitive areas compared to the 'do nothing' scenario up to 4,000ft.		
Design Principle **Airspace**	23L	MET
	23R	MET
Summary of Qualitative Assessment: These routes have been designed at a minimum climb gradient of 6% and climb to 7,000ft based on a fleet equipage and performance survey and are considered accessible by all aircraft types operating at MAN. These options could be used as part of a network that is consistent with this design principle that do not require any additional CAS; however, in isolation, it cannot be determined whether there is scope to reduce the volume of controlled airspace. The analysis of whether groups of options have potential to deliver CAS reductions will form part of Stage 3 activities.		
Design Principle **Technology**	23L	MET
	23R	MET
Summary of Qualitative Assessment: These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.		

17.13 Runways 23R/23L West Summary

	Option 2L	Option 3BL	Option 4L	Option 5AL	Option 5BL	Option 6L	Option 7L	Option 8L	Option 9L	Option 10L	Option 11L	option 12L
S	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	NOT MET	PARTIAL	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	PARTIAL	NOT MET	NOT MET	NOT MET	NOT MET
N2	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
N3	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	PARTIAL	PARTIAL	NOT MET	NOT MET	NOT MET
A	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Add. Qual.	Best	Add. Qual.	Add. Qual.	Add. Qual.	Add. Qual.

	Option 2R	Option 3BR	Option 4R	Option 5AR	Option 5BR	Option 6R	Option 7R	Option 8R	Option 9R	Option 10R	Option 11R	Option 12R
S	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	NOT MET	PARTIAL	NOT MET	NOT MET	NOT MET	NOT MET	PARTIAL	PARTIAL	PARTIAL	NOT MET	NOT MET	NOT MET
N2	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
N3	NOT MET	PARTIAL	NOT MET	NOT MET	NOT MET	NOT MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
A	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET	MET
	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Best	Best	Best	Add. Qual.	Add. Qual.	Add. Qual.

17.14 Runways 23R/23L West Viable but Poor Fit Options

<table>
<tr><th>Option</th><th>Safety</th><th>Policy</th><th>Capacity</th></tr>
<tr><td>A1 Extended straight ahead then route to WAL</td><td>S</td><td>P</td><td>C</td></tr>
<tr><td colspan="4">Originally created as Option 1, this seeks to align with current operations that are managed on a tactical basis by ATC. In current operations, aircraft route initially south-west (on the EKLAD SID) before being vectored off the SID by ATC towards Wallasey (WAL).

Policy: This option fails to align with the ends of the AMS with respect to:

• Efficiency: This option would interact with inbound and outbound routes to LPL airport which would require stop climb or descent profiles or ATC intervention to resolve.

The trade-off analysis against noise, did not identify a material noise benefit below 4,000ft.

Similarly, the trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Additional options were created to mitigate this by avoiding this interaction.

Capacity: This option would interact with the 23 South-west departure design envelope. This would limit the ability to achieve one minute departure splits and not enabling best use of runway capacity.</td></tr>
<tr><td>B13 Combined replication of EKLAD and KUXEM</td><td>S</td><td>P</td><td>C</td></tr>
<tr><td colspan="4">Originally created as Option 3A, this was a combined EKLAD and KUXEM SID which separated close to the termination point.

Safety: Feedback from NATS NERL suggested that this option would create issues with both flight planning and ATC procedures which may result in safety incidents. Additional options were created that avoid this risk occurring.

Capacity: This option would interact with the 23 South-west departure design envelope. This would limit the ability to achieve one minute departure splits and not enabling best use of runway capacity.</td></tr>
</table>

18 Standard Instrument Departures Evaluation Summary

The acceptance / rejection process set out at section 4.2 accepted 133 SID design options that were carried forward to the IOA for further consideration. This process also rejected 75 SID design options.

At this relatively early stage in the process the ability to carry out a detailed assessment of the design principles Capacity, Emissions, Noise N2 and Airspace in particular was limited, due to routes not being developed as a system or combined with the designs of the enroute network and adjacent airports. A full appreciation of these design principles will only be possible at Stage 3 once the individual design options have been consolidated into networks.

However, and in line with CAP1616, the design option development process considered all of the design principles including the need to align to the "must have" design principles of Safety, Policy and Capacity.

- Safety: Safety is the no.1 priority for all airspace changes, and our routes must be safe and comply with industry standards and regulations. The application of this design principle focussed on the alignment to PANS-OPS and CAP778 and the avoidance of a hazardous conflict between the design option and other aircraft either at MAN at adjacent airports or in adjacent airspace.
- Policy: The Design Principle Policy requires us to take account of the CAA AMS (CAP1711) which sets out the 'Ends' that airspace modernisation must deliver, including the need to create a more efficient, environmentally focussed and integrated airspace network. To address this, the design process takes account of the constraints and considerations in the local airspace to create options to meet the 'Ends' within the AMS. This includes options that seek to reduce the number of people affected by noise in line with the Air Navigation Guidance 2017 or provide a more direct routing to the joining point with the network airspace to reduce emissions. Although listed as one of the 'Ends' in the AMS, Safety was not considered within the Design Principle Policy assessment, but as part of the Design Principle Safety assessment. This is outlined in the Policy evaluation summary in section 4.5
- Capacity: The Design Principle Capacity requires us to create options that make best use of runway capacity. To address this, the design process created some options in isolation, but created others iteratively by comparing design options with those in adjacent envelopes. The aim of this was to create options that had the ability to be part of a system capable of one-minute departure separations and therefore align with this design principle.

Therefore, to ensure that the MAN airspace change continues to offer the potential to respond to the proposals from other change sponsors, and to ensure that design options that may offer benefits that have not been fully apparent at this early stage are not prematurely discounted, 23 design options, as detailed in the summary tables for each design envelope, that were initially rejected by the acceptance/rejection process, were carried forward to the IOA for further consideration. This was on the basis of the qualitative judgement by the SME referred to at section 4.2.1of this DPE and the potential for these options to align with the requirements of the design principles Safety, Policy and Capacity as identified above.

This SME judgement was based upon technical meetings with Manchester ATC and with NATS NERL. In particular the DOR section 3 details discussions with NERL regarding the network interface and managing this airspace change within the national airspace master plan. This highlights the need to ensure connectivity to the network against the challenge of a NERL design that has not yet been finalised. It also highlights the potential for misalignment and the need to modify or restore options at a later date. The retention of these options is aimed at reducing or eliminating this likelihood.

As a result, in total 133 SID design options were carried forward to the IOA for further consideration.

19 Transitions - Evaluation

20 Transitions Runways 05L/05R North –3,000ft FAF

20.1 Transition Runways 05L/05R North Option 1A – 3,000ft FAF

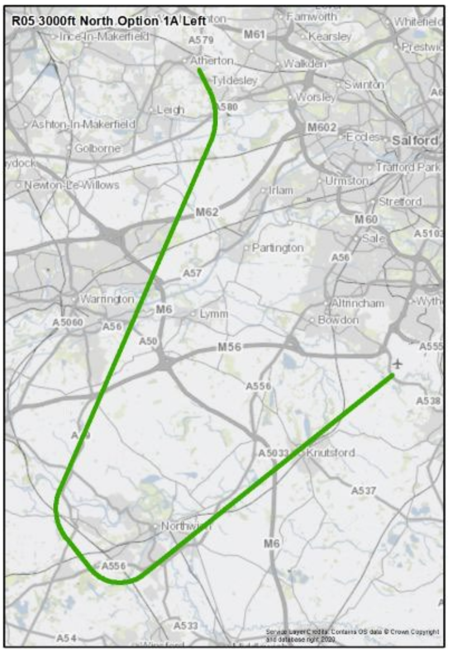
Design Principle Evaluation	Option No: 1A
Option Name: Transition RW 05L North Option 1A 3000ft FAF	ACCEPT
Option Name: Transition RW 05R North Option 1A 3000ft FAF	ACCEPT

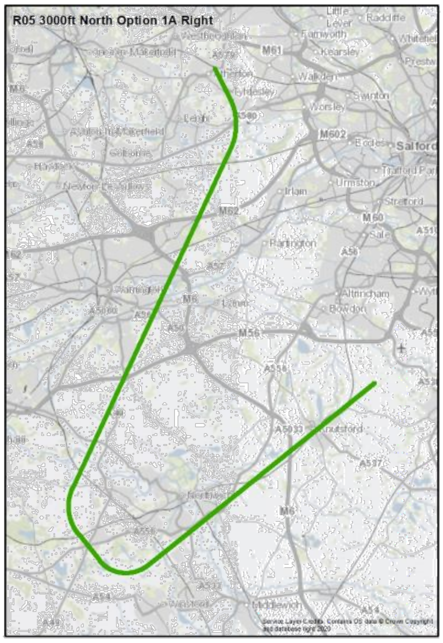
Option Description:

Option 1A has an IAF at 7,000ft to the north-west of the airport in the vicinity of Atherton and is equidistant to easterly or westerly operations. It is designed to facilitate an equal CDA profile to all runways.

From this location the route splits and turns south-west, west of Urmston, Irlam, Partington, Cadishead and then east of Warrington before turning on to the final approach to the west of Northwich at 3,000ft for either Runway 05L or Runway 05R.

The descent gradient to the FAF is 3.5%/2.01° for Runway 05L and 3.28%/1.88° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





	05L	MET

Design Principle **Safety**	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with ICAO PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1A L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 1A L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 1A L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 1A L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 1A L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 1A L is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 1A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 1A R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 1A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 1A R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 1A R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 1A R is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 1A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 1A L is 58km (31nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 1A R is 62km (33nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 1A L is estimated to overfly approximately 7,100 households with an approximate population of 16,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 17,300.

From 7,000ft, option 1A L is estimated to overfly approximately 39,950 households with an approximate population of 90,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 96,900.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 1A R is estimated to overfly approximately 5,850 households with an approximate population of 13,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 13,700.

From 7,000ft, option 1A R is estimated to overfly approximately 44,500 households with an approximate population of 100,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 106,700.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:
It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 1A L is estimated to overfly 45 noise sensitive areas.

From 7,000ft, this option 1A L is estimated to overfly 210 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 1A R is estimated to overfly 35 noise sensitive areas.

From 7,000ft, this option 1A R is estimated to overfly 220 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

20.2 Transition Runways 05L/05R North Option 2A – 3,000ft FAF

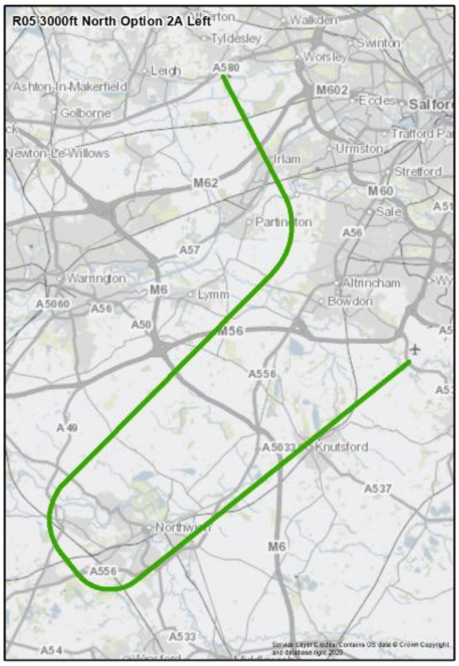
Design Principle Evaluation	Option No: 2A
Option Name: Transition RW 05L North Option 2A 3000ft FAF	ACCEPT
Option Name: Transition RW 05R North Option 2A 3000ft FAF	ACCEPT

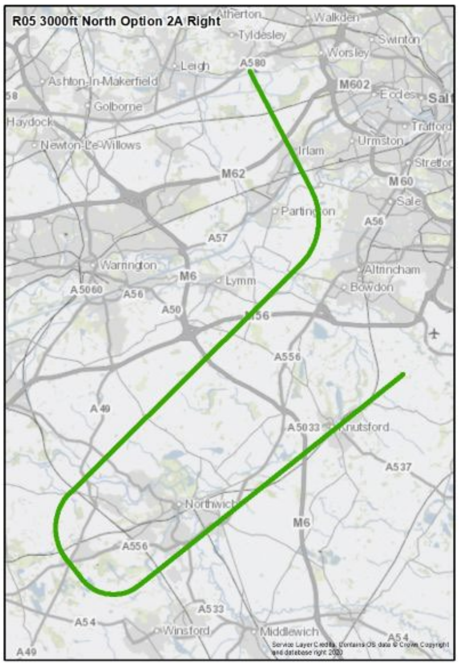
Option Description:

Option 2A has an IAF at 7,000ft to the north-west of the airport in the vicinity of Atherton and is equidistant to easterly or westerly operation. It is designed to facilitate an equal CDA profile to all runways.

From this location the route follows an initial straight segment towards the airport where it splits before turning right on to the downwind leg overflying Partington. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 05L or 05R.

The descent gradient to the FAF is 3.13%/1.79° for Runway 05L and 2.92%/1.68° for Runway 05R. These gradients are at the lower end of the optimum for low noise approach but still within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2A L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 2A L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 2A L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 2A L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 2A L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 2A L is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 2A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 2A R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 2A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 2A R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 2A R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 2A R is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 2A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 2A L is 59km (32nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 2A R is 62km (33nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 2A L is estimated to overfly approximately 7,150 households with an approximate population of 16,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 17,400.

From 7,000ft, option 2A L is estimated to overfly approximately 25,250 households with an approximate population of 59,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 63,500.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 2A R is estimated to overfly approximately 5,900 households with an approximate population of 13,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 13,800.

From 7,000ft, option 2A R is estimated to overfly approximately 24,900 households with an approximate population of 58,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 61,800.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 2A L is estimated to overfly 50 noise sensitive areas.

From 7,000ft, this option 2A L is estimated to overfly 120 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 2A R is estimated to overfly 40 noise sensitive areas.

From 7,000ft, this option 2A R is estimated to overfly 115 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

20.3 Transition Runways 05L/05R North Option 6A – 3,000ft FAF

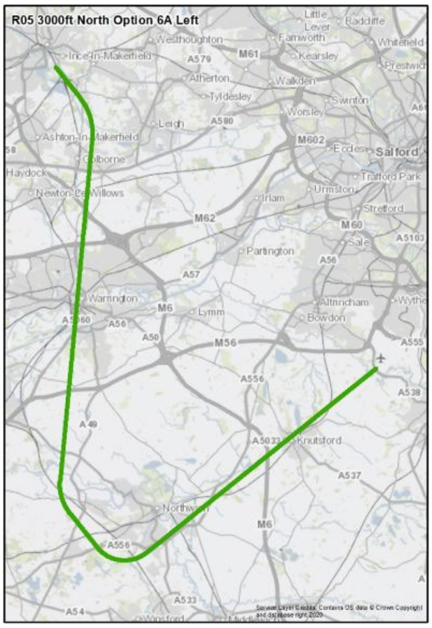
Design Principle Evaluation	Option No: 6A
Option Name: Transition RW 05L North Option 6A 3000ft FAF	REJECT
Option Name: Transition RW 05R North Option 6A 3000ft FAF	REJECT

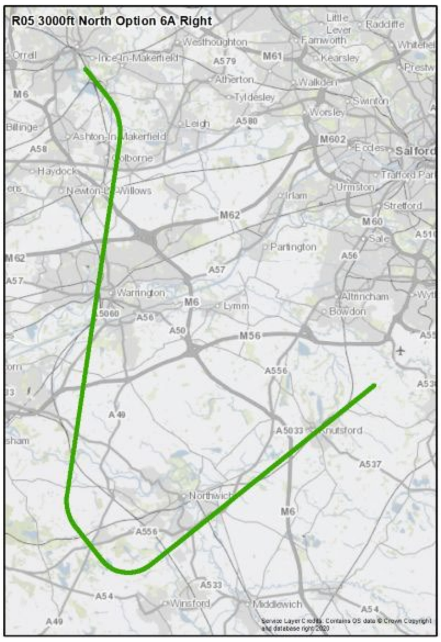
Option Description:

Option 6A has an IAF at 7,000ft to the north-west of the airport in the vicinity of Wigan and has been designed to reduce potential interactions with departures.

From this location the route splits and heads south, overflying Warrington and to the east of Frodsham. Both routes then turn left to establish aircraft on final approach to the west of Northwich at 3,000ft for either Runway 05L or 05R.

The descent gradient to the FAF is 3.61%/2.07° Runway 05L and 3.41%/1.95° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6A L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 6A L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 6A L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 6A L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 6A L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 6A L is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 6A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 6A R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 6A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 6A R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 6A R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 6A R is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 6A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	05L	PARTIAL

Design Principle **Emissions**	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 6A L is 58km (31nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 6A R is 61km (33nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 6A L is estimated to overfly approximately 7,000 households with an approximate population of 16,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 17,100.

From 7,000ft, option 6A L is estimated to overfly approximately 60,400 households with an approximate population of 132,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 144,200.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 6A R is estimated to overfly approximately 5,800 households with an approximate population of 13,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 13,600.

From 7,000ft, option 6A R is estimated to overfly approximately 52,950 households with an approximate population of 117,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 127,800.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:
It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 6A L is estimated to overfly 45 noise sensitive areas.

From 7,000ft, this option 6A L is estimated to overfly 340 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 6A R is estimated to overfly 35 noise sensitive areas.

From 7,000ft, this option 6A R is estimated to overfly 315 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

20.4 Transition Runways 05L/05R North Option 7A – 3,000ft FAF

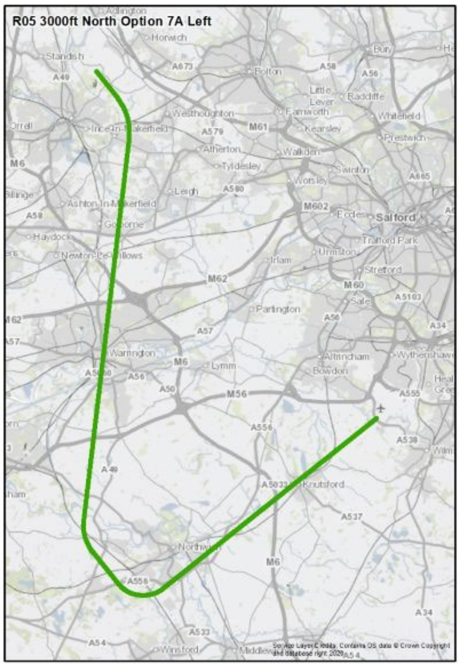
Design Principle Evaluation	Option No: 7A
Option Name: Transition RW 05L North Option 7A 3000ft FAF	REJECT
Option Name: Transition RW 05R North Option 7A 3000ft FAF	REJECT

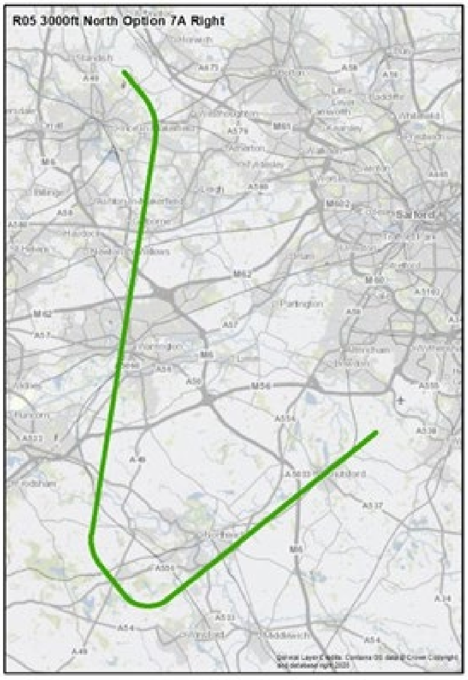
Option Description:

Option 7A has an IAF at 7,000ft to the north-west of the airport in the vicinity of Aspull to the east of Wigan and has been designed to reduce potential interactions with departures. It has a similar track to option 6a but reduces the impact of noise on Wigan. This results in a CDA profile that is similar to option 2A but not as optimal as 1A and 6A.

From this location the route splits and heads south, routing just east of Earlestown and overflying Warrington. Both routes then turn left to establish aircraft on final approach to the west of Northwich at 3,000ft for either Runway 05L or 05R.

The descent gradient to the FAF is 3.13%/1.79° for Runway 05L and 2.98%/1.71° for Runway 05R. These gradients are at the lower end of the optimum for low noise approach but still within the acceptable range for CDAs defined within ICAO guidance.





Design Principle Safety	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7A L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 7A L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 7A L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 7A L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 7A L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 7A L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 7A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 7A R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 7A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 7A R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 7A R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 7A R is longer in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 7A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 7A L is 64km (35nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 7A R is 66km (36nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 7A L is estimated to overfly approximately 6,650 households with an approximate population of 15,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 16,200.

From 7,000ft, option 7A L is estimated to overfly approximately 60,000 households with an approximate population of 133,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 147,600.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 7A R is estimated to overfly approximately 5,450 households with an approximate population of 12,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,700.

From 7,000ft, option 7A R is estimated to overfly approximately 53,600 households with an approximate population of 119,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 133,400.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

	05L	MET

Design Principle **Noise N3**	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 7A L is estimated to overfly 45 noise sensitive areas.

From 7,000ft, this option 7A L is estimated to overfly 330 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 7A R is estimated to overfly 35 noise sensitive areas.

From 7,000ft, this option 7A R is estimated to overfly 310 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

20.5 Transition Runways 05L/05R North Option 8A – 3,000ft FAF

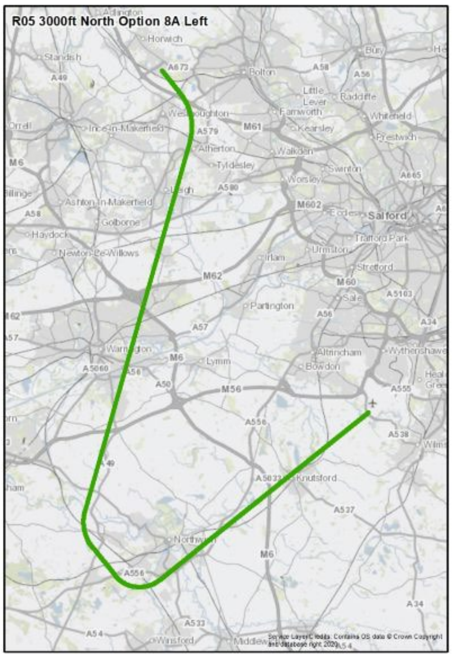
Design Principle Evaluation	Option No: 8A
Option Name: Transition RW 05L North Option 8A 3000ft FAF	ACCEPT
Option Name: Transition RW 05R North Option 8A 3000ft FAF	ACCEPT

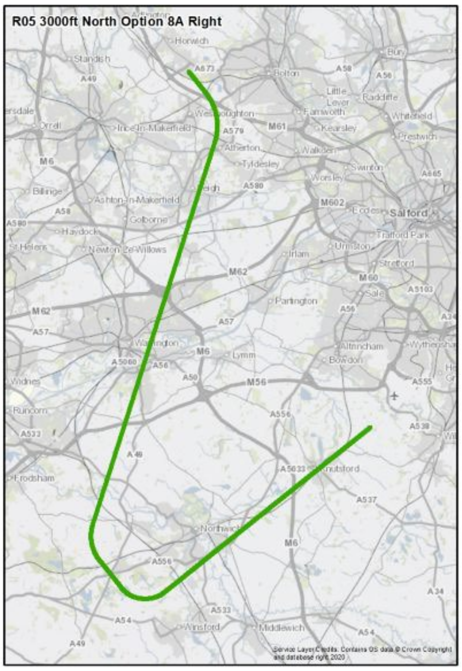
Option Description:

Option 8A has an IAF at 7,000ft to the north-west of the airport in the vicinity of the Middlebrook Retail Park. It has been designed to reduce potential interactions with departures and to facilitate a CDA profile to all runways. It also provides a broadly equal CDA for both runway directions.

From this location the route splits, and heads south-west in the vicinity of Atherton and routes just to the east of central Warrington. Both routes then turn left to establish aircraft on final approach to the west of Northwich at 3,000ft for either Runway 05L or 05R.

The descent gradient to the FAF is 3.06%/1.75° for Runway 05L and 2.9%/1.66° for Runway 05R. These gradients are at the lower end of the optimum for low noise approach but still within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 8A L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 8A L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 8A L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 8A L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 8A L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 8A L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 8A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 8A R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 8A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 8A R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 8A R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 8A R is longer in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 8A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	05L	PARTIAL

Design Principle **Emissions**	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 8A L is 64km (35nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 8A R is 67km (36nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 8A L is estimated to overfly approximately 7,800 households with an approximate population of 18,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 19,400.

From 7,000ft, option 8A L is estimated to overfly approximately 75,900 households with an approximate population of 172,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 182,500.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 8A R is estimated to overfly approximately 5,500 households with an approximate population of 12,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,900.

From 7,000ft, option 8A R is estimated to overfly approximately 80,600 households with an approximate population of 180,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 189,800.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 8A L is estimated to overfly 55 noise sensitive areas.

From 7,000ft, this option 8A L is estimated to overfly 390 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 8A R is estimated to overfly 35 noise sensitive areas.

From 7,000ft, this option 8A R is estimated to overfly 375 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

20.6 Transition Runways 05L/05R North Option 9A – 3,000ft FAF

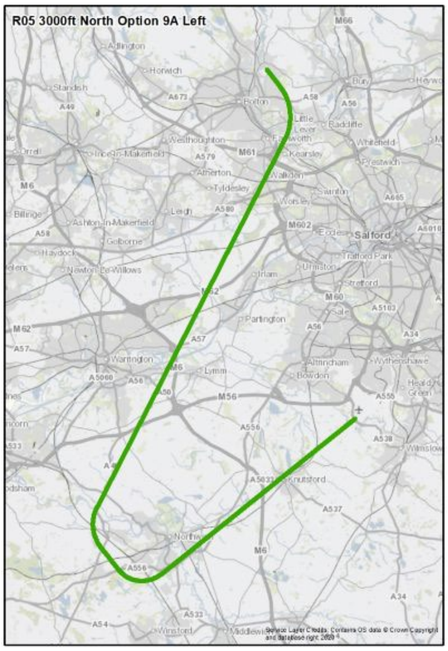
Design Principle Evaluation	Option No: 9A
Option Name: Transition RW 05L North Option 9A 3000ft FAF	ACCEPT
Option Name: Transition RW 05R North Option 9A 3000ft FAF	ACCEPT

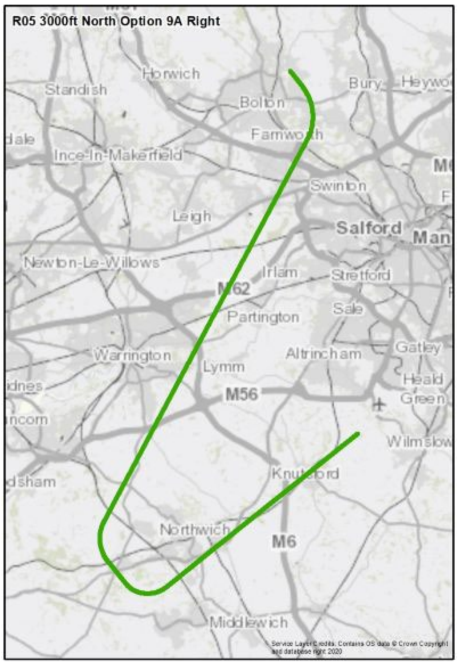
Option Description:

Option 9A has an IAF at 7,000ft to the north of the airport just to the east of Bolton and is designed to facilitate a CDA profile to all runways. This position results in this being the longest transition for Runway 05 and therefore the least optimal CDA profile.

From this location the route splits, heads initially south to avoid Bolton and then turns south-west to and tracks to the east of Warrington. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 05L or 05R.

The descent gradient to the FAF is 2.72%/1.56° for Runway 05L and 2.58%/1.48° for Runway 05R. These gradients are below the optimum for low noise approaches but just within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 9A L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 9A L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 9A L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 9A L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 9A L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 9A L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 9A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 9A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 9A R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 9A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 9A R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 9A R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 9A R is longer in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 9A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	05L	PARTIAL

Design Principle **Emissions**	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 9A L is 69km (37nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 9A R is 72km (39nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 9A L is estimated to overfly approximately 6,800 households with an approximate population of 16,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 17,700.

From 7,000ft, option 9A L is estimated to overfly approximately 65,450 households with an approximate population of 149,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 153,300.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 9A R is estimated to overfly approximately 6,400 households with an approximate population of 15,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 17,200.

From 7,000ft, option 9A R is estimated to overfly approximately 68,200 households with an approximate population of 156,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 160,500.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 9A L is estimated to overfly 45 noise sensitive areas.

From 7,000ft, this option 9A L is estimated to overfly 275 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 9A R is estimated to overfly 50 noise sensitive areas.

From 7,000ft, this option 9A R is estimated to overfly 290 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

20.7 Transition Runways 05L/05R North 3,000ft FAF Summary

	IAF STEAK	IAF STEAK	IAF 1	IAF 2	IAF 3	IAF 4
	Option 1AL	Option 2AL	Option 6AL	Option 7AL	Option 8AL	Option 9AL
S	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET
	Best	Best	Best but incomplete IAF	Best but incomplete IAF	Best	Best

	IAF STEAK	IAF STEAK	IAF 1	IAF 2	IAF 3	IAF 4
	Option 1AR	Option 2AR	Option 6AR	Option 7AR	Option 8AR	Option 9AR
S	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET	MET	MET	MET
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET
	4,000ft beneficial	4,000ft beneficial	Best but incomplete IAF	Best but incomplete IAF	4,000ft beneficial	4,000ft beneficial

20.8 Transition Runways 05L/05R North 3,000ft FAF: Viable but Poor Fit Options

Option	Safety	Policy	Capacity
Transition north option A3	S	P	C

This was initially designed as Option 3 and is a route based on the "North1" IAF located at the position of the current MIRSI hold.

Safety: This option raised significant safety concerns with regards to the vertical and lateral separation between MAN arrivals and departures and arrivals to LPL.

Policy: This option fails to align with the ends of the AMS with respect to:

- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve.
- Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. No other noise benefits sufficient to offset a red categorisation were identified.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Option	Safety	Policy	Capacity
Transition north option B4	S	P	C

This was initially designed as Option 4 and is a route based on the position of a NATS proposed" NW Merge" IAF located close to the current MIRSI hold.

Safety: This option raised significant safety concerns with regards to the vertical and lateral separation between MAN arrivals and departures and arrivals to LPL.

Policy: This option fails to align with the ends of the AMS with respect to:

- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve.
- Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Transition north option C5	S	P	C

This was initially designed as Option 5 and is a route based on the position of a NATS proposed" West Hold" IAF located north of the current MIRSI hold.

Safety: This option raised significant safety concerns with regards to the vertical and lateral separation between MAN arrivals and departures and arrivals to LPL.

Policy: This option fails to align with the ends of the AMS with respect to:

- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve.
- Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Transition north option D10	S	P	C

This was initially designed as **Option 10A** and is based on the use of IAF5 which is close to position of the current ROSUN hold. It was considered as an option for both runways; however, the analysis demonstrated that the profile for Runways 05L/05R would be below the minimum CDA criteria.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Transition north option E11	S	P	C

This was initially designed as **Option 11A** option is based on IAF6, which is the approximate position of the current ROSUN hold. It was considered as an option for both runways; however, the analysis demonstrated that the profile for Runways 05L/05R would be below the minimum CDA criteria.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Transition north option F12	S	P	C

An arrival procedure could be created to provide a straight-in transition from the west for Runway 05 at MAN.

Safety: This option raised significant safety concerns with regards to the vertical and lateral separation between MAN arrivals and departures and arrivals to LPL.

Policy: This option fails to align with the ends of the AMS with respect to:

- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve. Whilst there may be opportunities to provide this route on a tactical basis, it would not be viable to create this route for use during peak time operations.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

21 Transitions Runways 05L/05R North – 2,500ft FAF

21.1 Transition Runways 05L/05R North Option 1B – 2,500ft FAF

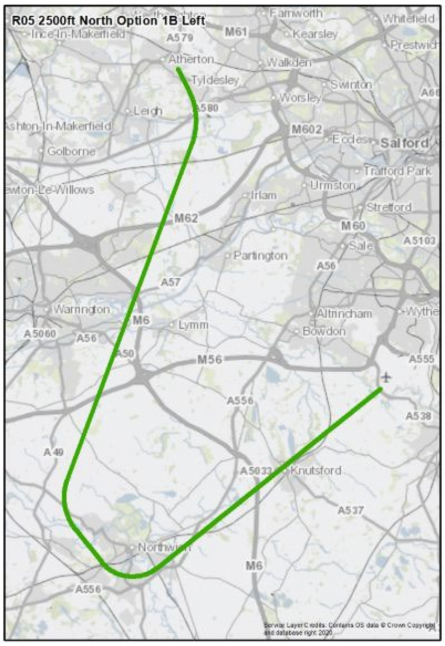
Design Principle Evaluation	Option No: 1B
Option Name: Transition RW 05L North Option 1B 2500ft FAF	ACCEPT
Option Name: Transition RW 05R North Option 1B 2500ft FAF	ACCEPT

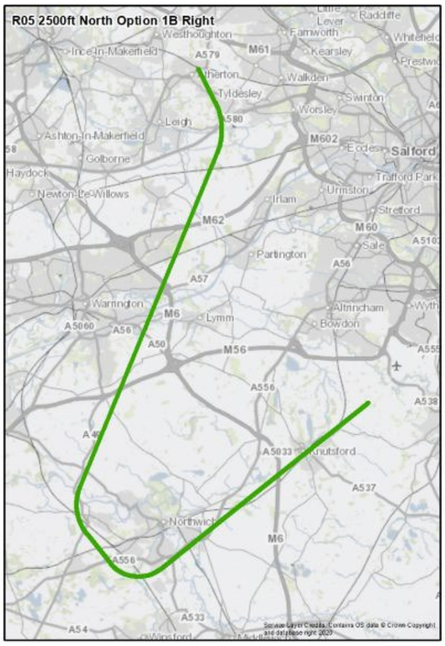
Option Description:

Option 1B has an IAF at 7,000ft to the north-west of the airport in the vicinity of Atherton and is equidistant to easterly or westerly operations. It is designed to facilitate a CDA profile to all runways.

From this location the route turns south-west and splits, heading west of Urmston, Irlam and east of Warrington towards base-leg positions. Both routes then turn left to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.

The descent gradient to the FAF is 4.24%/2.43° for Runway 05L and 3.96%/2.27° Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	05L	
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 1B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 1B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 1B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 1B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 1B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 1B L is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 1B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 1B R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 1B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 1B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 1B R is similar in length and it is anticipated that emissions would be limited when compared against the MIRSI 'do nothing' comparator. Option 1B R is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 1B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	05L	PARTIAL

Design Principle **Emissions**	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 1B L is 53km (29nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 1B R is 57km (31nm). When compared to the MIRSI 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 1B L is estimated to overfly approximately 10,650 households with an approximate population of 24,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 26,600.

From 7,000ft, option 1B L is estimated to overfly approximately 37,050 households with an approximate population of 83,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 89,900.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 1B R is estimated to overfly approximately 5,450 households with an approximate population of 12,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,500.

From 7,000ft, option 1B R is estimated to overfly approximately 38,000 households with an approximate population of 85,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 91,300.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 1B L is estimated to overfly 75 noise sensitive areas.

From 7,000ft, this option 1B L is estimated to overfly 190 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 1B R is estimated to overfly 35 noise sensitive areas.

From 7,000ft, this option 1B R is estimated to overfly 190 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

21.2 Transition Runways 05L/05R North Option 2B – 2,500ft FAF

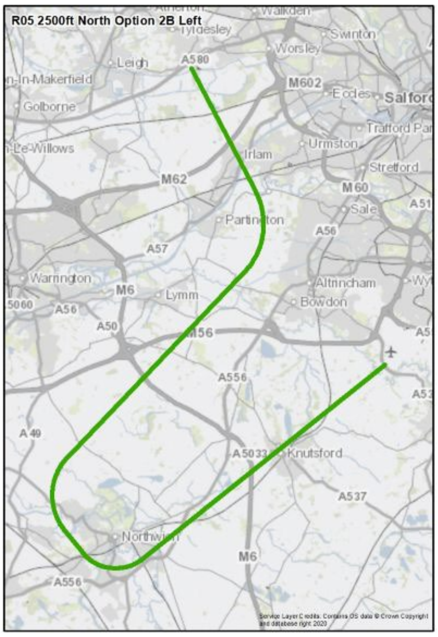
Design Principle Evaluation	Option No: 2B
Option Name: Transition RW 05L North Option 2B 2500ft FAF	ACCEPT
Option Name: Transition RW 05R North Option 2B 2500ft FAF	ACCEPT

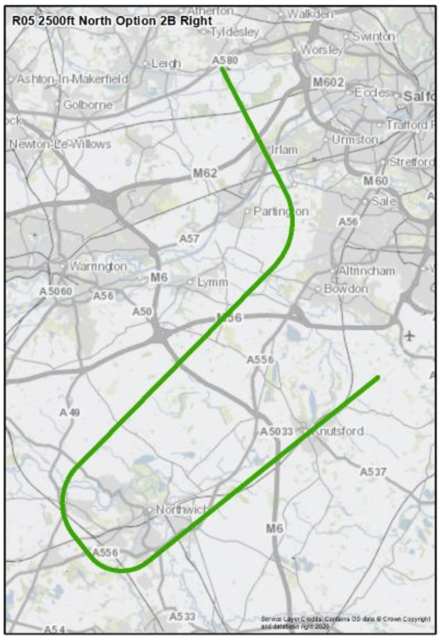
Option Description:

Option 2B has an IAF at 7,000ft to the north-west of the airport in the vicinity of Atherton and is equidistant to easterly or westerly operation. It is designed to facilitate a CDA profile to all runways.

From this location the route follows an initial straight segment towards the airport where it splits before turning right on to the downwind leg overflying Partington. Both routes then turn left to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.

The descent gradient to the FAF is 3.79%/2.17° for Runway 05L and 3.53%/2.02° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 2B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 2B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 2B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 2B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 2B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 2B L is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 2B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 2B R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 2B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 2B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 2B R is similar in length and it is anticipated that emissions would be limited when compared against the MIRSI 'do nothing' comparator. Option 2B R is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 2B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 2B L is 54km (29nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 2B R is 57km (31nm). When compared to the MIRSI 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.
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Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 2B L is estimated to overfly approximately 10,700 households with an approximate population of 24,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 26,600.

From 7,000ft, option 2B L is estimated to overfly approximately 28,500 households with an approximate population of 67,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 72,100.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 2B R is estimated to overfly approximately 6,000 households with an approximate population of 13,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 13,600.

From 7,000ft, option 2B R is estimated to overfly approximately 24,650 households with an approximate population of 58,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 60,700.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 2B L is estimated to overfly 75 noise sensitive areas.

From 7,000ft, this option 2B L is estimated to overfly 145 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 2B R is estimated to overfly 45 noise sensitive areas.

From 7,000ft, this option 2B R is estimated to overfly 120 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

21.3 Transition Runways 05L/05R North Option 6B – 2,500ft FAF

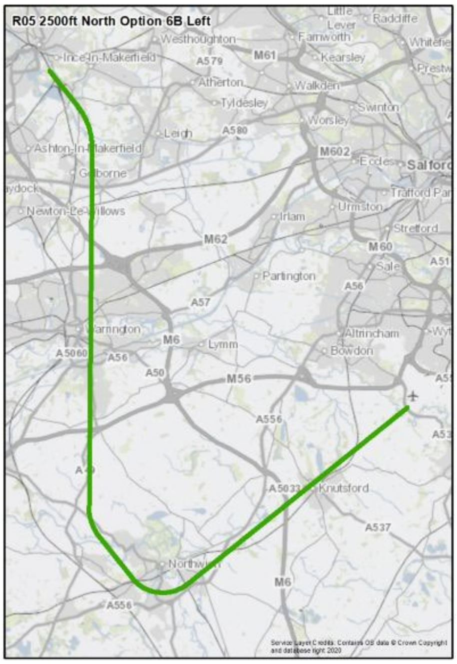
Design Principle Evaluation	Option No: 6B
Option Name: Transition RW 05L North Option 6B 2500ft FAF	REJECT
Option Name: Transition RW 05R North Option 6B 2500ft FAF	REJECT

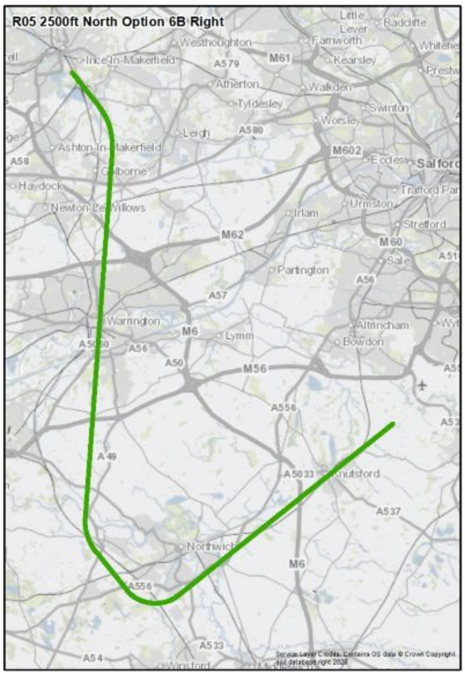
Option Description:

Option 6B has an IAF at 7,000ft to the north-west of the airport in the vicinity of Wigan and has been designed to reduce potential interactions with departures.

From this location the route splits and heads south, overflying Warrington. Both routes then turn left to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.

The descent gradient to the FAF is 4.3%/2.46° for Runway 05L and 4.06%/2.33° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this

Design Principle **Policy**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 6B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 6B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 6B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 6B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 6B L is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 6B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 6B R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 6B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 6B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 6B R is similar in length and it is anticipated that emissions would be limited when compared against the MIRSI 'do nothing' comparator. Option 6B R is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 6B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 6B L is 54km (29nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 6B R is 56km (30nm). When compared to the MIRSI 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 6B L is estimated to overfly approximately 10,550 households with an approximate population of 24,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 26,300.

From 7,000ft, option 6B L is estimated to overfly approximately 69,550 households with an approximate population of 153,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 163,200.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 6B R is estimated to overfly approximately 5,500 households with an approximate population of 12,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,600.

From 7,000ft, option 6B R is estimated to overfly approximately 59,050 households with an approximate population of 129,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 139,400.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 6B L is estimated to overfly 80 noise sensitive areas.

From 7,000ft, this option 6B L is estimated to overfly 385 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 6B R is estimated to overfly 35 noise sensitive areas.

From 7,000ft, this option 6B R is estimated to overfly 335 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

21.4 Transition Runways 05L/05R North Option 7B – 2,500ft FAF

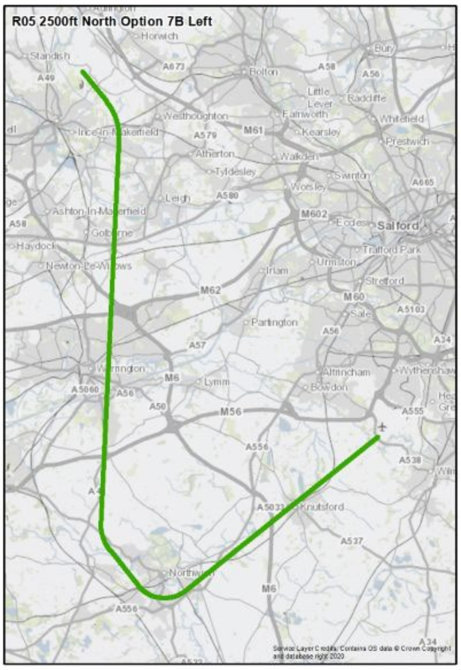
Design Principle Evaluation	Option No: 7B
Option Name: Transition RW 05L North Option 7B 2500ft FAF	REJECT
Option Name: Transition RW 05R North Option 7B 2500ft FAF	REJECT

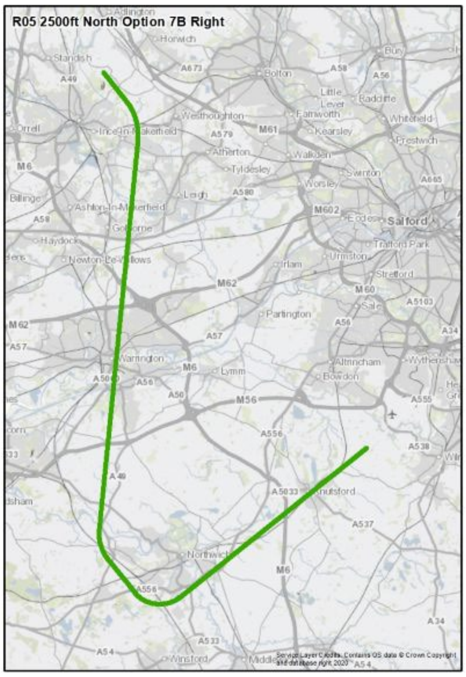
Option Description:

Option 7B has an IAF at 7,000ft to the north-west of the airport in the vicinity of Aspull and has been designed to reduce potential interactions with departures.

From this location the route splits and heads south, overflying Warrington. Both routes then turn left to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.

The descent gradient to the FAF is 3.71%/2.12° for Runway 05L and 3.52%/2.02° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle	Runway	Result
Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 7B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 7B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 7B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 7B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 7B L is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 7B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 7B R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 7B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 7B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 7B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 7B R is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 7B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	05L	PARTIAL

Design Principle **Emissions**	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 7B L is 59km (32nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 7B R is 61km (33nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 7B L is estimated to overfly approximately 13,150 households with an approximate population of 30,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 32,900.

From 7,000ft, option 7B L is estimated to overfly approximately 68,350 households with an approximate population of 154,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 167,500.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 7B R is estimated to overfly approximately 5,200 households with an approximate population of 11,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,100.

From 7,000ft, option 7B R is estimated to overfly approximately 60,100 households with an approximate population of 133,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 145,900.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 7B L is estimated to overfly 85 noise sensitive areas.

From 7,000ft, this option 7B L is estimated to overfly 325 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 7B R is estimated to overfly 35 noise sensitive areas.

From 7,000ft, this option 7B R is estimated to overfly 315 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

21.5 Transition Runways 05L/05R North Option 8B – 2,500ft FAF

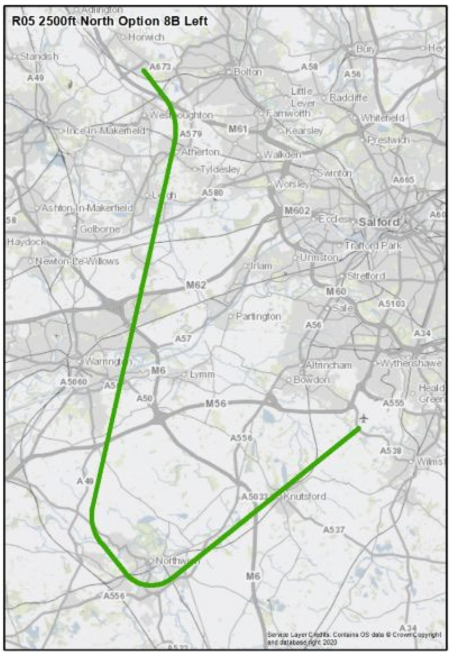
Design Principle Evaluation	Option No: 8B
Option Name: Transition RW 05L North Option 8B 2500ft FAF	ACCEPT
Option Name: Transition RW 05R North Option 8B 2500ft FAF	ACCEPT

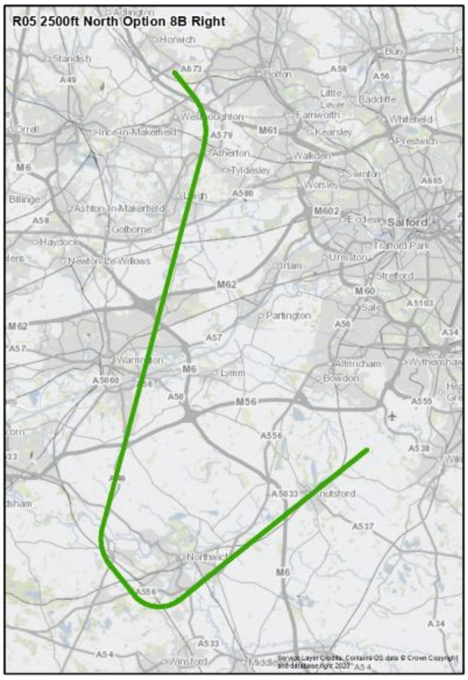
Option Description:

Option 8B has an IAF at 7,000ft to the north-west of the airport in the vicinity of the Middlebrook Retail Park. It has been designed to reduce potential interactions with departures and to facilitate a CDA profile to all runways.

From this location the route splits, heads south-west and routes to the east of Warrington. Both routes then turn left to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.

The descent gradient to the FAF is 3.65%/2.09° for Runway 05L and 3.45%/1.98° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle Safety		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 8B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 8B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 8B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 8B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 8B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 8B L is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 8B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 8B R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 8B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 8B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 8B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 8B R is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 8B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	05L	PARTIAL

Design Principle **Emissions**	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 8B L is 59km (32nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 8B R is 62km (33nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 8B L is estimated to overfly approximately 11,100 households with an approximate population of 26,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 29,800.

From 7,000ft, option 8B L is estimated to overfly approximately 69,750 households with an approximate population of 159,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 170,500.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 8B R is estimated to overfly approximately 7,300 households with an approximate population of 17,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 18,600.

From 7,000ft, option 8B R is estimated to overfly approximately 71,200 households with an approximate population of 161,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 172,100.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 8B L is estimated to overfly 75 noise sensitive areas.

From 7,000ft, this option 8B L is estimated to overfly 360 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 8B R is estimated to overfly 45 noise sensitive areas.

From 7,000ft, this option 8B R is estimated to overfly 365 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

21.6 Transition Runways 05L/05R North Option 9B – 2,500ft FAF

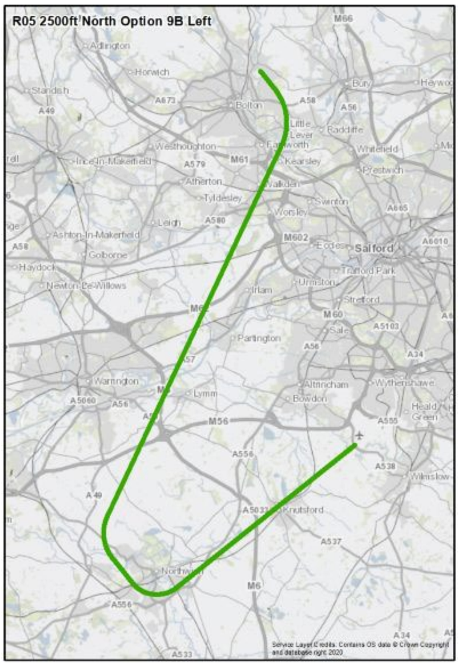
Design Principle Evaluation	Option No: 9B
Option Name: Transition RW 05L North Option 9B 2500ft FAF	ACCEPT
Option Name: Transition RW 05R North Option 9B 2500ft FAF	ACCEPT

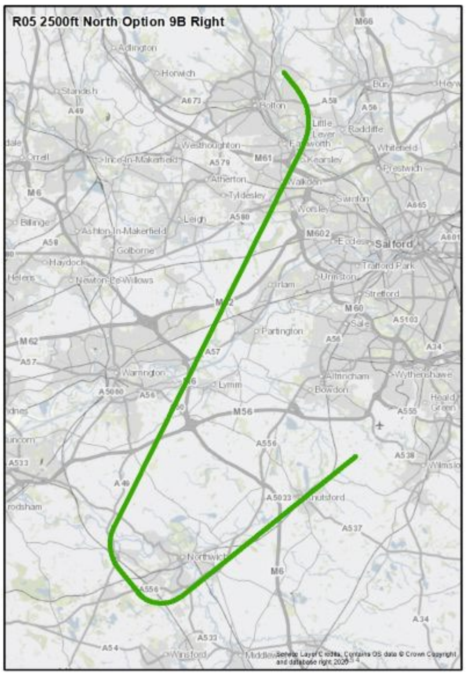
Option Description:

Option 9B has an IAF at 7,000ft to the north of the airport in the vicinity of Bolton and is designed to facilitate a CDA profile to all runways.

From this location the route splits, heads south-west and tracks to the east of Warrington. Both routes then turn left to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.

The descent gradient to the FAF is 3.24%/1.86° for Runway 05L and 3.07%/1.76° for Runway 05R. These gradients at the lower end of the optimum range for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 9B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 9B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 9B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 9B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 9B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 9B L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 9B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 9B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 9B R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 9B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 9B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 9B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 9B R is longer in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 9B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	05L	NOT MET

Design Principle **Emissions**	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 9B L is 64km (35nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 9B R is 66km (36nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 9B L is estimated to overfly approximately 9,350 households with an approximate population of 21,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 22,900.

From 7,000ft, option 9B L is estimated to overfly approximately 65,500 households with an approximate population of 150,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 152,900.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 9B R is estimated to overfly approximately 5,300 households with an approximate population of 12,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 12,800.

From 7,000ft, option 9B R is estimated to overfly approximately 61,750 households with an approximate population of 141,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 143,200.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 9B L is estimated to overfly 65 noise sensitive areas.

From 7,000ft, this option 9B L is estimated to overfly 280 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 9B R is estimated to overfly 35 noise sensitive areas.

From 7,000ft, this option 9B R is estimated to overfly 255 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

21.7 Transition Runways 05L/05R North Option 10B – 2,500ft FAF

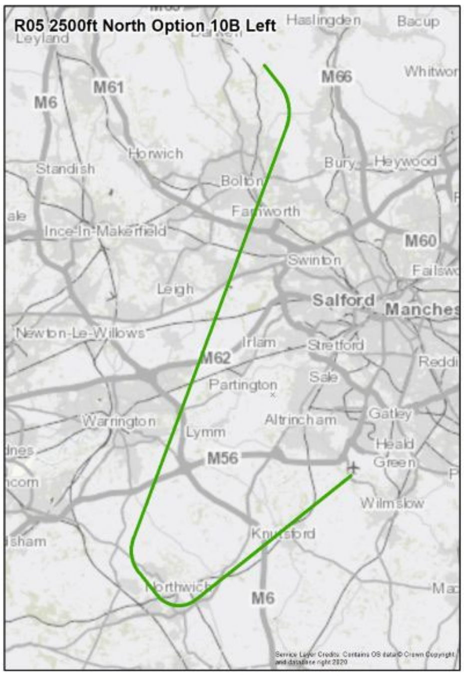
Design Principle Evaluation	Option No: 10B
Option Name: Transition RW 05L North Option 10B 2500ft FAF	ACCEPT
Option Name: Transition RW 05R North Option 10B 2500ft FAF	ACCEPT

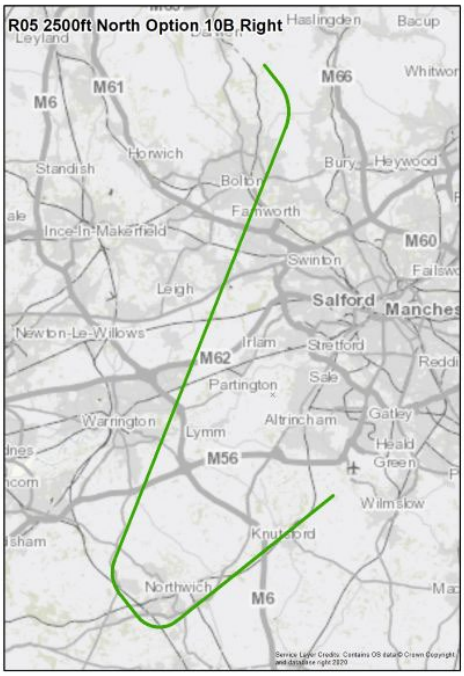
Option Description:

Option 10B has an IAF at 7,000ft to the north of the airport in the vicinity of Hawkshaw. The IAF is located approximately 2nm south of the ROSUN hold and is co-located with the IAF for the 23L/23R option 3B.

From this location the route splits, heads south-west and tracks to the east of Warrington. Both routes then turn left to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.

The descent gradient to the FAF is 2.79%/1.60° for Runway 05L and 2.66%/1.53° for Runway 05R. These gradients are at the lower end of the optimum range for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 10B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 10B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 10B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 10B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 10B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 10B L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 10B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 10B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 10B R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 10B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 10B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 10B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 10B R is longer in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 10B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 10B L is 71km (38nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 10B R is 73km (39nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 10B L is estimated to overfly approximately 10,100 households with an approximate population of 23,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 24,700.

From 7,000ft, option 10B L is estimated to overfly approximately 66,000 households with an approximate population of 155,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 159,000.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 10B R is estimated to overfly approximately 9,900 households with an approximate population of 23,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 25,200.

From 7,000ft, option 10B R is estimated to overfly approximately 68,100 households with an approximate population of 160,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 164,300.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 10B L is estimated to overfly 65 noise sensitive areas.

From 7,000ft, this option 10B L is estimated to overfly 290 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 10B R is estimated to overfly 60 noise sensitive areas.

From 7,000ft, this option 10B R is estimated to overfly 305 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

21.8 Transition Runways 05L/05R North 2,500ft Summary

	IAF STEAK	IAF STEAK	IAF 1	IAF 2	IAF 3	IAF 4	IAF 5
	Option 1BL	**Option 2BL**	**Option 6BL**	**Option 7BL**	**Option 8BL**	**Option 9BL**	**Option O10BL**
S	MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	MET	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET
	Best	Best	Best but incomplete IAF	Best but incomplete IAF	Best	Best	Best

	IAF STEAK	IAF STEAK	IAF 1	IAF 2	IAF 3	IAF 4	IAF 5
	Option 1BR	**Option 2BR**	**Option 6BR**	**Option 7BR**	**Option 8BR**	**Option 9BR**	**Option 10BR**
S	MET	MET	MET	MET	MET	MET	MET
P	MET	MET	MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET	MET	MET	MET	MET
E	MET	MET	MET	PARTIAL	PARTIAL	PARTIAL	PARTIAL
N1	MET	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET
	Best	Best	Best but incomplete IAF	4,000ft beneficial but incomplete IAF	4,000ft beneficial	4,000ft beneficial	4,000ft beneficial

21.9 Transition Runways 05L/05R North 2,500ft FAF: Viable but Poor Fit Options

Option	Safety	Policy	Capacity
Transition north option A3	S	P	C
This was initially designed as Option 3 and is a route based on the "North 1" IAF located at the position of the current MIRSI hold. Safety: This option raised significant safety concerns with regards to the vertical and lateral separation between MAN arrivals and departures and arrivals to LPL. Policy: This option fails to align with the ends of the AMS with respect to: • Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve. • Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			
Transition north option B4	S	P	C
This was initially designed as Option 4 and is a route based on the position of a NATS proposed" NW Merge" IAF located close to the current MIRSI hold. Safety: This option raised significant safety concerns with regards to the vertical and lateral separation between MAN arrivals and departures and arrivals to LPL. Policy: This option fails to align with the ends of the AMS with respect to: • Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles or, ATC intervention to resolve. • Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			
Transition north option C5	S	P	C
This was initially designed as Option 5 and is a route based on the position of a NATS proposed" West Hold" IAF located north of the current MIRSI hold. Safety: This option raised significant safety concerns with regards to the vertical and lateral separation between MAN arrivals and departures and arrivals to LPL.			

Policy: This option fails to align with the ends of the AMS with respect to:

- Efficiency: This option would interact with inbound and outbound routes to LPL airport which would require stop climb or descent profiles or ATC intervention to resolve.
- Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Transition north option D11	S	P	C

This was initially designed as Option 11 and is based on IAF6, which is the approximate position of the current ROSUN hold. It was considered as an option for both runways; however, the analysis demonstrated that profile for Runways 05L/05R would be below the minimum CDA criteria.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Transition north option E12	S	P	C

An arrival procedure could be created to provide a straight-in transition from the west for Runway 05 at MAN.

Safety: This option raised significant safety concerns with regards to the vertical and lateral separation between MAN arrivals and departures and arrivals to LPL.

Policy: This option fails to align with the ends of the AMS with respect to:

- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve. Whilst there may be opportunities to provide this route on a tactical basis, it would not be viable to create this route for use during peak time operations.

The trade-off analysis against other AMS ends, including did not identify any further benefits.

22 Transitions Runways 05L/05R North – 2,000ft FAF

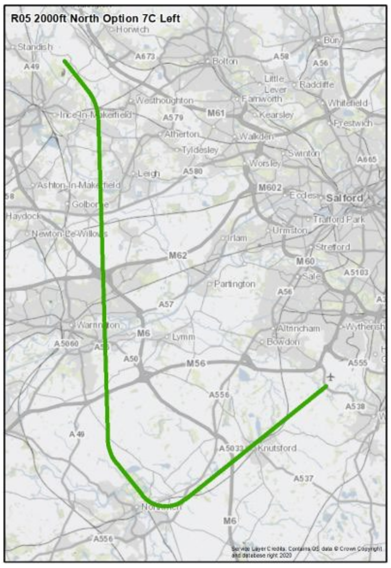
22.1 Transition Runways 05L/05R North Option 7C - 2,000ft FAF

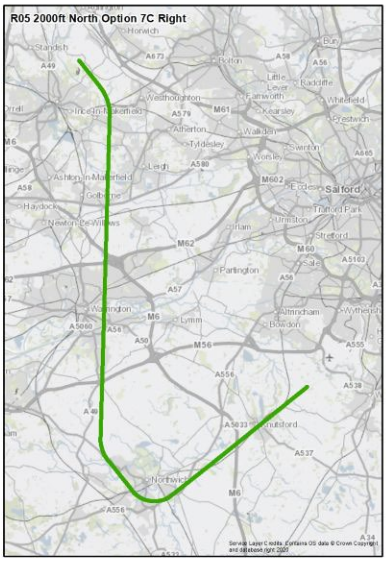
Design Principle Evaluation	Option No: 7C
Option Name: Transition RW 05L North Option 7C 2000ft FAF	REJECT
Option Name: Transition RW 05R North Option 7C 2000ft FAF	REJECT

Option Description:
Option 7C has an IAF at 7,000ft to the north-west of the airport in the vicinity of Aspull and has been designed to reduce potential interactions and increase the lateral separation from LPL Runway 27 arrivals.

From the Aspull area, east of Wigan, the route splits, and heads south overflying Warrington. Both routes then turn left to establish aircraft on final approach at 2,000ft for either Runway 05L or 05R.

The descent gradient to the FAF is 4.33%/2.48° for Runway 05L and 4.12%/2.36° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle		
Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 7C L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 7C L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 7C L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 7C L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 7C L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 7C L is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 7C L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7C R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 7C R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 7C R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 7C R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 7C R is similar in length and it is anticipated that emissions would be limited when compared against the MIRSI 'do nothing' comparator. Option 7C R is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 7C R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 7C L is 54km (29nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 7C R is 56km (30nm). When compared to the MIRSI 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 7C L is estimated to overfly approximately 10,300 households with an approximate population of 23,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 25,900.

From 7,000ft, option 7C L is estimated to overfly approximately 49,150 households with an approximate population of 113,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 126,800.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 7C R is estimated to overfly approximately 17,500 households with an approximate population of 40,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 44,600.

From 7,000ft, option 7C R is estimated to overfly approximately 66,900 households with an approximate population of 151,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 167,300.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 7C L is estimated to overfly 70 noise sensitive areas.

From 7,000ft, this option 7C L is estimated to overfly 255 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 7C R is estimated to overfly 105 noise sensitive areas.

From 7,000ft, this option 7C R is estimated to overfly 300 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

22.2 Transition Runways 05L/05R North Option 12 - 2,000ft FAF

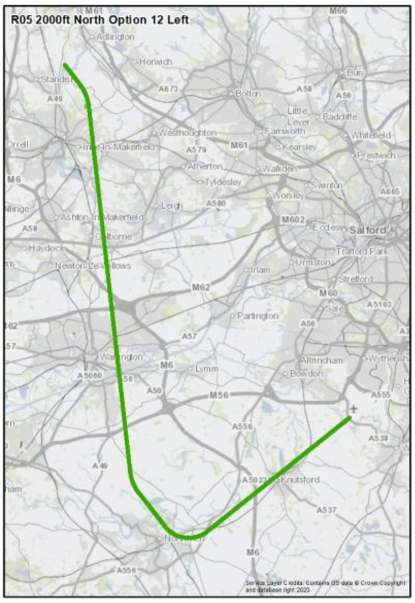
Design Principle Evaluation	Option No: 12
Option Name: Transition RW 05L North Option 12 2000ft FAF	REJECT
Option Name: Transition RW 05R North Option 12 2000ft FAF	REJECT

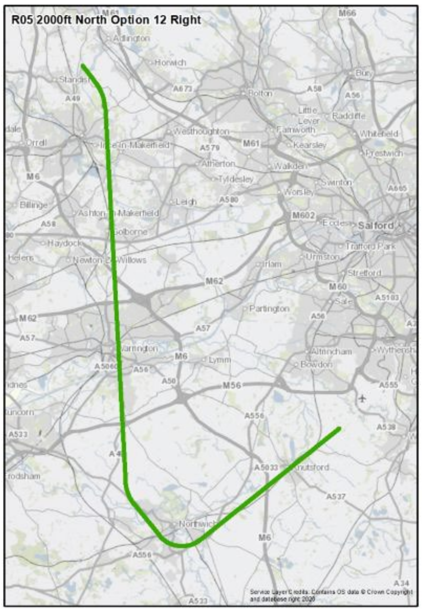
Option Description:

Option 12 has an IAF at 7,000ft to the north-west of the airport in the vicinity of Aspull and has been designed to reduce potential interactions and increase the lateral separation from LPL Runway 27 arrivals.

It is similar to 7C, except the right turn direct to the base leg to join the approach is made earlier and aircraft route more directly overhead Warrington.

The descent gradient to the FAF is 3.94%/2.26° for Runway 05L and 3.77%/2.16° for Runway 05R. These gradients are within the optimum range for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.





Design Principle		
Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 12 L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 12 L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 12 L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 12 L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 12 L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 12 L is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 12 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 12 R is estimated to increase the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 12 R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 12 R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 12 R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 12 R is similar in length and it is anticipated that emissions would be limited when compared against the MIRSI 'do nothing' comparator. Option 12 R is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 12 R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.

Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 12 L is 56km (30nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 12 R is 58km (31nm). When compared to the MIRSI 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	PARTIAL

Summary of Qualitative Assessment:

From 4,000ft, option 12 L is estimated to overfly approximately 14,250 households with an approximate population of 32,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 34,800.

From 7,000ft, option 12 L is estimated to overfly approximately 62,150 households with an approximate population of 141,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 152,000.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 12 R is estimated to overfly approximately 22,100 households with an approximate population of 49,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 52,500.

From 7,000ft, option 12 R is estimated to overfly approximately 72,350 households with an approximate population of 162,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 172,400.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a greater population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 12 L is estimated to overfly 85 noise sensitive areas.

From 7,000ft, this option 12 L is estimated to overfly 285 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 12 R is estimated to overfly 130 noise sensitive areas.

From 7,000ft, this option 12 R is estimated to overfly 400 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a greater number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

22.3 Transition Runways 05L/05R North Option 13 - 2,000ft FAF

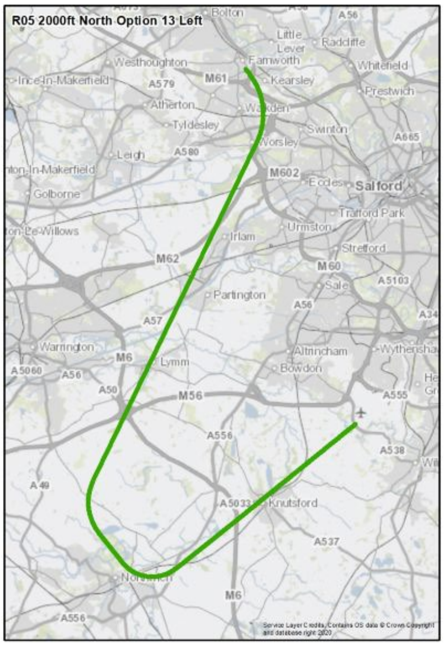
Design Principle Evaluation	Option No: 13
Option Name: Transition RW 05L North Option 13 2000ft FAF	ACCEPT
Option Name: Transition RW 05R North Option 13 2000ft FAF	ACCEPT

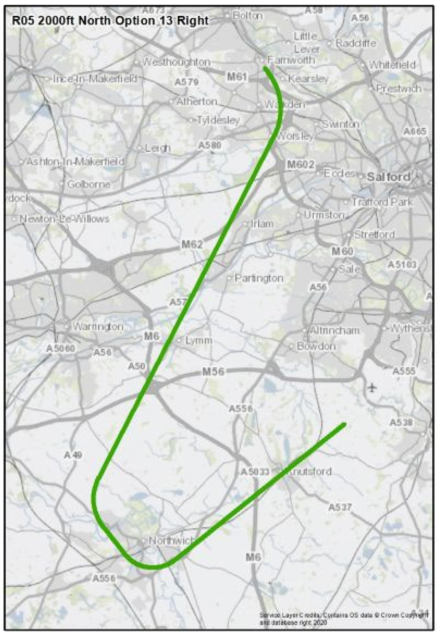
Option Description:

Option 13 has an IAF at 7,000ft to the north-north-west of the airport in the vicinity of Worsley, co-located with the IAF for option 23R/23L North 11A and has been designed to reduce potential interactions and increase the lateral separation from LPL Runway 27 arrivals.

From the Worsley area, west of Prestwich, the route splits, and heads south-west just to the west of Irlam and overflying Cadishead and Lymm. Both routes then turn left to establish aircraft on final approach at 2,000ft for either Runway 05L or 05R.

The descent gradient to the FAF is 4.37%/2.50° for Runway 05L and 4.09%/2.34° for Runway 05R. These gradients are optimum for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 13 L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 13 L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 13 L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 13 L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 13 L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 13 L is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 13 L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 13 R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 13 R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 13 R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 13 R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 13 R is similar in length and it is anticipated that emissions would be limited when compared against the MIRSI 'do nothing' comparator. Option 13 R is similar in length and it is anticipated that emissions would be limited when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 13 R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 13 L is 52km (28nm). When compared to the MIRSI 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 13 R is 55km (30nm). When compared to the MIRSI 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 13 L is estimated to overfly approximately 4,000 households with an approximate population of 8,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 9,900.

From 7,000ft, option 13 L is estimated to overfly approximately 51,300 households with an approximate population of 118,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 122,400.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 13 R is estimated to overfly approximately 11,350 households with an approximate population of 26,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 29,000.

From 7,000ft, option 13 R is estimated to overfly approximately 56,600 households with an approximate population of 131,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 136,100.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 13 L is estimated to overfly 45 noise sensitive areas.

From 7,000ft, this option 13 L is estimated to overfly 235 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 13 R is estimated to overfly 70 noise sensitive areas.

From 7,000ft, this option 13 R is estimated to overfly 260 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

22.4 Transition Runways 05L/05R North 2,000ft FAF Summary

	IAF 2	IAF 11	IAF 12
	Option 7CL	**Option 12L**	**Option 13L**
S	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL
E	PARTIAL	PARTIAL	PARTIAL
N1	MET	MET	MET
N2	MET	MET	MET
N3	MET	MET	MET
A	MET	MET	MET
T	MET	MET	MET
	Best but complete IAF	Best but complete IAF	Best

	IAF 2	IAF 11	IAF 12
	Option 7CR	**Option 12R**	**Option 13R**
S	MET	MET	MET
P	MET	PARTIAL	MET
C	MET	MET	MET
E	MET	MET	MET
N1	MET	PARTIAL	MET
N2	MET	MET	MET
N3	MET	MET	MET
A	MET	MET	MET
T	MET	MET	MET
	Best but complete IAF	Rejected	Best

23 Transitions Runways 05L/05R South – 3,000ft FAF

23.1 Transition Runways 05L/05R South Option 1A – 3,000ft FAF

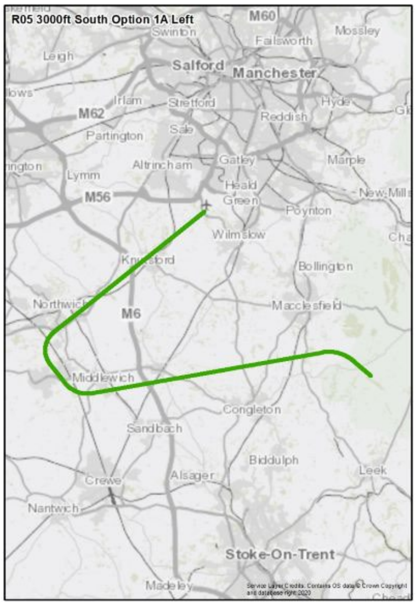
Design Principle Evaluation	Option No: 1A
Option Name: Transition RW 05L South Option 1A 3000ft FAF	ACCEPT
Option Name: Transition RW 05R South Option 1A 3000ft FAF	ACCEPT

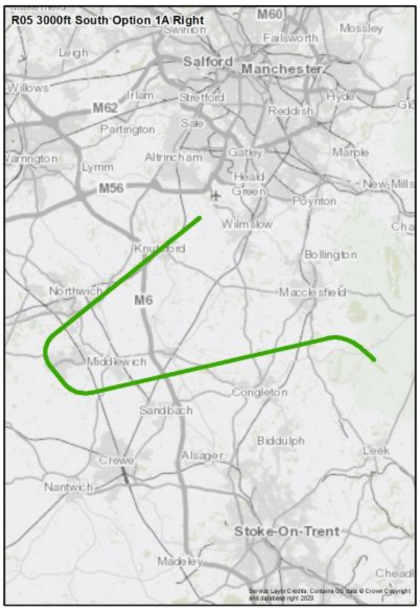
Option Description:

Option 1A has an IAF at 7,000ft to the south-east of the airport in the vicinity of Meerbrook and is equidistant to easterly or westerly operation. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads west, to the south of Macclesfield, north of Congleton. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 05L or 05R.

The descent gradient to the FAF is 3.45%/1.98° for Runway 05L and 3.28%/1.88° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 1A L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 1A L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 1A L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 1A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 1A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 1A R is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 1A R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 1A L is 60km (32nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1A R is 62km (33nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 1A L is estimated to overfly approximately 13,100 households with an approximate population of 30,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 34,900.

From 7,000ft, option 1A L is estimated to overfly approximately 14,550 households with an approximate population of 34,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 39,500.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 1A R is estimated to overfly approximately 9,700 households with an approximate population of 22,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 31,200.

From 7,000ft, option 1A R is estimated to overfly approximately 10,800 households with an approximate population of 25,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 34,100.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 1A L is estimated to overfly 60 noise sensitive areas.

From 7,000ft, this option 1A L is estimated to overfly 75 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 1A R is estimated to overfly 50 noise sensitive areas.

From 7,000ft, this option 1A R is estimated to overfly 65 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

23.2 Transition Runways 05L/05R South Option 6A – 3,000ft FAF

Design Principle Evaluation	Option No: 6A
Option Name: Transition RW 05L South Option 6A 3000ft FAF	ACCEPT
Option Name: Transition RW 05R South Option 6A 3000ft FAF	ACCEPT

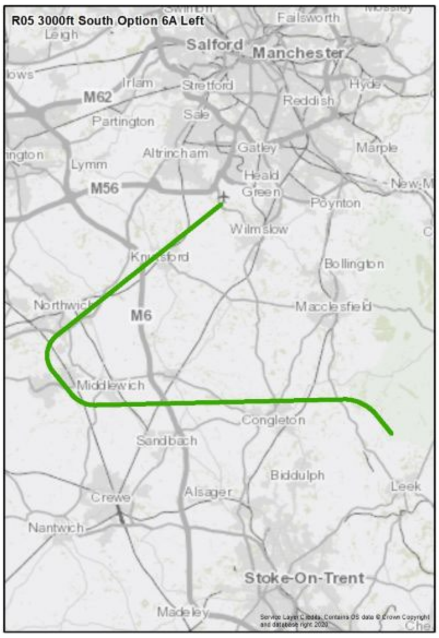
Option Description:

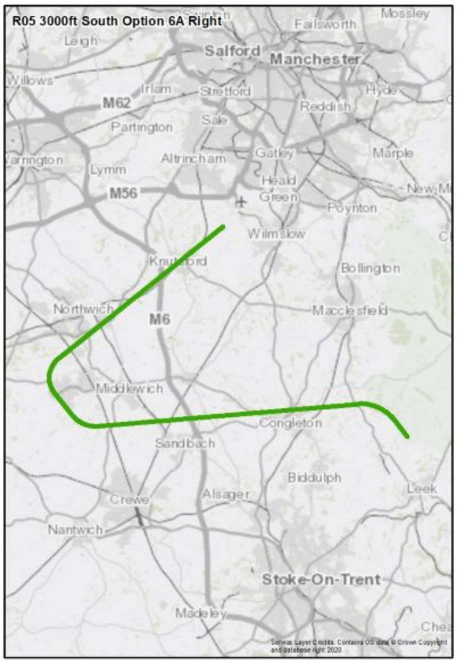
Option 6A has an IAF at 7,000ft to the south-east of the airport, just to the north of Leek. It is co-located with the IAF for the 23R/23L option 9A and is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads west, south of Holmes Chapel, north of Sandbach and over Middlewich. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 05L or 05R.

This is the southernmost option and has been designed to maintain 3nm separation from the boundary of CAS in accordance with the CAA containment policy.

The descent gradient to the FAF is 3.55% 2.03° for Runway 05L and 3.38%/1.94° Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6A L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 6A L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 6A L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 6A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 6A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 6A R is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 6A R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 6A L is 59km (32nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 6A R is 61km (33nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 6A L is estimated to overfly approximately 12,450 households with an approximate population of 29,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 33,100.

From 7,000ft, option 6A L is estimated to overfly approximately 19,700 households with an approximate population of 45,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 54,700.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 6A R is estimated to overfly approximately 9,350 households with an approximate population of 22,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 29,400.

From 7,000ft, option 6A R is estimated to overfly approximately 20,200 households with an approximate population of 46,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 58,900.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 6A L is estimated to overfly 60 noise sensitive areas.

From 7,000ft, this option 6A L is estimated to overfly 75 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 6A R is estimated to overfly 50 noise sensitive areas.

From 7,000ft, this option 6A R is estimated to overfly 65 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

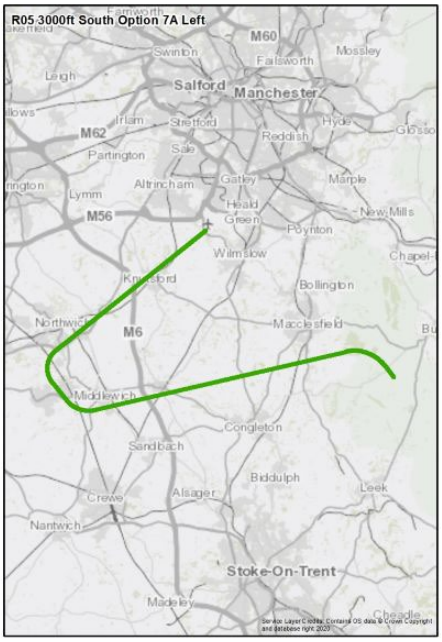
23.3 Transition Runways 05L/05R South Option 7A – 3,000ft FAF

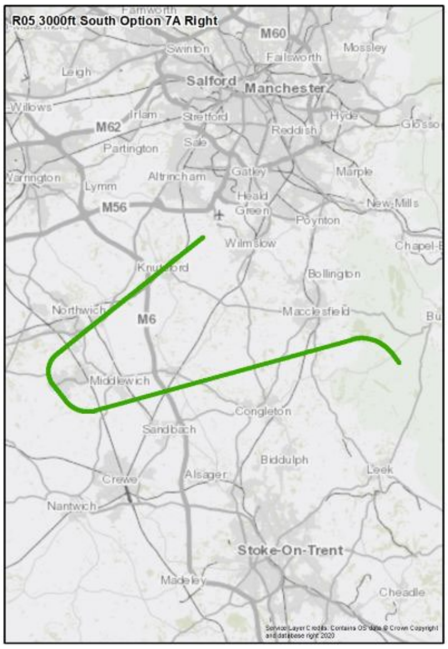
Design Principle Evaluation	Option No: 7A
Option Name: Transition RW 05L South Option 7A 3000ft FAF	ACCEPT
Option Name: Transition RW 05R South Option 7A 3000ft FAF	ACCEPT

Option Description:
Option 7A has an IAF at 7,000ft co-located at the existing DAYNE hold. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads west, south of Macclesfield, north of Congleton and Sandbach and then over Middlewich. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 05L or 05R.

The descent gradient to the FAF is 3.17%/1.82° for Runway 05L and 3.01%/1.73° Runway 05R. These gradients are just below the optimum for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.





Design Principle	Runway	Result
Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with ICAO PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 7A L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 7A L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 7A L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 7A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 7A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 7A R is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 7A R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 7A L is 63km (34nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 7A R is 65km (35nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 7A L is estimated to overfly approximately 13,450 households with an approximate population of 31,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 35,900.

From 7,000ft, option 7A L is estimated to overfly approximately 16,650 households with an approximate population of 38,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 44,800.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 7A R is estimated to overfly approximately 9,800 households with an approximate population of 23,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 31,000.

From 7,000ft, option 7A R is estimated to overfly approximately 11,650 households with an approximate population of 27,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 37,000.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:
From 4,000ft, this option 7A L is estimated to overfly 60 noise sensitive areas.

From 7,000ft, this option 7A L is estimated to overfly 85 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 7A R is estimated to overfly 50 noise sensitive areas.

From 7,000ft, this option 7A R is estimated to overfly 65 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

23.4 Transition Runways 05L/05R South Option 8A – 3,000ft FAF

Design Principle Evaluation	Option No: 8A
Option Name: Transition RW 05L South Option 8A 3000ft FAF	ACCEPT
Option Name: Transition RW 05R South Option 8A 3000ft FAF	ACCEPT

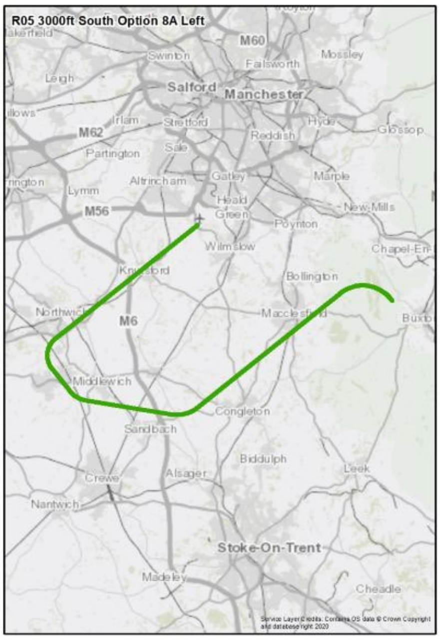
Option Description:

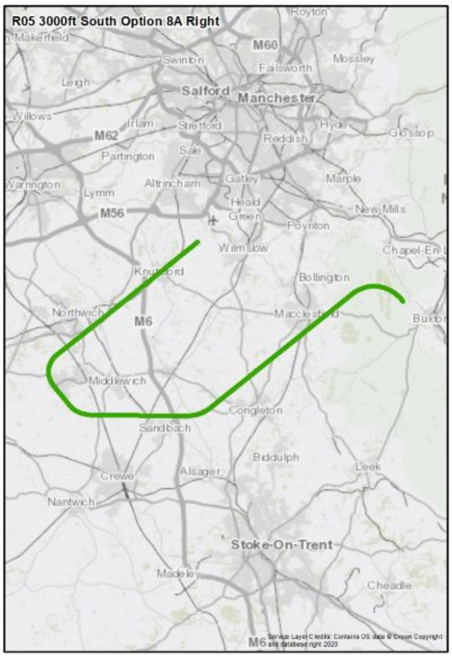
Option 8A has an IAF at 7,000ft to the south-east of the airport in the vicinity of Buxton.

From this location the route splits and turns downwind, to the south of Macclesfield, just north of Congleton, then west just north of Sandbach and over Middlewich to establish aircraft on the final approach at 3,000ft for either Runway 05L or 05R.

The route has been designed to replicate the existing vectoring patterns used by ATC and is anticipated to reduce interactions with Runway 05 southbound departures.

The descent gradient to the FAF is 2.72%/1.56° for Runway 05L and 2.63%/1.51° Runway 05R. These gradients are below the optimum for low noise approaches but just within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 8A L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 8A L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 8A L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 8A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 8A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 8A R is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 8A R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 8A L is 69km (37nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 8A R is 70km (38nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 8A L is estimated to overfly approximately 9,650 households with an approximate population of 22,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 27,400.

From 7,000ft, option 8A L is estimated to overfly approximately 22,400 households with an approximate population of 49,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 60,700.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 8A R is estimated to overfly approximately 11,600 households with an approximate population of 27,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 34,600.

From 7,000ft, option 8A R is estimated to overfly approximately 24,700 households with an approximate population of 55,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 68,600.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:
From 4,000ft, this option 8A L is estimated to overfly 55 noise sensitive areas.

From 7,000ft, this option 8A L is estimated to overfly 85 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 8A R is estimated to overfly 60 noise sensitive areas.

From 7,000ft, this option 8A R is estimated to overfly 65 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.		
Design Principle **Airspace**	05L	MET
	05R	MET
Summary of Qualitative Assessment: It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.		
Design Principle **Technology**	05L	MET
	05R	MET
Summary of Qualitative Assessment: These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.		

23.5 Transition Runways 05L/05R South Option 9A – 3,000ft FAF

Design Principle Evaluation	Option No: 9A
Option Name: Transition RW 05L South Option 9A 3000ft FAF	ACCEPT
Option Name: Transition RW 05R South Option 9A 3000ft FAF	ACCEPT

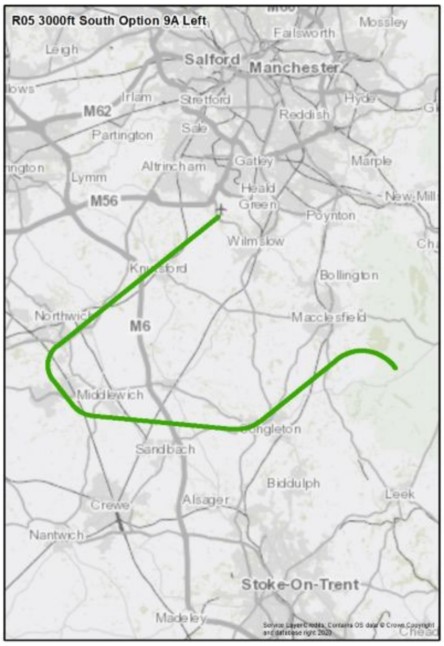
Option Description:

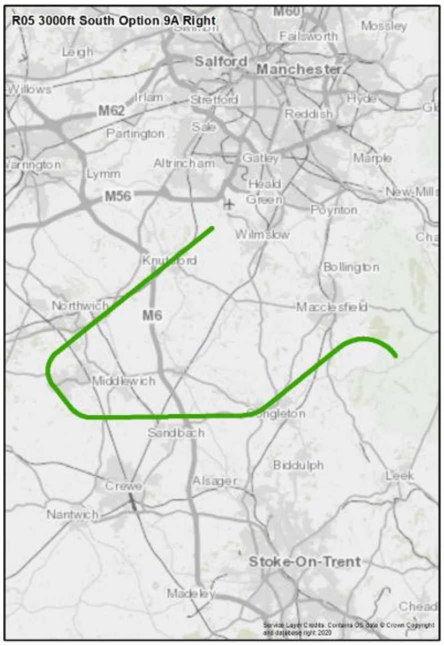
Option 9A has an IAF at 7,000ft to the south-east of the airport in the vicinity of The Roaches. It is co-located with the IAF for the 23R/23L option 8A and is designed to facilitate a CDA profile to all runways.

From this location the route splits and turns downwind, south-west to Congleton, then west just north of Sandbach and over Middlewich before turning on to the final approach at 3,000ft for either Runway 05L or 05R.

The route has been designed to replicate the existing vectoring patterns used by ATC and is anticipated to reduce interactions with Runway 05 southbound departures.

The descent gradient to the FAF is 3.21%/1.84° for Runway 05L and 3.08%/1.77° Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle Safety	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 9A L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 9A L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 9A L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 9A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 9A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 9A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 9A R is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 9A R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 9A L is 62km (33nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 9A R is 64km (35nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 9A L is estimated to overfly approximately 11,150 households with an approximate population of 26,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 31,100.

From 7,000ft, option 9A L is estimated to overfly approximately 21,900 households with an approximate population of 49,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 60,000.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 9A R is estimated to overfly approximately 10,050 households with an approximate population of 23,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 30,900.

From 7,000ft, option 9A R is estimated to overfly approximately 22,000 households with an approximate population of 50,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 62,900.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 9A L is estimated to overfly 55 noise sensitive areas.

From 7,000ft, this option 9A L is estimated to overfly 120 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 9A R is estimated to overfly 55 noise sensitive areas.

From 7,000ft, this option 9A R is estimated to overfly 125 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

23.6 Transition Runways 05L/05R South 3,000ft FAF Summary

	IAF TURKY	IAF 7	IAF 8	IAF 9	IAF 10
	Option 01AL	**Option 06AL**	**Option 07AL**	**Option 08AL**	**Option 09AL**
S	MET	MET	MET	MET	MET
P	MET	MET	MET	MET	MET
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	MET	MET	MET	MET	MET
N1	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET
	Best	Best	Best	Best	Best

	IAF TURKY	IAF 7	IAF 8	IAF 9	IAF 10
	Option 1AR	**Option 6AR**	**Option 7AR**	**Option 8AR**	**Option 9AR**
S	MET	MET	MET	MET	MET
P	MET	MET	MET	MET	MET
C	MET	MET	MET	MET	MET
E	MET	MET	MET	MET	MET
N1	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET
	Best	Best	Best	Best	Best

23.7 Transition Runways 05L/05R South 3,000ft FAF: Viable but Poor Fit Options

Option	Safety	Policy	Capacity
Transition south option A2	S	P	C
This was initially designed as Option 2 and is a route based on an IAF7 located to the south-east of the airport. The route has an initial straight leg from the IAF directly towards the airport where aircraft would make a 90 degrees left turn onto a downwind leg. Safety: This option is expected to interact with the Runways 05L/05R Missed Approach Procedure (MAP). This option also raised safety concerns with regards to the systemised separation between MAN arrivals and MAN Runway 05 southbound departures. Capacity: This option would interact with departures within the 05 South Departure Envelope. This would limit the ability to achieve one minute departure splits and not enabling best use of runway capacity.			
Transition south option B3	S	P	C
This was initially designed as Option 3 this procedure could be created to provide a straight-in transition from the west for Runway 05 at MAN. Safety: This option raised significant safety concerns with regards to the vertical and lateral separation between MAN arrivals and departures and arrivals to LPL. Policy: This option fails to align with the ends of the AMS with respect to: • Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve. Whilst there may be opportunities to provide this route on a tactical basis, it would not be viable to create this route for use during peak time operations. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			
Transition south option C4	S	P	C
This was initially designed as Option 4 and is a route based on the position of a NATS proposed 'South Merge' IAF located south-east of the existing DAYNE hold. Safety: The design of this may result in aircraft not being compliant with airspace containment requirements. This introduces the risk of conflicts between aircraft operating in Class D and Class G (uncontrolled) airspace which is not aligned to CAA Airspace Containment Policy. Alternative options were designed to mitigate this risk. Policy: This option fails to align with the ends of the AMS with respect to:			

Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			
Transition south option D5	S	P	C
This was initially designed as Option 5 and is a route based on the position of a NATS proposed South 2 IAF located south-west of the existing DAYNE hold. Safety: The design of this may result in aircraft not being compliant with airspace containment requirements. This introduces the risk of conflicts between aircraft operating in Class D and Class G (uncontrolled) airspace which is not aligned to CAA Airspace Containment Policy. Additional options that are fully contained were designed to mitigate this risk which resulted in this option offering no benefits if the containment restriction were not present. Policy: This option fails to align with the ends of the AMS with respect to: Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This creates a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			

24 Transitions Runways 05L/05R South – 2,500ft FAF

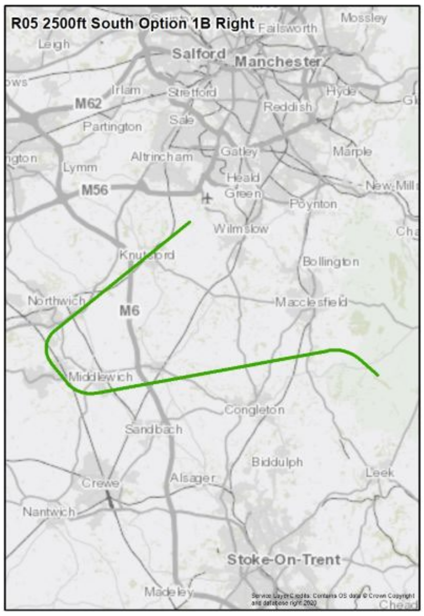
24.1 Transition Runways 05L/05R South Option 1B – 2,500ft FAF

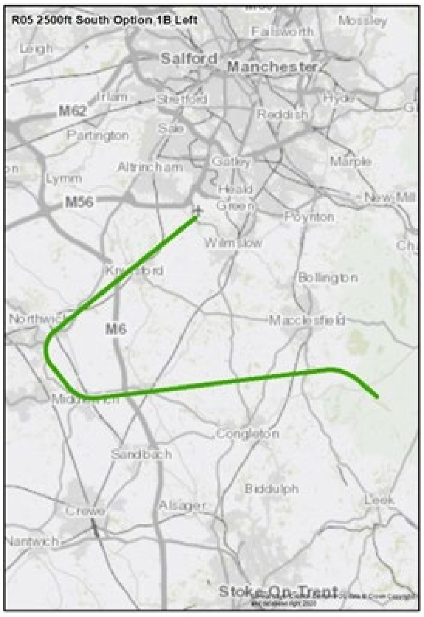
Design Principle Evaluation	Option No: 1B
Option Name: Transition RW 05L South Option 1B 2500ft FAF	ACCEPT
Option Name: Transition RW 05R South Option 1B 2500ft FAF	ACCEPT

Option Description:
Option 1B has an IAF at 7,000ft to the south-east of the airport in the vicinity of Meerbrook and is equidistant to easterly or westerly operation. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads west, to the south of Macclesfield, north of Congleton and over Middlewich. Both routes then turn right to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.

The descent gradient to the FAF is 4.17%/2.39° for Runway 05L and 3.95%/2.26° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 1B L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 1B L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 1B L is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 1B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 1B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 1B R is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 1B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 1B L is 55km (30nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 1B R is 57km (31nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 1B L is estimated to overfly approximately 11,100 households with an approximate population of 25,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 28,600.

From 7,000ft, option 1B L is estimated to overfly approximately 12,050 households with an approximate population of 27,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 31,100.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 1B R is estimated to overfly approximately 11,300 households with an approximate population of 26,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 30,700.

From 7,000ft, option 1B R is estimated to overfly approximately 12,450 households with an approximate population of 29,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 34,500.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:
From 4,000ft, this option 1B L is estimated to overfly 75 noise sensitive areas.

From 7,000ft, this option 1B L is estimated to overfly 120 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 1B R is estimated to overfly 50 noise sensitive areas.

From 7,000ft, this option 1B R is estimated to overfly 125 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

24.2 Transition Runways 05L/05R South Option 6B – 2,500ft FAF

Design Principle Evaluation	Option No: 6B
Option Name: Transition RW 05L South Option 6B 2500ft FAF	ACCEPT
Option Name: Transition RW 05R South Option 6B 2500ft FAF	ACCEPT

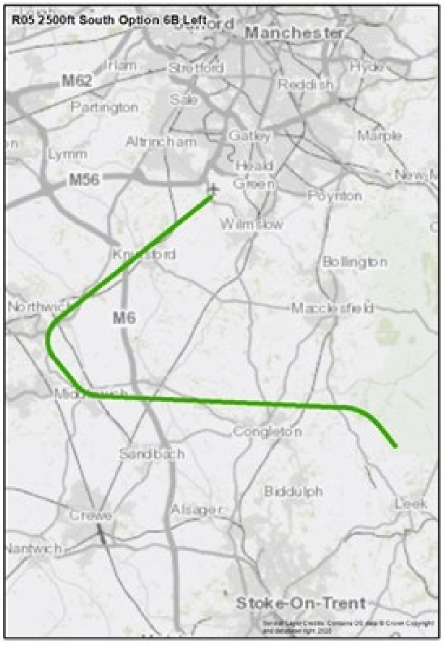
Option Description:

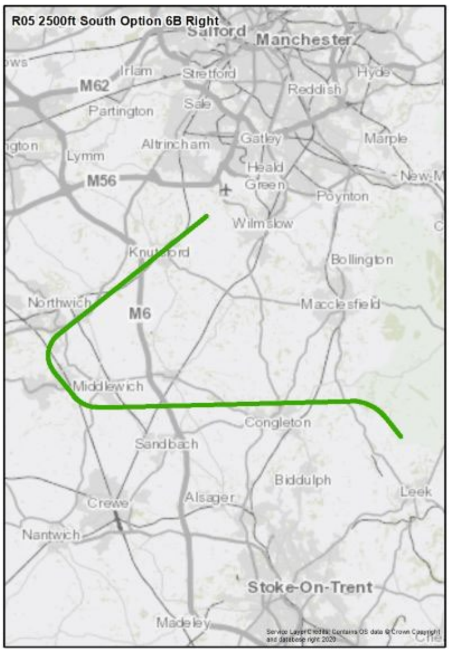
Option 6B has an IAF at 7,000ft to the south-east of the airport, just to the north of Leek. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads west, south of Holmes Chapel, north of Sandbach and over Middlewich. Both routes then turn right to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.

This is the southernmost option and has been designed to maintain 3nm separation from the boundary of CAS in accordance with the CAA containment policy.

The descent gradient to the FAF is 4.26%/2.44° for Runway 05L and 4.06%/2.33° Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.

At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 6B L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 6B L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 6B L is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 6B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 6B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 6B R is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 6B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 6B L is 54km (29nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 6B R is 56km (30nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 6B L is estimated to overfly approximately 9,250 households with an approximate population of 21,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 23,300.

From 7,000ft, option 6B L is estimated to overfly approximately 13,200 households with an approximate population of 30,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 37,400.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 6B R is estimated to overfly approximately 11,000 households with an approximate population of 25,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 29,800.

From 7,000ft, option 6B R is estimated to overfly approximately 18,200 households with an approximate population of 41,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 51,100.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:
From 4,000ft, this option 6B L is estimated to overfly 60 noise sensitive areas.

From 7,000ft, this option 6B L is estimated to overfly 80 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 6B R is estimated to overfly 50 noise sensitive areas.

From 7,000ft, this option 6B R is estimated to overfly 85 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

24.3 Transition Runways 05L/05R South Option 7B – 2,500ft FAF

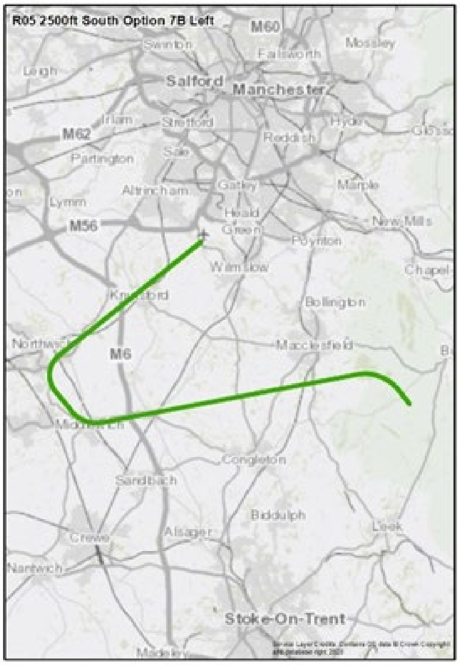
Design Principle Evaluation	Option No: 7B
Option Name: Transition RW 05L South Option 7B 2500ft FAF	ACCEPT
Option Name: Transition RW 05R South Option 7B 2500ft FAF	ACCEPT

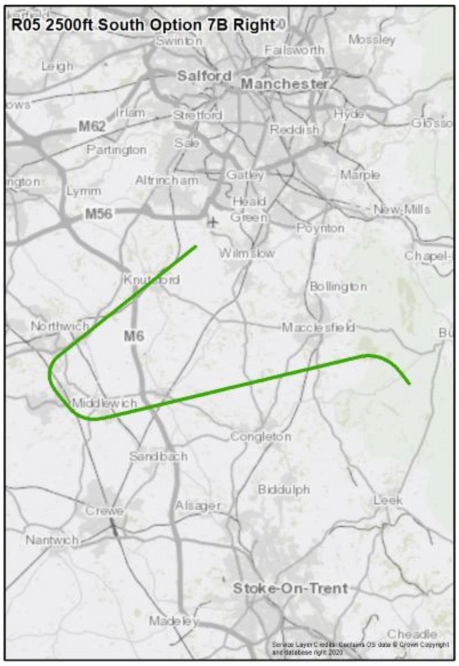
Option Description:

Option 7B has an IAF at 7,000ft co-located at the existing DAYNE hold. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads west, south of Macclesfield, north of Congleton and over Middlewich. Both routes then turn right to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.

The descent gradient to the FAF is 3.82%/2.19° for Runway 05L and 3.62%/2.08° Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**		
	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 7B L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 7B L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 7B L is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 7B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 7B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 7B R is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 7B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 7B L is 57km (31nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 7B R is 60km (32nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

	05L	MET

Design Principle **Noise N1**	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 7B L is estimated to overfly approximately 10,600 households with an approximate population of 24,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 27,300.

From 7,000ft, option 7B L is estimated to overfly approximately 12,500 households with an approximate population of 28,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 33,000.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 7B R is estimated to overfly approximately 12,650 households with an approximate population of 29,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 35,100.

From 7,000ft, option 7B R is estimated to overfly approximately 14,550 households with an approximate population of 34,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 40,200.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 7B L is estimated to overfly 70 noise sensitive areas.

From 7,000ft, this option 7B L is estimated to overfly 80 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 7B R is estimated to overfly 55 noise sensitive areas.

From 7,000ft, this option 7B R is estimated to overfly 85 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

24.4 Transition Runways 05L/05R South Option 8B – 2,500ft FAF

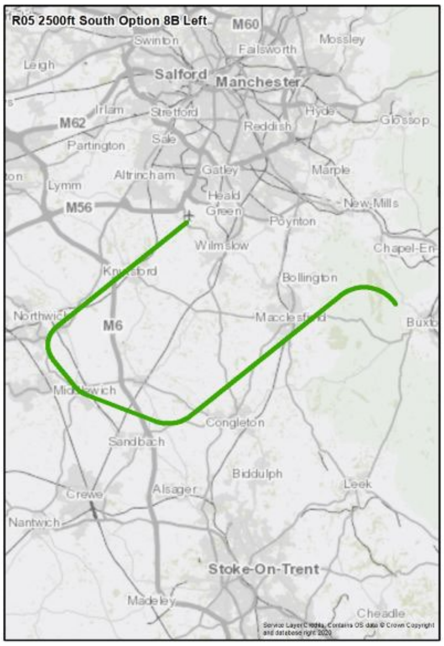
Design Principle Evaluation	Option No: 8B
Option Name: Transition RW 05L South Option 8B 2500ft FAF	ACCEPT
Option Name: Transition RW 05R South Option 8B 2500ft FAF	ACCEPT

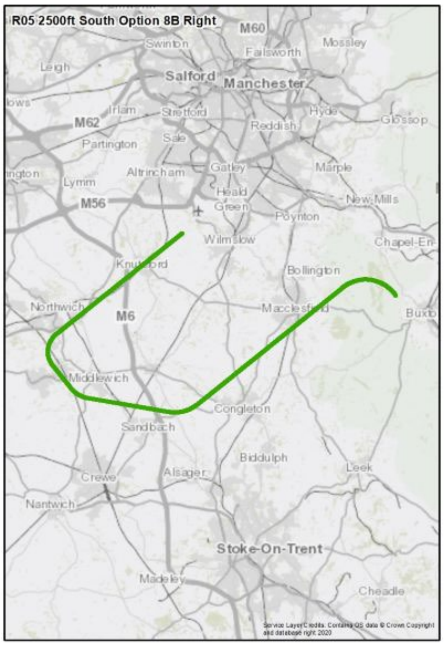
Option Description:
Option 8B has an IAF at 7,000ft to the south-east of the airport in the vicinity of Buxton.

From this location the route splits and turns downwind, to the south of Macclesfield, just north of Congleton, then west just north of Sandbach and over Middlewich to establish aircraft on the final approach at 2,500ft for either Runway 05L or 05R.

The route has been designed to replicate the existing vectoring patterns used by ATC and is anticipated to reduce interactions with Runway 05 southbound departures.

The descent gradient to the FAF is 3.2%/1.83° for Runway 05L and 3.11%/1.78° Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 8B L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 8B L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 8B L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 8B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 8B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 8B R is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 8B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 8B L is 64km (35nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 8B R is 65km (35nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 8B L is estimated to overfly approximately 8,300 households with an approximate population of 19,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 20,300.

From 7,000ft, option 8B L is estimated to overfly approximately 20,550 households with an approximate population of 45,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 52,700.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 8B R is estimated to overfly approximately 9,000 households with an approximate population of 21,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 26,100.

From 7,000ft, option 8B R is estimated to overfly approximately 21,350 households with an approximate population of 47,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 58,600.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:
From 4,000ft, this option 8B L is estimated to overfly 55 noise sensitive areas.

From 7,000ft, this option 8B L is estimated to overfly 125 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 8B R is estimated to overfly 45 noise sensitive areas.

From 7,000ft, this option 8B R is estimated to overfly 115 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

24.5 Transition Runways 05L/05R South Option 9B – 2,500ft FAF

Design Principle Evaluation	Option No: 9B
Option Name: Transition RW 05L South Option 9B 2500ft FAF	ACCEPT
Option Name: Transition RW 05R South Option 9B 2500ft FAF	ACCEPT

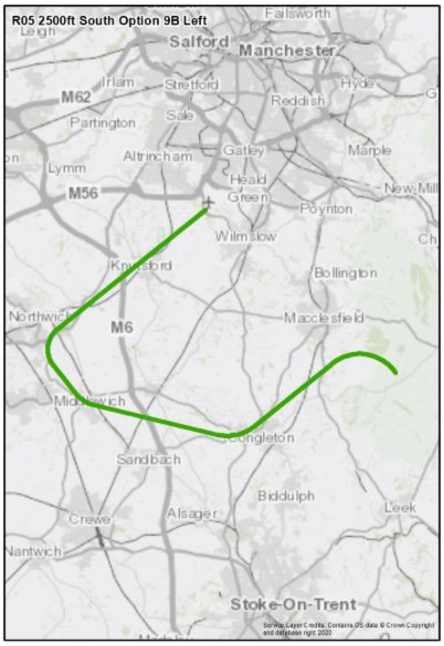
Option Description:

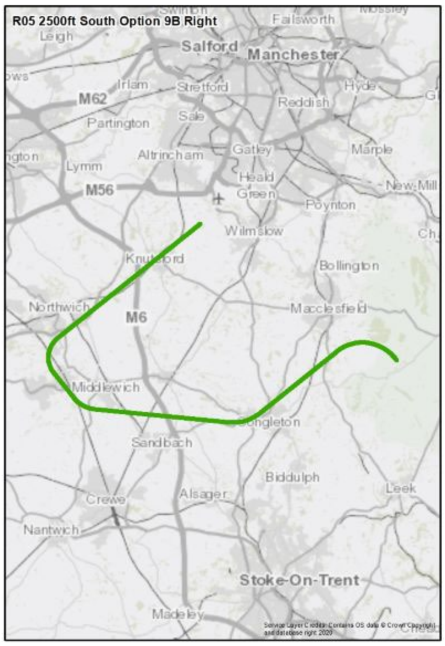
Option 9B has an IAF at 7,000ft to the south-east of the airport in the vicinity of The Roaches.

From this location the route splits and turns downwind, south-west to Congleton, then west just north of Sandbach over Middlewich before turning on to the final approach at 2,500ft for either Runway 05L or 05R.

The route has been designed to replicate the existing vectoring patterns used by ATC and is anticipated to reduce interactions with Runway 05 southbound departures.

The descent gradient to the FAF is 3.82%/2.19° for Runway 05L and 3.67%/2.1° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

Up to 4,000ft, option 9B L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 9B L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 9B L is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 9B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 9B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 9B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 9B R is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 9B R is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	05L	PARTIAL
	05R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

The estimated track length of option 9B L is 57km (31nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 9B R is 59km (32nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 9B L is estimated to overfly approximately 8,900 households with an approximate population of 20,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 21,900.

From 7,000ft, option 9B L is estimated to overfly approximately 19,300 households with an approximate population of 43,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 50,100.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 9B R is estimated to overfly approximately 9,900 households with an approximate population of 23,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 28,100.

From 7,000ft, option 9B R is estimated to overfly approximately 20,550 households with an approximate population of 46,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 56,700.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 9B L is estimated to overfly 60 noise sensitive areas.

From 7,000ft, this option 9B L is estimated to overfly 125 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 9B R is estimated to overfly 45 noise sensitive areas.

From 7,000ft, this option 9B R is estimated to overfly 115 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	05L	MET
	05R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

24.6 Transition Runways 05L/05R South 2,500ft FAF Summary

	IAF TURKY	IAF 7	IAF 8	IAF 9	IAF 10
	Option 1BL	**Option 6BL**	**Option 7BL**	**Option 8BL**	**Option 9BL**
S	MET	MET	MET	MET	MET
P	MET	MET	MET	MET	MET
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	MET	MET	MET	MET	MET
N1	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET
	Best	Best	Best	Best	Best

	IAF TURKY	IAF 7	IAF 8	IAF 9	IAF 10
	Option 1BR	**Option 6BR**	**Option 7BR**	**Option 8BR**	**Option 9BR**
S	MET	MET	MET	MET	MET
P	MET	MET	MET	MET	MET
C	MET	MET	MET	MET	MET
E	MET	MET	MET	MET	MET
N1	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET
	Best	Best	Best	Best	Best

24.7 Transition Runways 05L/05R South 2,500ft FAF: Viable but Poor Fit Options

Option	Safety	Policy	Capacity
Transition south option A2	S	P	C

This was initially designed as Option 2 and is a route based on an IAF7 located to the south-east of the airport. The route has an initial straight leg from the IAF towards the airport where aircraft would make a left turn onto a downwind leg.

Safety: This option is expected to interact with the Runways 05L/05R Missed Approach Procedure (MAP). This option also raised safety concerns with regards to the systemised separation between MAN arrivals and MAN Runway 05 southbound departures.

Capacity: This option would interact with departures within the 05 South Departure Envelope which would limit the ability to achieve one minute departure splits and not enabling best use of runway capacity.

Option	Safety	Policy	Capacity
Transition south option B3	S	P	C

Initially designed as Option 3, this procedure could be created to provide a straight-in transition from the west for Runway 05 at MAN.

Safety: This option raised significant safety concerns with regards to the vertical and lateral separation between MAN arrivals and departures and arrivals to LPL.

Policy: This option fails to align with the ends of the AMS with respect to:

- Efficiency: This option would interact with inbound and outbound routes to LPL which would require a stop to climb or descent profiles, or ATC intervention to resolve. Whilst there may be opportunities to provide this route on a tactical basis, it would not be viable to create this route for use during peak time operations.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Option	Safety	Policy	Capacity
Transition south option C4	S	P	C

This was initially designed as Option 4 and is a route based on the position of a NATS proposed 'South Merge' IAF located south-east of the existing DAYNE hold.

Safety: The design of this may result in aircraft not being compliant with airspace containment requirements. This introduces the risk of conflicts between aircraft operating in Class D and Class G (uncontrolled) airspace which is not aligned to CAA Airspace Containment Policy.

Additional options that are fully contained were designed to mitigate this risk which resulted in this option offering no benefits if the containment restriction were not present.

Policy: This option fails to align with the ends of the AMS with respect to:

• Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			
Transition south option D5	S	P	C
This was initially designed as Option 5 and is a route based on the position of a NATS proposed South 2 IAF located south-west of the existing DAYNE hold. Safety: The design of this may result in aircraft not being compliant with airspace containment requirements. This introduces the risk of conflicts between aircraft operating in Class D and Class G (uncontrolled) airspace which is not aligned to CAA Airspace Containment Policy. Additional options that are fully contained were designed to mitigate this risk which resulted in this option offering no benefits if the containment restriction were not present. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			

25 Transitions Runways 23R/23L North – 3,500ft FAF

25.1 Transition Runways 23R/23L North Option 1A – 3,500ft FAF

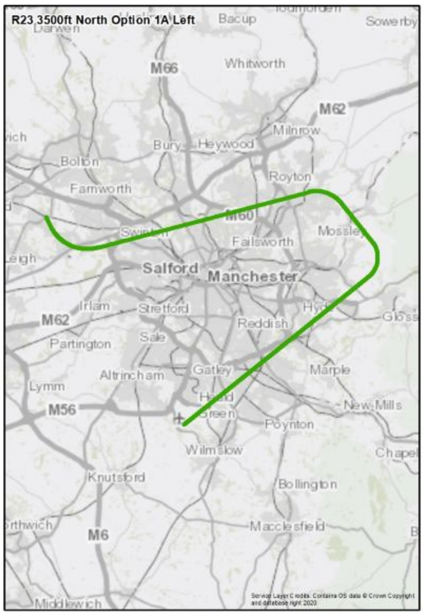
Design Principle Evaluation	Option No: 1A
Option Name: Transition RW 23L North Option 1A 3500ft FAF	ACCEPT
Option Name: Transition RW 23R North Option 1A 3500ft FAF	ACCEPT

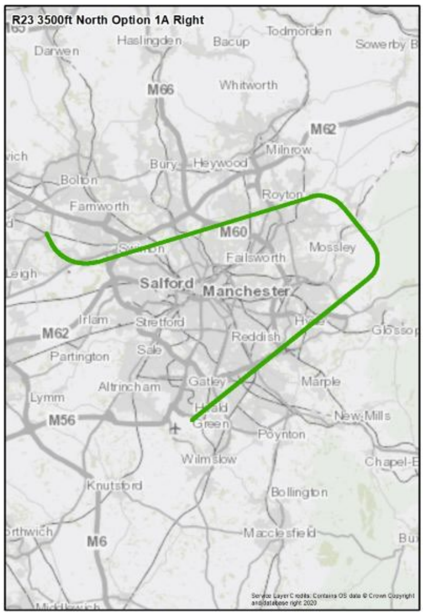
Option Description:

Option 1A has an IAF at 7,000ft to the north-west of the airport in the vicinity of Aspull. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads east, over Boothstown, Prestwich and Oldham but north of Manchester city centre. Both routes then turn right to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R.

The descent gradient to the FAF is 2.99%/1.71° for Runway 23L and 2.89%/1.65° for Runway 23R. These gradients are just below the optimum for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1A L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 1A L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 1A L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 1A L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 1A L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 1A L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 1A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 1A R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 1A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 1A R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 1A R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 1A R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 1A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	23L	MET

Design Principle **Emissions**	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 1A L is 63km (34nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 1A R is 64km (35nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 1A L is estimated to overfly approximately 33,000 households with an approximate population of 75,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 77,100.

From 7,000ft, option 1A L is estimated to overfly approximately 132,550 households with an approximate population of 311,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 320,300.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 1A R is estimated to overfly approximately 24,950 households with an approximate population of 59,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 59,000.

From 7,000ft, option 1A R is estimated to overfly approximately 123,600 households with an approximate population of 292,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 300,700.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 1A L is estimated to overfly 150 noise sensitive areas.

From 7,000ft, this option 1A L is estimated to overfly 630 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 1A R is estimated to overfly 125 noise sensitive areas.

From 7,000ft, this option 1A R is estimated to overfly 565 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

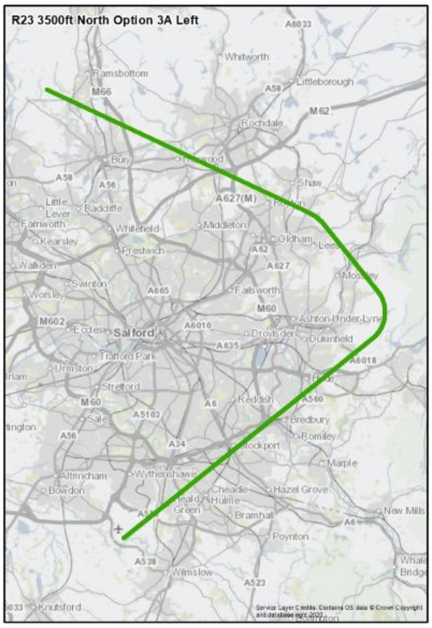
25.2 Transition Runways 23R/23L North Option 3A – 3,500ft FAF

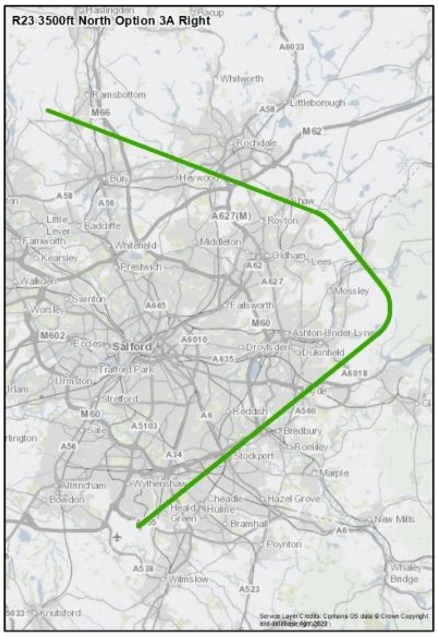
Design Principle Evaluation	Option No: 3A
Option Name: Transition RW 23L North Option 3A 3500ft FAF	ACCEPT
Option Name: Transition RW 23R North Option 3A 3500ft FAF	ACCEPT

Option Description:
Option 3A has an IAF at 7,000ft to the north of the airport in the vicinity of Hawkshaw approximately 2nm south of the ROSUN hold.

From this location the route splits and heads south-east between Bury and Rochdale. Both routes then turn right to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.35%/1.92° for Runway 23L and 3.3%/1.89° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3A L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 3A L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 3A L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 3A L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 3A L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 3A L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 3A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 3A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 3A R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 3A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 3A R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 3A R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 3A R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 3A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 3A L is 55km (30nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 3A R is 56km (30nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 3A L is estimated to overfly approximately 23,850 households with an approximate population of 54,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 54,900.

From 7,000ft, option 3A L is estimated to overfly approximately 74,000 households with an approximate population of 171,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 178,800.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 3A R is estimated to overfly approximately 19,650 households with an approximate population of 45,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 45,700.

From 7,000ft, option 3A R is estimated to overfly approximately 62,200 households with an approximate population of 146,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 153,000.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 3A L is estimated to overfly 100 noise sensitive areas.

From 7,000ft, this option 3A L is estimated to overfly 320 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 3A R is estimated to overfly 110 noise sensitive areas.

From 7,000ft, this option 3A R is estimated to overfly 280 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

25.3 Transition Runways23R/23L North Option 6A – 3,500ft FAF

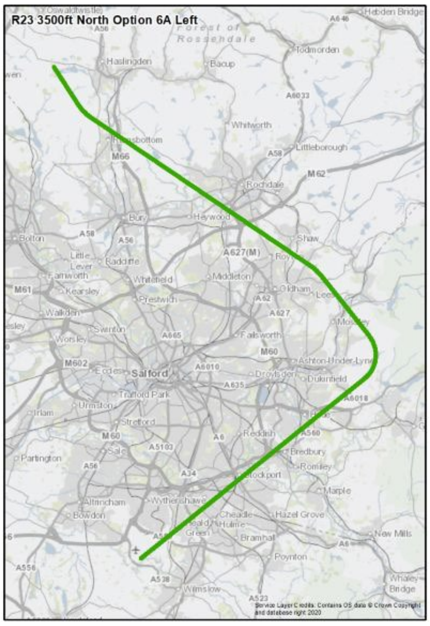
Design Principle Evaluation	Option No: 6A
Option Name: Transition RW 23L North Option 6A 3500ft FAF	REJECT
Option Name: Transition RW 23R North Option 6A 3500ft FAF	REJECT

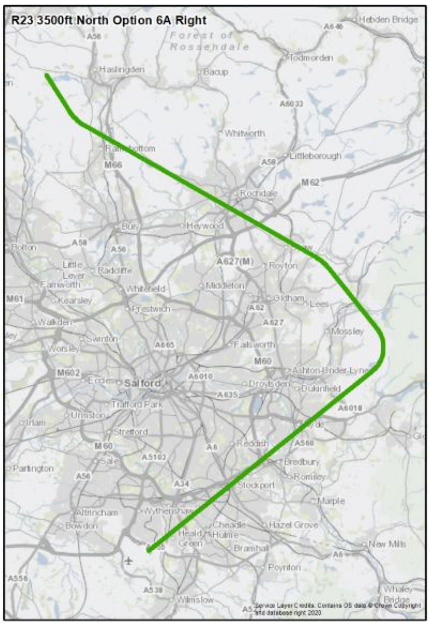
Option Description:

Option 6A has an IAF at 7,000ft to the north-west of the airport co-located with the ROSUN hold.

From this location the route splits and heads south-east, to the east of Bury but overhead Rochdale. Both routes then turn right to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.26%/1.87° for Runway 23L and 3.24%/1.86° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations. At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6A L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 6A L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 6A L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 6A L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 6A L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 6A L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 6A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 6A R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 6A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 6A R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 6A R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 6A R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 6A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	23L	MET

Design Principle **Emissions**	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 6A L is 60km (32nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 6A R is 60km (32nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 6A L is estimated to overfly approximately 27,300 households with an approximate population of 63,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 64,600.

From 7,000ft, option 6A L is estimated to overfly approximately 59,500 households with an approximate population of 139,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 145,200.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 6A R is estimated to overfly approximately 19,400 households with an approximate population of 45,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 45,400.

From 7,000ft, option 6A R is estimated to overfly approximately 56,500 households with an approximate population of 135,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 140,200.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 6A L is estimated to overfly 110 noise sensitive areas.

From 7,000ft, this option 6A L is estimated to overfly 260 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 6A R is estimated to overfly 105 noise sensitive areas.

From 7,000ft, this option 6A R is estimated to overfly 300 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

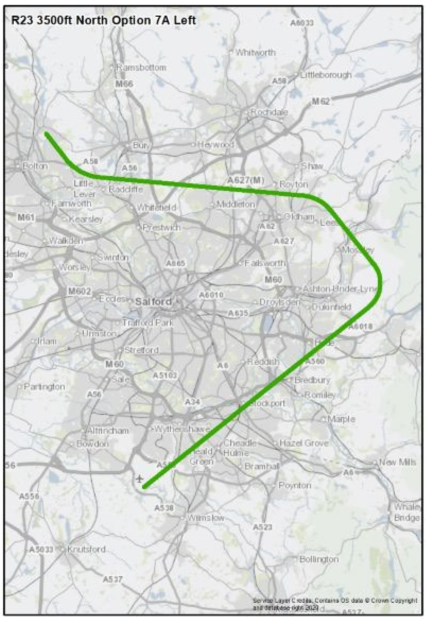
25.4 Transition Runways 23R/23L North Option 7A – 3,500ft FAF

Design Principle Evaluation	Option No: 7A
Option Name: Transition RW 23L North Option 7A 3500ft FAF	ACCEPT
Option Name: Transition RW 23R North Option 7A 3500ft FAF	ACCEPT

Option Description:
Option 7A has an IAF at 7,000ft to the north-west of the airport in the vicinity of Harwood. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads south-east between Bolton and Bury but overhead Oldham. Both routes then turn right to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.64%/2.09° for Runway 23L and 3.53%/2.02° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.



Design Principle		
Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7A L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 7A L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 7A L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 7A L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 7A L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 7A L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 7A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 7A R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 7A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 7A R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 7A R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 7A R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 7A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	23L	MET

Design Principle **Emissions**	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 7A L is 57km (31nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 7A R is 58km (31nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 7A L is estimated to overfly approximately 24,450 households with an approximate population of 55,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 56,200.

From 7,000ft, option 7A L is estimated to overfly approximately 102,950 households with an approximate population of 237,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 257,000.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 7A R is estimated to overfly approximately 19,000 households with an approximate population of 44,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 44,200.

From 7,000ft, option 7A R is estimated to overfly approximately 84,800 households with an approximate population of 195,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 215,100.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 7A L is estimated to overfly 100 noise sensitive areas.

From 7,000ft, this option 7A L is estimated to overfly 425 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 7A R is estimated to overfly 105 noise sensitive areas.

From 7,000ft, this option 7A R is estimated to overfly 380 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

25.5 Transition Runways 23R/23L North Option 8A – 3,500ft FAF

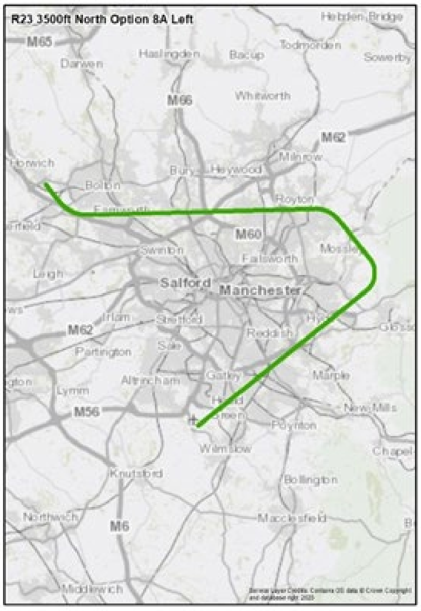
Design Principle Evaluation	Option No: 8A
Option Name: Transition RW 23L North Option 8A 3500ft FAF	ACCEPT
Option Name: Transition RW 23R North Option 8A 3500ft FAF	ACCEPT

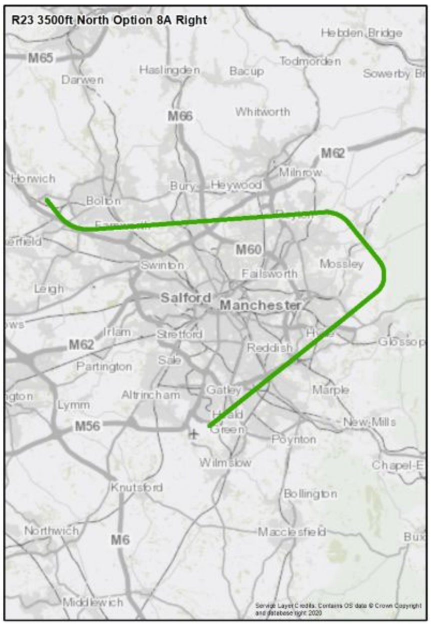
Option Description:

Option 8A has an IAF at 7,000ft to the north-west of the airport in the vicinity of the Middlebrook Retail Park, co-located with the IAF for option 05L/05R North 8A. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads east, to the south of Bury and Rochdale. Both routes then turn right to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R.

The descent gradient to the FAF is 2.84%/1.63° for Runway 23L and 2.76%/1.58° for Runway 23R. These gradients are below the optimum for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 8A L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 8A L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 8A L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 8A L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 8A L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 8A L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 8A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 8A R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 8A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 8A R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 8A R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 8A R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 8A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	23L	MET

Design Principle **Emissions**	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 8A L is 65km (35nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 8A R is 66km (36nm). When compared to the MIRSI 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 8A L is estimated to overfly approximately 34,900 households with an approximate population of 82,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 85,000.

From 7,000ft, option 8A L is estimated to overfly approximately 122,500 households with an approximate population of 288,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 304,200.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 8A R is estimated to overfly approximately 27,200 households with an approximate population of 64,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 65,800.

From 7,000ft, option 8A R is estimated to overfly approximately 109,500 households with an approximate population of 257,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 273,600.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 8A L is estimated to overfly 155 noise sensitive areas.

From 7,000ft, this option 8A L is estimated to overfly 535 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 8A R is estimated to overfly 145 noise sensitive areas.

From 7,000ft, this option 8A R is estimated to overfly 495 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

25.6 Transition Runways 23R/23L North Option 11A – 3,500ft FAF

Design Principle Evaluation	Option No: 11A
Option Name: Transition RW 23L North Option 11A 3500ft FAF	ACCEPT
Option Name: Transition RW 23R North Option 11A 3500ft FAF	ACCEPT

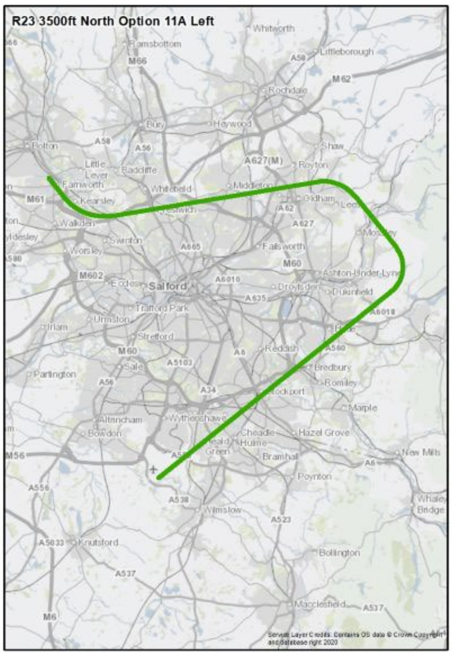
Option Description:

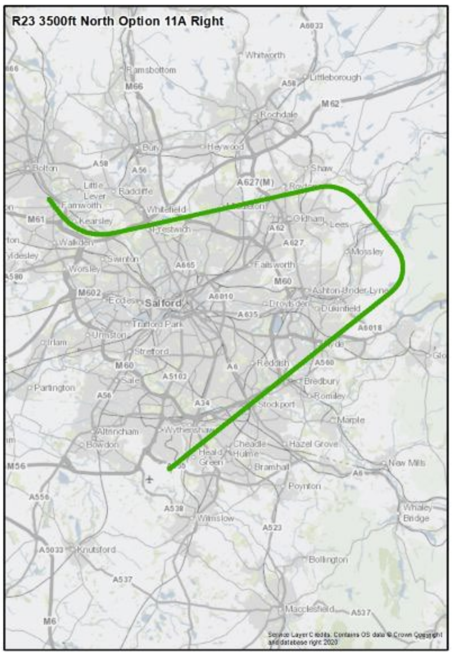
Option 11A has an IAF at 7,000ft to the north-west of the airport in the vicinity of Worsley, co-located with the IAF for option 05L/05R North 13. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads south-east overhead Farnworth, then heads east, just to the north of Prestwich overhead Oldham. Both routes then turn right to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R.

This option is included to provide a design option from an IAF created specifically for Runways 05L/05R (05L/05R 2,000ft FAF option 13), where design options were required that minimise the impact on LPL Runway 27 arrivals.

The descent gradient to the FAF is 3.59%/2.05° for Runway 23L and 3.44%/1.97° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle Safety	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 11A L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 11A L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 11A L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 11A L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 11A L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 11A L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 11A L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 11A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 11A R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 11A R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 11A R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 11A R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 11A R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 11A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	23L	MET

Design Principle **Emissions**	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 11A L is 57km (31nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 11A R is 58km (31nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 11A L is estimated to overfly approximately 24,400 households with an approximate population of 55,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 56,900.

From 7,000ft, option 11A L is estimated to overfly approximately 119,400 households with an approximate population of 280,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 287,700.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 11A R is estimated to overfly approximately 19,100 households with an approximate population of 44,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 44,500.

From 7,000ft, option 11A R is estimated to overfly approximately 109,900 households with an approximate population of 257,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 263,900.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 11A L is estimated to overfly 105 noise sensitive areas.

From 7,000ft, this option 11A L is estimated to overfly 515 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 11A R is estimated to overfly 105 noise sensitive areas.

From 7,000ft, this option 11A R is estimated to overfly 500 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

25.7 Transition Runways 23R/23L North 3,500ft FAF Summary

	IAF STEAK	IAF 5	IAF 6	IAF 4	IAF 3	IAF 12
	Option 1AL	Option 3AL	Option 6AL	Option 7AL	Option 8AL	Option 11AL
S	MET	MET	MET	MET	MET	MET
P	MET	MET	MET	MET	MET	MET
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	MET	MET	MET	MET	MET	MET
N1	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET
	Best	Best	Best but incomplete IAF	Best	Best	Best

	IAF STEAK	IAF 5	IAF 6	IAF 4	IAF 3	IAF 12
	Option 1AR	Option 3AR	Option 6AR	Option 7AR	Option 8AR	Option 11AR
S	MET	MET	MET	MET	MET	MET
P	MET	MET	MET	MET	PARTIAL	MET
C	MET	MET	MET	MET	MET	MET
E	MET	MET	MET	MET	PARTIAL	MET
N1	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET
	Best	Best	Best but incomplete IAF	Best	4,000ft beneficial	Best

25.8 Transition Runways 23R/23L North 3,500ft FAF: Viable but Poor Fit Options

Option	Safety	Policy	Capacity
Transition north option A2	S	P	C
This was initially designed as Option 2 and is a route based on the STEAK IAF located to the north-west of the airport. The route has an initial straight leg from the IAF towards the airport where aircraft would make a left turn onto a downwind leg. Safety: This option is expected to interact with the Runway 23R Missed Approach Procedure (MAP). This option also raised safety concerns with regards to the systemised separation between MAN arrivals and MAN Runway 23 north and eastbound departures. Capacity: This option would interact with departures within the Runway 23L/23R North and East departure envelopes which would limit the ability to achieve one minute departure splits and not enabling best use of runway capacity.			
Transition north option B4	S	P	C
This was initially designed as Option 4 and is a route based on the North Merge IAF located near Blackburn. It was considered as an option for both runways; however, the analysis demonstrated that the profile for Runways 23L/23R would be below the minimum CDA criteria. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			
Transition north option C5	S	P	C
This was initially designed as Option 5A and is a route based on the North 2 IAF located near Blackburn and north-west of the current ROSUN hold. It was considered as an option for both runways; however, the analysis demonstrated that the profile for Runways 23L/23R would be below the minimum CDA criteria. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			
Transition north option D9	S	P	C

This was initially designed as Option 9A and is a route based on IAF2. It was considered as an option for both runways; however, the analysis demonstrated that the profile for Runways 23L/23R for this 3,500ft FAF would be below the minimum CDA criteria. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			
Transition north option E10	S	P	C
This was initially designed as Option 10A and is a route based on IAF1. It was considered as an option for both runways; however, the analysis demonstrated that the profile for Runways 23L/23R for this 3,500ft FAF would be below the minimum CDA criteria. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			
Transition north option F12	S	P	C
This was initially designed as Option 12A and is a route based on IAF11. It was considered as an option for both runways; however, the analysis demonstrated that the profile for Runways 23L/23R for this 3,500ft FAF would be below the minimum CDA criteria. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			

26 Transitions Runways 23R/23L North – 3,000ft FAF

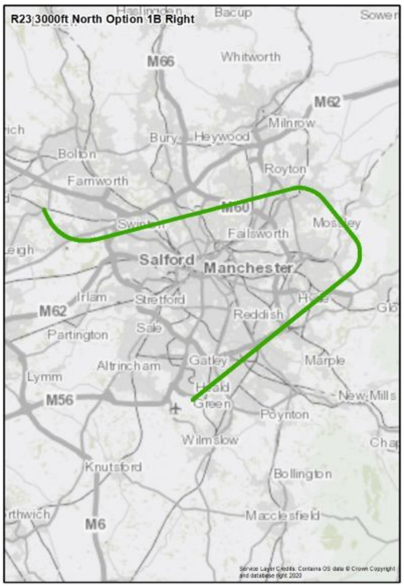
26.1 Transition Runways 23R/23L North Option 1B – 3,000ft FAF

Design Principle Evaluation	Option No: 1B
Option Name: Transition RW 23L North Option 1B 3000ft FAF	REJECT
Option Name: Transition RW 23R North Option 1B 3000ft FAF	REJECT

Option Description:
Option 1B has an IAF at 7,000ft to the north-west of the airport in the vicinity of Aspull. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads east, over Boothstown, Prestwich and Oldham but north of Manchester City Centre. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.68%/2.11° for Runway 23L and 3.54%/2.03° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.



Design Principle Safety		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 1B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 1B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 1B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 1B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 1B L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 1B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 1B R is estimated to increase it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 1B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 1B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 1B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 1B R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 1B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	23L	PARTIAL

Design Principle **Emissions**	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 1B L is 57km (31nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 1B R is 58km (31nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

From 4,000ft, option 1B L is estimated to overfly approximately 44,000 households with an approximate population of 113,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 115,400.

From 7,000ft, option 1B L is estimated to overfly approximately 136,300 households with an approximate population of 334,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 345,500.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft.

From 4,000ft, option 1B R is estimated to overfly approximately 46,200 households with an approximate population of 112,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 115,600.

From 7,000ft, option 1B R is estimated to overfly approximately 137,250 households with an approximate population of 325,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 335,400.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a greater population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

From 4,000ft, this option 1B L is estimated to overfly 225 noise sensitive areas.

From 7,000ft, this option 1B L is estimated to overfly 700 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft.

From 4,000ft, this option 1B R is estimated to overfly 265 noise sensitive areas.

From 7,000ft, this option 1B R is estimated to overfly 675 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a greater number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

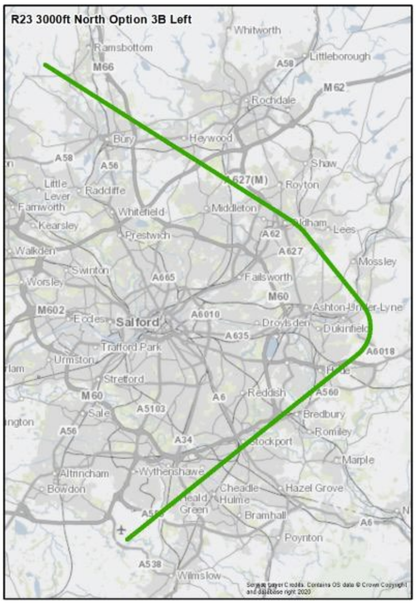
26.2 Transition Runways 23R/23L North Option 3B – 3,000ft FAF

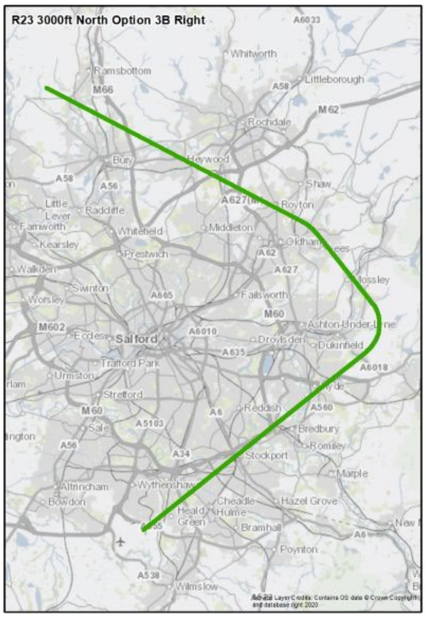
Design Principle Evaluation	Option No: 3B
Option Name: Transition RW 23L North Option 3B 3000ft FAF	ACCEPT
Option Name: Transition RW 23R North Option 3B 3000ft FAF	ACCEPT

Option Description:
Option 3B has an IAF at 7,000ft to the north of the airport in the vicinity of Hawkshaw approximately 2nm south of the ROSUN hold.

From this location the route splits and heads south-east between Bury and Rochdale. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.96%/2.27° for Runway 23L and 3.93%/2.25° for Runway 23R. These gradients are within the optimum range for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.





Design Principle		
Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 3B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 3B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 3B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 3B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 3B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 3B L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 3B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 3B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 3B R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 3B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 3B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 3B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 3B R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 3B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 3B L is 51km (28nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 3B R is 51km (28nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 3B L is estimated to overfly approximately 31,000 households with an approximate population of 73,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 76,100.

From 7,000ft, option 3B L is estimated to overfly approximately 87,300 households with an approximate population of 213,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 222,300.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 3B R is estimated to overfly approximately 33,650 households with an approximate population of 78,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 81,400.

From 7,000ft, option 3B R is estimated to overfly approximately 82,400 households with an approximate population of 192,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 199,700.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 3B L is estimated to overfly 130 noise sensitive areas.

From 7,000ft, this option 3B L is estimated to overfly 430 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 3B R is estimated to overfly 160 noise sensitive areas.

From 7,000ft, this option 3B R is estimated to overfly 375 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

26.3 Transition Runways 23R/23L North Option 6B – 3,000ft FAF

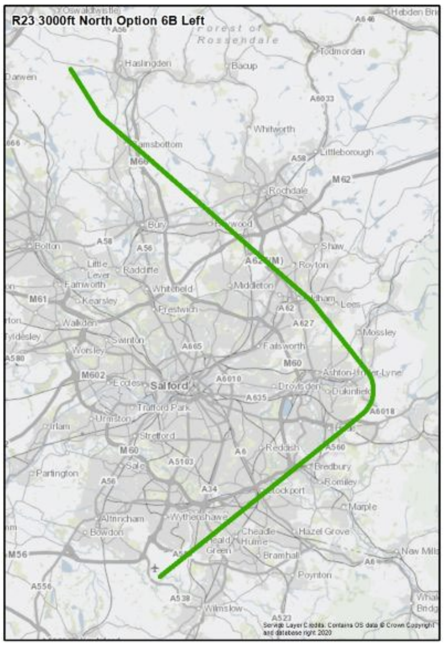
Design Principle Evaluation	Option No: 6B
Option Name: Transition RW 23L North Option 6B 3000ft FAF	REJECT
Option Name: Transition RW 23R North Option 6B 3000ft FAF	REJECT

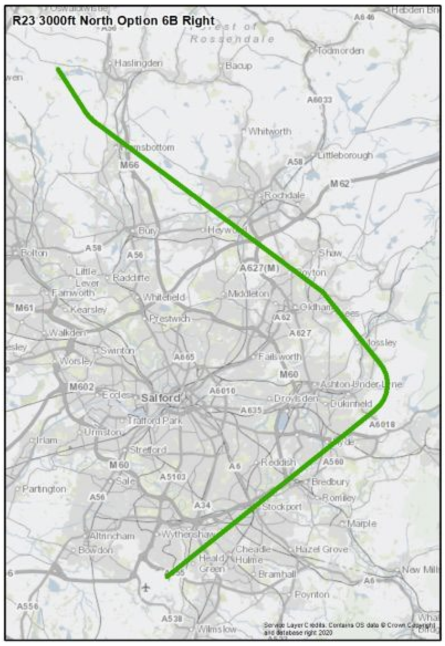
Option Description:

Option 6B has an IAF at 7,000ft to the north-west of the airport co-located with the ROSUN hold.

From this location the route splits and heads south-east, to the east of Bury but overhead Rochdale. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.81%/2.19° for Runway 23L and 3.8%/2.18° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle		
Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 6B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 6B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 6B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 6B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 6B L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 6B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 6B R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 6B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 6B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 6B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 6B R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 6B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	23L	MET

Design Principle **Emissions**	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 6B L is 57km (31nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 6B R is 57km (31nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 6B L is estimated to overfly approximately 39,250 households with an approximate population of 100,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 101,500.

From 7,000ft, option 6B L is estimated to overfly approximately 62,650 households with an approximate population of 153,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 158,100.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 6B R is estimated to overfly approximately 39,800 households with an approximate population of 92,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 96,400.

From 7,000ft, option 6B R is estimated to overfly approximately 63,200 households with an approximate population of 147,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 154,600.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

From 4,000ft, this option 6B L is estimated to overfly 205 noise sensitive areas.

From 7,000ft, this option 6B L is estimated to overfly 320 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 6B R is estimated to overfly 180 noise sensitive areas.

From 7,000ft, this option 6B R is estimated to overfly 285 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

26.4 Transition Runways 23R/23L North Option 7B – 3,000ft FAF

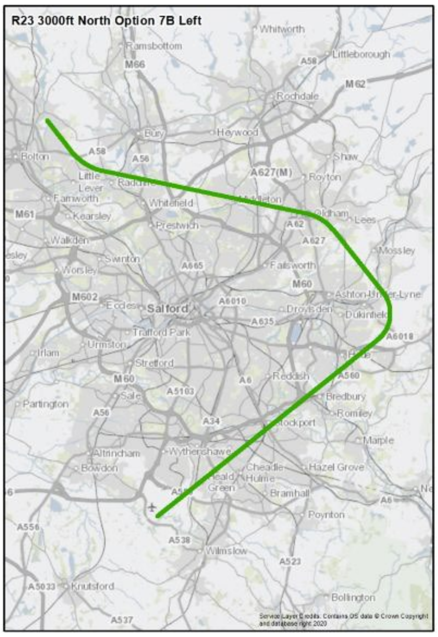
Design Principle Evaluation	Option No: 7B
Option Name: Transition RW 23L North Option 7B 3000ft FAF	ACCEPT
Option Name: Transition RW 23R North Option 7B 3000ft FAF	ACCEPT

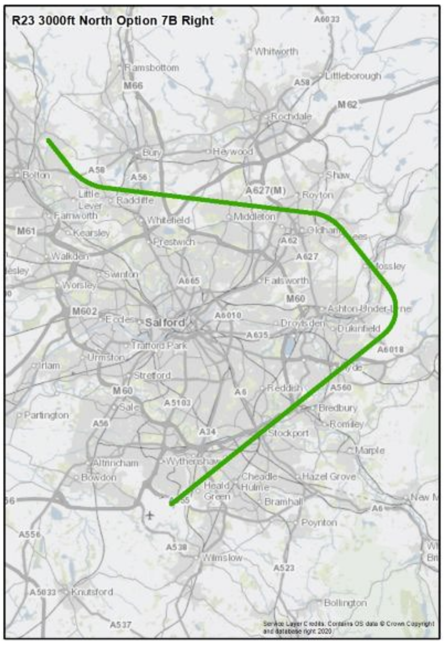
Option Description:

Option 7B has an IAF at 7,000ft to the north-west of the airport in the vicinity of Harwood. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads south-east between Bolton and Bury but overhead Oldham. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 4.45%/2.55° for Runway 23L and 4.32%/2.48° for Runway 23R. These gradients are optimal for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 7B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 7B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 7B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 7B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 7B L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 7B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 7B R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 7B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 7B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 7B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 7B R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 7B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 7B L is 52km (28nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 7B R is 53km (29nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 7B L is estimated to overfly approximately 33,150 households with an approximate population of 82,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 84,400.

From 7,000ft, option 7B L is estimated to overfly approximately 118,050 households with an approximate population of 283,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 303,000.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 7B R is estimated to overfly approximately 36,700 households with an approximate population of 85,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 88,700.

From 7,000ft, option 7B R is estimated to overfly approximately 111,900 households with an approximate population of 260,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 280,000.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 7B L is estimated to overfly 135 noise sensitive areas.

From 7,000ft, this option 7B L is estimated to overfly 535 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 7B R is estimated to overfly 165 noise sensitive areas.

From 7,000ft, this option 7B R is estimated to overfly 485 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

26.5 Transition Runways 23R/23L North Option 8B – 3,000ft FAF

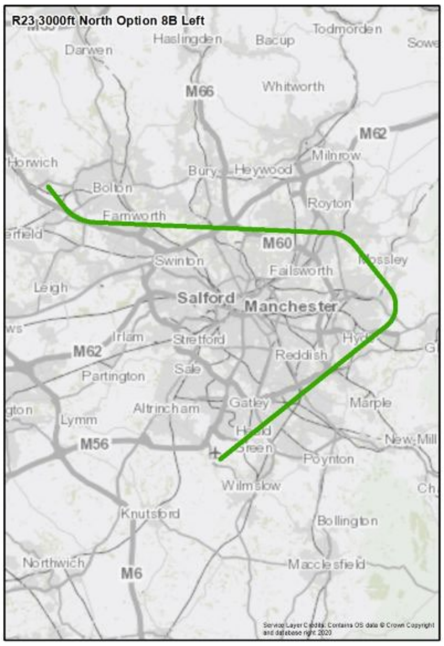
Design Principle Evaluation	Option No: 8B
Option Name: Transition RW 23L North Option 8B 3000ft FAF	REJECT
Option Name: Transition RW 23R North Option 8B 3000ft FAF	REJECT

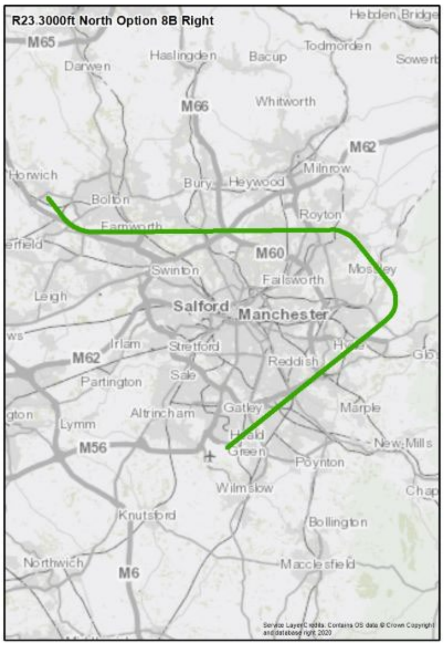
Option Description:

Option 8B has an IAF at 7,000ft to the north-west of the airport co-located with the IAF for option 05L/05R North 8A. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads east, to the south of Bury and Rochdale. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.45%/1.98° for Runway 23L and 3.36%/1.92° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle		
Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 8B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 8B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 8B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 8B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 8B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 8B L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 8B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 8B R is estimated to increase it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 8B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 8B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 8B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 8B R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 8B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 8B L is 60km (32nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 8B R is 61km (33nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

From 4,000ft, option 8B L is estimated to overfly approximately 43,550 households with an approximate population of 113,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 114,700.

From 7,000ft, option 8B L is estimated to overfly approximately 118,900 households with an approximate population of 289,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 302,000.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft.

From 4,000ft, option 8B R is estimated to overfly approximately 47,750 households with an approximate population of 116,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 120,100.

From 7,000ft, option 8B R is estimated to overfly approximately 128,450 households with an approximate population of 304,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 321,200.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a greater population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

From 4,000ft, this option 8B L is estimated to overfly 235 noise sensitive areas.

From 7,000ft, this option 8B L is estimated to overfly 545 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft.

From 4,000ft, this option 8B R is estimated to overfly 235 noise sensitive areas.

From 7,000ft, this option 8B R is estimated to overfly 585 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a greater number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

26.6 Transition Runways 23R/23L North Option 9B – 3,000ft FAF

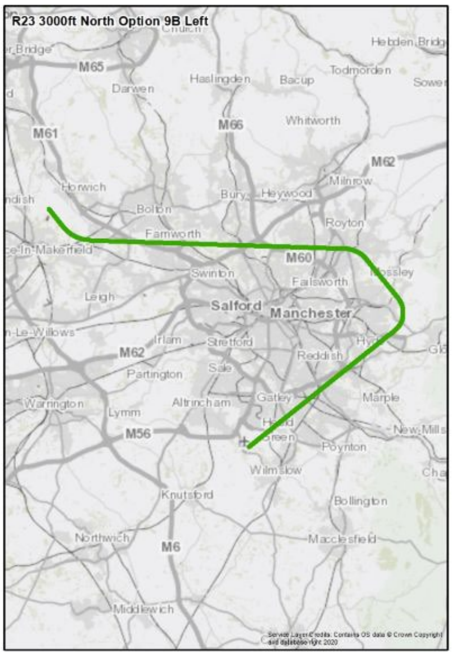
Design Principle Evaluation	Option No: 9B
Option Name: Transition RW 23L North Option 9B 3000ft FAF	REJECT
Option Name: Transition RW 23R North Option 9B 3000ft FAF	REJECT

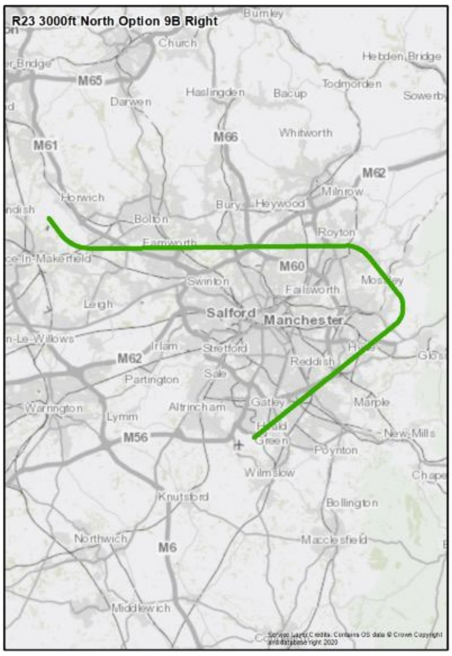
Option Description:

Option 9B has an IAF at 7,000ft to the north-west of the airport co-located with the IAF for option 05L/05R North 7B. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads east, to the south of Bolton and Bury but overhead Oldham. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.01%/1.72° for Runway 23L and 2.93%/1.68° for Runway 23R. These gradients are below the optimum for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 9B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 9B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 9B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 9B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 9B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 9B L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 9B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 9B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 9B R is estimated to increase it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 9B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 9B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 9B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 9B R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 9B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	23L	MET

Design Principle **Emissions**	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 9B L is 65km (35nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 9B R is 66km (36nm). When compared to the MIRSI 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

From 4,000ft, option 9B L is estimated to overfly approximately 48,300 households with an approximate population of 122,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 123,600.

From 7,000ft, option 9B L is estimated to overfly approximately 115,050 households with an approximate population of 277,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 287,500.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft.

From 4,000ft, option 9B R is estimated to overfly approximately 57,200 households with an approximate population of 136,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 141,100.

From 7,000ft, option 9B R is estimated to overfly approximately 127,850 households with an approximate population of 302,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 316,000.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a greater population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

From 4,000ft, this option 9B L is estimated to overfly 250 noise sensitive areas.

From 7,000ft, this option 9B L is estimated to overfly 515 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft.

From 4,000ft, this option 9B R is estimated to overfly 270 noise sensitive areas.

From 7,000ft, this option 9B R is estimated to overfly 565 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a greater number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

26.7 Transition Runways 23R/23L North Option 10B – 3,000ft FAF

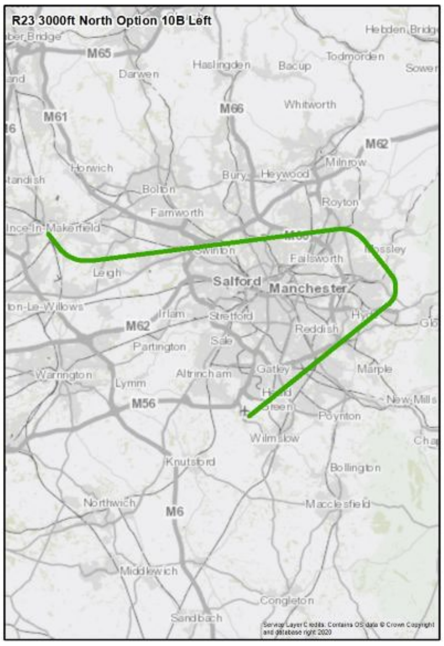
Design Principle Evaluation	Option No: 10B
Option Name: Transition RW 23L North Option 10B 3000ft FAF	REJECT
Option Name: Transition RW 23R North Option 10B 3000ft FAF	REJECT

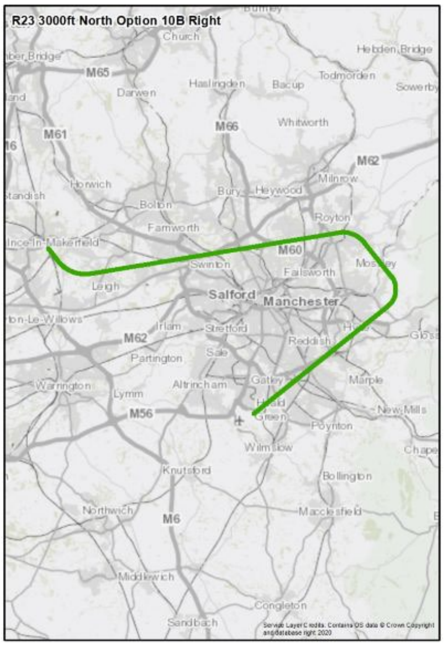
Option Description:

Option 10B has an IAF at 7,000ft to the north-west of the airport co-located with the IAF for option 05L/R North 6B. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads east, overhead Prestwich, Chadderton and Oldham but north of Manchester City Centre. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 2.92%/1.67° for Runway 23L and 2.84%/1.63° for Runway 23R. These gradients are below the optimum for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.





Design Principle		
Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 10B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 10B L is estimated to increase the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 10B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 10B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 10B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 10B L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 10B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 10B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 10B R is estimated to increase it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 10B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 10B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 10B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 10B R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 10B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	23L	MET

Design Principle **Emissions**	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 10B L is 66km (36nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 10B R is 67km (36nm). When compared to the MIRSI 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

From 4,000ft, option 10B L is estimated to overfly approximately 49,800 households with an approximate population of 126,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 128,100.

From 7,000ft, option 10B L is estimated to overfly approximately 140,200 households with an approximate population of 332,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 348,200.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a greater population from 4,000ft.

From 4,000ft, option 10B R is estimated to overfly approximately 56,700 households with an approximate population of 136,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 140,900.

From 7,000ft, option 10B R is estimated to overfly approximately 144,600 households with an approximate population of 332,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 353,100.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a similar population from 7,000ft, and a greater population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

From 4,000ft, this option 10B L is estimated to overfly 260 noise sensitive areas.

From 7,000ft, this option 10B L is estimated to overfly 685 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a greater number from 4,000ft.

From 4,000ft, this option 10B R is estimated to overfly 285 noise sensitive areas.

From 7,000ft, this option 10B R is estimated to overfly 680 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a similar number of sensitive sites from 7,000ft, and a greater number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

26.8 Transition Runways 23R/23L North Option 11B – 3,000ft FAF

Design Principle Evaluation	Option No: 11B
Option Name: Transition RW 23L North Option 11B 3000ft FAF	ACCEPT
Option Name: Transition RW 23R North Option 11B 3000ft FAF	ACCEPT

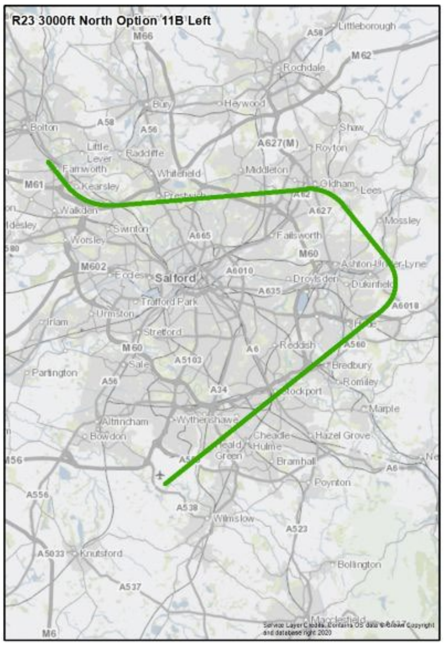
Option Description:

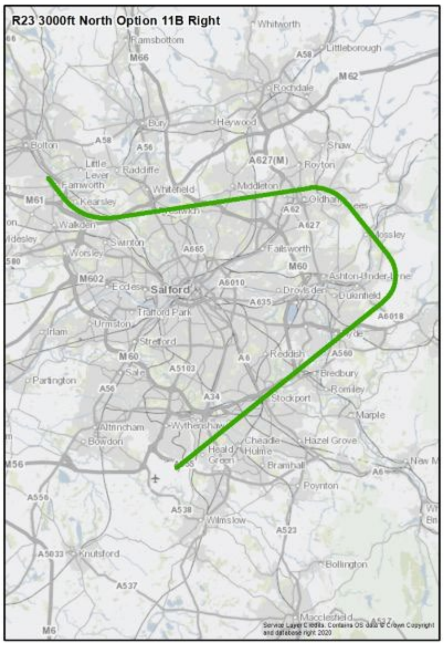
Option 11B has an IAF at 7,000ft to the north-west of the airport in the vicinity of Worsley, co-located with the IAF for option 05L/05R North 13. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads south-east overhead Farnworth, then heads east, just to the north of Prestwich overhead Oldham. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

This option is included to provide a design option from an IAF created specifically for Runways 05L/05R (05L/05R 2,000ft FAF option 13), where design options were required that minimise the impact on LPL Runway 27 arrivals.

The descent gradient to the FAF is 4.45%/2.55° for Runway 23L and 4.27%/2.45° for Runway 23R. These gradients are optimal for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle Safety	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 11B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 11B L is estimated to limit the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 11B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 11B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 11B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 11B L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 11B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 11B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 11B R is estimated to limit it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 11B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 11B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 11B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 11B R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 11B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

	23L	MET

Design Principle **Emissions**	23R	MET

Summary of Qualitative Assessment:

The estimated track length of option 11B L is 52km (28nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 11B R is 53km (29nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 11B L is estimated to overfly approximately 32,950 households with an approximate population of 81,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 83,700.

From 7,000ft, option 11B L is estimated to overfly approximately 124,100 households with an approximate population of 304,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 309,800.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 11B R is estimated to overfly approximately 37,550 households with an approximate population of 87,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 90,900.

From 7,000ft, option 11B R is estimated to overfly approximately 123,350 households with an approximate population of 291,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 299,800.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 11B L is estimated to overfly 130 noise sensitive areas.

From 7,000ft, this option 11B L is estimated to overfly 545 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 11B R is estimated to overfly 165 noise sensitive areas.

From 7,000ft, this option 11B R is estimated to overfly 555 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

26.9 Transition Runways 23R/23L North Option 12B – 3,000ft FAF

Design Principle Evaluation	Option No: 12B
Option Name: Transition RW 23L North Option 12B 3000ft FAF	REJECT
Option Name: Transition RW 23R North Option 12B 3000ft FAF	REJECT

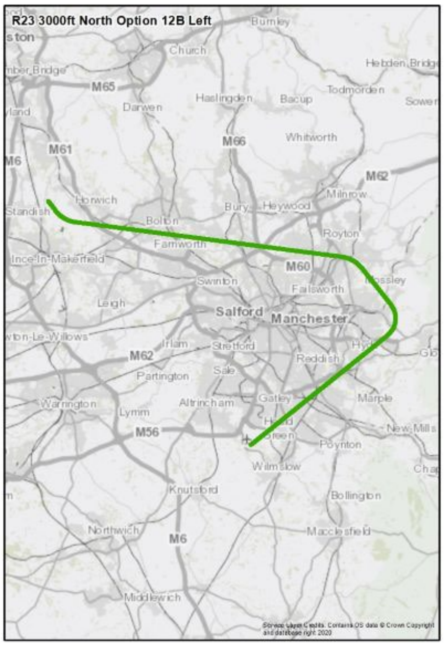
Option Description:

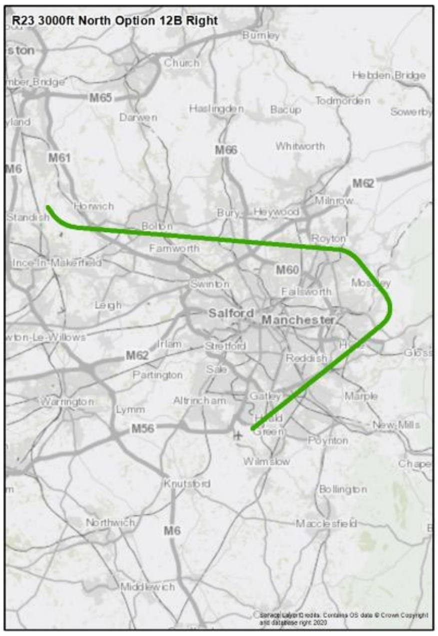
Option 12B has an IAF at 7,000ft to the north-west of the airport in the vicinity of Bolton, co-located with the IAF for option 05L/05R North 12.

From this location the route splits and heads east overhead Bolton and Oldham but north of Manchester City Centre. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

This option is included to provide a design option from an IAF created specifically for Runways 05L/05R (05L/05R 2,000ft FAF option 12), where design options were required that minimise the impact on LPL Runway 27 arrivals.

The descent gradient to the FAF is 2.80%/1.61° for Runway 23L and 2.75%/1.57° for Runway 23R. These gradients are below the optimum for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 12B L is estimated to limit the total population affected by noise, when compared with the MIRSI 'do nothing' comparator. Up to 4,000ft, option 12B L is estimated to increase the total population affected by noise, when compared with the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 12B L is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 12B L is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 12B L is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 12B L is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 12B L is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 12B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 4,000ft, option 12B R is estimated to increase it when compared against the ROSUN 'do nothing' comparator.
Up to 7,000ft, option 12B R is estimated to limit the total population affected by noise, when compared against the MIRSI 'do nothing' comparator. Up to 7,000ft, option 12B R is estimated to limit the total population affected by noise, when compared against the ROSUN 'do nothing' comparator.
Option 12B R is longer in length and it is anticipated that emissions would be increased when compared against the MIRSI 'do nothing' comparator. Option 12B R is longer in length and it is anticipated that emissions would be increased when compared against the ROSUN 'do nothing' comparator.

At this stage of the process, option 12B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

The estimated track length of option 12B L is 67km (36nm). When compared to the MIRSI 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 12B R is 67km (36nm). When compared to the MIRSI 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated. When compared to the ROSUN 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

From 4,000ft, option 12B L is estimated to overfly approximately 51,600 households with an approximate population of 128,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 130,900.

From 7,000ft, option 12B L is estimated to overfly approximately 121,200 households with an approximate population of 296,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 309,000.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a greater population from 4,000ft.

From 4,000ft, option 12B R is estimated to overfly approximately 56,550 households with an approximate population of 133,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 138,700.

From 7,000ft, option 12B R is estimated to overfly approximately 127,500 households with an approximate population of 303,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 321,600.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a greater population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	PARTIAL
	23R	PARTIAL

Summary of Qualitative Assessment:

From 4,000ft, this option 12B L is estimated to overfly 265 noise sensitive areas.

From 7,000ft, this option 12B L is estimated to overfly 605 noise sensitive areas.

Compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a greater number from 4,000ft.

From 4,000ft, this option 12B R is estimated to overfly 255 noise sensitive areas.

From 7,000ft, this option 12B R is estimated to overfly 625 noise sensitive areas.

When compared to the MIRSI 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. When compared to the ROSUN 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a greater number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

26.10 Transition Runways 23R/23L North 3,000ft FAF Summary

	IAF STEAK	IAF 5	IAF 6	IAF 4	IAF 3	IAF 2	IAF 1	IAF 12	IAF 11
	Option 1BL	**Option 3BL**	**Option 6BL**	**Option 7BL**	**Option 8BL**	**Option 9BL**	**Option 10BL**	**Option 11BL**	**Option 12BL**
S	MET	MET	MET	MET	MET	MET	MET	MET	MET
P	MET	MET	MET	MET	MET	MET	PARTIAL	MET	PARTIAL
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	MET	MET	MET	MET	MET	MET	MET	MET	MET
N1	MET	MET	MET	MET	MET	MET	PARTIAL	MET	PARTIAL
N2	MET	MET	MET	MET	MET	MET	MET	MET	MET
N3	PARTIAL	MET	MET	MET	PARTIAL	PARTIAL	PARTIAL	MET	PARTIAL
A	MET	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET	MET
	Rejected	Best	Best but incomplete IAF	Best	Rejected	Rejected	Rejected	Best	Rejected

	IAF STEAK	IAF 5	IAF 6	IAF 4	IAF 3	IAF 2	IAF 1	IAF 12	IAF 11
	Option 1BR	Option 3BR	Option 6BR	Option 7BR	Option 8BR	Option 9BR	Option 1OBR	Option 11BR	Option 12BR
S	MET	MET	MET	MET	MET	MET	MET	MET	MET
P	PARTIAL	MET	MET	MET	PARTIAL	PARTIAL	PARTIAL	MET	PARTIAL
C	MET	MET	MET	MET	MET	MET	MET	MET	MET
E	MET	MET	MET	MET	MET	PARTIAL	PARTIAL	MET	PARTIAL
N1	PARTIAL	MET	MET	MET	PARTIAL	PARTIAL	PARTIAL	MET	PARTIAL
N2	MET	MET	MET	MET	MET	MET	MET	MET	MET
N3	PARTIAL	MET	PARTIAL	MET	PARTIAL	PARTIAL	PARTIAL	MET	PARTIAL
A	MET	MET	MET	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET	MET	MET	MET
	Rejected	Best	Rejected	Best	Rejected	Rejected	Rejected	Best	Rejected

26.11 Transition Runways 23R/23L North 3,000ft FAF: Viable but Poor Fit Options

Option	Safety	Policy	Capacity
Transition north option A2	S	P	C
This was initially designed as Option 2 and is a route based on the STEAK IAF located to the north-west of the airport. The route has an initial straight leg from the IAF towards the airport where aircraft would make a left turn onto a downwind leg. Safety: This option is expected to interact with the Runway 23R Missed Approach Procedure (MAP). This option also raised safety concerns with regards to the systemised separation between MAN arrivals and MAN Runway 23 north and eastbound departures. Capacity: This option would interact with departures within the Runway 23L/23R North and East departure envelopes which would limit the ability to achieve one minute departure splits and not enabling best use of runway capacity.			
Transition north option B4	S	P	C
This was initially designed as Option 4 and is a route based on the North Merge IAF located near Blackburn. It was considered as an option for both runways; however, the analysis demonstrated that the profile for Runways 23L/23R would be below the minimum CDA criteria. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			
Transition north option C5	S	P	C
This was initially designed as Option 5A and is a route based on the North 2 IAF located near Blackburn and north-west of the current ROSUN hold. It was considered as an option for both runways; however, the analysis demonstrated that the profile for Runways 23L/23R would be below the minimum CDA criteria. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			

27 Transitions Runways 23R/23L South – 3,500ft FAF

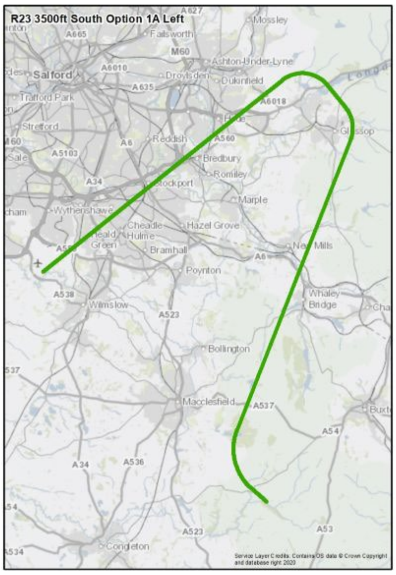
27.1 Transition Runways 23R/23L South Option 1A – 3,500ft FAF

Design Principle Evaluation	Option No: 1A
Option Name: Transition RW 23L South Option 1A 3500ft FAF	ACCEPT
Option Name: Transition RW 23R South Option 1A 3500ft FAF	ACCEPT

Option Description:
Option 1A has an IAF at 7,000ft to the south-east of the airport in the vicinity of Sutton. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.15%/1.80° for Runway 23L and 3.02%/1.73° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.



Design Principle Safety	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1A L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 1A L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 1A L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 1A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 1A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 1A R is longer in length and it is anticipated that emissions would be increased when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 1A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 1A L is 61km (33nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1A R is 62km (33nm). When compared to the DAYNE 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 1A L is estimated to overfly approximately 19,500 households with an approximate population of 43,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 43,900.

From 7,000ft, option 1A L is estimated to overfly approximately 25,000 households with an approximate population of 55,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 57,200.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 1A R is estimated to overfly approximately 17,000 households with an approximate population of 39,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 39,600.

From 7,000ft, option 1A R is estimated to overfly approximately 22,600 households with an approximate population of 51,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 53,200.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:
From 4,000ft, this option 1A L is estimated to overfly 80 noise sensitive areas.

From 7,000ft, this option 1A L is estimated to overfly 105 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 1A R is estimated to overfly 80 noise sensitive areas.

From 7,000ft, this option 1A R is estimated to overfly 105 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

27.2 Transition Runways 23R/23L South Option 2A – 3,500ft FAF

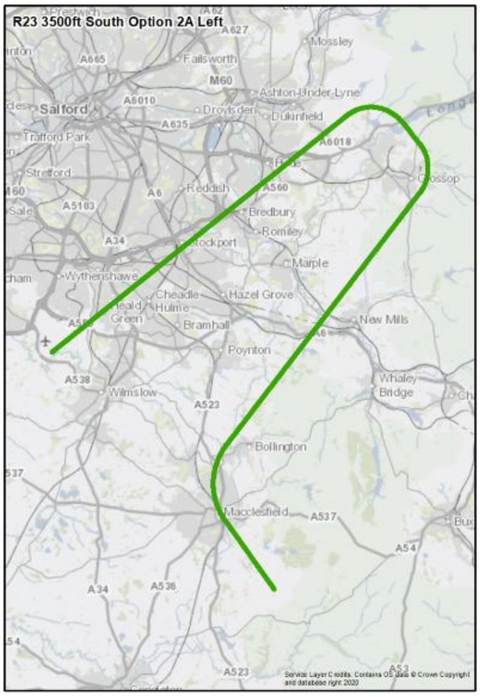
Design Principle Evaluation	Option No: 2A
Option Name: Transition RW 23L South Option 2A 3500ft FAF	ACCEPT
Option Name: Transition RW 23R South Option 2A 3500ft FAF	ACCEPT

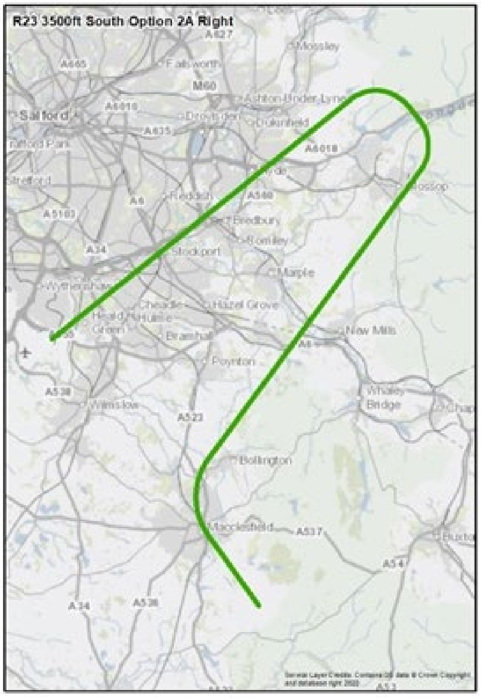
Option Description:

Option 2A has an IAF at 7,000ft to the south-east of the airport in the vicinity of Sutton. It is designed to facilitate a CDA profile to all runways.

From this location the route overflies Macclesfield, splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R.

The descent gradient to the FAF is 2.83%/1.62° for Runway 23L and 2.73%/1.56° for Runway 23R. These gradients are below the optimum for low noise approaches but just within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2A L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 2A L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 2A L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 2A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 2A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 2A R is longer in length and it is anticipated that emissions would be increased when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 2A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 2A L is 61km (33nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 2A R is 62km (33nm). When compared to the DAYNE 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 2A L is estimated to overfly approximately 21,450 households with an approximate population of 47,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 47,900.

From 7,000ft, option 2A L is estimated to overfly approximately 47,450 households with an approximate population of 104,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 106,300.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 2A R is estimated to overfly approximately 20,600 households with an approximate population of 47,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 47,200.

From 7,000ft, option 2A R is estimated to overfly approximately 46,450 households with an approximate population of 103,100. Taking account of planned property developments, this option is estimated to impact an approximate total population of 105,200.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 2A L is estimated to overfly 90 noise sensitive areas.

From 7,000ft, this option 2A L is estimated to overfly 105 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 2A R is estimated to overfly 110 noise sensitive areas.

From 7,000ft, this option 2A R is estimated to overfly 105 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

27.3 Transition Runways 23R/23L South Option 6A – 3,500ft FAF

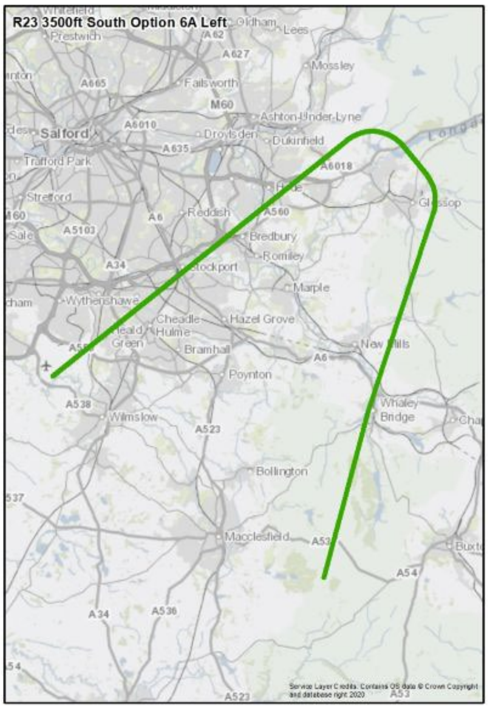
Design Principle Evaluation	Option No: 6A
Option Name: Transition RW 23L South Option 6A 3500ft FAF	ACCEPT
Option Name: Transition RW 23R South Option 6A 3500ft FAF	ACCEPT

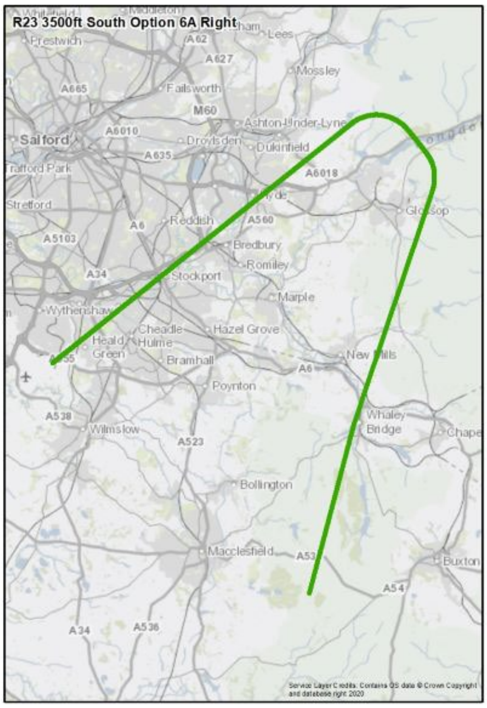
Option Description:

Option 6A has an IAF at 7,000ft to the south-east of the airport co-located with the DAYNE hold. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads north-east, to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.41%/1.96° for Runway 23L and 3.27%/1.87° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





	23L	MET

Design Principle **Safety**	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 6A L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 6A L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 6A L is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 6A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 6A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 6A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 6A R is longer in length and it is anticipated that emissions would be increased when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 6A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 6A L is 55km (30nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 6A R is 56km (30nm). When compared to the DAYNE 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 6A L is estimated to overfly approximately 21,650 households with an approximate population of 48,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 49,000.

From 7,000ft, option 6A L is estimated to overfly approximately 27,200 households with an approximate population of 60,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 62,200.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 6A R is estimated to overfly approximately 17,850 households with an approximate population of 41,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 41,500.

From 7,000ft, option 6A R is estimated to overfly approximately 23,400 households with an approximate population of 53,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 54,600.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 6A L is estimated to overfly 90 noise sensitive areas.

From 7,000ft, this option 6A L is estimated to overfly 115 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 6A R is estimated to overfly 90 noise sensitive areas.

From 7,000ft, this option 6A R is estimated to overfly 115 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

27.4 Transition Runways 23R/23L South Option 7A – 3,500ft FAF

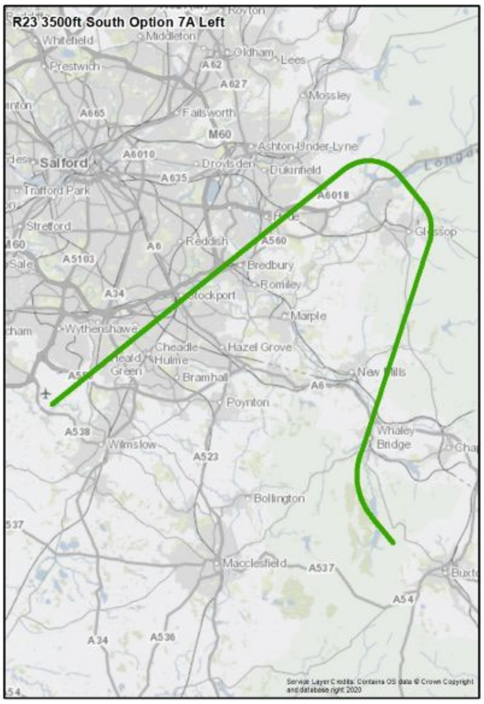
Design Principle Evaluation	Option No: 7A
Option Name: Transition RW 23L South Option 7A 3500ft FAF	ACCEPT
Option Name: Transition RW 23R South Option 7A 3500ft FAF	ACCEPT

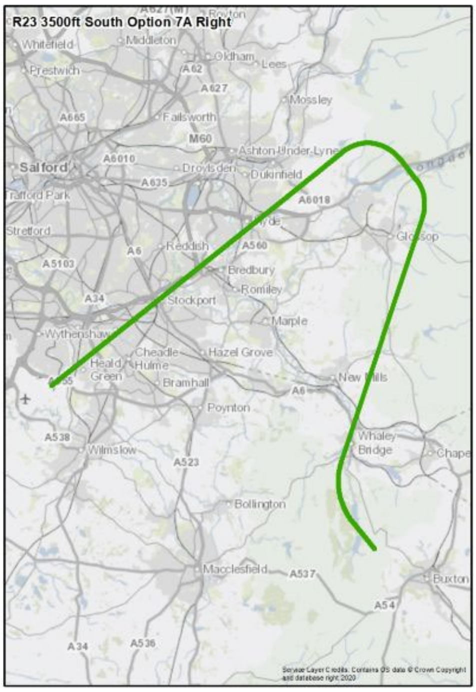
Option Description:

Option 7A has an IAF at 7,000ft to the south-east of the airport in the vicinity of Goyt Valley. It is co-located with the IAF for the 05L/05R option 8A and is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R.

The descent gradient to the FAF is 4.48%/2.57° for Runway 23L and 4.24%/2.43° for Runway 23R. These gradients are optimal for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7A L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 7A L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 7A L is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 7A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 7A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 7A R is longer in length and it is anticipated that emissions would be increased when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 7A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 7A L is 51km (28nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 7A R is 52km (28nm). When compared to the DAYNE 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 7A L is estimated to overfly approximately 21,600 households with an approximate population of 48,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 48,900.

From 7,000ft, option 7A L is estimated to overfly approximately 29,650 households with an approximate population of 66,200. Taking account of planned property developments, this option is estimated to impact an approximate total population of 67,700.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 7A R is estimated to overfly approximately 17,100 households with an approximate population of 39,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 39,600.

From 7,000ft, option 7A R is estimated to overfly approximately 24,850 households with an approximate population of 56,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 57,800.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 7A L is estimated to overfly 100 noise sensitive areas.

From 7,000ft, this option 7A L is estimated to overfly 115 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 7A R is estimated to overfly 95 noise sensitive areas.

From 7,000ft, this option 7A R is estimated to overfly 115 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

27.5 Transition Runways 23R/23L South Option 8A – 3,500ft FAF

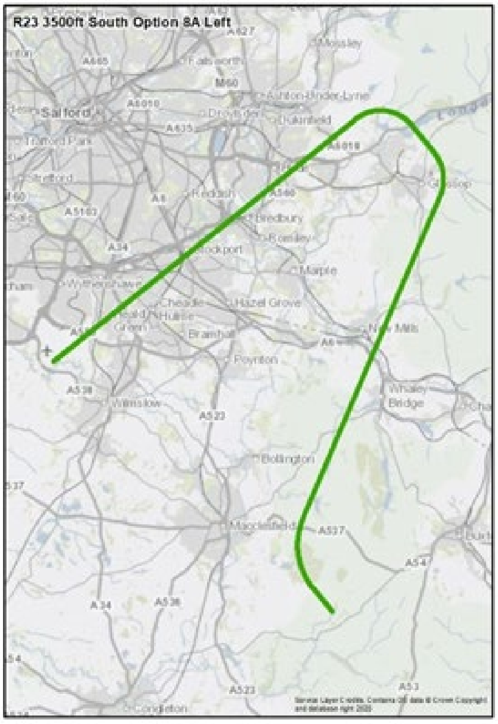
Design Principle Evaluation	Option No: 8A
Option Name: Transition RW 23L South Option 8A 3500ft FAF	ACCEPT
Option Name: Transition RW 23R South Option 8A 3500ft FAF	ACCEPT

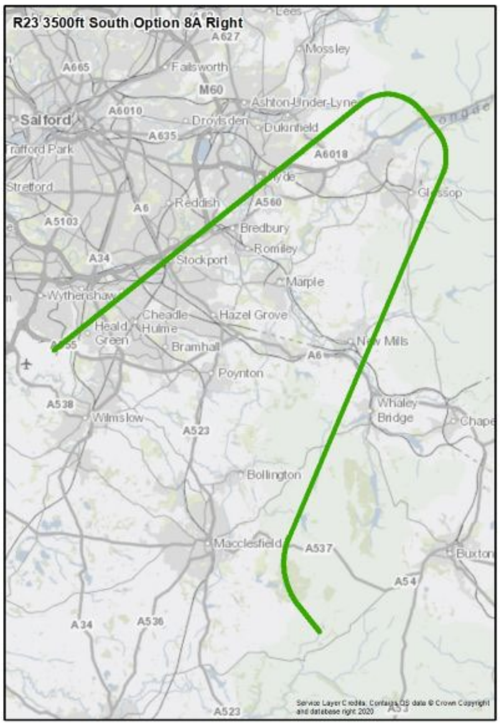
Option Description:

Option 8A has an IAF at 7,000ft to the south-east of the airport in the vicinity of the Roaches. It is co-located with the IAF for the 05L/05R option 9A and is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.42%/1.96° for Runway 23L and 3.28%/1.88° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle Safety	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 8A L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 8A L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 8A L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 8A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 8A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 8A R is longer in length and it is anticipated that emissions would be increased when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 8A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:
When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 8A L is 59km (32nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 8A R is 60km (32nm). When compared to the DAYNE 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 8A L is estimated to overfly approximately 20,350 households with an approximate population of 45,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 45,800.

From 7,000ft, option 8A L is estimated to overfly approximately 26,250 households with an approximate population of 58,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 60,000.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 8A R is estimated to overfly approximately 17,850 households with an approximate population of 41,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 41,300.

From 7,000ft, option 8A R is estimated to overfly approximately 23,800 households with an approximate population of 54,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 55,800.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 8A L is estimated to overfly 85 noise sensitive areas.

From 7,000ft, this option 8A L is estimated to overfly 115 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 8A R is estimated to overfly 90 noise sensitive areas.

From 7,000ft, this option 8A R is estimated to overfly 120 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

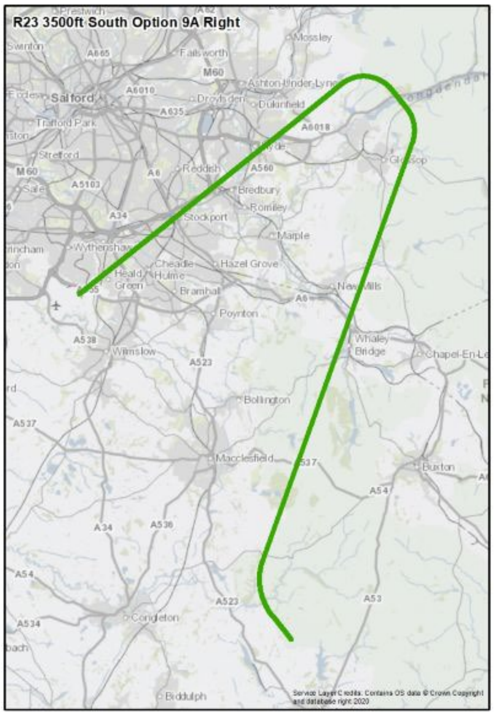
27.6 Transition Runways 23R/23L South Option 9A – 3,500ft FAF

Design Principle Evaluation	Option No: 9A
Option Name: Transition RW 23L South Option 9A 3500ft FAF	ACCEPT
Option Name: Transition RW 23R South Option 9A 3500ft FAF	ACCEPT

Option Description:
Option 9A has an IAF at 7,000ft to the south-east of the airport, just to the north of Leek. It is co-located with the IAF for the 05L/05R option 6A and is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads north-east between Macclesfield and Buxton, overhead Whaley Bridge and Glossop. Both routes then turn left to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R.

The descent gradient to the FAF is 2.78%/1.59° for Runway 23L and 2.69%/1.54° for Runway 23R. These gradients are below the optimum range for low noise approaches but just within the acceptable range for CDAs defined within ICAO guidance.



Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:		
Summary of Qualitative Assessment: Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations. At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.		
Design Principle **Policy**	23L	MET
	23R	PARTIAL
Summary of Qualitative Assessment: Up to 4,000ft, option 9A L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 9A L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 9A L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator. At this stage of the process, option 9A L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 9A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 9A R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 9A R is longer in length and it is anticipated that emissions would be increased when compared against the DAYNE 'do nothing' comparator. At this stage of the process, option 9A R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.		
Design Principle **Capacity**	23L	PARTIAL
	23R	MET
Summary of Qualitative Assessment: When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures. When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.		
Design Principle **Emissions**	23L	MET
	23R	NOT MET
Summary of Qualitative Assessment:		

The estimated track length of option 9A L is 66km (36nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 9A R is 67km (36nm). When compared to the DAYNE 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 9A L is estimated to overfly approximately 17,800 households with an approximate population of 39,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 39,900.

From 7,000ft, option 9A L is estimated to overfly approximately 21,950 households with an approximate population of 48,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 49,900.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 9A R is estimated to overfly approximately 15,950 households with an approximate population of 37,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 37,400.

From 7,000ft, option 9A R is estimated to overfly approximately 20,350 households with an approximate population of 46,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 48,000.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:
From 4,000ft, this option 9A L is estimated to overfly 75 noise sensitive areas.

From 7,000ft, this option 9A L is estimated to overfly 115 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 9A R is estimated to overfly 80 noise sensitive areas.

From 7,000ft, this option 9A R is estimated to overfly 120 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

27.7 Transition Runways 23R/23L South 3,500ft FAF Summary

	IAF TURKY	IAF TURKY	IAF 8	IAF 9	IAF 10	IAF 7
	Option 1AL	Option 2AL	Option 6AL	Option 7AL	Option 8AL	Option 9AL
S	MET	MET	MET	MET	MET	MET
P	MET	MET	MET	MET	MET	MET
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	MET	MET	MET	MET	MET	MET
N1	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET
	Best	Best	Best	Best	Best	Best

	IAF TURKY	IAF TURKY	IAF 8	IAF 9	IAF 10	IAF 7
	Option 1AR	Option 2AR	Option 6AR	Option 7AR	Option 8AR	Option 9AR
S	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET	MET	MET	MET
E	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
N1	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET
	Best	Best	Best	Best	Best	Best

27.8 Transition Runways 23R/23L South 3,500ft FAF: Viable but Poor Fit Options

Option	Safety	Policy	Capacity
Transition south option A3	S	P	C

This option was the result of early concept work with NERL as Option 3 and is based on the South 1 IAF but was not developed due to perceived Network connection issues to the south-east of the airport.

Safety: The design of this may result in aircraft not being compliant with airspace containment requirements. This option introduced the risk of conflicts between aircraft operating in Class D and Class G (uncontrolled) airspace which is not aligned to CAA Airspace Containment Policy.

Additional options that are fully contained were designed to mitigate this risk which resulted in this option offering no benefits if the containment restriction were not present.

Policy: This option fails to align with the ends of the AMS with respect to:

- Efficiency: It was found that access to this IAF from the south would not align to the traffic flows within the NATS network.
- Integration: This option had the potential to reduce airspace access for GA users because of the need to reduce the base of CAS to allow its use.
- Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Option	Safety	Policy	Capacity
Transition south option B4	S	P	C

This was initially designed as Option 4 and is a route based on the position of a NATS proposed South Merge IAF located south-east of the existing DAYNE hold.

Safety: The design of this may result in aircraft not being compliant with airspace containment requirements in the Daventry CTA10 area. This introduces the risk of conflicts between aircraft operating in Class D and Class G (uncontrolled) airspace which is not aligned to CAA Airspace Containment Policy.

Additional options that are fully contained were designed to mitigate this risk which resulted in this option offering no benefits if the containment restriction were not present.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise.
- Integration: This option had the potential to reduce airspace access for GA users because of the need to change the dimensions of CAS to allow its use.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Transition south option C5	S	P	C

This was initially designed as Option 5 and is a route based on the position of a NATS proposed South 2 IAF located south-west of the existing DAYNE hold.

Safety: The design of this may result in aircraft not being compliant with airspace containment requirements in the Daventry CTA10 area. This introduces the risk of conflicts between aircraft operating in Class D and Class G (uncontrolled) airspace which is not aligned to CAA Airspace Containment Policy. Alternative options were designed to mitigate this risk.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise.
- Integration: This option had the potential to reduce airspace access for GA users because of the need to change the dimensions of CAS to allow its use.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

28 Transitions Runways 23R/23L South – 3,000ft FAF

28.1 Transition Runways 23R/23L South Option 1B – 3,000ft FAF

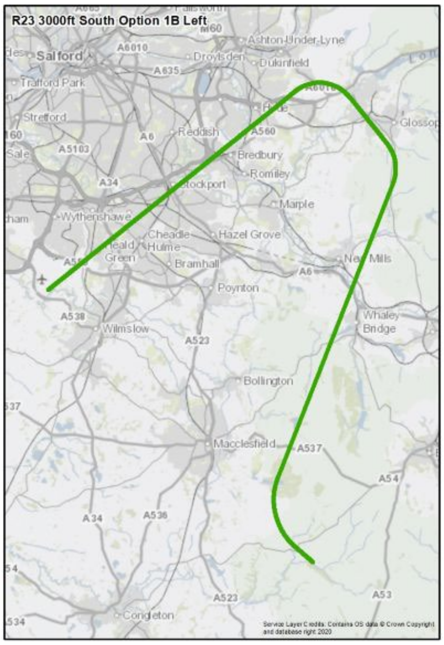
Design Principle Evaluation	Option No: 1B
Option Name: Transition RW 23L South Option 1B 3000ft FAF	ACCEPT
Option Name: Transition RW 23R South Option 1B 3000ft FAF	ACCEPT

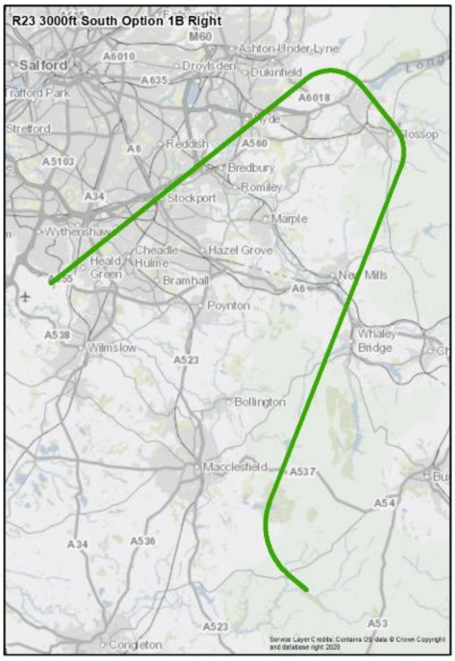
Option Description:

Option 1B has an IAF at 7,000ft to the south-east of the airport in the vicinity of Danebridge. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.78%/2.17° for Runway 23L and 3.63%/2.08° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





	23L	MET

Design Principle **Safety**	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 1B L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 1B L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 1B L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 1B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 1B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 1B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 1B R is longer in length and it is anticipated that emissions would be increased when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 1B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 1B L is 57km (31nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 1B R is 58km (31nm). When compared to the DAYNE 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 1B L is estimated to overfly approximately 26,100 households with an approximate population of 59,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 59,000.

From 7,000ft, option 1B L is estimated to overfly approximately 31,250 households with an approximate population of 70,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 71,600.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 1B R is estimated to overfly approximately 24,000 households with an approximate population of 54,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 55,100.

From 7,000ft, option 1B R is estimated to overfly approximately 29,250 households with an approximate population of 66,000. Taking account of planned property developments, this option is estimated to impact an approximate total population of 67,900.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 1B L is estimated to overfly 105 noise sensitive areas.

From 7,000ft, this option 1B L is estimated to overfly 130 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 1B R is estimated to overfly 130 noise sensitive areas.

From 7,000ft, this option 1B R is estimated to overfly 155 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

28.2 Transition Runways 23R/23L South Option 2B – 3,000ft FAF

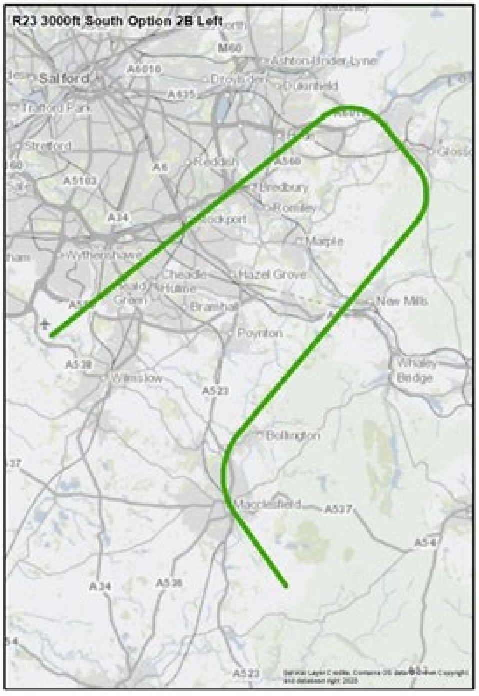
Design Principle Evaluation	Option No: 2B
Option Name: Transition RW 23L South Option 2B 3000ft FAF	ACCEPT
Option Name: Transition RW 23R South Option 2B 3000ft FAF	ACCEPT

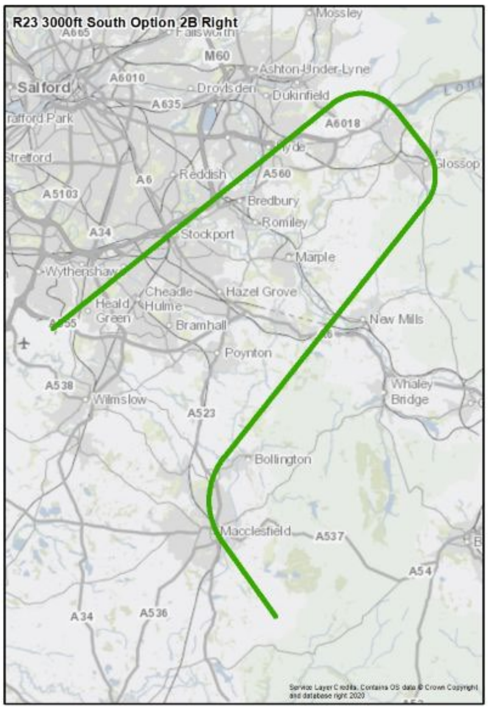
Option Description:

Option 2B has an IAF at 7,000ft to the south-east of the airport in the vicinity of Sutton. It is designed to facilitate a CDA profile to all runways.

From this location the route overflies Macclesfield, splits, and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.38%/1.94° for Runway 23L and 3.26%/1.87° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle Safety		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 2B L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 2B L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 2B L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 2B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 2B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 2B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 2B R is longer in length and it is anticipated that emissions would be increased when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 2B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 2B L is 57km (31nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 2B R is 58km (31nm). When compared to the DAYNE 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 2B L is estimated to overfly approximately 26,000 households with an approximate population of 58,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 58,900.

From 7,000ft, option 2B L is estimated to overfly approximately 53,400 households with an approximate population of 117,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 120,200.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 2B R is estimated to overfly approximately 24,600 households with an approximate population of 55,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 56,400.

From 7,000ft, option 2B R is estimated to overfly approximately 50,600 households with an approximate population of 111,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 114,600.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 2B L is estimated to overfly 105 noise sensitive areas.

From 7,000ft, this option 2B L is estimated to overfly 130 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 2B R is estimated to overfly 130 noise sensitive areas.

From 7,000ft, this option 2B R is estimated to overfly 155 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

28.3 Transition Runways 23R/23L South Option 6B – 3,000ft FAF

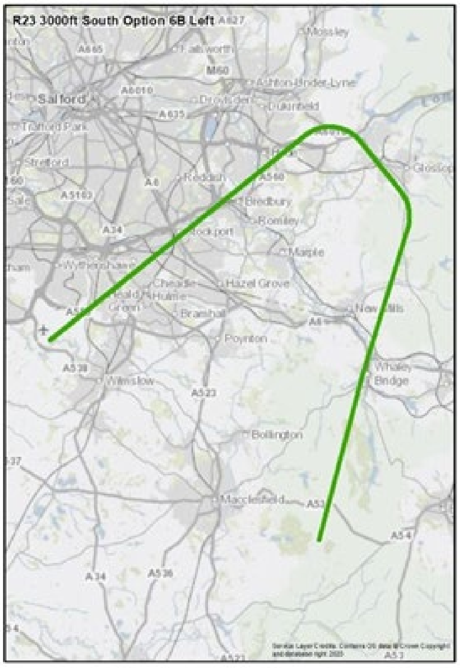
Design Principle Evaluation	Option No: 6B
Option Name: Transition RW 23L South Option 6B 3000ft FAF	ACCEPT
Option Name: Transition RW 23R South Option 6B 3000ft FAF	ACCEPT

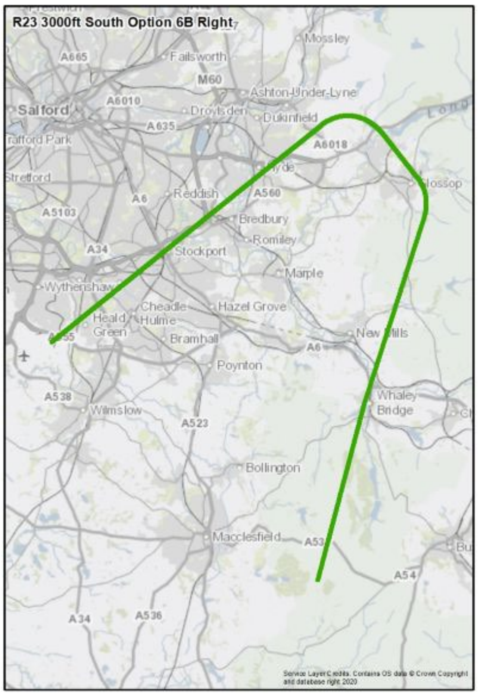
Option Description:

Option 6B has an IAF at 7,000ft to the south-east of the airport co-located with the DAYNE hold. It is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads north-east, to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 4.12%/2.36° for Runway 23L and 3.94%/2.26° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle Safety	23L	MET
	23R	MET

Summary of Qualitative Assessment: Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations. At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment: Up to 4,000ft, option 6B L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 6B L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 6B L is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator. At this stage of the process, option 6B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy. Up to 4,000ft, option 6B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 6B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 6B R is longer in length and it is anticipated that emissions would be increased when compared against the DAYNE 'do nothing' comparator. At this stage of the process, option 6B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment: When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures. When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this. Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports. Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 6B L is 50km (27nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 6B R is 51km (28nm). When compared to the DAYNE 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 6B L is estimated to overfly approximately 29,850 households with an approximate population of 67,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 67,300.

From 7,000ft, option 6B L is estimated to overfly approximately 35,150 households with an approximate population of 78,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 80,100.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 6B R is estimated to overfly approximately 26,300 households with an approximate population of 59,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 60,200.

From 7,000ft, option 6B R is estimated to overfly approximately 31,450 households with an approximate population of 70,800. Taking account of planned property developments, this option is estimated to impact an approximate total population of 72,600.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 6B L is estimated to overfly 125 noise sensitive areas.

From 7,000ft, this option 6B L is estimated to overfly 145 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

From 4,000ft, this option 6B R is estimated to overfly 140 noise sensitive areas.

From 7,000ft, this option 6B R is estimated to overfly 165 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

28.4 Transition Runways 23R/23L South Option 7B – 3,000ft FAF

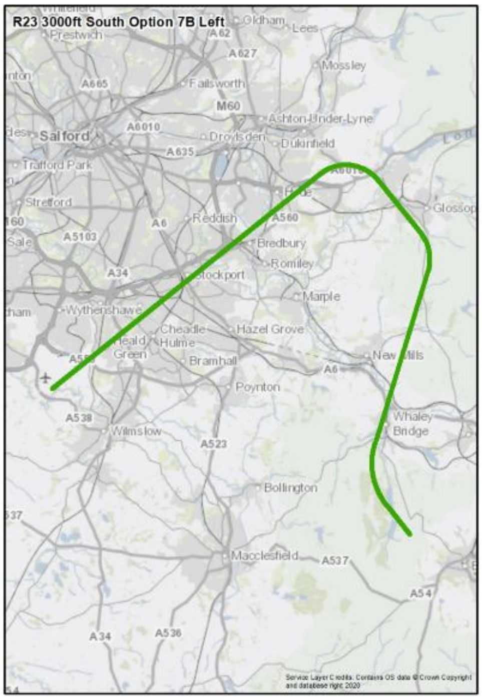
Design Principle Evaluation	Option No: 7B
Option Name: Transition RW 23L South Option 7B 3000ft FAF	ACCEPT
Option Name: Transition RW 23R South Option 7B 3000ft FAF	ACCEPT

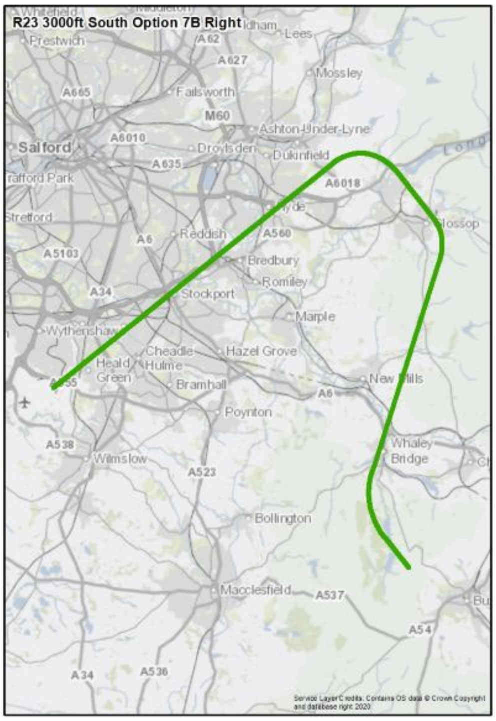
Option Description:

Option 7B has an IAF at 7,000ft to the south-east of the airport in the vicinity of Goyt Valley. It is co-located with the IAF for the 05L/R option 8B and is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 5.5%/3.15° for Runway 23L and 5.19%/2.97° for Runway 23R. These gradients are just above the range for low noise approaches but are still within the acceptable range for CDAs defined within ICAO guidance.





Design Principle **Safety**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 7B L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 7B L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 7B L is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 7B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 7B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 7B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 7B R is longer in length and it is anticipated that emissions would be increased when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 7B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 7B L is 47km (25nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 7B R is 48km (26nm). When compared to the DAYNE 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 7B L is estimated to overfly approximately 31,250 households with an approximate population of 70,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 70,500.

From 7,000ft, option 7B L is estimated to overfly approximately 37,600 households with an approximate population of 84,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 85,500.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a similar population from 4,000ft.

From 4,000ft, option 7B R is estimated to overfly approximately 27,600 households with an approximate population of 62,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 63,100.

From 7,000ft, option 7B R is estimated to overfly approximately 33,550 households with an approximate population of 75,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 77,100.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 7B L is estimated to overfly 140 noise sensitive areas.

From 7,000ft, this option 7B L is estimated to overfly 145 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a similar number from 4,000ft.
From 4,000ft, this option 7B R is estimated to overfly 145 noise sensitive areas.

From 7,000ft, this option 7B R is estimated to overfly 165 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

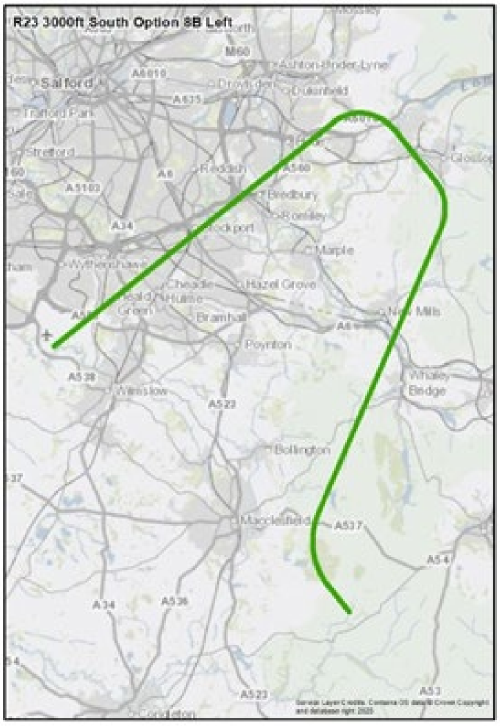
28.5 Transition Runways 23R/23L South Option 8B – 3,000ft FAF

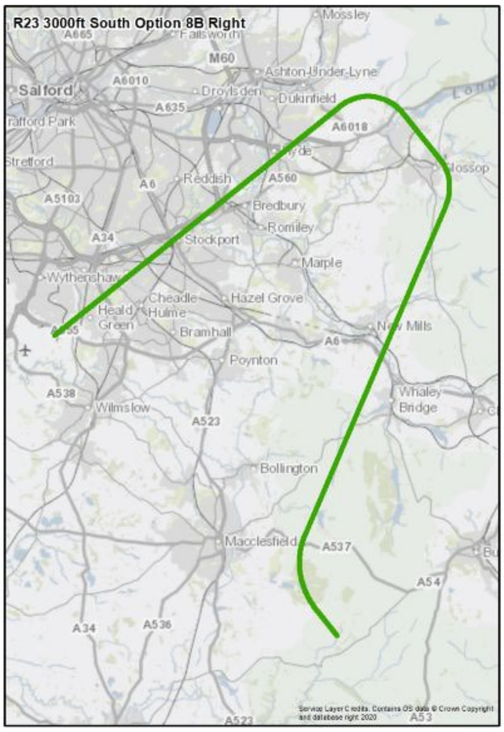
Design Principle Evaluation	Option No: 8B
Option Name: Transition RW 23L South Option 8B 3000ft FAF	ACCEPT
Option Name: Transition RW 23R South Option 8B 3000ft FAF	ACCEPT

Option Description:
Option 8B has an IAF at 7,000ft to the south-east of the airport in the vicinity of the Roaches. It is co-located with the IAF for the 05L/05R option 9B and is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 4.14%/2.37° for Runway 23L and 3.95%/2.26° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





Design Principle Safety		
	23L	MET
	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 8B L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 8B L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 8B L is shorter in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 8B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 8B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 8B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 8B R is longer in length and it is anticipated that emissions would be increased when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 8B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 8B L is 54km (29nm). When compared to the DAYNE 'do nothing' scenario this option is shorter in length and therefore fewer emissions would be anticipated.

The estimated track length of option 8B R is 55km (30nm). When compared to the DAYNE 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 8B L is estimated to overfly approximately 27,600 households with an approximate population of 62,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 62,300.

From 7,000ft, option 8B L is estimated to overfly approximately 32,900 households with an approximate population of 73,900. Taking account of planned property developments, this option is estimated to impact an approximate total population of 75,300.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 8B R is estimated to overfly approximately 24,900 households with an approximate population of 56,500. Taking account of planned property developments, this option is estimated to impact an approximate total population of 57,100.

From 7,000ft, option 8B R is estimated to overfly approximately 30,500 households with an approximate population of 68,700. Taking account of planned property developments, this option is estimated to impact an approximate total population of 70,700.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 8B L is estimated to overfly 110 noise sensitive areas. From 7,000ft, this option 8B L is estimated to overfly 130 noise sensitive areas. Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft. From 4,000ft, this option 8B R is estimated to overfly 130 noise sensitive areas. From 7,000ft, this option 8B R is estimated to overfly 155 noise sensitive areas. When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

28.6 Transition Runways 23R/23L South Option 9B – 3,000ft FAF

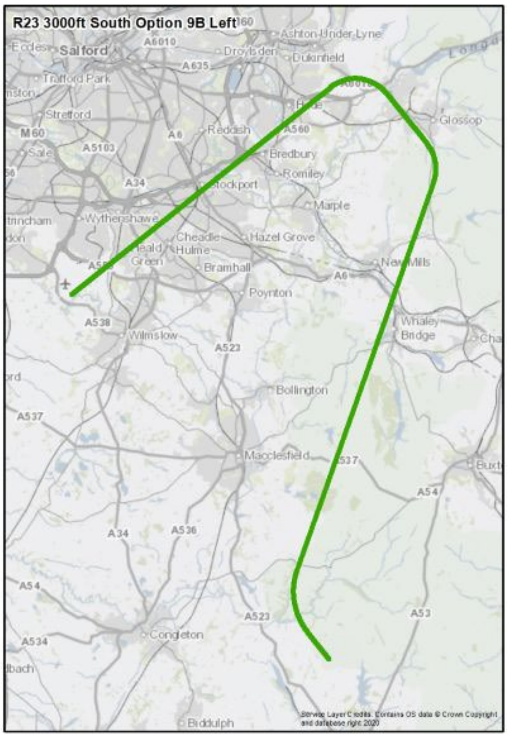
Design Principle Evaluation	Option No: 9B
Option Name: Transition RW 23L South Option 9B 3000ft FAF	ACCEPT
Option Name: Transition RW 23R South Option 9B 3000ft FAF	ACCEPT

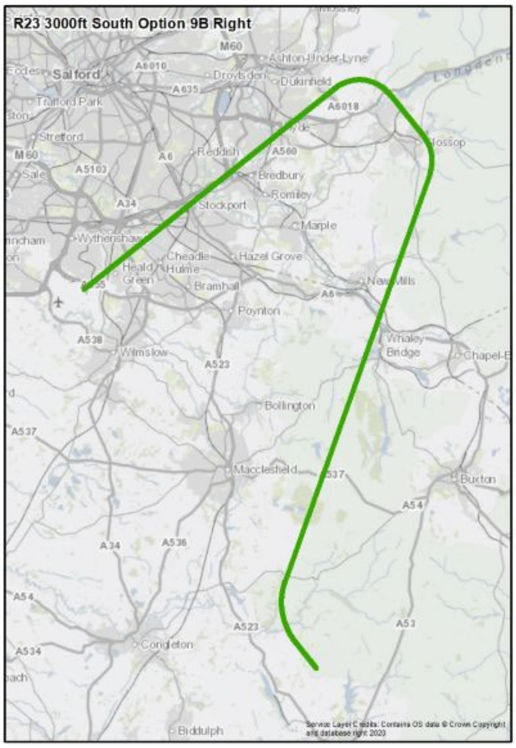
Option Description:

Option 9B has an IAF at 7,000ft to the south-east of the airport, just to the north of Leek. It is co-located with the IAF for the 05L/05R option 6B and is designed to facilitate a CDA profile to all runways.

From this location the route splits and heads north-east between Macclesfield and Buxton, overhead Whaley Bridge and Glossop. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R.

The descent gradient to the FAF is 3.33%/1.91° for Runway 23L and 3.21%/1.84° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.





	23L	MET

Design Principle **Safety**	23R	MET

Summary of Qualitative Assessment:

Both these options have been designed by CAA Approved IFP designers in accordance with PANS-OPS requirements. Assessed in isolation, they are considered to be safe, designable and meets with industry standards and regulations.
At this stage, it is not believed that additional protocols or mitigations are required to confirm safe operation, although an assessment against the other FASI-N airports will be required, at Stage 3, to confirm this.

Design Principle **Policy**	23L	MET
	23R	PARTIAL

Summary of Qualitative Assessment:

Up to 4,000ft, option 9B L is estimated to limit the total population affected by noise, when compared with the DAYNE 'do nothing' comparator. Up to 7,000ft, option 9B L is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Option 9B L is similar in length and it is anticipated that emissions would be limited when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 9B L is evaluated to be consistent with the environmental performance 'End' and Design Principle Policy.

Up to 4,000ft, option 9B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator. Up to 7,000ft, option 9B R is estimated to limit the total population affected by noise, when compared against the DAYNE 'do nothing' comparator.
Option 9B R is longer in length and it is anticipated that emissions would be increased when compared against the DAYNE 'do nothing' comparator.
At this stage of the process, option 9B R is evaluated to be partially consistent with the environmental performance 'End' and Design Principle Policy.

Design Principle **Capacity**	23L	PARTIAL
	23R	MET

Summary of Qualitative Assessment:

When assessed in isolation for Runway 05L, there is a greater likelihood that best use of the capacity of our runways may not be fully attained due to the ATC operational restriction that prohibits the utilisation of Runway 05L for arrivals with Runway 05R being used for departures.

When assessed in isolation for Runway 05R, this option is deemed to be capable of enabling the best use of the capacity of our existing runways and could be used operationally in conjunction with another runway, or as a single runway operation to achieve this.

Based on current information, these options should not affect adversely affect operations within airspace that is shared with adjacent airports.
Further assessments would be conducted at Stage 3 of the ACP process, and will consider whether, as part of a combination of routes, these design options continue to satisfy the Design Principle Capacity.

Design Principle **Emissions**	23L	MET
	23R	NOT MET

Summary of Qualitative Assessment:

The estimated track length of option 9B L is 61km (33nm). When compared to the DAYNE 'do nothing' scenario this option is similar in length and therefore similar emissions would be anticipated.

The estimated track length of option 9B R is 62km (33nm). When compared to the DAYNE 'do nothing' scenario this option is longer in length and therefore greater emissions would be anticipated.

Design Principle **Noise N1**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, option 9B L is estimated to overfly approximately 24,950 households with an approximate population of 56,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 57,200.

From 7,000ft, option 9B L is estimated to overfly approximately 28,600 households with an approximate population of 64,400. Taking account of planned property developments, this option is estimated to impact an approximate total population of 65,600.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

From 4,000ft, option 9B R is estimated to overfly approximately 23,400 households with an approximate population of 53,300. Taking account of planned property developments, this option is estimated to impact an approximate total population of 54,000.

From 7,000ft, option 9B R is estimated to overfly approximately 27,200 households with an approximate population of 61,600. Taking account of planned property developments, this option is estimated to impact an approximate total population of 63,200.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller population from 7,000ft, and a smaller population from 4,000ft.

Design Principle **Noise N2**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Noise N3**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

From 4,000ft, this option 9B L is estimated to overfly 90 noise sensitive areas.

From 7,000ft, this option 9B L is estimated to overfly 130 noise sensitive areas.

Compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.
From 4,000ft, this option 9B R is estimated to overfly 125 noise sensitive areas.

From 7,000ft, this option 9B R is estimated to overfly 155 noise sensitive areas.

When compared to the DAYNE 'do nothing' scenario this option overflies a smaller number of sensitive sites from 7,000ft, and a smaller number from 4,000ft.

Design Principle **Airspace**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

It has not been possible to evaluate the impact of dispersion and/or respite at this stage. This will only become possible when the design options have been grouped into systemised networks in Stage 3. Therefore, this option has been evaluated to meet this design principle.

Design Principle **Technology**	23L	MET
	23R	MET

Summary of Qualitative Assessment:

These options have been designed to utilise the latest aircraft technology through the use of PBN and have been designed in accordance with PANS-OPS requirements.

28.7 Transition Runways 23R/23L South 3,000ft FAF Summary

	IAF TURKY	IAF TURKY	IAF 8	IAF 9	IAF 10	IAF 7
	Option 1BL	**Option 2BL**	**Option 6BL**	**Option 7BL**	**Option 8BL**	**Option 9BL**
S	MET	MET	MET	MET	MET	MET
P	MET	MET	MET	MET	MET	MET
C	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
E	MET	MET	MET	MET	MET	MET
N1	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET
	Best	Best	Best	Best	Best	Best

	IAF TURKY	IAF TURKY	IAF 8	IAF 9	IAF 10	IAF 7
	Option 1BR	**Option 2BR**	**Option 6BR**	**Option 7BR**	**Option 8BR**	**Option 9BR**
S	MET	MET	MET	MET	MET	MET
P	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL	PARTIAL
C	MET	MET	MET	MET	MET	MET
E	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
N1	MET	MET	MET	MET	MET	MET
N2	MET	MET	MET	MET	MET	MET
N3	MET	MET	MET	MET	MET	MET
A	MET	MET	MET	MET	MET	MET
T	MET	MET	MET	MET	MET	MET
	Best	Best	Best	Best	Best	Best

28.8 Transition Runways 23R/23L South 3,000ft FAF: Viable but Poor Fit Options

Option	Safety	Policy	Capacity
Transition south option A3	S	P	C

This option was the result of early concept work with NERL as Option 3 and is based on the South 1 IAF but was not developed due to perceived network connection issues to the south-east of the airport.

Safety: The design of this may result in aircraft not being compliant with airspace containment requirements. This option introduced the risk of conflicts between aircraft operating in Class D and Class G (uncontrolled) airspace which is not aligned to CAA Airspace Containment Policy.

Additional options that are fully contained were designed to mitigate this risk which resulted in this option offering no benefits if the containment restriction were not present.

Policy: This option fails to align with the ends of the AMS with respect to:

- Efficiency: It was found that access to this IAF from the south would not align to the traffic flows within the NATS network.
- Integration: This option had the potential to reduce airspace access for GA users because of the need to reduce the base of CAS to allow its use.
- Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Option	Safety	Policy	Capacity
Transition south option B4	S	P	C

This was initially designed as Option 4 and is a route based on the position of a NATS proposed South Merge IAF located south-east of the existing DAYNE hold.

Safety: The design of this may result in aircraft not being compliant with airspace containment requirements in the Daventry CTA10 area. This introduces the risk of conflicts between aircraft operating in Class D and Class G (uncontrolled) airspace which is not aligned to CAA Airspace Containment Policy.

Additional options that are fully contained were designed to mitigate this risk which resulted in this option offering no benefits if the containment restriction were not present.

Policy: This option fails to align with the ends of the AMS with respect to:

- Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise.
- Integration: This option had the potential to reduce airspace access for GA users because of the need to change the dimensions of CAS to allow its use.

The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.

Transition south option C5	S	P	C
This was initially designed as Option 5 and is a route based on the position of a NATS proposed South 2 IAF located south-west of the existing DAYNE hold. Safety: The design of this may result in aircraft not being compliant with airspace containment requirements in the Daventry CTA10 area. This introduces the risk of conflicts between aircraft operating in Class D and Class G (uncontrolled) airspace which is not aligned to CAA Airspace Containment Policy. Alternative options were designed to mitigate this risk. Policy: This option fails to align with the ends of the AMS with respect to: • Environmental performance – Noise: The options created from this IAF were outside the arrivals design envelope and unable to provide a CDA to both runway directions. This would create a sub-optimal descent profile likely to result in additional noise. • Integration: This option had the potential to reduce airspace access for GA users because of the need to change the dimensions of CAS to allow its use. The trade-off analysis against other AMS ends did not identify other material benefits sufficient to offset a red categorisation.			

29 Transitions Evaluation Summary

The acceptance / rejection process set out at section 4.3 accepted 80 transition design options that were carried forward to the IOA for further consideration. This process also rejected 26 transition design options.

As with departures, at this relatively early stage in the process our assessment of the design principles Capacity, Emissions Noise N2 and Airspace in particular was limited due to routes not being developed as a system or combined with the designs of the enroute network and adjacent airports. A full appreciation of these design principles will only be possible at Stage 3 once the individual design options have been consolidated into networks.

However, and in line with CAP1616, the design option development process considered all of the design principles including the need to align to the "must have" design principles of Safety, Policy and Capacity.

- Safety: Safety is the no.1 priority for all airspace changes, and our routes must be safe and comply with industry standards and regulations. The application of this design principle focussed on the alignment to PANS-OPS and CAP778 and the avoidance of a hazardous conflict between the design option and other aircraft either at MAN at adjacent airports or in adjacent airspace.
- Policy: The Design Principle Policy requires us to take account of the CAA AMS (CAP1711) which sets out the 'Ends' that airspace modernisation must deliver, including the need to create a more efficient, environmentally focussed and integrated airspace network. To address this, the design process takes account of the constraints and considerations in the local airspace to create options to meet the 'Ends' within the AMS. This includes options that seek to reduce the number of people affected by noise in line with the Air Navigation Guidance 2017 or provide a more direct routing to the joining point with the network airspace to reduce emissions. Although listed as one of the 'Ends' in the AMS, Safety was not considered within the Design Principle Policy assessment, but as part of the Design Principle Safety assessment. This is outlined in the Policy evaluation summary in section 4.5
- Capacity: The Design Principle Capacity requires us to create options that make best use of runway capacity. To address this, the design process created some options in isolation, but created others iteratively by comparing design options with those in adjacent envelopes. The aim of this was to create options that had the ability to be part of a system capable of one-minute departure separations and therefore align with this design principle.

Section 3.5 of the DOR refers to the management of the MAN Future Airspace project within the national airspace masterplan, and the possibility that as the NERL designs progress, it is possible that some of our design options will either be misaligned or conflict with their designs (or those of other airports). Some design options may need to be further refined or modified in response to the progress of this work. Alternatively, some options that have not been carried forward from either the DPE or IOA process may need to be restored as working options.

30 Next Steps

30.1

We have undertaken a design process that is consistent with the requirements of CAP1616, to identify a comprehensive list of design options, that were published in the DOR. In Step 2A, these design options have been evaluated against the design principles that were identified through stakeholder engagement in Stage 1. This work is reported this DPE. Those that best align with the design principles are carried forward in the process to Step 2B.

30.2

Design options carried forward to Step 2B have been subject to an initial appraisal. The findings are set out in the IOA and the accompanying assessment tables. The IOA has enabled us to identify a shortlist of design options.

30.3

The shortlist of design options has benefited from extensive engagement with stakeholders, including the general public. Amongst the stakeholders were other sponsors of airspace change, including NATS as the enroute airspace provider. Therefore, we are confident that our proposals are flexible enough to provide compatibility with proposals emerging from other change sponsors, in so far as they are known at this time. However, it is still likely that some of our design options will be difficult to integrate with the proposals from other sponsors.

Therefore, we will continue to work with other sponsors, including NATS, to ensure that collectively we optimise operations with the MTMA. This will include providing information to NATS to inform their visualisation and development simulations, which will test the emerging concepts. It is likely that to optimise the MTMA trade-off decisions will need to be made between incompatible airport design options and where this is the case, we will undertake the necessary cumulative assessment of options in accordance with emerging guidance from ACOG. This process may mean that our consideration of some options shortlisted at Stage 2B is discontinued, or some options previously classified as rejected may be reconsidered or require modification in order to continue in the process. Where this is the case, we will set out our rationale and supporting evidence so that stakeholders have the opportunity to comment during the consultation exercise at Stage 3.

This work will allow us to combine our design options into operating networks. Defining networks of routes that support operations to and from MAN will allow us to undertake the more detailed assessment required at Stage 3 and it will also allow us to understand the extent to which we are able to provide noise respite and relief to those that are most impacted. The introduction of PBN which, consistent with the requirements of the AMS, is integral to our proposals, will increase the accuracy with which aircraft fly and is likely therefore to lead to greater concentration on any single flight path. In exploring different combinations of routes and their role in a network, we will be guided by the Government's objective to minimise the total adverse effects on people on routes below 4,000 feet.

30.4

The IOA that we have completed is the first of three appraisals required under the CAP1616 process. The operating networks that result from the steps we set out at 30.3 will allow us to undertake the more detailed Full Options Appraisal (FOA) required at Stage 3. This further assessment will make much greater use of quantitative data. As the FOA will consider fewer options, it will also allow us to explore local factors including tranquillity and biodiversity in greater detail than has been possible to date, though this more detailed assessment will benefit from the data we have collated and reported at Stage 2.

Whilst the IOA considered the characteristics of each design option, the FOA will also consider operating networks. This assessment will require an estimate of the numbers and types of aircraft that will fly each route in a network. To facilitate this assessment, we will prepare detailed air traffic forecasts that estimate aircraft activity at the year of implementation and the ten years after implementation. To allow the networks that we are considering to be compared to today's operations, we will also prepare air traffic forecasts for a 'do nothing' scenario, that reflects the way we operate today and a 'do minimum' scenario, that reflects an informed view of the future and the minimum changes required to address the issues that mean "doing nothing" is not a feasible option in reality, as well as the issues identified in our statement of need.

The assessment of operating networks will also allow greater consideration of some important factors, reflected in our design principles and for which the assessment in the IOA was limited due to routes not being developed as a system, or combined with the designs of the enroute network and adjacent airports. These include noise, emissions, capacity and safety. In defining the full range of criteria that we will assess in the FOA we will be guided by CAP1616 and will take account of the information in Appendices B and E.

Our proposed approach to the FOA and the way we will consider and collect the key information is set out in greater detail in the IOA at section 8.3.

30.5

Our Design Principle Airspace states that the amount of Controlled Airspace (CAS) required should be minimised, to ensure the needs of other airspace users are considered. This requirement is also reflected in our Design Principle Policy, which considers the ends of the AMS, including the Integration end, which calls for a transition towards greater integration of air traffic including GA and the military. However, due to the potential for routes to be refined or amended, as referred to in 30.3, it would be premature to define future CAS requirements at this stage. As such, CAS requirements for groups of design options will be identified during Stage 3. All stakeholders will be provided with an indication of the CAS requirements within the Step 3C consultation material, and the comments received will be considered as part of the consultation analysis activities in Step 3D. More details of this approach are provided in the DOR section 4.5.

30.6

The CAA published its refreshed Airspace Modernisation Strategy (AMS) in January 2023. The refreshed AMS pulls together the ICAO Global Air Navigation Plan, the 2018 AMS and new requirements that the CAA has identified through stakeholder engagement.

This MAN Stage 2 Gateway submissions, including the Viability Filter within the DOR, the Design Principles Evaluation (DPE) and the Initial Options Appraisal (IOA) that assessed alignment to Design Principle Policy (P), were based on assessments carried out against the requirements of the previous iteration of the AMS, which was in force at the time those assessments were carried out.

MAG have reviewed the refreshed 2023 AMS. This review concluded that no material change would result had the refreshed AMS been applied to this MAN Stage 2 submission. It has therefore been agreed with the CAA that it would not be practical or proportionate to revise the MAN Stage 2 submissions to refer to the 2023 AMS for the purpose of this resubmission. However, our assessment work within Stage 3A and beyond will align to the refreshed 2023 AMS.

30.7

The proposals being developed by MAG and other sponsors within the MTMA cluster are complex and will not be implemented for several years. Given the intention to rationalise the network of DVORs across the UK, it will be important that aircraft are able to continue to operate safely and efficiently in the intervening period between this rationalisation and the new arrangements being introduced. MAN intend to use the CAP1781 process provided by the CAA to provide a temporary solution using RNAV substitution, which will maintain the current network of routes with no change in aircraft behaviour, pending the full implementation of this airspace change. CAP1781 allows new technology - RNAV – to be used to maintain existing routeings (SIDs). To support this, we will work with airlines to ensure they implement the appropriate technical changes to their systems. The CAP1781 process has begun and will run in parallel to this airspace change. We expect to conclude this separate change process in 2024.

30.8

The completion of the work required at Stage 2 'Develop and Assess' has developed and refined the design options available at Manchester Airport, as well as expanding the understanding of stakeholders' views on those options. While it is not a requirement of the CAP1616 process, all stakeholders that have participated in engagement activities to date, will be provided with the information submitted to the CAA at the conclusion of Stage 2, to ensure that they remain informed of the development of the Airspace Change Proposal at Manchester Airport ahead of the full public consultation at Stage 3.

31 Glossary

ACOG	Airspace Change Organisation Group formed in 2019 as a fully independent organisation within NATS under the direction of the UK Government Department for Transport and Civil Aviation Authority, who are the co-sponsors of the AMS.
ACP	Airspace Change Proposal.
ADWR	Airspace Development Workshop Record - the output from bilateral discussions with NERL to record and inform their comprehensive list of options for the network that interfaces with MAN traffic.
Agl	Above ground level.
AIP	Aeronautical Information Publication - A document published by the UK CAA which contains information essential to air navigation (www.aurora.nats.co.uk/htmlAIP/Publications/2022-07-14-AIRAC/html/index-en-GB.html).
Altitude Based Priorities	The ANG sets out a framework of 'Altitude Based Priorities', to be taken into account when considering the potential environmental impact of airspace changes.
AMS	Airspace Modernisation Strategy (CAP1711) - this is the Government's strategy and plan for the use of UK airspace, including the modernisation of airspace (www.caa.co.uk/cap1711). The original AMS was published in December 2018 and a refreshed version in January 2023. Unless otherwise stated, all references to the AMS are to the December 2018 version.
Amsl	Above mean sea level.
ANCON	The UK civil Aircraft Noise Contour Model. A computer model developed and maintained by the Environmental Research and Consultancy Department (ERCD) of the Civil Aviation Authority which calculates contours of aircraft noise exposure levels around airports.
ANG	Air Navigation Guidance 2017 - Guidance to the CAA (from DfT) on its environmental objectives when carrying out its air navigation functions, and to the CAA and wider industry on airspace and noise management (www.gov.uk/government/publications/uk-air-navigation-guidance-2017).
ANSP	Air Navigation Service Provider - an organisation which operates the technical system, infrastructure, procedures, and rules of an air navigation service system, which includes air traffic control.
AONB	Area of Outstanding Natural Beauty - an area of countryside which has been designated for conservation because of its significant landscape value, recognising its national importance.
AQMA	Air Quality Management Area - designated by a local authority and subject to a Local Air Quality Management Plan.
ASMIM[4]	A navigation fix to the north-west of Manchester used by departing aircraft.
ATC	Air Traffic Control - service from an air navigation service provider providing guidance to aircraft through Controlled Airspace.
ATM	Air Transport Movement - an aircraft operation for commercial purposes, as opposed to a flight for recreational or personal reasons.
ATS	Air Traffic Services.

[4] The language to communicate between a pilot and an Air Traffic Controller needs to be clear and avoid misunderstanding. Names need to sound different and be incapable of confusion with others, particularly others close by.

Biodiversity	The variability among living things from all ecosystems (including terrestrial, marine, and aquatic amongst others) and the ecological complexes of which they are part, including diversity within species, between species and of ecosystems.
CAA	Civil Aviation Authority -the aviation industry's regulator.
CAP	Civil Aviation Publication - a document published by the UK CAA which can provide information, guidance or policy depending on the subject covered. The list of all CAPs is published on the CAA website (www.caa.co.uk/our-work/publications).
CAP1385	The CAA's PBN enhanced route spacing guidance (www.caa.co.uk/cap1385).
CAP1498	The CAA's definition of overflight - the report defines overflight as it relates to airspace regulation; and an overflight metric which may be used to quantitatively compare different airspace options (www.caa.co.uk/cap1498).
CAP1616	The CAA's airspace change guidance document - it sets out the regulatory process which all airspace change proposals must follow (www.caa.co.uk/cap1616).
CAP1616a	A technical annex to CAP1616- guidance on the regulatory process for changing airspace design including community engagement requirements. This annex outlines relevant methodologies for use in environmental assessments relating to airspace change (www.caa.co.uk/cap1616a).
CAP1781	The CAA's DVOR/DME/NDB Rationalisation - guidance for the use of RNAV Substitution (www.caa.co.uk/cap1781).
CAP1711	Airspace Modernisation Strategy - this is the Government's strategy and plan for the use of UK airspace, including the modernisation of airspace (www.caa.co.uk/cap1711).
CAP1926	General Requirements and Guidance Material for the use of RNAV Substitution (www.caa.co.uk/cap1926).
CAP1991	Procedure for the CAA to review the classification of airspace (www.caa.co.uk/cap1991).
CAP2091	CAA Policy on Minimum Standards for Noise Modelling -document defines categories of noise modelling sophistication and sets out requirements of the minimum category which different stakeholder or sponsor groups should use when providing noise calculations to the CAA. (www.caa.co.uk/cap2091).
CAP2156A	Airspace change masterplan - CAA acceptance criteria, the criteria against which the CAA will make the decision whether to accept the airspace change masterplan into the Airspace Modernisation Strategy (www.caa.co.uk/cap2156A).
CAP2302	A Low Noise Arrival CAP2302 - a report that makes recommendations to implement low noise arrivals (www.caa.co.uk/cap2303).
CAP493	Manual of Air Traffic Services - contains procedures, instructions and information which are intended to form the basis of air traffic services within the United Kingdom (www.caa.co.uk/cap493).
CAP725	The CAA's airspace change process guidance document that preceded CAP1616 (www.caa.co.uk/cap725).
CAP760	CAA's Guidance on the Conduct of Hazard Identification, Risk Assessment, and the Production of Safety Cases (www.caa.co.uk/cap760).
CAP778	The CAA's Policy and Guidance for the Design and Operation of Departure Procedures in UK Airspace (www.caa.co.uk/cap778).
CAA Controlled Airspace	The CAA Controlled Airspace Containment Policy Statement (January 2014 superseded in August 2022) sets out the minimum criteria applicable to containment of instrument flight

Containment Policy Statement	procedures for airports already within Controlled Airspace (CAS). Annex B provides the design criteria that have been applied to the arrival and departure routes in this ACP. (https://publicapps.caa.co.uk/docs/33/Policy%20for%20the%20Design%20of%20Controlled%20Airspace%20Structures%20110822.pdf).
CAS	Controlled Airspace is airspace within which air traffic services are provided. There are different classifications which define the air traffic control service provided and the requirements of aircraft flying within it. All commercial (passenger) flights fly within Controlled Airspace.
CATI & CATIIIB (approaches)	Categories of precision approach and landing (including Instrument Landing System (ILS) and Autoland) operations are defined according to the applicable Decision Altitude/Height and Runway Visual Range/visibility. A category I (CATI) approach requires a higher decision height and better visibility than a category IIIB (CATIIIB) approach. The technical apparatus for CATIIIB approaches allow an airport to maintain operations in very poor visibility.
CCO	Continuous Climb Operations - allows departing aircraft to climb continuously, which reduces the level of noise heard on the ground, reduces fuel burn and emissions.
CDA	Continuous Descent Approach - allows arriving aircraft to descend continuously which reduces the level of noise heard on the ground, reducing fuel burn and emissions.
CF	Course to Fix - a path that terminates at a fix with a specified course at that fix.
Change sponsor	An organisation that proposes, or sponsors, a change to the airspace design in accordance with the CAA's airspace change process.
Comprehensive list	The full list of design options that are viable designs as required by Stage 2 of the CAP1616 process and which are detailed in the Design Options Report.
CONOPS	Concept of Operations - a document that outlines how we want the airspace system to work in the future and the standards that we will use.
COVID-19	Coronavirus disease 19 is a contagious disease caused by a virus that was identified in 2019 and which resulted in a pandemic in the year 2020.
CP	Country Park - areas of land designated and protected by local authorities to provide access to the countryside.
Cumulative Impact	Where an environmental topic/receptor is affected by impacts from more than one source/project at the same time and the impacts act together.
CTA	Control Area - the controlled airspace that exists in the vicinity of an airport
DAYNE	One of three existing hold stacks used at Manchester Airport.
dB	Decibels - a unit used to measure noise levels.
DEFRA	Department for the Environment, Food and Rural Affairs (UK Government).
DER	Departure End of Runway - a term that, when used in PANS-OPS 8168, determines the start point for the design of a departure procedure.
DESIG	A navigation fix to the north-east of Manchester used by departing aircraft.
Design envelopes	Broad areas where it is possible to design routes and which are the areas where we have created design options for arriving and departing aircraft.
Design option	An output from the route design process that responds to the design principles and the Statement of Need (SoN). Design options are a requirement of the CAP1616

	process. During the engagement carried out at Stage 2, design options were also referred to as "route options".
Design principles	The principles encompassing the safety, environmental and operational criteria, and the strategic policy objectives that the change sponsor seeks to achieve in developing the airspace change proposal. They are an opportunity to combine local context with technical considerations and are therefore drawn up through discussion with affected stakeholders and in Manchester's case - members of the public. The design principles at Manchester Airport were established during Stage 1 of the CAP1616 process.
DF Coding	Direct to Fix coding - type of waypoint used in the design of PBN procedures.
DfT	Department for Transport.
DME	Distance Measuring Equipment - a ground-based beacon that allows aircraft to measure their precise distance from its location, often used to define a turn point.
DOE	Design Options Evolution - shows the evolution of the design options through Stages 2A and 2B of the CAP1616 process. Included as Appendix A to the Stage 2 Summary Document.
DOR	Design Options Report - this responds to the requirements of CAP1616 to develop a comprehensive list of options that address the SoN and that align with the design principles. It details the design process and the output of that process in the form of design options for both departures and arrivals.
DPE	Design Principle Evaluation - the document that undertakes an evaluation of the viable and good fit options described in this report against the design principles.
DVOR	Doppler VHF Omni-directional Range - ground-based radio navigation beacon used by pilots to assist in aircraft navigation.
EASA	European Union Aviation Safety Agency.
Education (facilities)	For our analysis we have used the 'Ordnance Survey Address Base' count of educations facilities, details of which they receive from the local government contributing authority. These include all educational services including College, Further Education, Higher Education, Children's Nursery / Crèche, Preparatory / First / Primary / Infant / Junior / Middle School, Non State Primary / Preparatory School, Secondary / High School, Non State Secondary School, University, Special Needs Establishment and Other Educational Establishments.
EGCC	The four-letter ICAO code for Manchester Airport.
EU	The European Union - an economic and political union of 27 countries.
EKLAD[4]	A navigation fix to the west of Manchester used by departing aircraft.
ERCD	The Environmental Research and Consultancy Department of the Civil Aviation Authority.
FAF	Final Approach Fix - The point at which an aircraft starts its final approach to land.
FASI-N	Future Airspace Strategy Implementation – North: The programme of airspace changes across the northern part of the UK, including Manchester, that is implementing the Governments Airspace Modernisation Strategy.
FIR	Flight Information Region - airspace delegated to a country by ICAO. In the UK there are two FIRs, London and Scottish.
FL85	FL means 'Flight Level' and uses the standard international pressure (1013.2 hPa) to express altitude in hundreds of feet. FL85 equates to 8,500ft calculated according to the 'constant' pressure altitude rather than local pressure (QNH). So FL90 would mean 9,000ft.
Flat segment	A defined period of level flight as required by a PANS-OPS PBN Approach procedure.
Flightpath	The routes taken by aircraft within airspace.

Flight Level	A means to separate aircraft (above the transition altitude) by using a standard pressure setting for all aircraft.
FMS	Flight Management System - a specialised computer system that automates a wide variety of in-flight tasks, reducing the workload on the flight crew.
FOA	Full Options Appraisal - the options appraisal carried out at Stage 3 of the CAP1616 process.
Focus group	Group of representative stakeholders brought together to discuss proposals and offer feedback.
Ft	Feet.
Future housing sites	Future housing sites with a reasonable prospect of being developed based on Local Plan allocations and Local Authority five-year Housing Land Supply Assessment data. During engagement we have used the term 'Future Housing Sites' to represent the broader phrase of Planned Property Development as we are not aware of other future noise sensitive developments that would sit within this category. Data was collated by CBRE and supplied to MAN on 17th March 2022 with updates included to the Cheshire East Borough Council and Staffordshire Moorlands District Council areas in July and August 2022.
GA	General Aviation - defined by ICAO as 'all civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire.
GBAS	Ground Based Augmentation System - augments the existing GPS by providing corrections to aircraft in the vicinity of an airport to improve the accuracy of, and provide integrity for, the aircrafts' GPS navigational position.
GDPR	The General Data Protection Regulations.
GIS	Geographic Information System.
GNSS	Global Navigation Satellite System - a term used to describe a system that uses satellites for position fixing.
GPS	Global Positioning System - a satellite-based radionavigation system owned by the United States government and operated by the United States Space Force.
HAZID Workshop	Hazard Identification workshop - held with air traffic control experts from the Future Airspace team, NATS Manchester, NATS En Route and Liverpool John Lennon Airport as well as airline representatives operating from Manchester Airport.
HON	Abbreviation for the HONILEY DVOR navigation beacon that is to the south of Manchester and is used by departing aircraft as a navigation point.
IAF	Initial Approach Fix - the start of the approach phase of flight. For the Manchester arrival design options, the IAF is at 7,000ft unless stated otherwise.
IATA	The International Air Transport Association - a trade association that supports aviation with global standards for airline safety, security, efficiency and sustainability.
ICAO	International Civil Aviation Organisation - an agency of the United Nations
IFP	Instrument Flight Procedure.
ILS	Instrument Landing System - a radio navigation system that provides vertical and horizontal guidance to arriving aircraft to help them land safely, especially in bad weather.
Instrument Approach Procedures (IAPs)	A series of predetermined manoeuvres for the orderly transfer of an aircraft operating under instrument flight rules from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

IOA	Initial Options Appraisal - the document that is the first iteration of the three option appraisals required by CAP1616 - the design options appraised within the IOA are the outputs from the DPE.
KIAS	Knots of indicated airspeed - the number shown on the airspeed indicator.
KUXEM[4]	A navigation fix to the south-west of Manchester used by departing aircraft.
LAeq	Equivalent continuous sound level, or Leq/LAeq, is the average sound level for a specific location, over a given period.
LISTO[4]	A navigation fix to the south of Manchester used by departing aircraft.
LBA	The three letter IATA code for Leeds Bradford Airport.
LDA	Localiser Directional Aid - an assisted approach not aligned with the landing runway, used in places where terrain or other factors prevent the localiser antenna from being aligned with the runway that it serves.
LLR	Low-Level Route - the Manchester LLR is Class D airspace within which the CAA have exempted aircraft from requiring an ATC clearance to fly within the route (http://publicapps.caa.co.uk/docs/33/ORS4%20No.1545%20Correction.pdf).
LOAEL	Lowest Observed Adverse Effect Level - below this level, there is no detectable effect on health and quality of life due to the noise.
LNAV	Lateral Navigation - a term for lateral (left/right) navigation used within Performance Based Navigation.
LPL	The three letter IATA code for Liverpool John Lennon Airport.
m	Metres.
MAGIC map	Interactive map managed by DEFRA containing authoritative geographic information about the natural and built environment from across Government.
MAP	Missed Approach Procedure - on occasions, inbound aircraft are unable to land successfully on their first approach and perform an action known as a 'Go-Around'. The Missed Approach Procedure outlines a mechanism to route the aircraft, without conflict with departing or arriving aircraft, and re-establish on to the arrivals path for another approach.
MAN	The three letter IATA code for Manchester Airport.
MANTIS	Manchester Airport Noise and Track Information System - a system that monitors and records the path and noise of aircraft arriving and departing from Manchester Airport.
Masterplan	The strategic plan for the coordinated national programme of airspace change, created by the ACOG under the direction of the CAA and DfT.
MCT	Abbreviation for the Manchester DVOR navigation beacon and routes that use that as a navigation point.
Medical (facilities)	For our analysis we have used the 'Ordnance Survey Address Base' count of 'Medical', details of which they receive from the local government contributing authority. These include Dentist, General Practice Surgery / Clinic, Health Centre, Health Care Services, Hospital, Hospice, Medical / Testing / Research Laboratory, Professional Medical Service, Assessment / Development Services. Not all of these are 'noise sensitive' receptors and in Stage 3 those which are not 'noise sensitive' will be removed from future analysis.
Mean track	For noise modelling purposes, an average track over the ground, derived from radar data samples.
MIRSI	One of three existing hold stacks used at Manchester Airport.
Modal average path	The path over the ground most commonly flown, derived from radar data samples.

MONTY[4]	A navigation fix to the south-west of Manchester used by departing aircraft.
MSD	Minimum Stabilisation Distance - a design criteria within PANS-OPS 8168 that ensures aircraft stability when flying a procedure.
MTMA	Manchester Terminal Manoeuvring Area - the designated area of Controlled Airspace for Manchester Airport.
NANTI	A navigation fix to the south-west of Manchester used by Liverpool aircraft.
NATS	The air navigation service provider for the UK, formerly National Air Traffic Services. NATS 'En Route' manage the traffic in the upper airspace and climbing and descending to land in the Manchester area.
NERL	NATS En Route Ltd - the part of NATS that delivers en route air traffic control.
Nm	Nautical miles.
NNR	National Nature Reserves - designated under the National Parks and Access to the Countryside Act 1949 and the Wildlife and Countryside Act 1981 to protect important habitats, species or geology.
Noise abatement	Activity to reduce the emission of noise from a given source (aircraft operations).
Noise-sensitive receptors	Specific locations or developments identified as likely to be adversely affected by noise from or due to aircraft operations. Individual locations will have varying degrees of sensitivity (measured noise exposure levels) depending upon their use. These provide a useful reference to the design principles N1, N2 and N3 where the number of people affected by noise, noise effects and noise sensitive areas are referenced.
NP	National Park - designated areas under the National Parks and Access to the Countryside Act 1949 to protect landscapes because of their special qualities.
Overflight	According to CAP1498, the definition of overflight is 'an aircraft in flight passing an observer at an elevation angle (approximately the angle between the horizon and the aircraft) that is greater than an agreed threshold, and at an altitude below 7,000ft.'
PANS-OPS	An ICAO document that stands for Procedures for Air Navigation Services Document 8168 outlines the rules and criteria for designing aircraft flying procedures - commonly shorted to PANS-OPS.
PBN	Performance Based Navigation - a range of specifications that requires aircraft to navigate to specific accuracy standards, mainly by using satellite-based navigation systems. It is designed to improve track-keeping accuracy for departing and arriving aircraft. The transition to PBN is a UK and International policy requirement and a foundation of the AMS and this ACP.
PBN IR	The PBN IR introduces the gradual implementation of PBN flight procedures to support safer, greener, and more efficient aircraft operations. The Regulation is binding in its entirety and directly applicable in all EU Member States.
Peak District	The Peak District - an upland area in England at the southern end of the Pennines. Mostly in Derbyshire, it extends into Cheshire, Greater Manchester, Staffordshire, West Yorkshire and South Yorkshire.
PDG	Procedure Design Gradient.
Places of Worship	For our analysis we have used the 'Ordnance Survey Address Base' count of 'Places of Worship', details of which they receive from the local government contributing authority. These include any Abbey, Baptistery, Cathedral, Church, Chapel, Citadel, Gurdwara, Kingdom Hall, Methodist, Mosque, Minster, Stupa, Succah, Synagogue, Tabernacle or Temple.

PNR	Preferred Noise Route - lines of tolerances widen from the runway ends out to 1.5km each side of the Standard Instrument Departure route. The area encompassed by these 1.5km tolerances is commonly recognised as the PNR.
Point Merge	Is based on a specific precision-area navigation (P-RNAV) route structure, consisting of a point (the merge point) and pre-defined legs (the sequencing legs) equidistant from this point. The sequencing is achieved with a “direct-to” instruction to the merge point at the appropriate time.
POL	Abbreviation for the Pole Hill DVOR navigation beacon and routes that is to the north of Manchester and is used by departing aircraft as a navigation point
Q&A	Question and Answer - a list of questions (and their answers) that help the reader understand the subject material.
Radius to fix	Radius to Fix (RF) is defined as a constant radius circular path around a defined turn centre that terminates at a fix.
RAG	Red, Amber, Green - a means of assessing a project’s status using the traffic light colours.
RF	Radius to Fix is defined as a constant radius path around a defined turn centre. It is a type of waypoint used in PBN procedures and provides highly accurate track keeping in a turn.
RNAV1	Area Navigation 1 is one of the specifications within PBN. Aircraft must maintain specific navigational accuracy within the flight. The ‘1’ suffix refers to the accuracy requirement in the procedure, in this case aircraft must fly within +/-1 nautical mile of the centreline of the designed route.
RNP APCH	Required Navigation Performance Approach - a type of RNP procedure used in the descent phase of flight.
RNP1	Required Navigation Performance - one of the specifications under PBN. Aircraft must maintain specific navigation accuracy, and in RNP are aided by on-board performance monitoring and alerting. It provides slightly more predictable track-keeping when compared to RNAV1. The ‘1’ suffix refers to the accuracy requirement in the procedure, in this case aircraft must fly within +/-1 nautical mile of the centreline of the designed route.
RNP1+RF	Required Navigation Performance with Radius to Fix turns.
ROSUN	One of three existing hold stacks used at Manchester Airport.
Route option	A term used in engagement to describe the design options that have been created in this step of the Airspace Change Process.
SAC	Special Area of Conservation - Designated under the Conservation of Habitats and Species Regulations 2017 as making a significant contribution to the conserving of the habitats of protected species.
Safety Case	A written demonstration of evidence and due diligence provided by a corporation to demonstrate the ability to operate safely and effectively control hazards.
SANBA[4]	A navigation fix to the south of Manchester used by departing aircraft.
SARG	Safety and Airspace Regulation Group which drives UK Civil Aviation Authority (CAA) safety standards including overseeing aircraft, airlines and air traffic controllers. They are also responsible for the planning and regulation of UK airspace.
Secretary of State	The title typically held by Cabinet Ministers in charge of Government Departments.
SESAR	The Europe-wide Single European Sky Air Traffic Management Research programme - a joint undertaking is an institutionalised European partnership between private and public

	sector partners set up to accelerate through research and innovation the delivery of the Digital European Sky (www.sesarju.eu).
SID	Standard Instrument Departure - pre-determined flightpath set by Air Traffic Control that aircraft follow when departing an airport.
SME	Subject Matter Expert(s) is a person (are people) who has (have) accumulated great knowledge in a particular field or topic.
SoN	Statement of Need - the means by which the change sponsor sets out what airspace issue or opportunity it is seeking to address and what outcome it wishes to achieve, without specifying solutions, technical or otherwise. Manchester Airport's SoN can be found online (airspacechange.caa.co.uk/documents/download/602).
SONEX[4]	A navigation fix to the east of Manchester used by departing aircraft.
SPA	Special Protection Area - protected areas for birds classified under the Wildlife and Countryside Act 1981 and protected under the Conservation of Habitats and Species Regulations 2017.
SSSI	Sites of Special Scientific Interest - areas of importance designated and protected by Natural England under the Wildlife and Countryside Act 1981 to recognise the land's wildlife, geology or landform is of special interest.
STAR	Standard Terminal Arrival Route - a pre-determined flightpath set by Air Traffic Control that aircraft follow when arriving at an airport.
Step 1B Design Principles Report	A document that formed part of Manchester Airport's Stage 1 submission to the CAA (https://airspacechange.caa.co.uk/documents/download/1382).
T-Bar	A name given to a type of RNAV final approach procedure. There is a final approach based on an extended centreline from the runway and then perpendicular to that, two Initial Approach Segments are connected to form a 'T' shape.
TABLY	A navigation fix to the south-west of Manchester used by departing aircraft.
Technical Coordination Group	Created by ACOG the Group regularly meet to discuss and resolve policy and technical issues affecting airspace design across all airports.
TODA	Take off Distance Available - The length of the paved surface of the take-off runway plus the length of the clearway.
TOS	Traffic Orientation Structure ensures smooth traffic flows and decrease the safety risks associated with crossing traffic.
Track to fix	A Track to Fix (TF) leg is used in PBN procedures to create a line between two waypoints. It is defined by the flight track to the following waypoint and Track to a Fix leg are sometimes called point-to-point legs for this reason.
Tranquillity	There is no universally accepted definition of tranquillity and therefore no accepted metric by which it can be measured. In general terms it can be defined as a state of calm. The consideration of impacts upon tranquillity for airspace change is with specific reference to National Parks and Areas of Outstanding Natural Beauty (AONB), plus any locally identified 'tranquil' areas that are identified through community engagement and are subsequently reflected within an airspace change proposal's design principles.
Transition	The part of the arrival route from the IAF at 7,000ft where aircraft are descending prior to joining the final approach at the FAF.
Transition Altitude	The altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes. Above this, the reference is to a Flight Level.

Transport Act 2000	The Transport Act 2000 is an Act of the Parliament of the United Kingdom. The Act provided for a number of measures across the transport industry. In the aviation sector, the Act set a framework for creation of a public-private partnership of National Air Traffic Services.
Uncontrolled Airspace	Uncontrolled airspace is airspace where an ATC service is not deemed necessary or cannot be provided for practical reasons.
Unviable	Options which would not comply with the rules or for flight procedure design, specifically the requirements of ICAO PANS-OPS 8168, or if they are not compliant with these rules, did not have a supporting safety justification.
VHF	Very High Frequency.
Viable and good fit	Options that are viable to design and which would be expected to meet the three design principles with which all design options 'must' comply (design principles Safety, Policy, and Capacity).
Viable but poor fit	Options that are viable to design, but which would not be expected to meet the requirements of the design principles Safety, Policy and Capacity.
VNAV	Vertical Navigation - a term for vertical (up/down) navigation used within Performance Based Navigation.
VRP	Visual reference point.
WAL	Abbreviation for the Wallasey DVOR navigation beacon that is to the west of Manchester and is used by departing aircraft as a navigation point.
XORBO[4]	A navigation fix to the north-east of Manchester used by departing aircraft.
XUMAT[4]	A navigation fix to the north of Manchester used by departing aircraft.

MAG Manchester Airport

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Co-financed by the Connecting Europe Facility of the European Union