Liverpool John Lennon Airport
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LJLA Airspace Transition

Design Principles Evaluation

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Issue 1	Initial Issue	14th May 2019
Issue 1.1	Addition of 'Do Nothing' evaluation	16th May 2019
Issue 2	Addition of rationale for assessing baseline procedures in 'groups' see baseline options tables in section 3.1	29th May 2019

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Author		
Reviewer		

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1 Introduction

1.1 Background

The LJLA Airspace Transition project is currently at the Stage 2 – Develop & Assess stage of the CAP 1616 Airspace Design process. Step 2A requires the change sponsor to develop a comprehensive list of options that address the Statement of Need and that align with the Design Principles developed in Stage 1. As the change sponsor, LJLA is then required to test these options with those stakeholders that contributed to the development of the Design Principles before producing a Design Principle evaluation that sets out how the options have responded to the Design Principles.

This document articulates the evaluation of each of the options developed against the Design Principles agreed in Stage 1 and forms part of the document set required to provide the necessary evidence to satisfy the Stage 2 Develop & Assess Gateway and should be read alongside the LJLA Airspace Transition Initial Options Appraisal document.

The change sponsor must also bear in mind that the options that are eventually chosen must also be compliant with the relevant technical criteria as detailed in Appendix F to CAP 1616. Also included in this document is an initial evaluation of how each option developed responds to the technical criteria, identifying where plans will need to be established to resolve any issues that may arise.

1.2 Prioritised List of Design Principles

The work undertaken during Stage 1 helped to establish a prioritised shortlist of Design Principles to act as a framework against which Design Options have been drawn up. The prioritised list of Design Principles is shown in Table 1 below.

Prioritised DP	Design Principle
1	Procedures must be designed to meet acceptable levels of flight safety.
2	Procedures must be designed to minimise aircraft emissions to reduce air pollution.
3	Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.
=4 (4a)	Procedures must be designed to minimise the impact of noise below 7,000ft.
=4 (4b)	Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.
6	Procedures should be designed to enable more continuous climbs.
=7 (7a)	Procedures should be designed to fit within existing airspace constraints and boundaries.

Prioritised DP	Design Principle
=7 (7b)	Procedures should be designed to enable more continuous descents.
9	Procedures should be designed that minimise the number of track miles flown.
10	If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.
11	Procedures should be developed to allow for alternative routes to offer respite.
=12 (12a)	Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.
=12 (12b)	Procedures should be designed to concentrate routes to minimise the numbers overflown.
14	Procedures should be designed to ensure predictability of tracks for consistency of operations.
15	Procedures should be designed to include alternative routes to avoid other aviation operators.

Table 1 – Prioritised Design Principles

1.3 Step 2B – Options Appraisal

The second part of Stage 2 (Step 2B) involves an assessment of the options to develop the short list to be taken forward to Stage 3. Options Appraisal is used as a tool throughout the CAP1616 process to help refine the options from an initial longlist, down to a short list and a final set of preferred options. The process is iterative with the Initial Options Appraisal being used to whittle down the longlist in Stage 2B, Full Options Appraisal of the shortlist taking place in Stage 3 for consultation, and the Final Options Appraisal supporting the submission of the ACP application to CAA.

At the end of Step 2B, LJLA will submit details of the options and the Initial Options Appraisal to the CAA to pass through the Stage 2 Develop & Assess Gateway, currently programmed for 31st May 2019.

2 Longlist of Options

2.1 Procedure Options

New arrival and departure procedures, including transitions, are being considered by the Airport to comply with the new regulatory directives, and to improve operational efficiency. Table 2 contains a summary of the extant conventional procedures and the longlist of options under consideration.

Procedure	Number of options	Basic Description
Conventional SID from each runway	4	Conventional departures from each runway to POLE HILL, REXAM, WAL and BARTN
SID from runway 27 to AGGER	3	Options include: an immediate right turn to AGGER; a later right hand turn to AGGER; and a left hand turn to AGGER
SID from runway 27 to WAL	2	Options include: a right hand turn overhead the Mersey to WAL; and a later right hand turn overland to WAL.
SID from runway 27 to TEMP2	1	Only one option available to balance aircraft performance versus noise sensitive areas.
SID from runway 09 to AGGER	2	Both options follow similar series of right hand turns to achieve 11,000ft by AGGER. Left hand turns not feasible to achieve height by AGGER.
SID from runway 09 to CAVEN	4	Two options turning left, and two turning right to CAVEN.
SID from runway 09 to CORKA	3	Two options turning right to CORKA and one turning left.
Transitions	0	No current Transition procedures. Aircraft are vectored by ATC to join the approach procedure.
Transition to runway 27 from DIOUF	1	Only one option available to achieve continuous descent profile from starting altitude.
Transition to 27 from NOMSU	1	Only one option due to conflict with Manchester arrivals.
Transition to 27 from VEGUN	2	One option routes aircraft to join the approach procedure from the north and the other offers a shorter transition from southeast.

Procedure	Number of options	Basic Description
Transition to runway 09 from DIOUF	1	Only one option for continuous descent and optimal length.
Transition to runway 09 from NOMSU	1	Only one option considered: optimal route remains over the sea.
Transition to runway 09 from VEGUN	1	Only one option for continuous descent and optimal length.
Conventional and RNAV approaches to each runway	9	Conventional approaches (ILS/DME/NDB, LOC/DME/NDB, NDB/DME and SRA) and RNAV approaches to each runway
Approach to runway 27	3	Three traditional T-bar approaches of varying lengths with defined Missed Approach Procedures.
Approach to runway 09	3	Three traditional T-bar approaches of varying lengths with defined Missed Approach Procedures.

Table 2 – Summary of number of options under consideration

3 Design Principle Evaluation

3.1 Evaluation of the Options against the Design Principles

Each option has been assessed against the prioritised list of Design Principles shown in Table 1 in Section 1 above. Table 3 below gives an overview of how well each option aligns to each Design Principle; it shows a summary of the analysis conducted for each option 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.

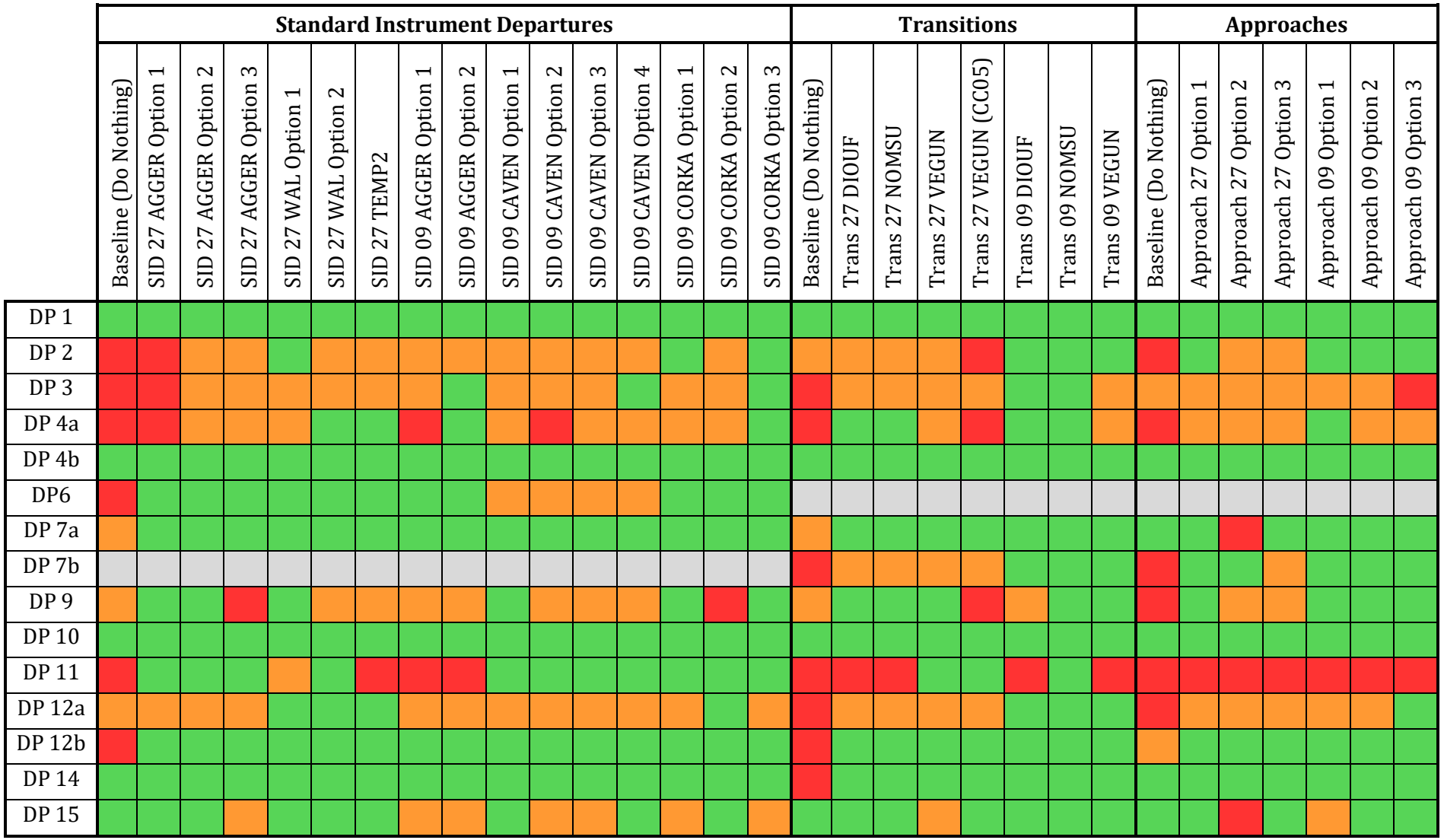


Table 3 – Design Principle Evaluation Overview

Design Principle Evaluation			**OPTION NO: Baseline**
Option Name: SID Baseline (Do Nothing)			REJECT
Description of Option: Retain the current conventional SIDs. The DPE for all SIDs are summarised in this table – the results were the same for each.			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change. Current conventional procedures are safe.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Maximum altitude for aircraft following SIDs is 4,000 ft until cleared by ATC.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Conventional routing less predictive that PBN. Current procedures do not take into account sensitive areas.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Maximum altitude for aircraft following SIDs is 4,000 ft until cleared by ATC.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No Change. Current conventional procedures are technically flyable and maintain existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Maximum altitude for aircraft following SIDs is 4,000 ft until cleared by ATC.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Potential for aircraft to leave controlled airspace if clearance to climb not received by ATC.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: More direct routing achievable.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Single SIDs available depending on routing.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change. ATC intervention required for altitude clearances to join the en-route structure and deconfliction between arriving and departing traffic.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Conventional procedures rely on the pilot interpreting ground-based beacon information and don't represent actual tracks flown.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Single SIDs available depending on routing to destination.			

Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change to existing arrangements.			

Design Principle Evaluation			**OPTION NO: SID 1**
Option Name: Runway 27 SID AGGER Option 1			REJECT
Description of Option: On achieving 500 ft, aircraft make an immediate right-hand turn to fly direct towards AGGER, achieving an altitude of FL 110 (approximately 11,000 ft) by AGGER. During the initial turn, aircraft will fly-by waypoints GPW01, GPW03, GPN01 and GPN03.			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Although the procedure incorporates a continuous climb, the procedure is designed to be flown at 190 Kts and therefore the aircraft will not be in an optimum configuration so will need an increased power setting to fly the profile. The aircraft will not be able to follow this route if the turn is delayed achieving optimum speed/configuration to minimise emissions.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Sefton Park (Grade 1 historic park) and a secondary school during the initial turn after departure. A steeper climb gradient to avoid the areas vertically would not be possible in the planned configuration.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The initial turn is designed to be flown at 190 Kts and therefore the aircraft will not be in an optimum configuration so will need an increased power setting to fly the profile. A steeper climb gradient is not possible in this configuration and the aircraft will not be able to follow this route if the turn is delayed to achieve optimum speed/configuration.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure represents the most direct route to AGGER.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Option to route to the south of the airport to route to AGGER – to be assessed as an alternative SID option.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

This procedure is not compliant with the criteria laid down in PANS-OPS 8168 Vol II Construction of Visual and Instrument Flight Procedures and has therefore been rejected.

Design Principle Evaluation			**OPTION NO: SID 2**
Option Name: Runway 27 SID AGGER Option 2			ACCEPT
Description of Option: Climb straight ahead then turn right to flyby waypoints 270501, 270502, 270503 and GPN03 then direct to overfly AGGER, achieving an altitude of FL 110 (approximately 11,000 ft) by AGGER. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance but is not the most direct routing to AGGER. If procedure design allows, an earlier turn to allow more direct routing would reduce aircraft emissions but may adversely affect DP 3 and DP 4a.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Eastham Country Park after departure, 3.2 nm on the extended centreline. Current departing aircraft from Runway 27 follow this routing and are above 2, 000 ft over the Park. A fixed Noise Monitoring Terminal is located adjacent to Eastham Country Park. A school and a hospital, within built-up areas, are close to the planned flightpath; aircraft will be above 2,000 ft and 4,000 ft respectively at these points. If procedure design allows, an earlier turn may avoid Eastham Country Park but may adversely affect DP 2 and DP 4a.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise. Routing takes the aircraft over populated areas of Bebington and Liverpool. Routing to avoid populated areas would have an adverse effect on DP 2 and DP 9.			

Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Although this is not the most direct route to AGGER, it is the shortest route that allows the aircraft to fly at optimum performance levels and is PANS-OPS compliant in design.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Option to route to the south of the airport to route to AGGER – to be assessed as an alternative SID option.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: SID 3**
Option Name: Runway 27 SID AGGER Option 3			ACCEPT
Description of Option: Climb straight ahead then turn left to flyby waypoints 270501, 270601, 270602 and 270603 then direct to overfly AGGER, achieving an altitude of FL 110 (approximately 11,000 ft)by AGGER. (Alternatively, flyby 270602 then GPN03 before direct to overfly AGGER). Both options are assessed together; the aircraft will be above approximately 7, 000 ft by the time the routes split so there will be minimal difference between the 2 options. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance but has increased distance to AGGER by turning left initially after take-off. A right turn after take-off would meet this DP, but this has been assessed as options 1 and 2 and may adversely affect DP 4a			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Eastham Country Park after departure, 3.2 nm on the extended centreline. Current departing aircraft from Runway 27 follow this routing and are above 2, 000 ft over the Park. A fixed Noise Monitoring Terminal is located adjacent to Eastham Country Park. The procedure also overflies Capenhurst Nuclear Processing plant, a Restricted area up to 2,200 ft, at an altitude of approximately 4,000 ft. The route flies over school grounds in Ellesmere Port, at an altitude of approximately 4,500 ft. Routing to avoid all these sites would have further effect on DP 2 and DP 9.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise. Routing takes the aircraft over populated areas of Bebington and Ellesmere Port but avoids the more densely populated south Liverpool. Any routing to decrease the impact of noise would have an adverse effect on DP 2 and DP 9.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: By turning left about after take-off, this procedure is not the most direct routing to AGGER and therefore increases the number of track miles flown. The most direct routing would involve a right turn after take-off, which has been assessed as options 1 and 2.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: This option would provide respite should the chosen option route to the north of the airport.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload. In addition, there may be potential conflict with this procedure and traffic inbound to Hawarden Runway 22.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: .This procedure has the potential to impact on Hawarden operations. ATC intervention may be required to ensure deconfliction between LJLA traffic and aircraft inbound to Hawarden Runway 22.			

Design Principle Evaluation			**OPTION NO: SID 4**
Option Name: Runway 27 SID WAL Option 1			ACCEPT
Description of Option: Climb straight ahead then turn right to flyby waypoint GPW01 then direct to overfly WAL. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be the most direct routing to WAL and incorporates a continuous climb profile.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies or is in the vicinity of a number of schools in residential areas of Bebington and Birkenhead, although this procedure is very similar to the current Wallasey SID currently in use. Routing to avoid all sensitive areas would have an adverse effect on DP 2, DP 4a and DP 9.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise. Direct track to WAL follows extended routing over populated areas of Bebington and Birkenhead. Minimising the impact of noise would have an adverse effect on DP 2 and DP 9.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET

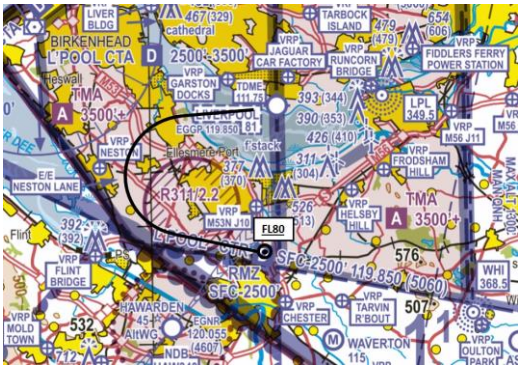
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure represents the most direct routing to WAL.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This option could provide respite to the chosen option but will increase the numbers overflown, having an adverse effect on DP 2, DP 3 and DP 4a.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to integrate with the en-route structure reducing the required input from ATC.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: SID 5**
Option Name: Runway 27 SID WAL Option 2			ACCEPT
Description of Option: Climb straight ahead then turn right to flyby waypoint NEW6 then direct to overfly WAL. 			
esign Principle 1: Procedures must be designed to meet acceptable levels of flight safety.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.				
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile and has been designed to be flown at optimum aircraft performance but is not the most direct routing to WAL. A reduction in track miles to reduce air pollution has been assessed as option 1, which would have an adverse effect on DP 4a.				
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Eastham Country Park after departure, 3.2 nm on the extended centreline and also flies in the vicinity of schools in Bebington. The routing is close to two major hospitals (Clatterbridge and Arrowe Park) in the Wirral. Routing to avoid all these sites would have further effect on DP 2, DP 4a and DP 9.				
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise. The routing follows the shortest possible route over populated areas of Bebington and avoids most of the populated areas of the Wirral.				

Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure does not follow the most direct routing to WAL but represents only approximately 1 nm greater than the most direct route. A reduction in track miles has been assessed as option 1, which would have an adverse effect on DP 4a.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This option would provide respite should an alternative option be chosen.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure has been designed to integrate with the en-route structure reducing the required input from ATC.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: SID 6**
Option Name: Runway 27 SID TEMP2			ACCEPT
Description of Option: Climb straight ahead then turn left to flyby waypoints NEW6 and NEW5 then direct to overfly TEMP2. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance but is not the most direct routing to TEMP2. A change to the routing could have an adverse effect on DP 3 and DP 4a.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Eastham Country Park after departure, 3.2 nm on the extended centreline. Current departing aircraft from Runway 27 follow this routing and are above 2, 000 ft over the Park. A fixed Noise Monitoring Terminal is located adjacent to Eastham Country Park. The procedure also flies in the vicinity of schools in Bebington. Routing to avoid all these sites would have further effect on DP 2, DP 4a and DP 9.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise. The routing flies over populated areas of Bebington and Raby Mere but follows the most direct route across the populated area. The route also avoids most of the populated areas in the southern part of the Wirral, including the densely populated Ellesmere Port.			

Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure does not follow the most direct routing to TEMP2. A change to the routing could have an adverse effect on DP 3 and DP 4a.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No alternative options have been developed for this SID, as there are no practical alternatives. Any alternate options may have an adverse effect on DP 3, DP 4a and DP 9.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to integrate with the en-route structure reducing the required input from ATC.			

Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: SID 7**
Option Name: Runway 09 SID AGGER Option 1			ACCEPT
Description of Option: Climb straight ahead then turn right to flyby waypoints 091601, 091602, 091603, GPN01 and GPN03 then direct to overfly AGGER. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance but has increased distance to AGGER by turning right initially after take-off. A more direct routing to AGGER would have an adverse effect on DP 3, DP 4a, DP 6, DP 7a and DP 12.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Hale Primary School after departure, 1.5 nm on the extended centreline. The procedure also overflies schools in Runcorn and Frodsham. Option 8 amends the routing to avoid sensitive areas in Runcorn and Frodsham.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise. Routing takes the aircraft over the village of Hale and populated areas of Runcorn, Frodsham and Helsby. Option 8 amends the routing to avoid sensitive areas in Runcorn and Frodsham.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET

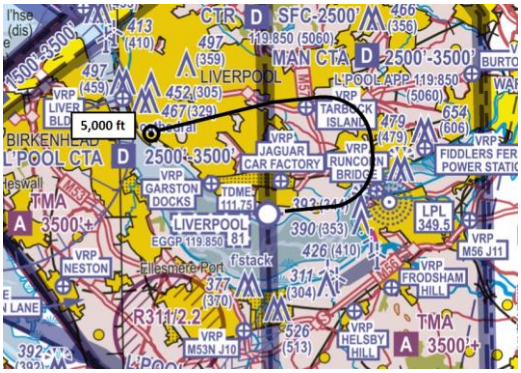
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure has been designed to be flown in a clockwise direction around LJLA to enable aircraft to obtain the correct height prior to AGGER. Therefore, this is not the most direct routing to AGGER and increases the number of track miles flown. A more direct routing to AGGER would have an adverse effect on DP 3, DP 4a, DP 6, DP 7a and DP 12.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This option would not provide respite for alternative options.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload. In addition, there may be potential conflict with this procedure and traffic inbound to Hawarden Runway 22.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure has the potential to impact on Hawarden operations. ATC intervention may be required to ensure deconfliction between LJLA traffic and aircraft inbound to Hawarden Runway 22.			

Design Principle Evaluation			**OPTION NO: SID 8**
Option Name: Runway 09 SID AGGER Option 2			ACCEPT
Description of Option: Climb straight ahead then turn right to flyby waypoints 091501, 091502, 091201, 091603, GPN01 and GPN03 then direct to overfly AGGER. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance but has increased distance to AGGER by turning right initially after take-off. A more direct routing to AGGER would have an adverse effect on DP 3, DP 4a, DP 6, DP 7a and DP 12.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Hale Primary School after departure, 1.5 nm on the extended centreline.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise. Routing takes the aircraft over the village of Hale immediately after take-off. The proposed turn after take-off is as tight as PANS-OPS design criteria will allow to minimise the population centres overflown.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET

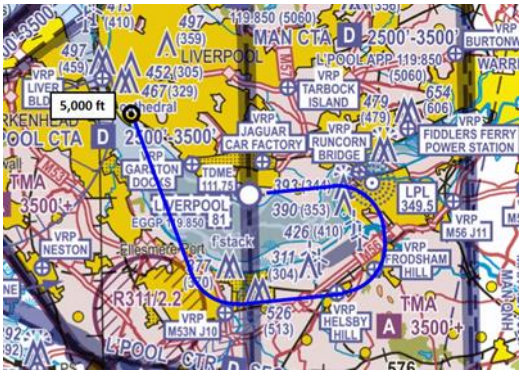
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure has been designed to be flown in a clockwise direction around LJLA to enable aircraft to obtain the correct height prior to AGGER. Therefore, this is not the most direct routing to AGGER and increases the number of track miles flown. A more direct routing to AGGER would have an adverse effect on DP 3, DP 4a, DP 6, DP 7a and DP 12.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No alternative options have been developed for this SID that would provide respite.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload. In addition, there may be potential conflict with this procedure and traffic inbound to Hawarden Runway 22.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure has the potential to impact on Hawarden operations. ATC intervention may be required to ensure deconfliction between LJLA traffic and aircraft inbound to Hawarden Runway 22.			

Design Principle Evaluation			**OPTION NO: SID 9**
Option Name: Runway 09 SID CAVEN Option 1			ACCEPT
Description of Option: Climb straight ahead then turn left to flyby waypoints 091601, 091001 and 091002 then direct to overfly CAVEN. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.				
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance but is restricted to 5,000 ft maximum altitude. Aircraft will remain at this altitude for a number of track miles. This restriction is to comply with FASI (North) requirements.				
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Hale Primary School after departure, 1.5 nm on the extended centreline. The procedure also overflies schools in Widnes. Alternate routing would have an adverse effect on DP 2 and DP 9.				
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise but has been restricted to a maximum altitude of 5,000 ft. Routing takes the aircraft over populated areas of Widnes, Huyton and Liverpool. The height restriction is to comply with FASI (North) requirements, alternate routing would have an adverse effect on DP 2 and DP 9.				
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.		NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile but is limited to a maximum altitude of 5,000 ft, which aircraft will achieve prior to CAVEN. This restriction is to comply with FASI (North) requirements.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure represents the most direct tack to CAVEN.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This option would provide respite should the chosen option route to the south of the airport.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload.			

Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: SID 10**
Option Name: Runway 09 SID CAVEN Option 2			ACCEPT
Description of Option: Climb straight ahead then turn right to flyby waypoints 091601, 091602 and 091603 then direct to overfly CAVEN. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.				
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance but is restricted to 5,000 ft maximum altitude. Aircraft will remain at this altitude for a number of track miles. The distance to CAVEN is increased by turning right initially after take-off. The height restriction is to comply with FASI (North) requirements. Turning left after take-off to reduce track miles is assessed as options 9 and 12.				
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Hale Primary School after departure, 1.5 nm on the extended centreline. The procedure also overflies schools in Runcorn, Frodsham and Ellesmere Port. Option 12 amends the routing to avoid sensitive areas in Runcorn and Frodsham. Alternative routing to also avoid Ellesmere Port would have an adverse effect on DP 9.				
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.		NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise, but is restricted to 5,000 ft maximum altitude for en-route requirements. Routing takes the aircraft over the village of Hale and populated areas of Runcorn, Frodsham, Helsby and Ellesmere Port. The height restriction is to comply with FASI (North) requirements. Alternate routing to reduce track miles is assessed as options 9, 11 and 12.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile but is limited to a maximum altitude of 5,000 ft, which aircraft will achieve prior to CAVEN. This restriction is to comply with FASI (North) requirements.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: By turning right after take-off, this procedure is not the most direct routing to CAVEN and therefore increases the number of track miles flown. Turning left after take-off to reduce track miles is assessed as options 9 and 12.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: This option could provide respite should the chosen option route to the north of the airport.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload. In addition, there may be potential conflict with this procedure and traffic inbound to Hawarden Runway 22.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure has the potential to impact on Hawarden operations. ATC intervention may be required to ensure deconfliction between LJLA traffic and aircraft inbound to Hawarden Runway 22.			

Design Principle Evaluation			**OPTION NO: SID 11**
Option Name: Runway 09 SID CAVEN Option 3			ACCEPT
Description of Option: Climb straight ahead then turn right to flyby waypoints 091501, 091502, 091201 and 091603 then direct to overfly CAVEN. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance but is restricted to 5,000 ft maximum altitude. Aircraft will remain at this altitude for a number of track miles. The distance to CAVEN is increased by turning right initially after take-off. The height restriction is to comply with FASI (North) requirements. Turning left after take-off to reduce track miles is assessed as options 9 and 12.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Hale Primary School after departure, 1.5 nm on the extended centreline. The procedure also overflies schools in Ellesmere Port. Alternate routing would have an adverse effect on DP 2, DP 4a and DP 9.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise, but is restricted to 5,000 ft maximum altitude for en-route requirements. Routing takes the aircraft over the village of Hale and populated areas of Ellesmere Port. The height restriction is to comply with FASI (North) requirements. Alternate routing would have an adverse effect on DP 2, DP 3 and DP 9.			

Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile but is limited to a maximum altitude of 5,000 ft, which aircraft will achieve prior to CAVEN. This restriction is to comply with FASI (North) requirements.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: By turning right after take-off, this procedure is not the most direct routing to CAVEN and therefore increases the number of track miles flown. Turning left after take-off to reduce track miles is assessed as options 9 and 12.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This option could provide respite should the chosen option route to the north of the airport.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload. In addition, there may be potential conflict with this procedure and traffic inbound to Hawarden Runway 22.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure has the potential to impact on Hawarden operations. ATC intervention may be required to ensure deconfliction between LJLA traffic and aircraft inbound to Hawarden Runway 22.			

Design Principle Evaluation			**OPTION NO: SID 12**
Option Name: Runway 09 SID CAVEN Option 4			ACCEPT
Description of Option: Climb straight ahead then turn left to flyby waypoints 091501, 09xx02, 091001 and 091002 then direct to overfly CAVEN. This option is an amendment to Option 1 to avoid the densely populated areas overflown by that option.			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.				
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance but is restricted to 5,000 ft maximum altitude. Aircraft will remain at this altitude for a number of track miles. The distance to CAVEN is increased slightly by routing via the gap between Widnes and Warrington. The height restriction is to comply with FASI (North) requirements. Alternate routing would have an adverse effect on DP 2 and DP 4a.				
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Hale Primary School after departure, 1.5 nm on the extended centreline.				
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise but has been restricted to a maximum altitude of 5,000 ft. Routing takes the aircraft over populated areas of Huyton and Liverpool. The height restriction is to comply with FASI (North) requirements. Alternate routing would have an adverse effect on DP 2 and DP 9.				

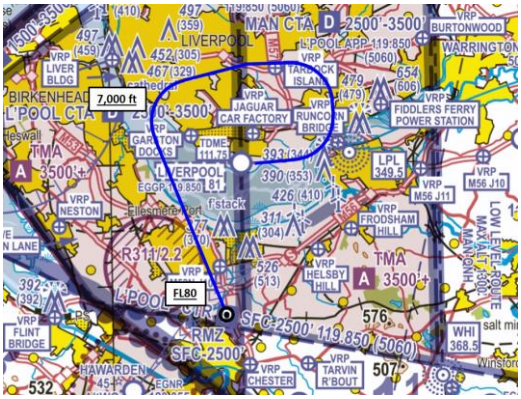
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile but is limited to a maximum altitude of 5,000 ft, which aircraft will achieve prior to CAVEN. This restriction is to comply with FASI (North) requirements.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The number of track miles flown is increased by delaying the initial left-hand turn to avoid overflying populated areas of Widnes. Alternative routing would have an adverse effect on DP 4a.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This option could provide respite should the chosen option route to the south of the airport.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: SID 13**
Option Name: Runway 09 SID CORKA Option 1			ACCEPT
Description of Option: Climb straight ahead then turn right to flyby waypoints 091601 and 091301 then direct to overfly CORKA. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance and includes a continuous climb profile.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Hale Primary School after departure, 1.5 nm on the extended centreline. The procedure also overflies schools in Runcorn and Frodsham. Option 15 amends the routing to avoid sensitive areas in Runcorn and Frodsham.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise. Routing takes the aircraft over the village of Hale and populated areas of Runcorn and Frodsham. Option 15 amends the routing to avoid sensitive areas in Runcorn and Frodsham.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure represents the most direct route to CORKA.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This option would provide respite should the chosen option route to the north of the airport.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload. In addition, there may be potential conflict with this procedure and traffic inbound to Hawarden Runway 22.			

Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure has the potential to impact on Hawarden operations. ATC intervention may be required to ensure deconfliction between LJLA traffic and aircraft inbound to Hawarden Runway 22.			

Design Principle Evaluation			**OPTION NO: SID 14**
Option Name: Runway 09 SID CORKA Option 2			ACCEPT
Description of Option: Climb straight ahead then turn left to flyby waypoints 091601, 091001, 091002 and CAVEN then direct to overfly TEMP2. (Planned procedure uses waypoint TEMP2 not CORKA)			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.				
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance but has increased distance to TEMP2 by turning left initially after take-off. Turning right after take-off to reduce the distance flown has been assessed as options 13 and 15.				
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Hale Primary School after departure, 1.5 nm on the extended centreline. The procedure also overflies schools in Widnes. Alternate routing would have an adverse impact on DP 2 and DP 9.				
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise. Routing takes the aircraft over populated areas of Widnes, Huyton and Liverpool. Alternate routing would have an adverse impact on DP 2 and DP 9.				
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.		NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: By turning left about after take-off, this procedure is not the most direct routing to CORKA and therefore increases the number of track miles flown. Turning right after take-off to reduce the the number of track miles flown has been assessed as options 13 and 15.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This option would provide respite should the chosen option route to the south of the airport.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to integrate with the en-route structure reducing the required input from ATC.			

Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: SID 15**
Option Name: Runway 09 SID CORKA Option 3			ACCEPT
Description of Option: Climb straight ahead then turn right to flyby waypoints 091501 and 091502 then direct to overfly TEMP2. This option is an amendment to Option 1 to avoid the densely populated areas overflown by that option. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.				
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance and represents the most direct track to TEMP2.				
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies Hale Primary School after departure, 1.5 nm on the extended centreline.				
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise. Routing takes the aircraft over the village of Hale.				
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.				

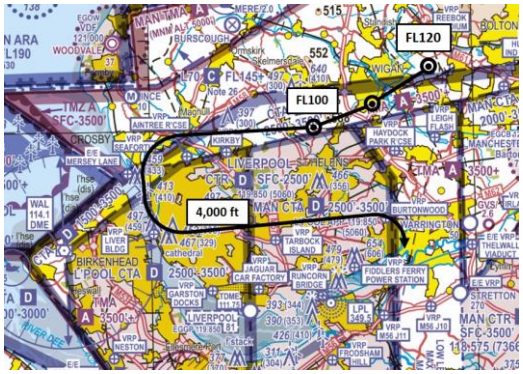
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure represents the most direct route to CORKA.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This option would provide respite should the chosen option route to the north of the airport.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload. In addition, there may be potential conflict with this procedure and traffic inbound to Hawarden Runway 22.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure has the potential to impact on Hawarden operations. ATC intervention may be required to ensure deconfliction between LJLA traffic and aircraft inbound to Hawarden Runway 22.			

Design Principle Evaluation			**OPTION NO: Baseline**
Option Name: Transitions Baseline (Do Nothing)			REJECT
Description of Option: Transitions are currently managed tactically by ATC. Aircraft are vectored to the IAF for the desired approach procedure. There are no defined routes for Transition; the DPE contained in this table applies to all tactical routes as the same results applied to each.			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change. Tactical vectoring by ATC is currently safe.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The current transitions from STAR procedure to approach procedure is tactically managed by ATC. Track lengths and altitude profiles will depend on the local traffic picture at the time and may not be optimum.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Tactical routing does not take into account sensitive locations in the local area.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Tactical routing does not take into account noise-sensitive or residential areas.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No Change. Current conventional procedures are technically flyable and maintain existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for Transitions.			

Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Routing and altitude profile will be tactically managed by ATC and will depend on the local air picture at the time. There is no guarantee that the procedures will be contained within CAS.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Descent clearances will be as directed by ATC.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Whilst ATC will endeavour to use the most direct routing, actual routes will depend on the traffic situation at the time.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: There are no extant transition procedures. Routing is tactically managed by ATC.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: There are no extant transition procedures. Routing is tactically managed by ATC.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Routing is tactically managed by ATC and will be dictated by the local air picture at the time.			

Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Routing is tactically managed by ATC and will be dictated by the local air picture at the time.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change to existing arrangements.			

Design Principle Evaluation			**OPTION NO: TRANS 1**
Option Name: Trans 27 DIOUF			ACCEPT
Description of Option: DIOUF @ FL120. Flyby CABRY, LATON (LATON @ FL100), NEW1 and NEW2. Flyby NEW3 at 4,000 ft then flyby IAF at LIV05 to join IAP. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance and includes a continuous descent profile. The extended 'S' profile increases track miles flown but this is required to allow the improved descent profile given the aircraft's altitude at the beginning of the Transition. Height restrictions at NEW3 to deconflict from Manchester arrival traffic means the descent profile flown is not optimum. This restriction is to comply with FASI (North) requirements.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies residential areas of Crosby and Liverpool in the vicinity of a number of schools and close to hospitals, but at altitudes greater than 4,000 ft. The procedure also passes over two small country parks, above 2,000 ft. Alternate routing would have an adverse effect on DP 2, DP 4a, DL 7b and DP 9.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure passes over residential areas of Liverpool and Crosby, aircraft will be above 5,000 ft and in the descent, so will have lower power settings. Routing is planned over industrial areas and close to the motorways, with higher ambient noise.			

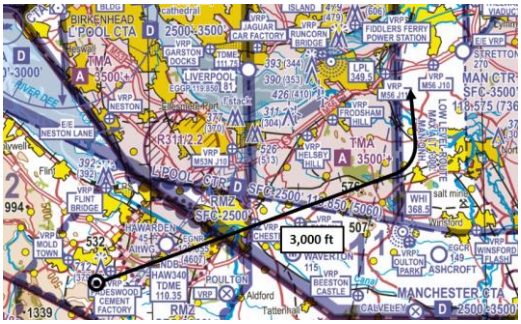
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for Transitions.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to enable a more continuous descent but height restrictions at NEW3 to deconflict from Manchester arrival traffic means the descent profile flown is not optimum. This restriction is to comply with FASI (North) requirements.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The track miles flown is the minimum required for a continuous descent profile to be flown, given the aircraft's altitude at the beginning of the Transition.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No alternative routes developed for this Transition. The procedure has been designed to comply with FASI (North) requirements.			

Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: All aircraft arrivals have previously required tactical routing from ATC from STAR to IAP. Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: TRANS 2**
Option Name: Trans 27 NOMSU			ACCEPT
Description of Option: Flyby NOMSU and NEW2. Flyby NEW3 at 4,000 ft then flyby IAF at LIV05 to join procedure. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure represents the most direct route from NOMSU to the IAP. The procedure has been designed to be flown at optimum aircraft performance and includes an improved descent profile, although height restrictions at NEW3 due to Manchester arrival traffic restricts the use of a continuous descent profile. This restriction is to comply with FASI (North) requirements.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies residential areas of Liverpool in the vicinity of a number of schools and close to hospitals, but at altitudes greater than 4,000 ft. The procedure also passes over two small country parks, above 2,000 ft. Alternate routing would have an adverse effect on DP 2, DP 4a, DL 7b and DP 9.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedures routes over residential areas of Wallasey, Liverpool and Huyton during the descent, so will have lower power settings. Routing is planned over industrial areas and close to the motorways, with higher ambient noise.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for Transitions.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to enable a more continuous descent. Height restrictions at NEW3 to deconflict from Manchester arrival traffic means the descent profile flown is not optimum. This restriction is to comply with FASI (North) requirements.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure is almost the most direct route from NOMSU to the IAP, although routing in a direct line would only reduce the track distance flown by approximately 500m.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No alternative routes developed for this Transition. The procedure has been designed to comply with FASI (North) requirements.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: All aircraft arrivals have previously required tactical routing from ATC from STAR to IAP. Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: TRANS 3**
Option Name: Trans 27 VEGUN			ACCEPT
Description of Option: Flyby VEGUN then flyby NEW7 at 3,000 ft. Flyby IAF at NEW8 to join procedure. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure represents the most direct routing from VEGUN, minimising the track miles flown. The height restriction of 3,000 ft at NEW7 is required to separate from Manchester departures and hence the descent profile is not continuous, requiring an increased engine power setting. This restriction is to comply with FASI (North) requirements.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure routes close to schools in Broughton and Chester, but at heights in excess of 3,000 ft. The procedure overflies Delamere Forest Park. Alternate routing would have an adverse effect on DP 2 and DP 9.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure routes over mainly rural locations, with the exception of residential areas in Broughton and Chester, where aircraft will be at, or above, 3,000 ft. The procedure does not incorporate a continuous descent profile due to a height restriction of 3,000 ft at NEW7 to deconflict from Manchester departures, requiring an increased engine power setting. This restriction is to comply with FASI (North) requirements.			

Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for Transitions.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: A height restriction of 3,000 ft at NEW7 is required to separate from Manchester departures and hence the procedure does not fully follow a continuous descent profile. This restriction is to comply with FASI (North) requirements.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure represents the most direct flyable route from VEGUN to the IAP.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This option would provide respite should an alternative option be chosen.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: All aircraft arrivals have previously required tactical routing from ATC from STAR to IAP. Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure has the potential to impact on Hawarden operations. ATC intervention may be required to ensure deconfliction between LJLA traffic and aircraft inbound to Hawarden Runway 22.			

Design Principle Evaluation			**OPTION NO: TRANS 4**
Option Name: Trans 27 VEGUN (CC05)			ACCEPT
Description of Option: VEGUN @ FL90. Flyby NEW2 then flyby NEW3 at 4,000 ft and flyby IAF at LIV05 to join procedure. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure routes to the north of the airport, increasing the track miles flown. A height restriction of 4,000 ft at NEW3 due to Manchester arrival traffic restricts the use of a continuous descent profile. This routing is required when Manchester Airport is operating on Runway 05 to deconflict with Manchester arrivals. The height restriction is to comply with FASI (North) requirements. Alternate routing would have an adverse effect on DP 4a and DP 9.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies two schools and the periphery of Clatterbridge Hospital in the Wirral, although aircraft will be above 5,000 ft at this point. The procedure also overflies residential areas of Liverpool in the vicinity of a number of schools and close to hospitals, but at altitudes greater than 4,000 ft. The procedure passes over two small country parks, above 2,000 ft. Alternate routing would have an adverse effect on DP 2, DP 4a and DP 9.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure routes over residential areas of Birkenhead, Liverpool and Huyton. A height restriction of 4,000 ft at NEW3 due to Manchester arrival traffic restricts the use of a continuous descent profile, requiring an increased engine power setting. Increased track miles by routing to the north increases the time below 7,000 ft. This routing is required when Manchester Airport is operating on Runway 05 to deconflict with Manchester arrivals. The height restriction is to comply with FASI (North) requirements. Alternate routing would have an adverse effect on DP 2 and DP 9.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for Transitions.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to enable a more continuous descent. However, extended track miles and a height restriction of 4,000 ft at NEW3 to deconflict from Manchester arrival traffic means the descent profile flown is not optimum. This restriction is to comply with FASI (North) requirements.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure routes to the north of the airport, increasing the track miles flown. This routing is required when Manchester Airport is operating on Runway 05 to deconflict with Manchester arrivals.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			

Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This option would provide respite should an alternative option be chosen.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: All aircraft arrivals have previously required tactical routing from ATC from STAR to IAP. Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: TRANS 5**
Option Name: Trans 09 DIOUF			ACCEPT
Description of Option: DIOUF @ FL120. Flyby CABRY, LATON (LATON @ FL100and LIV20. Flyby IAF at LIV11 to join procedure. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure incorporates a continuous descent profile and is the optimum distance for that profile.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The routing of this procedure is in the vicinity of several schools, in particular in the Crosby area. However, at this stage aircraft will be at, or above, 7,000 ft.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Aircraft will descend below 7,000 ft in the vicinity of Crosby, just prior to coasting out. Aircraft will be a continuous descent so will have a minimum engine power setting. The aircraft will remain over the sea for the remainder of the Transition to the IAP.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			

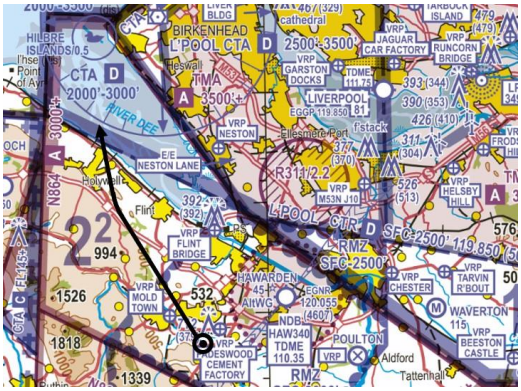
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for Transitions.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure has been designed to enable a continuous descent.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: A more direct track could reduce the number of track miles flown by approximately 4 nm but would require more turns by the aircraft during a busy period of the flight, so could have an adverse effect on DP 1.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No alternative routes have been developed for this Transition. The procedure has been designed to comply with FASI (North) requirements.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: All aircraft arrivals have previously required tactical routing from ATC from STAR to IAP. This procedure has been designed to integrate with the en-route structure and arrival procedures, reducing the required input from ATC.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: TRANS 6**
Option Name: Trans 09 NOMSU			ACCEPT
Description of Option: Flyby NOMSU then flyby IAF at LIV11 to join procedure. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous descent profile at optimum aircraft performance and minimises the track miles flown.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure remains over the sea at all times.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure remains over the sea at all times.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for Transitions.			

Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous descent profile.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure represents the most direct route from NOMSU to the IF for the IAP.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure remains over the sea at all times. No requirement for respite.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: All aircraft arrivals have previously required tactical routing from ATC from STAR to IAP. This procedure has been designed to integrate with the en-route structure and arrival procedures, reducing the required input from ATC.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: TRANS 7**
Option Name: Trans 09 VEGUN			ACCEPT
Description of Option: Flyby VEGUN and LIV12 and flyby IAF at LIV11 to join procedure. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous descent profile at optimum aircraft performance and minimises the track miles flown.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure does not overfly any sensitive areas but routes in the vicinity of a number of schools in rural villages. Alternate routing would have an adverse effect on DP2, DP 4a and DP 9.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous descent profile to reduce engine power settings. The route represents the minimum practicable route to reduce track miles flown although the route passes over several small village locations at approximate altitudes of 3,000 ft and above. Alternate routing would have an adverse effect on DP2 and DP 9.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET

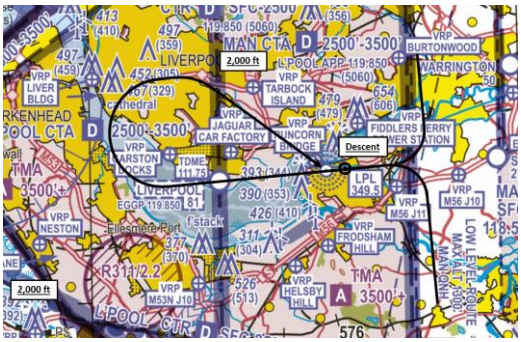
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for Transitions.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous descent profile.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure represents the minimum practicable routing to the IAF for the IAP.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No alternative routes have been developed for this Transition. The procedure has been designed to comply with FASI (North) requirements.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: All aircraft arrivals have previously required tactical routing from ATC from STAR to IAP. This procedure has been designed to integrate with the en-route structure and arrival procedures, reducing the required input from ATC.			

Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: Baseline**
Option Name: Approaches Baseline (Do Nothing)			REJECT
Description of Option: Retain the current procedures, which include conventional and GNSS approaches. All procedures rely on ground-based infrastructure (NDB) including the GNSS based approaches; the Missed Approach Procedures for the extant RNAV approaches reference the NDB and are therefore assessed alongside the conventional approaches.			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change. Current procedures are safe.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: A number of the procedures rely on routing aircraft via the LPL NDB at 2,500 ft, followed by a 'teardrop' flight path to intercept the final approach.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Current procedures were not designed to take into account sensitive areas. The requirement to be lined-up for final approach means that it is inevitable that some schools will be overflown during the procedure.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: A number of the procedures rely on routing aircraft via the LPL NDB at 2,500 ft, followed by a 'teardrop' flight path to intercept the final approach.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for approach procedures.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedures do not enable a continuous descent profile.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: A number of the procedures rely on tactical routing or routing aircraft via the LPL NDB at 2,500 ft, followed by a 'teardrop' flight path to intercept the final approach.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Alternate procedures are not developed for individual approach procedures.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The majority of the procedures rely on ATC intervention to establish on the final approach.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Although the ground-based beacons are more accurate at closer ranges, the conventional procedures still rely on the pilot interpreting the information received and don't represent actual tracks flown.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Regardless of the type of approach flown, the procedures are basically the same and follow the same planned routing.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change to existing arrangements.			

Design Principle Evaluation			**OPTION NO: APPCH 1**
Option Name: Approach 27 Option 1			ACCEPT
Description of Option: Join the procedure not below 3,000 ft via the IAF at LIV05 or NEW8. Flyby waypoint LIV02 onto final approach. MAP – Climb straight ahead to 2,000 ft. Turn right to flyby waypoints 0127GPM01, 0127GPM02 and 0127GPM03 then direct to hold at 0127LPL, not below 2,000 ft.			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance and with the minimum practicable track miles flown.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure flies over, or close to, a number of schools in the built-up areas of Warrington and Runcorn on final approach. The missed approach procedure routes in the vicinity of a number of schools and hospitals in Liverpool at 2,000 ft.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance and with the minimum practicable track miles flown. The missed approach procedure overflies residential areas of Liverpool.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			

Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for approach procedures.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to enable a continuous descent profile.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure represents the minimum practicable track miles flown.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Alternate procedures are not developed for individual approach procedures.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Aircraft carrying out the Missed Approach Procedure are likely to be in direct conflict with aircraft carrying out an approach procedure. The hold point is the same as is currently used, so although ATC tactical intervention will be required, it will be no different to current procedures.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: APPCH 2**
Option Name: Approach 27 Option 2			REJECT
Description of Option: Join the procedure not below 3,000 ft via the IAF at LIV05 or NEW8. Flyby waypoint LIV02 onto final approach. MAP – Climb straight ahead to 2,000 ft. Turn left to flyby waypoints 0227GPM01, 0227GPM02 and 0227GPM03 then direct to hold at 0227LPL, not below 2,000 ft.			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.				
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance. Extended track miles are flown due to avoiding Restricted Area R311. Alternate routing has been assessed as option 1.				
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure flies over, or close to, a number of schools in the built-up areas of Warrington and Runcorn on final approach. The missed approach procedure routes in the vicinity of a number of schools in Bebington at 2,000 ft.				
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance. The missed approach procedure briefly overflies a residential area of Bebington. The majority of the missed approach procedure is flown over rural or industrial areas.				
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.		NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for approach procedures.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The missed approach procedure exits CAS at 2,000 ft to the south, although at this point it enters Hawarden ATZ and RMZ.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to enable a continuous descent profile.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The missed approach procedure follows extended routing in order to avoid Restricted Area R311.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Alternate procedures are not developed for individual approach procedures.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Aircraft carrying out the Missed Approach Procedure are likely to be in direct conflict with aircraft carrying out an approach procedure. The hold point is the same as is currently used, so although ATC tactical intervention will be required, it will be no different to current procedures.			

Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The missed approach procedure impacts on Hawarden ATZ and RMZ.			

The Missed Approach Procedure for this approach would have an adverse effect on Hawarden operations which is unlikely to be mitigated through agreed procedures. This option has therefore been rejected.

Design Principle Evaluation			**OPTION NO: APPCH 3**
Option Name: Approach 27 Option 3			ACCEPT
Description of Option: Join the procedure not below 2,000 ft via the IAF at 0327IAF1 or 0327IAF2. Flyby existing GNSS waypoint INVEB onto final approach. MAP – Climb straight ahead to 2,000 ft. Turn right to flyby waypoints 0327GPM01, 0327GPM02 and 0327GPM03 then direct to hold at 0327LPL, not below 2,000 ft (MAP replicates Approach 27 Option 1).			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.				
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This procedure uses the existing waypoint INVEB as an Intermediate Fix, thus increasing the number of track miles flown. There is also the potential for aircraft to spend extended periods in level flight at 2,000 ft on the approach. The missed approach procedure represents the minimum practicable track miles flown.				
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure flies over, or close to, a number of schools in the built-up areas of Weaverham, Warrington and Runcorn on final approach. The missed approach procedure routes in the vicinity of a number of schools and hospitals in Liverpool at 2,000 ft.				
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure overflies residential areas of Warrington and Runcorn, potentially in level flight at 2,000 ft. The missed approach procedure overflies residential areas of Liverpool, also at 2,000 ft.				
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.		NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for approach procedures.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The initial approach for the procedure has the potential to be flown at a level altitude of 2,000 ft, depending on clearances.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: By using the existing waypoint INVEB, the number of track miles flown is higher than the minimum.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Alternate procedures are not developed for individual approach procedures.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Aircraft carrying out the Missed Approach Procedure are likely to be in direct conflict with aircraft carrying out an approach procedure. The hold point is the same as is currently used, so although ATC tactical intervention will be required, it will be no different to current procedures.			

Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: APPCH 4**
Option Name: Approach 09 Option 1			ACCEPT
Description of Option: Join the procedure not below 2,500 ft via the IAF at LIV12 or LIV20 or the IF at LIV11. Flyby waypoint LIV11 onto final approach. MAP – Climb straight ahead to 2,500 ft. Turn right to flyby waypoints 0109GPM01, 0109GPM02 and 0109GPM03 then direct to hold at 0109LPL, not below 2,500 ft.			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.				
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous descent profile, to be flown at optimum aircraft performance and represents the most direct flight path.				
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure flies over, or close to, a number of schools in residential areas of Heswall and Bebington on final approach. The missed approach procedure routes in the vicinity of a number of schools in Runcorn and Frodsham, not below 2,500 ft.				
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to incorporate a continuous descent profile and represents the most direct routing to minimise track miles flown.				
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.				

Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for approach procedures.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to enable a continuous descent profile.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The final and missed approach procedure represents the minimum number of track miles flown.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Alternate procedures are not developed for individual approach procedures.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Aircraft carrying out the Missed Approach Procedure are likely to be in direct conflict with aircraft carrying out an approach procedure. The hold point is the same as is currently used, so although ATC tactical intervention will be required, it will be no different to current procedures.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Aircraft carrying out the Missed Approach Procedure are likely to be in direct conflict with Manchester operations. ATC intervention may be required to ensure deconfliction between LJLA and Manchester traffic.			

Design Principle Evaluation			**OPTION NO: APPCH 5**
Option Name: Approach 09 Option 2			ACCEPT
Description of Option: Join the procedure not below 2,500 ft via the IAF at LIV12 or LIV20 or the IF at LIV11. Flyby waypoint LIV11 onto final approach. MAP – Climb straight ahead to 2,500 ft. Turn left to flyby waypoints 0209GPM01, 0209GPM02 and 0209GPM03 then direct to hold at 0209LPL, not below 2,500 ft.			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous descent profile, to be flown at optimum aircraft performance and represents the most direct flight path.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure flies over, or close to, a number of schools in residential areas of Heswall and Bebington on final approach. The missed approach procedure routes in the vicinity of a number of schools in Runcorn, Warrington and Widnes, not below 2,500 ft.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to incorporate a continuous descent profile and represents the most direct routing to minimise track miles flown, but overflies residential areas of Runcorn, Warrington and Widnes.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			

Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for approach procedures.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to enable a continuous descent profile.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The final and missed approach procedure represents the minimum number of track miles flown.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Alternate procedures are not developed for individual approach procedures.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Aircraft carrying out the Missed Approach Procedure are likely to be in direct conflict with aircraft carrying out an approach procedure. The hold point is the same as is currently used, so although ATC tactical intervention will be required, it will be no different to current procedures.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: APPCH 6**
Option Name: Approach 09 Option 3			ACCEPT
Description of Option: Join the procedure not below 2,500 ft via the IAF at LIV12 or LIV20 or the IF at LIV11. Flyby waypoint LIV11 onto final approach. MAP – Climb straight ahead to 2,500 ft. Turn left to flyby waypoints 0209GPM01, 0209GPM02 and 0209GPM03 then direct to hold at LIV11(2), not below 2,500 ft.			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous descent profile, to be flown at optimum aircraft performance and represents the most direct flight path. The Missed Approach Procedure routes the aircraft back to the re-join the approach procedure.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure flies over, or close to, a number of schools in residential areas of Heswall and Bebington on final approach. The missed approach procedure routes in the vicinity of a number of schools in Runcorn, Warrington, Huyton, Liverpool and Birkenhead, and over or close to hospitals in Prescot and Liverpool, including Alder Hey Children's Hospital, not below 2,500 ft.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to incorporate a continuous descent profile and represents the most direct routing to minimise track miles flown, but overflies residential areas of Runcorn, Warrington, Huyton, Liverpool and Birkenhead, not below 2,500 ft.			
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for approach procedures.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to enable a continuous descent profile.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The approach procedure represents the minimum number of track miles flown. Although the Hold for the Missed Approach Procedure is further than the current conventional hold position, the routing directs the aircraft back towards the approach procedure.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Alternate procedures are not developed for individual approach procedures.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to minimise the required input from ATC.			

Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

4 Technical Criteria Evaluation of Design Options

4.1 Technical Criteria Evaluation

The technical criteria detailed in Appendix F to CAP 1616 form the basic structure on which the change sponsor builds a formal airspace change proposal. The tables in this section show how each of the developed options complies with the technical criteria detailed in Appendix F to CAP 1616, identifying where plans will need to be established to resolve any issues that may arise, as follows:

- A green box indicates that the specified option is **compliant** with or has no impact on the relevant technical criteria.
- An orange box means that the specified option is **not fully compliant** with the relevant technical criteria but mitigation is possible through agreed operating procedures or agreements.
- A red box indicates that the specified option is **not compliant** with the relevant technical criteria and that there will be no possible plans available to mitigate the issue.

4.2 Standard Instrument Departures

		SID 27 AGGER Option 1	SID 27 AGGER Option 2	SID 27 AGGER Option 3	SID 27 WAL Option 1	SID 27 WAL Option 2	SID 27 TEMP2	SID 09 AGGER Option 1	SID 09 AGGER Option 2	SID 09 CAVEN Option 1	SID 09 CAVEN Option 2	SID 09 CAVEN Option 3	SID 09 CAVEN Option 4	SID 09 CORKA Option 1	SID 09 CORKA Option 2	SID 09 CORKA Option 3
Operational Impact																
	An analysis of the impact of the change on all airspace users, airfields and traffic levels must be provided, and include an outline concept of operations describing how operations within the new airspace will be managed. Specifically, consideration should be given to:	**Evidence of compliance/ mitigation**														
a	Impact on IFR general air traffic and operational air traffic or on VFR General Aviation (GA) traffic flow in or through the area															
b	Impact on VFR operations (including VFR routes where applicable)															

		SID 27 AGGER Option 1	SID 27 AGGER Option 2	SID 27 AGGER Option 3	SID 27 WAL Option 1	SID 27 WAL Option 2	SID 27 TEMP2	SID 09 AGGER Option 1	SID 09 AGGER Option 2	SID 09 CAVEN Option 1	SID 09 CAVEN Option 2	SID 09 CAVEN Option 3	SID 09 CAVEN Option 4	SID 09 CORKA Option 1	SID 09 CORKA Option 2	SID 09 CORKA Option 3
c	Consequential effects on procedures and capacity, i.e. on SIDs, STARs, and/or holding patterns. Details of existing or planned routes and holds															
d	Impact on aerodromes and other specific activities within or adjacent to the proposed airspace	[1]	[1]	[1, 2]	[1]	[1]	[1, 2]	[1]	[1]	[1]	[1, 2]	[1, 2]	[1]	[1]	[1]	[1]
e	Any flight planning restrictions and/or route requirements															
Supporting Infrastructure/Resources																
	General Requirements	**Evidence of compliance/ mitigation**														
a	Evidence to support RNAV and conventional navigation as appropriate															
b	Evidence to support primary and secondary surveillance radar (SSR)															

[1] Operating agreements required with Manchester Airport and NATS
[2] Operating agreement may be required with Hawarden

		SID 27 AGGER Option 1	SID 27 AGGER Option 2	SID 27 AGGER Option 3	SID 27 WAL Option 1	SID 27 WAL Option 2	SID 27 TEMP2	SID 09 AGGER Option 1	SID 09 AGGER Option 2	SID 09 CAVEN Option 1	SID 09 CAVEN Option 2	SID 09 CAVEN Option 3	SID 09 CAVEN Option 4	SID 09 CORKA Option 1	SID 09 CORKA Option 2	SID 09 CORKA Option 3
c	Evidence of communications infrastructure including R/T coverage															
d	The effects of failure of equipment, procedures and/or personnel with respect to the overall management of the airspace must be considered	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
e	Effective responses to the failure modes that will enable the functions associated with airspace to be carried out	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
f	A clear statement on SSR code assignment requirements															
g	Evidence of sufficient numbers of suitably qualified staff required to provide air traffic services following the implementation of a change															
Airspace and Infrastructure																

[3] Operating procedures will need to be developed in case of failures
[4] Operating procedures will need to be developed in case of failures

		SID 27 AGGER Option 1	SID 27 AGGER Option 2	SID 27 AGGER Option 3	SID 27 WAL Option 1	SID 27 WAL Option 2	SID 27 TEMP2	SID 09 AGGER Option 1	SID 09 AGGER Option 2	SID 09 CAVEN Option 1	SID 09 CAVEN Option 2	SID 09 CAVEN Option 3	SID 09 CAVEN Option 4	SID 09 CORKA Option 1	SID 09 CORKA Option 2	SID 09 CORKA Option 3
	General Requirements	**Evidence of compliance/ mitigation**														
a	The airspace structure must be of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to fully contain horizontal and vertical flight activity in both radar and non-radar environments															
b	Where an additional airspace structure is required for radar control purposes, the dimensions shall be such that radar control manoeuvres can be contained within the structure, allowing a safety buffer.															
c	The Air Traffic Management system must be adequate to ensure that prescribed separation can be maintained between aircraft within the airspace structure and safe management of interfaces with other airspace structures															

		SID 27 AGGER Option 1	SID 27 AGGER Option 2	SID 27 AGGER Option 3	SID 27 WAL Option 1	SID 27 WAL Option 2	SID 27 TEMP2	SID 09 AGGER Option 1	SID 09 AGGER Option 2	SID 09 CAVEN Option 1	SID 09 CAVEN Option 2	SID 09 CAVEN Option 3	SID 09 CAVEN Option 4	SID 09 CORKA Option 1	SID 09 CORKA Option 2	SID 09 CORKA Option 3
d	Air traffic control procedures are to ensure required separation between traffic inside a new airspace structure and traffic within existing adjacent or other new airspace structures															
e	Within the constraints of safety and efficiency, the airspace classification should permit access to as many classes of user as practicable															
f	There must be assurance, as far as practicable, against unauthorised incursions. This is usually done through the classification and promulgation															
g	Pilots shall be notified of any failure of navigational facilities and of any suitable alternative facilities available and the method of identifying failure and notification should be specified															

		SID 27 AGGER Option 1	SID 27 AGGER Option 2	SID 27 AGGER Option 3	SID 27 WAL Option 1	SID 27 WAL Option 2	SID 27 TEMP2	SID 09 AGGER Option 1	SID 09 AGGER Option 2	SID 09 CAVEN Option 1	SID 09 CAVEN Option 2	SID 09 CAVEN Option 3	SID 09 CAVEN Option 4	SID 09 CORKA Option 1	SID 09 CORKA Option 2	SID 09 CORKA Option 3
h	There must be sufficient R/T coverage to support the Air Traffic Management system within the totality of proposed controlled airspace															
i	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered	5	5	5, 6	5	5	5, 6	5	5	5	5, 6	5, 6	5	5	5	5
j	Should there be any other aviation activity (low flying, gliding, parachuting, microlight site, etc) in the vicinity of the new airspace structure and no suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests															
	ATS Route Requirements	**Evidence of compliance/ mitigation**														

[5] Operating agreements required with Manchester Airport and NATS
[6] Operating agreement may be required with Hawarden

		SID 27 AGGER Option 1	SID 27 AGGER Option 2	SID 27 AGGER Option 3	SID 27 WAL Option 1	SID 27 WAL Option 2	SID 27 TEMP2	SID 09 AGGER Option 1	SID 09 AGGER Option 2	SID 09 CAVEN Option 1	SID 09 CAVEN Option 2	SID 09 CAVEN Option 3	SID 09 CAVEN Option 4	SID 09 CORKA Option 1	SID 09 CORKA Option 2	SID 09 CORKA Option 3
a	There must be sufficient accurate navigational guidance based on in-line VOR/DME or NDB or by approved RNAV derived sources, to contain the aircraft within the route to the published RNP value in accordance with ICAO/Eurocontrol standards															
b	Where ATS routes adjoin terminal airspace there shall be suitable link routes as necessary for the ATM task															
c	All new routes should be designed to accommodate P-RNAV navigational requirements															
	Terminal Airspace Requirements	**Evidence of compliance/ mitigation**														
a	The airspace structure shall be of sufficient dimensions to contain appropriate procedures, holding patterns and their associated protected areas															

		SID 27 AGGER Option 1	SID 27 AGGER Option 2	SID 27 AGGER Option 3	SID 27 WAL Option 1	SID 27 WAL Option 2	SID 27 TEMP2	SID 09 AGGER Option 1	SID 09 AGGER Option 2	SID 09 CAVEN Option 1	SID 09 CAVEN Option 2	SID 09 CAVEN Option 3	SID 09 CAVEN Option 4	SID 09 CORKA Option 1	SID 09 CORKA Option 2	SID 09 CORKA Option 3
b	There shall be effective integration of departure and arrival routes associated with the airspace structure and linking to designated runways and published instrument approach procedures (IAPs)															
c	Where possible, there shall be suitable linking routes between the proposed terminal airspace and existing en-route airspace structure															
d	The airspace structure shall be designed to ensure that adequate and appropriate terrain clearance can be readily applied within and adjacent to the proposed airspace															
e	Suitable arrangements for the control of all classes of aircraft (including transits) operating within or adjacent to the airspace in question, in all meteorological conditions and under all flight rules, shall be in place or will be put into effect by the change sponsor upon implementation of the change in question (if these do not already exist)															

		SID 27 AGGER Option 1	SID 27 AGGER Option 2	SID 27 AGGER Option 3	SID 27 WAL Option 1	SID 27 WAL Option 2	SID 27 TEMP2	SID 09 AGGER Option 1	SID 09 AGGER Option 2	SID 09 CAVEN Option 1	SID 09 CAVEN Option 2	SID 09 CAVEN Option 3	SID 09 CAVEN Option 4	SID 09 CORKA Option 1	SID 09 CORKA Option 2	SID 09 CORKA Option 3
f	The change sponsor shall ensure that sufficient visual reference points are established within or adjacent to the subject airspace to facilitate the effective integration of VFR arrivals, departures and transits of the airspace with IFR traffic															
g	There shall be suitable availability of radar control facilities															
h	All new procedures should, wherever possible, incorporate Continuous Descent Approach (CDA) profiles after aircraft leave the holding facility associated with that procedure															
	Off-Route Airspace Requirements	**Evidence of compliance/ mitigation**														
a	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered															

		SID 27 AGGER Option 1	SID 27 AGGER Option 2	SID 27 AGGER Option 3	SID 27 WAL Option 1	SID 27 WAL Option 2	SID 27 TEMP2	SID 09 AGGER Option 1	SID 09 AGGER Option 2	SID 09 CAVEN Option 1	SID 09 CAVEN Option 2	SID 09 CAVEN Option 3	SID 09 CAVEN Option 4	SID 09 CORKA Option 1	SID 09 CORKA Option 2	SID 09 CORKA Option 3
b	Should there be any other aviation activity (military low flying, gliding, parachuting, microlight site etc) in the vicinity of the new airspace structure and no suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests															

Environmental Assessment

	Theme	Content	Assessment of Impact													
a	Assessment of noise impacts	Consideration of noise impacts	7	8		9			10		11	10		12	10	11	
b	Assessment of CO_2 emissions	Consideration of the impacts on CO_2 emissions															

[7] Initial turn immediately after take-off will require high engine power setting to achieve
[8] Routing over Liverpool city
[9] Extended routing over Birkenhead
[10] Routing over Runcorn immediately after take-off
[11] Routing over Widnes, Huyton and Liverpool city
[12] Routing over Huyton and Liverpool city

			SID 27 AGGER Option 1	SID 27 AGGER Option 2	SID 27 AGGER Option 3	SID 27 WAL Option 1	SID 27 WAL Option 2	SID 27 TEMP2	SID 09 AGGER Option 1	SID 09 AGGER Option 2	SID 09 CAVEN Option 1	SID 09 CAVEN Option 2	SID 09 CAVEN Option 3	SID 09 CAVEN Option 4	SID 09 CORKA Option 1	SID 09 CORKA Option 2	SID 09 CORKA Option 3
c	Assessment of local air quality	Consideration of the impacts on local air quality															
d	Assessment of impacts upon tranquillity	Consideration of any impact upon tranquillity, notably on AONB or National Parks															

Table 4 – Technical Criteria Evaluation of Standard Instrument Departures

4.3 Transitions

		Trans 27 DIOUF	Trans 27 NOMSU	Trans 27 VEGUN	Trans 27 VEGUN (CC05)	Trans 09 DIOUF	Trans 09 NOMSU	Trans 09 VEGUN
Operational Impact								
	An analysis of the impact of the change on all airspace users, airfields and traffic levels must be provided, and include an outline concept of operations describing how operations within the new airspace will be managed. Specifically, consideration should be given to:	**Evidence of compliance/ mitigation**						
a	Impact on IFR general air traffic and operational air traffic or on VFR General Aviation (GA) traffic flow in or through the area							
b	Impact on VFR operations (including VFR routes where applicable)							
c	Consequential effects on procedures and capacity, i.e. on SIDs, STARs, and/or holding patterns. Details of existing or planned routes and holds							
d	Impact on aerodromes and other specific activities within or adjacent to the proposed airspace	13	13	13	13	13	13	13
e	Any flight planning restrictions and/or route requirements							

[13] Operating agreements required with Manchester Airport and NATS

		Trans 27 DIOUF	Trans 27 NOMSU	Trans 27 VEGUN	Trans 27 VEGUN (CC05)	Trans 09 DIOUF	Trans 09 NOMSU	Trans 09 VEGUN
Supporting Infrastructure/Resources								
	General Requirements	**Evidence of compliance/ mitigation**						
a	Evidence to support RNAV and conventional navigation as appropriate							
b	Evidence to support primary and secondary surveillance radar (SSR)							
c	Evidence of communications infrastructure including R/T coverage							
d	The effects of failure of equipment, procedures and/or personnel with respect to the overall management of the airspace must be considered							
e	Effective responses to the failure modes that will enable the functions associated with airspace to be carried out							
f	A clear statement on SSR code assignment requirements							
g	Evidence of sufficient numbers of suitably qualified staff required to provide air traffic services following the implementation of a change							
Airspace and Infrastructure								
	General Requirements	**Evidence of compliance/ mitigation**						

		Trans 27 DIOUF	Trans 27 NOMSU	Trans 27 VEGUN	Trans 27 VEGUN (CC05)	Trans 09 DIOUF	Trans 09 NOMSU	Trans 09 VEGUN
a	The airspace structure must be of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to fully contain horizontal and vertical flight activity in both radar and non-radar environments							
b	Where an additional airspace structure is required for radar control purposes, the dimensions shall be such that radar control manoeuvres can be contained within the structure, allowing a safety buffer.							
c	The Air Traffic Management system must be adequate to ensure that prescribed separation can be maintained between aircraft within the airspace structure and safe management of interfaces with other airspace structures							
d	Air traffic control procedures are to ensure required separation between traffic inside a new airspace structure and traffic within existing adjacent or other new airspace structures							
e	Within the constraints of safety and efficiency, the airspace classification should permit access to as many classes of user as practicable							
f	There must be assurance, as far as practicable, against unauthorised incursions. This is usually done through the classification and promulgation							

		Trans 27 DIOUF	Trans 27 NOMSU	Trans 27 VEGUN	Trans 27 VEGUN (CC05)	Trans 09 DIOUF	Trans 09 NOMSU	Trans 09 VEGUN
g	Pilots shall be notified of any failure of navigational facilities and of any suitable alternative facilities available and the method of identifying failure and notification should be specified							
h	There must be sufficient R/T coverage to support the Air Traffic Management system within the totality of proposed controlled airspace							
i	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered	14	14	14	14	14	14	14
j	Should there be any other aviation activity (low flying, gliding, parachuting, microlight site, etc) in the vicinity of the new airspace structure and no suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests							
	ATS Route Requirements	**Evidence of compliance/ mitigation**						
a	There must be sufficient accurate navigational guidance based on in-line VOR/DME or NDB or by approved RNAV derived sources, to contain the aircraft within the route to the published RNP value in accordance with ICAO/Eurocontrol standards							

[14] Operating agreements required with Manchester Airport and NATS

		Trans 27 DIOUF	Trans 27 NOMSU	Trans 27 VEGUN	Trans 27 VEGUN (CC05)	Trans 09 DIOUF	Trans 09 NOMSU	Trans 09 VEGUN
b	Where ATS routes adjoin terminal airspace there shall be suitable link routes as necessary for the ATM task							
c	All new routes should be designed to accommodate P-RNAV navigational requirements							
	Terminal Airspace Requirements	**Evidence of compliance/ mitigation**						
a	The airspace structure shall be of sufficient dimensions to contain appropriate procedures, holding patterns and their associated protected areas							
b	There shall be effective integration of departure and arrival routes associated with the airspace structure and linking to designated runways and published instrument approach procedures (IAPs)							
c	Where possible, there shall be suitable linking routes between the proposed terminal airspace and existing en-route airspace structure							
d	The airspace structure shall be designed to ensure that adequate and appropriate terrain clearance can be readily applied within and adjacent to the proposed airspace							

		Trans 27 DIOUF	Trans 27 NOMSU	Trans 27 VEGUN	Trans 27 VEGUN (CC05)	Trans 09 DIOUF	Trans 09 NOMSU	Trans 09 VEGUN
e	Suitable arrangements for the control of all classes of aircraft (including transits) operating within or adjacent to the airspace in question, in all meteorological conditions and under all flight rules, shall be in place or will be put into effect by the change sponsor upon implementation of the change in question (if these do not already exist)							
f	The change sponsor shall ensure that sufficient visual reference points are established within or adjacent to the subject airspace to facilitate the effective integration of VFR arrivals, departures and transits of the airspace with IFR traffic							
g	There shall be suitable availability of radar control facilities							
h	All new procedures should, wherever possible, incorporate Continuous Descent Approach (CDA) profiles after aircraft leave the holding facility associated with that procedure							
	Off-Route Airspace Requirements	**Evidence of compliance/ mitigation**						
a	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered							

		Trans 27 DIOUF	Trans 27 NOMSU	Trans 27 VEGUN	Trans 27 VEGUN (CC05)	Trans 09 DIOUF	Trans 09 NOMSU	Trans 09 VEGUN
b	Should there be any other aviation activity (military low flying, gliding, parachuting, microlight site etc) in the vicinity of the new airspace structure and no suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests							
Environmental Assessment								
	Theme	**Content**	**Assessment of Impact**					
a	Assessment of noise impacts	Consideration of noise impacts						
b	Assessment of CO_2 emissions	Consideration of the impacts on CO_2 emissions						
c	Assessment of local air quality	Consideration of the impacts on local air quality						
d	Assessment of impacts upon tranquillity	Consideration of any impact upon tranquillity, notably on Areas of Outstanding Natural Beauty or National Parks						

Table 5 – Technical Criteria Evaluation of Transitions

4.4 Instrument Approach Procedures

		Approach 27 Option 1	Approach 27 Option 2	Approach 27 Option 3	Approach 09 Option 1	Approach 09 Option 2	Approach 09 Option 3
Operational Impact							
	An analysis of the impact of the change on all airspace users, airfields and traffic levels must be provided, and include an outline concept of operations describing how operations within the new airspace will be managed. Specifically, consideration should be given to:	**Evidence of compliance/ mitigation**					
a	Impact on IFR general air traffic and operational air traffic or on VFR General Aviation (GA) traffic flow in or through the area						
b	Impact on VFR operations (including VFR routes where applicable)						
c	Consequential effects on procedures and capacity, i.e. on SIDs, STARs, and/or holding patterns. Details of existing or planned routes and holds						
d	Impact on aerodromes and other specific activities within or adjacent to the proposed airspace		15				
e	Any flight planning restrictions and/or route requirements						
Supporting Infrastructure/Resources							

[15] Operating arrangements with Hawarden will be required to facilitate Missed Approach Procedure

	General Requirements	Approach 27 Option 1	Approach 27 Option 2	Approach 27 Option 3	Approach 09 Option 1	Approach 09 Option 2	Approach 09 Option 3
		Evidence of compliance/ mitigation					
a	Evidence to support RNAV and conventional navigation as appropriate						
b	Evidence to support primary and secondary surveillance radar (SSR)						
c	Evidence of communications infrastructure including R/T coverage						
d	The effects of failure of equipment, procedures and/or personnel with respect to the overall management of the airspace must be considered						
e	Effective responses to the failure modes that will enable the functions associated with airspace to be carried out						
f	A clear statement on SSR code assignment requirements						
g	Evidence of sufficient numbers of suitably qualified staff required to provide air traffic services following the implementation of a change						
Airspace and Infrastructure							

	General Requirements	Approach 27 Option 1	Approach 27 Option 2	Approach 27 Option 3	Approach 09 Option 1	Approach 09 Option 2	Approach 09 Option 3
		Evidence of compliance/ mitigation					
a	The airspace structure must be of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to fully contain horizontal and vertical flight activity in both radar and non-radar environments		[16]				
b	Where an additional airspace structure is required for radar control purposes, the dimensions shall be such that radar control manoeuvres can be contained within the structure, allowing a safety buffer.		[17]				
c	The Air Traffic Management system must be adequate to ensure that prescribed separation can be maintained between aircraft within the airspace structure and safe management of interfaces with other airspace structures						
d	Air traffic control procedures are to ensure required separation between traffic inside a new airspace structure and traffic within existing adjacent or other new airspace structures						
e	Within the constraints of safety and efficiency, the airspace classification should permit access to as many classes of user as practicable						

[16] MAP not fully contained within CAS
[17] No additional airspace available; procedure infringes Hawarden ATZ/RMZ

		Approach 27 Option 1	Approach 27 Option 2	Approach 27 Option 3	Approach 09 Option 1	Approach 09 Option 2	Approach 09 Option 3
f	There must be assurance, as far as practicable, against unauthorised incursions. This is usually done through the classification and promulgation						
g	Pilots shall be notified of any failure of navigational facilities and of any suitable alternative facilities available and the method of identifying failure and notification should be specified						
h	There must be sufficient R/T coverage to support the Air Traffic Management system within the totality of proposed controlled airspace						
i	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered	18	18, 19	18	18	18	18
j	Should there be any other aviation activity (low flying, gliding, parachuting, microlight site, etc) in the vicinity of the new airspace structure and no suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests		19				
	ATS Route Requirements	**Evidence of compliance/ mitigation**					

[18] Operating agreements required with Manchester Airport and NATS
[19] Operating arrangements with Hawarden will be required to facilitate Missed Approach Procedure

		Approach 27 Option 1	Approach 27 Option 2	Approach 27 Option 3	Approach 09 Option 1	Approach 09 Option 2	Approach 09 Option 3
a	There must be sufficient accurate navigational guidance based on in-line VOR/DME or NDB or by approved RNAV derived sources, to contain the aircraft within the route to the published RNP value in accordance with ICAO/Eurocontrol standards						
b	Where ATS routes adjoin terminal airspace there shall be suitable link routes as necessary for the ATM task						
c	All new routes should be designed to accommodate P-RNAV navigational requirements						
	Terminal Airspace Requirements	**Evidence of compliance/ mitigation**					
a	The airspace structure shall be of sufficient dimensions to contain appropriate procedures, holding patterns and their associated protected areas		20				
b	There shall be effective integration of departure and arrival routes associated with the airspace structure and linking to designated runways and published instrument approach procedures (IAPs)						
c	Where possible, there shall be suitable linking routes between the proposed terminal airspace and existing en-route airspace structure						
d	The airspace structure shall be designed to ensure that adequate and appropriate terrain clearance can be readily applied within and adjacent to the proposed airspace						

[20] MAP not fully contained within CAS

		Approach 27 Option 1	Approach 27 Option 2	Approach 27 Option 3	Approach 09 Option 1	Approach 09 Option 2	Approach 09 Option 3
e	Suitable arrangements for the control of all classes of aircraft (including transits) operating within or adjacent to the airspace in question, in all meteorological conditions and under all flight rules, shall be in place or will be put into effect by the change sponsor upon implementation of the change in question (if these do not already exist)						
f	The change sponsor shall ensure that sufficient visual reference points are established within or adjacent to the subject airspace to facilitate the effective integration of VFR arrivals, departures and transits of the airspace with IFR traffic						
g	There shall be suitable availability of radar control facilities						
h	All new procedures should, wherever possible, incorporate Continuous Descent Approach (CDA) profiles after aircraft leave the holding facility associated with that procedure						
	Off-Route Airspace Requirements	**Evidence of compliance/ mitigation**					
a	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered		21				

[21] Operating arrangements with Hawarden will be required to facilitate Missed Approach Procedure

		Approach 27 Option 1	Approach 27 Option 2	Approach 27 Option 3	Approach 09 Option 1	Approach 09 Option 2	Approach 09 Option 3
b	Should there be any other aviation activity (military low flying, gliding, parachuting, microlight site etc) in the vicinity of the new airspace structure and no suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests						
Environmental Assessment							
	Theme	**Content**	**Assessment of Impact**				
a	Assessment of noise impacts	Consideration of noise impacts	[22]		[23]		[24]	[25]
b	Assessment of CO_2 emissions	Consideration of the impacts on CO_2 emissions						
c	Assessment of local air quality	Consideration of the impacts on local air quality						
d	Assessment of impacts upon tranquillity	Consideration of any impact upon tranquillity, notably on Areas of Outstanding Natural Beauty or National Parks						

Table 6 – Technical Criteria Evaluation of Instrument Approach Procedures

[22] The Missed Approach Procedure overflies residential areas of Liverpool
[23] Current procedures route via NDB(L) LPL and include 'teardrop' routing onto approach
[24] The Missed Approach Procedure overflies residential areas of Runcorn, Warrington and Widnes
[25] The Missed Approach Procedure overflies residential areas of Runcorn, Warrington, Liverpool and Birkenhead

5 Updated Designs Following Engagement

5.1 Stakeholder Evaluation of Design Options

Following a review of the design options by the stakeholders that had contributed to the development of the Design Principles, 3 alternate options have been developed and included in the Design Principle Evaluation and Technical Criteria Evaluation. Table 7 contains a summary of the post-engagement options under consideration.

Procedure	Basic Description
Post-Engagement SID 27 AGGER	This option includes a right hand turn direct to AGGER that remains over the River Mersey during the initial turn after take-off. The nominal routing is between the routing taken by SID 27 AGGER options 1 and 2.
Post-Engagement Approach 27	The initial approach remains the same as Approach 27 options 1 and 2. The position of the hold has been moved to a position over the sea to the west of LJLA in the vicinity of Wallasey.
Post-Engagement Approach 09	This procedure is the same as Approach 09 option 3 except that the direction of the hold has been adjusted so that the aircraft will remain over the sea when in the hold.

Table 7 – Summary of Post-Engagement Options Under Consideration

A summary of how these options have responded to the Design Principles is included at Table 8 below.

	Post-Engagement SID27 AGGER	Post-Engagement Approach 27	Post-Engagement Approach 09
DP 1			
DP 2			
DP 3			
DP 4a			
DP 4b			
DP6			
DP 7a			
DP 7b			
DP 9			
DP 10			
DP 11			
DP 12a			
DP 12b			
DP 14			
DP 15			

Table 8 – Design Principle Evaluation Overview of Post-Engagement Options

5.2 Design Principle Evaluation of Post-Engagement Design Options

Design Principle Evaluation			**OPTION NO: PE 1**
Option Name: Runway 27 SID AGGER Post-Engagement			ACCEPT
Description of Option: Climb straight ahead then turn right to fly direct to overfly AGGER, achieving a height of approximately 11,000 ft by AGGER. 			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.				
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to be flown at optimum aircraft performance and represents the most direct routing to AGGER.				
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure remains over the River Mersey during the initial right hand turn after take-off. A school and a hospital, within built-up areas, are close to the planned flightpath; aircraft will be above approximately 4,000 ft at these points.				
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.		NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is designed to incorporate a continuous climb profile to minimise the impact of noise. Routing takes the aircraft over populated areas of Liverpool but will be above approximately 4,000 ft before flying over this area. Routing to avoid populated areas would have an adverse effect on DP 2 and DP 9.				
Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.		NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous climb profile.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for SIDs.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: This route represents the most direct track to AGGER.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Option to route to the south of the airport to route to AGGER – to be assessed as an alternative SID option.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Although the procedure has been designed to integrate with the en-route structure, the size and complexity of the airspace around LJLA means that there is potential conflict between this SID and other LJLA procedures, which may lead to an increase in ATC workload.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: PE 2**
Option Name: Approach 27 Post-Engagement			ACCEPT
Description of Option: Join the procedure not below 3,000 ft via the IAF at LIV05 or NEW8. Flyby waypoint LIV02 onto final approach. MAP – Climb straight ahead to 2,500 ft. Turn right direct to hold oversea, not below 2,500 ft.			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Positioning the hold over the sea to the west will mean an increase in track miles flown. However, the climb straight ahead after the missed approach will reduce the cockpit workload, allowing the pilots the time to deal with any issues that may have caused an unsuccessful landing. Amending the position of the hold would have an adverse effect on DP 3 and DP 4a.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure flies over, or close to, a number of schools in the built-up areas of Warrington and Runcorn on final approach. The missed approach procedure routes over Eastham Country Park and in the vicinity of a number of schools in Bebington and Birkenhead at or above 2,500 ft. Amending the position of the hold would have a different effect on this DP as well as an adverse effect on DP 2 and DP 4a.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment The procedure has been designed to be flown at optimum aircraft performance. The missed approach procedure briefly overflies a residential area of Bebington and Birkenhead. The majority of the missed approach procedure is flown over rural parts of the Wirral and the hold is positioned over the sea. Amending the position of the hold would have a different effect on DP 2 and DP 3.			

Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for approach procedures.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to enable a continuous descent profile.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Positioning the hold over the sea to the west will mean an increase in track miles flown. However, the climb straight ahead after the missed approach will reduce the cockpit workload, allowing the pilots the time to deal with any issues that may have caused an unsuccessful landing. Amending the position of the hold would have a different effect on this DP as well as an adverse effect on DP 2, DP 3 and DP 4a.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Alternate procedures are not developed for individual approach procedures.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure has been designed to minimise the required input from ATC.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

Design Principle Evaluation			**OPTION NO: PE 3**
Option Name: Approach 09 Post-Engagement			ACCEPT
Description of Option: Join the procedure not below 2,500 ft via the IAF at LIV12 or LIV20 or the IF at LIV11. Flyby waypoint LIV11 onto final approach. MAP – Climb straight ahead to 2,500 ft. Turn left direct to hold oversea, not below 2,500 ft.			
Design Principle 1: Procedures must be designed to meet acceptable levels of flight safety.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to meet acceptable levels of flight safety.			
Design Principle 2: Procedures must be designed to minimise aircraft emissions to reduce air pollution.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure incorporates a continuous descent profile, to be flown at optimum aircraft performance and represents the most direct flight path. The Missed Approach Procedure routes the aircraft back to the re-join the approach procedure with the hold positioned over the sea.			
Design Principle 3: Procedures should be designed to avoid overflight of sensitive areas, e.g. hospitals, schools, country parks, high risk industrial sites.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure flies over, or close to, a number of schools in residential areas of Heswall and Bebington on final approach. The missed approach procedure routes in the vicinity of a number of schools in Runcorn, Warrington, Huyton, Liverpool and Birkenhead, and over or close to hospitals in Prescot and Liverpool, including Alder Hey Children's Hospital, not below 2,500 ft. Alternate routing to the hold would have an adverse effect on DP 2, DP 4a and DP 9.			
Design Principle 4a: Procedures must be designed to minimise the impact of noise below 7,000ft.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to incorporate a continuous descent profile and represents the most direct routing to minimise track miles flown, but overflies residential areas of Runcorn, Warrington, Huyton, Liverpool and Birkenhead, not below 2,500 ft. The hold is positioned so aircraft remain over the sea. Alternate routing would have an adverse effect on DP 2, DP 3 and DP 9.			

Design Principle 4b: Procedures should be designed to be technically flyable and maintain existing operational performance, and capacity.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is technically flyable and maintains existing operational performance, and capacity.			
Design Principle 6: Procedures should be designed to enable more continuous climbs.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Not evaluated for approach procedures.			
Design Principle 7a: Procedures should be designed to fit within existing airspace constraints and boundaries.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure is contained within existing airspace boundaries.			
Design Principle 7b: Procedures should be designed to enable more continuous descents.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The procedure has been designed to enable a continuous descent profile.			
Design Principle 9: Procedures should be designed that minimise the number of track miles flown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: The approach procedure represents the minimum number of track miles flown. Although the Hold for the Missed Approach Procedure is further than the current conventional hold position, the routing directs the aircraft back towards the approach procedure.			
Design Principle 10: If the design of the new procedures requires a smaller volume of airspace, airspace design or classification should be altered for the benefit of other airspace users.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No change required to existing arrangements for Controlled Airspace.			
Design Principle 11: Procedures should be developed to allow for alternative routes to offer respite.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Alternate procedures are not developed for individual approach procedures.			
Design Principle 12a: Procedures should be designed to minimise the need for aircraft vectoring to reduce Air Traffic Controllers (ATCOs) workload.	NOT MET	PARTIAL	MET

Summary of Qualitative Assessment: The procedure has been designed to minimise the required input from ATC.			
Design Principle 12b: Procedures should be designed to concentrate routes to minimise the numbers overflown.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 14: Procedures should be designed to ensure predictability of tracks for consistency of operations.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: Introduction of PBN procedures will lead to more accurate route keeping meaning tracks over the ground flown will be more consistent.			
Design Principle 15: Procedures should be designed to include alternative routes to avoid other aviation operators.	NOT MET	PARTIAL	MET
Summary of Qualitative Assessment: No impact on other aviation operators.			

5.3 Post-Engagement Design Options Technical Criteria Evaluation

		Post-Engagement SID27 AGGER	Post-Engagement Approach 27	Post-Engagement Approach 09
Operational Impact				
	An analysis of the impact of the change on all airspace users, airfields and traffic levels must be provided, and include an outline concept of operations describing how operations within the new airspace will be managed. Specifically, consideration should be given to:	**Evidence of compliance/ mitigation**		
a	Impact on IFR general air traffic and operational air traffic or on VFR General Aviation (GA) traffic flow in or through the area			
b	Impact on VFR operations (including VFR routes where applicable)			
c	Consequential effects on procedures and capacity, i.e. on SIDs, STARs, and/or holding patterns. Details of existing or planned routes and holds			
d	Impact on aerodromes and other specific activities within or adjacent to the proposed airspace	[26]		
e	Any flight planning restrictions and/or route requirements			
Supporting Infrastructure/Resources				

[26] Operating agreements required with Manchester Airport and NATS

	General Requirements	Post-Engagement SID27 AGGER	Post-Engagement Approach 27	Post-Engagement Approach 09
		Evidence of compliance/ mitigation		
a	Evidence to support RNAV and conventional navigation as appropriate			
b	Evidence to support primary and secondary surveillance radar (SSR)			
c	Evidence of communications infrastructure including R/T coverage			
d	The effects of failure of equipment, procedures and/or personnel with respect to the overall management of the airspace must be considered	[27]		
e	Effective responses to the failure modes that will enable the functions associated with airspace to be carried out	[28]		
f	A clear statement on SSR code assignment requirements			
g	Evidence of sufficient numbers of suitably qualified staff required to provide air traffic services following the implementation of a change			
Airspace and Infrastructure				

[27] Operating procedures will need to be developed in case of failures
[28] Operating procedures will need to be developed in case of failures

	General Requirements	Post-Engagement SID27 AGGER	Post-Engagement Approach 27	Post-Engagement Approach 09
		Evidence of compliance/ mitigation		
a	The airspace structure must be of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to fully contain horizontal and vertical flight activity in both radar and non-radar environments			
b	Where an additional airspace structure is required for radar control purposes, the dimensions shall be such that radar control manoeuvres can be contained within the structure, allowing a safety buffer.			
c	The Air Traffic Management system must be adequate to ensure that prescribed separation can be maintained between aircraft within the airspace structure and safe management of interfaces with other airspace structures			
d	Air traffic control procedures are to ensure required separation between traffic inside a new airspace structure and traffic within existing adjacent or other new airspace structures			
e	Within the constraints of safety and efficiency, the airspace classification should permit access to as many classes of user as practicable			
f	There must be assurance, as far as practicable, against unauthorised incursions. This is usually done through the classification and promulgation			
g	Pilots shall be notified of any failure of navigational facilities and of any suitable alternative facilities available and the method of identifying failure and notification should be specified			

		Post-Engagement SID27 AGGER	Post-Engagement Approach 27	Post-Engagement Approach 09
h	There must be sufficient R/T coverage to support the Air Traffic Management system within the totality of proposed controlled airspace			
i	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered	29	29	29
j	Should there be any other aviation activity (low flying, gliding, parachuting, microlight site, etc) in the vicinity of the new airspace structure and no suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests			
	ATS Route Requirements	**Evidence of compliance/ mitigation**		
a	There must be sufficient accurate navigational guidance based on in-line VOR/DME or NDB or by approved RNAV derived sources, to contain the aircraft within the route to the published RNP value in accordance with ICAO/Eurocontrol standards			
b	Where ATS routes adjoin terminal airspace there shall be suitable link routes as necessary for the ATM task			
c	All new routes should be designed to accommodate P-RNAV navigational requirements			
	Terminal Airspace Requirements	**Evidence of compliance/ mitigation**		

[29] Operating agreements required with Manchester Airport and NATS

		Post-Engagement SID27 AGGER	Post-Engagement Approach 27	Post-Engagement Approach 09
a	The airspace structure shall be of sufficient dimensions to contain appropriate procedures, holding patterns and their associated protected areas			
b	There shall be effective integration of departure and arrival routes associated with the airspace structure and linking to designated runways and published instrument approach procedures (IAPs)			
c	Where possible, there shall be suitable linking routes between the proposed terminal airspace and existing en-route airspace structure			
d	The airspace structure shall be designed to ensure that adequate and appropriate terrain clearance can be readily applied within and adjacent to the proposed airspace			
e	Suitable arrangements for the control of all classes of aircraft (including transits) operating within or adjacent to the airspace in question, in all meteorological conditions and under all flight rules, shall be in place or will be put into effect by the change sponsor upon implementation of the change in question (if these do not already exist)			
f	The change sponsor shall ensure that sufficient visual reference points are established within or adjacent to the subject airspace to facilitate the effective integration of VFR arrivals, departures and transits of the airspace with IFR traffic			
g	There shall be suitable availability of radar control facilities			
h	All new procedures should, wherever possible, incorporate Continuous Descent Approach (CDA) profiles after aircraft leave the holding facility associated with that procedure			

			Post-Engagement SID27 AGGER	Post-Engagement Approach 27	Post-Engagement Approach 09
	Off-Route Airspace Requirements		**Evidence of compliance/ mitigation**		
a	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered				
b	Should there be any other aviation activity (military low flying, gliding, parachuting, microlight site etc) in the vicinity of the new airspace structure and no suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests				
Environmental Assessment					
	Theme	**Content**	**Assessment of Impact**		
a	Assessment of noise impacts	Consideration of noise impacts			
b	Assessment of CO_2 emissions	Consideration of the impacts on CO_2 emissions			
c	Assessment of local air quality	Consideration of the impacts on local air quality			
d	Assessment of impacts upon tranquillity	Consideration of any impact upon tranquillity, notably on Areas of Outstanding Natural Beauty or National Parks			

Table 9 – Technical Criteria Evaluation of Post-Engagement Design Options