Airspace Change Proposal Stage 2A

Options Development & Design Principle Evaluation

London Southend Airport FASI(S)

14 November 2022

CPJ-5641-RPT-017 V1.0

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Executive Summary

The Civil Aviation Authority wrote to 21 airports in the South-East of England (including London Southend Airport) to advise them that it is essential that they participate in a programme of Airspace Modernisation. This programme consists of a coordinated attempt to improve the efficiency of airspace usage across the region, whilst implementing the latest technology. It aims to reduce the environmental impacts associated with aviation.

London Southend Airport passed the CAA CAP 1616 Stage 1 Gateway in March 2022 and commenced Stage 2 activities. A comprehensive list of options was developed through internal workshops and stakeholder engagement. These options were assessed against the Design Principles developed during Stage 1 of the ACP process.

Workshops were held on the 8th of April 2022, which introduced the list of options to the stakeholders and our assessment of the options against the Design Principles they helped develop. Following these workshops stakeholders were invited to take part in an online survey from the 13th of April 2022 to the 16th of May 2022. The survey asked whether the stakeholders considered the Design Principles were correctly applied and consistent in each option. It provided an opportunity for stakeholders to comment if they considered this was not the case.

The feedback from the stakeholders was incorporated into the Design Principle Evaluation document, which is an Annex to this document and available on the ACP Portal.

This report forms part of the Stage 2 submission and details the comprehensive list of options that were developed for the ACP. It also includes a summary of the Design Principle Evaluation.

London Southend Airport would like to thank the stakeholders for their time, consideration, and valuable input. London Southend Airport look forward to continuing to work with them to improve our system of flight procedures and our airspace configuration.

Abbreviations

ACOG	Airspace Change Organising Group
ACP	Airspace Change Proposal
AMS	Airspace Modernisation Strategy
AONB	Area of Outstanding Natural Beauty
ATC	Air Traffic Control
ATM	Air Traffic Management
BWY	Barkway
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAT	Commercial Air Transport
CTA	Control Areas
CTR	Control Zones
DFT	Department for Transport
DME	Distance Measuring Equipment
DP	Design Principle
FAS	Future Airspace Strategy
FASI-S	Future Airspace Implementation South
FASI-N	Future Airspace Implementation North
GA	General Aviation
GNSS	Global Navigation Satellite Systems
IAP	Instrument Approach Procedure
ICAO	International Civil Aviation Organisation
LSA	London Southend Airport
LTMA	London Terminal Manoeuvring Area
NAP	Noise Abatement Procedures
NERL	National Air Traffic Services En-Route Limited
NTK	Noise and Track Keeping
PBN	Performance-Based Navigation
RNAV	Area Navigation
SID	Standard Instrument Departures
STAR	Standard Arrival
UK	United Kingdom

References

[1] Commission Implementing Regulation EU 2018/1048, PBN-IR

[2] Civil Aviation Authority, CAP 1616, 1 March 2021, Version 4

[3] Civil Aviation Authority, CAP 2312B: UK Airspace Change Masterplan Iteration 2, 11 May 2022, Version 2.2

[4] Civil Aviation Authority, Decision Letter on ACP-2017-25, 23 January 2015

[5] ACP-2017-25, Introduction of CTA 10X and CTA 11, 31 March 2017

[6] CPJ-5641-PRE-022, LSA Stakeholder Workshop Stage 2a Presentation, 8 April 2022

[7] CPJ-5641-RPT-020, LSA Design Principle Evaluation, 9 November 2022

[8] Planning Obligation by Agreement, Pursuant to Section 106 of the Town and Country Planning Act 1990 and Section 111 of the Local Government Act 1972 in relation to land at London Southend Airport, Southend on Sea, Essex

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1. Introduction

1.1. Overview

1.1.1. *Airspace Modernisation Strategy (AMS) – Why does London Southend Airport (LSA) need more change?*

1.1.2. The Civil Aviation Authority (CAA) published its AMS in December 2018. This Strategy was developed in response to the Department for Transport (DFT), tasking the CAA with preparing and maintaining a co-ordinated plan for the use of the United Kingdom (UK) Airspace up to 2040, including the modernisation.

1.1.3. The AMS, which replaced the Future Airspace Strategy (FAS), sets out the ways, the means and ends of modernising airspace through 15 initiatives intended to modernise the Design, Technology and Operations of airspace. Amongst other initiatives, this includes a fundamental redesign of the terminal route network using precise and flexible satellite navigation.

1.1.4. It describes what the AMS must deliver, drawn from relevant national and international policy and law. Paragraphs 1.2 – 1.4 set out factors that airspace modernisation must deliver, drawn from Section 70 of the Transport Act 2000 and relevant policy as:

- To increase aviation capacity in the South-East;
- Growth to be sustainable; and
- To make the best use of existing runways.

1.1.5. The UK's Airspace, particularly that of southern England, was originally designed decades ago; it has evolved over time to manage the increasing volumes of climbing and descending aircraft travelling to and from the various airports all within close proximity. This complex evolution has resulted in an environmentally inefficient and overly complicated design, that places a burden on Air Traffic Controllers (ATC) and limits airspace capacity. Prior to the worldwide pandemic, flights in southern England were forecast to double over the next 20 years. Whilst COVID-19 has undoubtedly had a significant impact upon the aviation and travel industries, if the airspace is not modernised, the benefits of reduced carbon emissions and noise reduction may not be realised.

1.1.6. The Airspace Change Organising Group (ACOG) was established in 2019, as a fully independent organisation at the request of the DFT and CAA, to coordinate the delivery of key aspects of the AMS.

1.1.7. ACOG's role is to coordinate the delivery of two major national airspace change programmes known as Future Airspace Implementation South (FASI-S) and Future Airspace Implementation North (FASI-N). FASI-S is a complete redesign of the existing airspace structure in southern England and LSA is one of 18 airports included within this programme.

1.1.8. ACOG in collaboration with NATS En-Route Ltd (NERL) and each of the airports, must deliver a Masterplan that provides detailed information on the Airspace Design options. The Masterplan must consider potential areas of overlap between individual Airspace Change

Proposals (ACPs), the compromises and trade-offs that may need to be made to integrate them effectively.

1.1.9. LSA and the other airports must ensure that their modernisation proposals are aligned with neighbouring airports and connect efficiently with the Upper Airspace. The FASI(S) airports are responsible for modernising or upgrading their individual arrival and departure routes up to 7,000ft. NERL are responsible for redesigning the route network above 7,000ft. Therefore, it is possible that despite the new LSA Standard Instrument Departures (SIDs) and the Instrument Approach Procedures (IAPs) not having been implemented yet, alterations may be required to comply with the overarching airspace plan for the region.

1.1.10. For more information, including a brief video, on the importance of modernising UK airspace, see https://www.ourfutureskies.uk/why-modernise/.

1.1.11. *Why are you seeking my opinion on your airspace again?*

1.1.12. LSA are aware you were asked to participate on several ACP consultations over the last few years and that it may seem odd that we are coming to you again for feedback on further changes to the airspace. The ongoing ACPs were specifically for the introduction of new SIDs and IAPs that utilised modern navigation methods, namely Performance-Based Navigation (PBN). Please be assured that your time and consideration on the introduction of these new procedures was not wasted and the proposals are with the CAA for their final decision. The procedures comply with the AMS and form a part of the modernisation programme. However, as the process of the FASI-S development evolves, the procedures may ultimately require amendment to accommodate other changes in the region. This should not be seen as a negative, rather an opportunity to further improve the overall construct for all stakeholders.

1.2. Performance-Based Navigation (PBN)

1.2.1. One of the major aims of the AMS is to optimise future airspace designs by considering modern aircraft performance and functional capabilities. This will improve efficiency, saving time, fuel and reduce emissions.

1.2.2. Key to achieving the AMS aims is the application of PBN. In parallel, the UK navigation infrastructure will also be optimised to take advantage of the lateral navigation accuracy from Global Navigation Satellite Systems (GNSS). Conventional ground-based navigation aids will be retained for resilience.

1.2.3. PBN is being adopted world-wide. The International Civil Aviation Organisation (ICAO) States are expected to modernise airspace through International, Regional and State level initiatives, including regulations. It impacts both the high-level airways and the lower-level arrival and departure routes into and out of airports and IAPs.

1.2.4. European-wide legislation[1] was developed to drive the deployment of PBN in the European region to meet the international vision laid down by ICAO.

1.3. Impact

1.3.1. LSA has already commenced the modernisation of its airspace having submitted a proposal for the introduction of PBN procedures in the form of Area Navigation (RNAV) SIDs and IAPs. In addition, the FASI(S) programme may result in more requirements for the Airport to implement new Arrival Transitions, to enable aircraft to establish on an IAP.

1.3.2. It is possible that in the development of options for new departure and arrival profiles for the other airports in the region, that the existing airspace configuration may also require re-configuration.

1.4. Civil Aviation Publication 1616 Process

1.4.1. CAA regulations[2] define the ACP process. The ACP is designed to be transparent, comprehensible and proportionate. It is aligned with Government Policy [3] on managing airspace.

1.4.2. The 7-stage process contains 14 'Steps' and 4 'Gateways'. The Change Sponsor must satisfy the CAA at each of these 'Gateways' that it has fully followed the process. Failure to do so results in further work until such time as the CAA is satisfied.

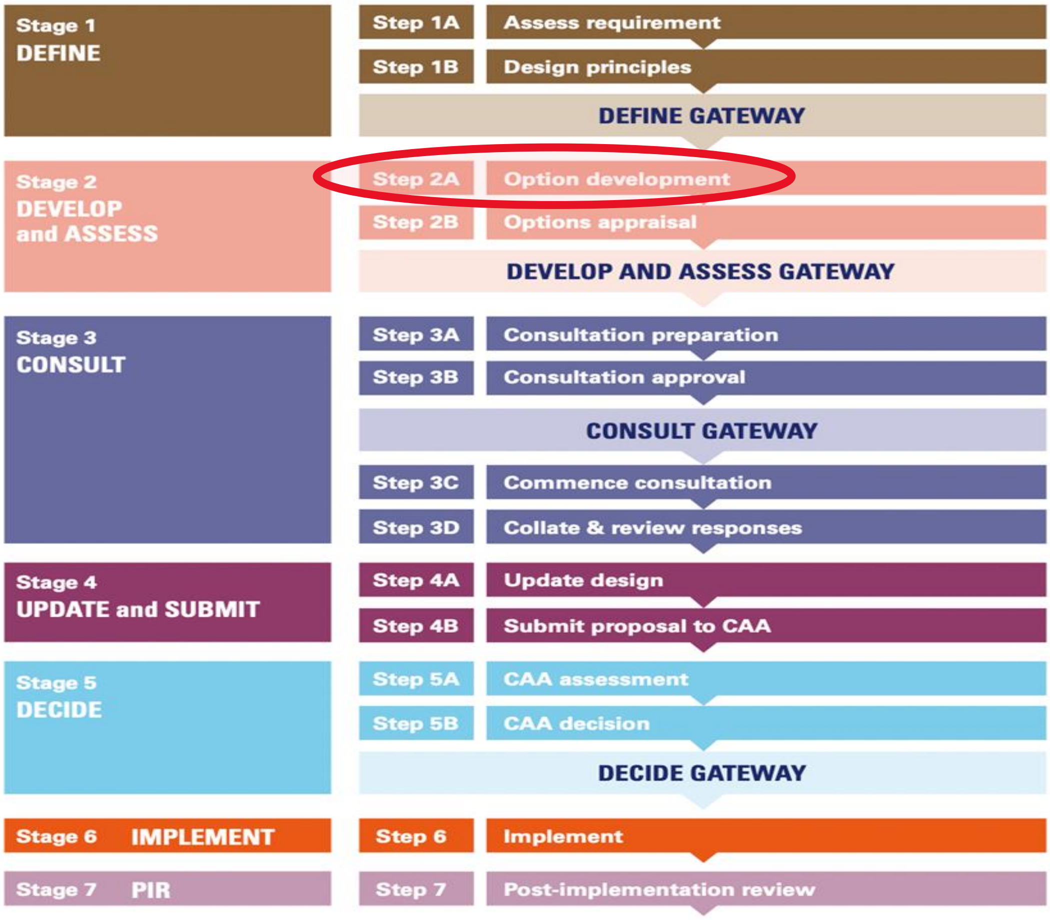

Figure 1: The CAP1616 Process

1.4.3. LSA has completed Stage 1 and we have embarked upon the development of the Options (Step 2a). These Options have been developed through a two-way engagement process with stakeholders.

1.5. Stage 1

1.5.1. LSA began their ACP in September 2021 and subsequently passed through the Stage 1 Gateway of the CAP 1616 process in March 2022. The Stage 1 documentation can be found on the ACP Portal.

1.6. Stage 2

1.6.1. This report forms part of the Stage 2 submission and details the Comprehensive List of Options developed for this ACP. Over the course of the CAP1616 ACP process, these options will be developed and refined through the following means:

- Design Principle Evaluation;
- Safety and Environmental Assessments;
- Appraisals;
- Stakeholder Engagement; and
- Consultation.

1.7. Current Operations

1.7.1. Esken (previously known as the Stobart Group) bought LSA in 2008 and set about the first phase of the re-development, utilising a longer runway with upgraded navigation and lighting systems. A new state-of-the-art ATC tower and mainline railway station were opened in 2011, the same year that easyJet signed a ten-year agreement to use Southend as a new hub, with flights to a range of European destinations. In 2012, the runway extension became operational and a new passenger terminal building was officially opened. LSA was able to handle a new generation of medium capacity, high-efficiency jets for short-haul scheduled flights and holiday charters.

1.7.2. A month later, a proposed extension to the new terminal at LSA was approved by Rochford District Council to help meet the target of serving 2 million passengers by 2020. The extended terminal building was opened in 2014 delivering a larger Check-In facility, improved security screening channels and larger Departure and Arrivals areas. These improvements provided space and a better customer experience for passengers.

1.7.3. LSA has won 'Best Airport in London' by the survey company 'Which?' an impressive six times in a row. With a catchment of 8.2 million users, 60% of which come from London, it has become the airport of choice. The onsite train station located 100 paces away from the passenger terminal, provides a 15 minute journey time from plane to train.

1.7.4. However, the last two years were particularly challenging for the aviation sector. This is reflected in LSA's performance for the period March 2020 to February 2021, coinciding with the spread of the COVID-19 virus. Airport passenger numbers reduced from 2.15 million in 2019 to 147,000, a reduction of 93%. This was a complete reversal from 2019, when it recorded its busiest year ever, to its lowest throughput post development.

1.7.5. During Covid restrictions, LSA were able to attract training activity that was permitted within Government guidance. As a result, LSA air traffic controllers remained "recent" as required by their CAA licence conditions. LSA remains ready for an increase in commercial flying and in the business aviation market.

1.8. Types of Operations

1.8.1. LSA can accommodate a wide range of aircraft from medium sized twin engine jets to small business jets and single/twin engine propeller aircraft for training and private (General Aviation) use.

1.8.2. LSA supports the following types of operation:

- Commercial Air Transport (CAT) operations providing scheduled and charter services;
- Non-Commercial operations, that include:
  - Business Aviation;
  - Military Training and Refuelling;
  - Private and Commercial Pilot Training;
  - Skill testing; and
  - Private recreational flying.

1.8.3. LSA supported a total of 36,327 movements in 2019 (just over 2 million passengers), this number halved in 2020 owing to the global pandemic to 18,401 and there was a significant downward shift in passenger carriage (only 400,000 passengers). LSA supported a total of 34,114 movements in 2021.

1.8.4. Movement figures are expected to fluctuate as the Aviation Industry comes to terms with the effect of the COVID pandemic. It is the desire of LSA to return operations to pre-pandemic levels in keeping with the Section 106 conditions detailed in **Section 1.15**. The volume of General Aviation (GA) traffic is likely to remain static or in a growth scenario, as can be accommodated.

1.9. Operational Hours

1.9.1. Whilst LSA is operational 24 hours a day, the published operational hours are 0630-2200hrs (local), outside of these hours aircraft operations are only permitted by prior arrangement.

1.10. Runways

1.10.1. LSA has a single runway with two ends known as '05' and '23'; these are given their names as their true bearing is rounded to two figures, e.g., Runway 05 has a true bearing of 054.16 degrees.

1.10.2. Aircraft normally land and take off heading into the wind, thus the wind direction at the time of an aircraft approach or departure usually determines which runway is chosen. The prevailing wind direction at LSA is from the South-West, therefore Runway 23 is in operation roughly 70% of the year. This means, aircraft typically depart initially to the West before turning and typically arrive from the East.

1.10.3. LSA has a 'Preferred Runway Scheme' agreed with the local authorities forming part of the Section 106 Agreement [8], detailed in **Section 1.15**. The Airport has committed to use Runway 23 for arrivals and Runway 05 for departures at night (2300-0630hrs) if weather and safety conditions permit. In the daytime, the Airport has committed to do the same (for more than 50% of its operations) if weather, safety conditions and movement volumes allow. The rationale for the employment of this Scheme is that the area to the Northeast of the Airport (Rochford) is less densely populated. **This ACP is not seeking to shift away from this policy.**

1.11. Airspace

1.11.1. LSA is overflown by some of the busiest and most complex airspace in the world. It is affected by flights to and from the major airports of:

- London Stansted;
- London Luton;
- London City;
- London Gatwick; and
- London Heathrow.

1.11.2. As LSA is located near other London airports, its traffic flies beneath their traffic flows. **Figure 2** shows the Departure and Arrival traffic from London City Airport and Stansted Airport (the Airports which interface with LSA to the greatest extent). When the traffic flows for the other airports are added (not illustrated) the picture becomes extremely busy. Although the diagram indicates 2016 traffic flows, these have not changed significantly.

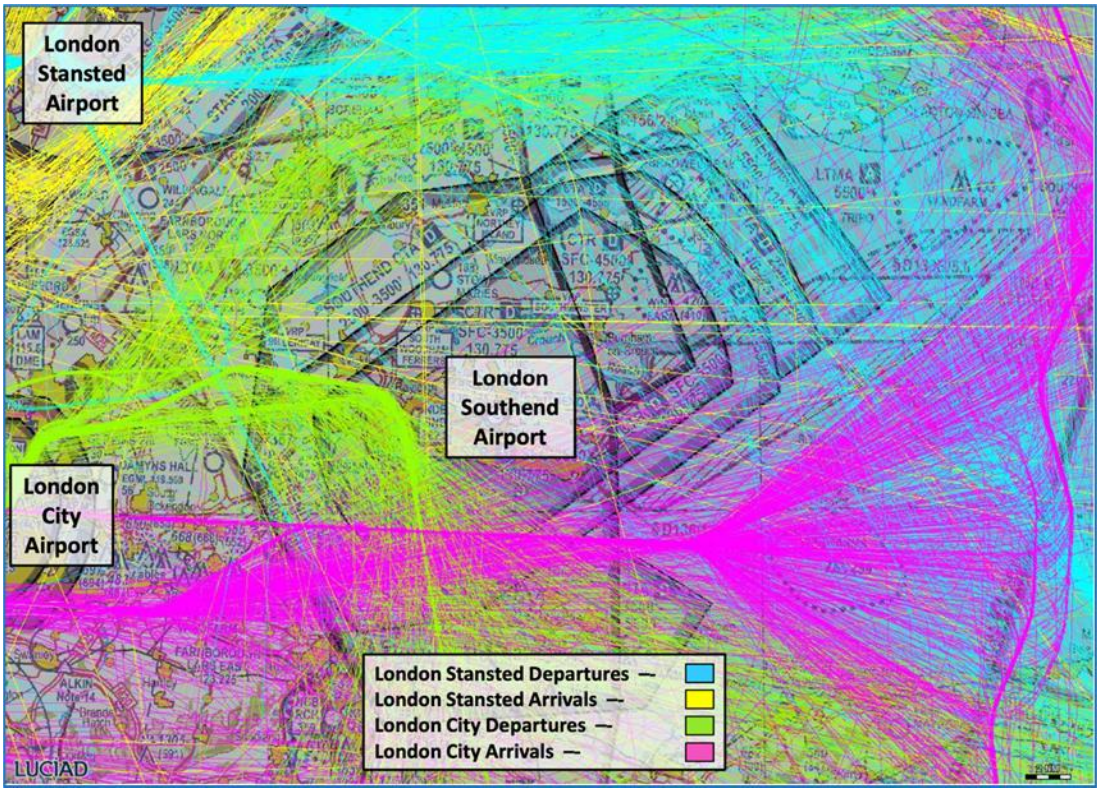

Figure 2: Stansted & London City Arrivals & Departures Over LSA Surrounding Area (One Week August 2016)

1.11.3. The Terminal airspace surrounding LSA is very complex because of the proximity to London Stansted, London Luton, London City, London Gatwick, and London Heathrow. LSA sits underneath the London Terminal Manoeuvring Area (LTMA) airspace. The LTMA and the respective Control Areas (CTA) and Control Zones (CTRs) are depicted in **Figure 3.** This shows the layers of 'Controlled Airspace' used by ATC units to manage the flights of LSA and other airports. These layers of LTMA airspace dictate the vertical and horizontal extent of LSA's own airspace.

1.11.4. The LSA CTR extends from the surface to 3,500ft above mean sea level (amsl) and in other parts extends to 4,500ft and 5,500ft respectively. The CTR is surrounded by several CTAs that provide continuous Controlled Airspace containment from the Airport into the LTMA above.

1.11.5. Military Danger Areas, densely populated areas and the Kent Downs Area of Outstanding Natural Beauty (AONB) to the South, further restrict the LSA airspace.

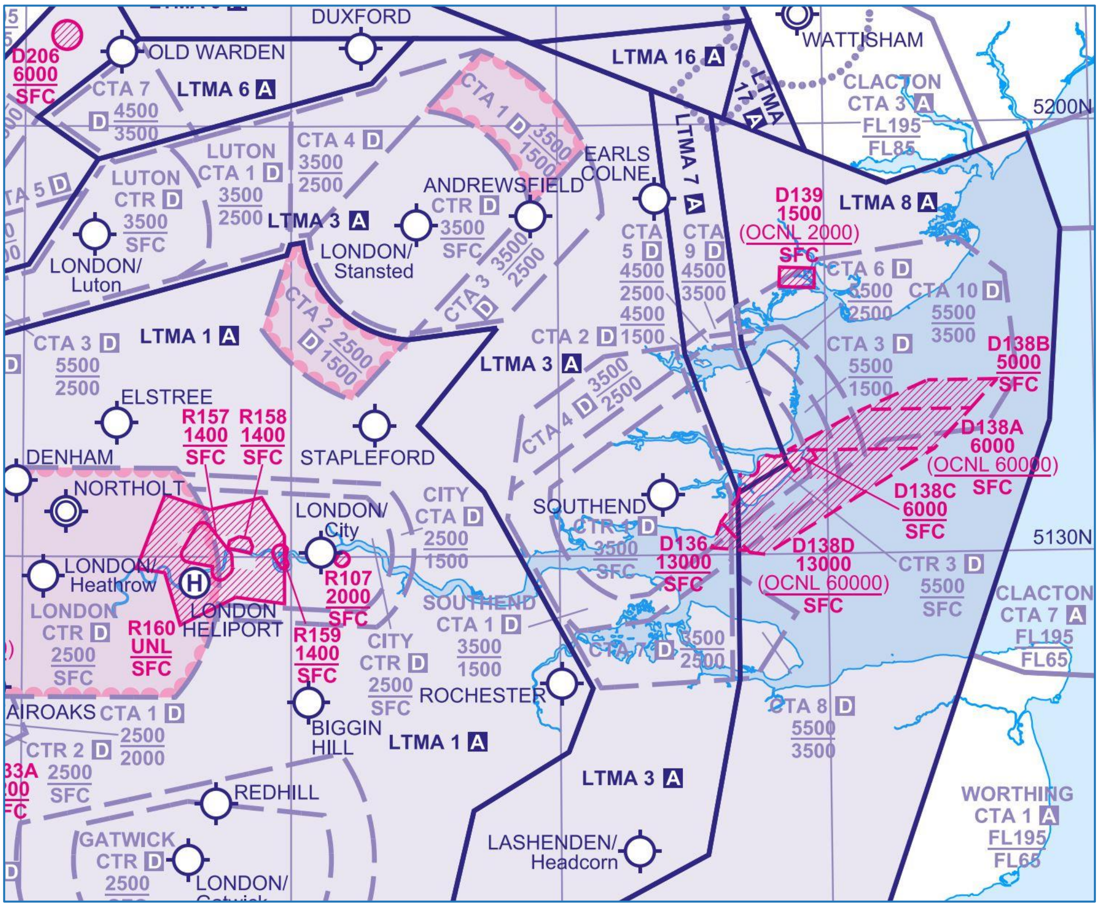

Figure 3: London TMA

Source: UK AIP ENR 6-42

1.12. Current Operational Requirement

1.12.1. The current operation requires departure procedures to the Northwest, the Northeast and the South for each Runway. The Northeast routing is increasing in importance, because it meets the needs of operators wishing to access destinations in Eastern Europe (a growth market for the Airport).

1.12.2. Arrivals are predominantly from the South and East, however, there remains a requirement for arrival procedures from the Northwest.

1.13. Control Area 10X

1.13.1. An ACP[5] was submitted to the CAA on 31 March 2017 requesting the establishment of Class D Controlled Airspace near LSA, to ensure the safety of the increasing CAT operating at the Airport.

1.13.2. The CAA Decision Letter [4] , whilst approving most of the requested Controlled Airspace, did not approve the introduction of two portions (namely CTA-11 to the Southeast and a major portion of CTA-10 to the Northeast). The CAA stated that the then extant traffic levels and Air Traffic Management (ATM) complexity, did not justify the introduction of these volumes of Controlled Airspace. The Decision Letter[4] made provision for the future introduction of the CTA-10 and CTA-11 Controlled Airspace segments, if increasing traffic levels and airspace complexity is justified.

1.13.3. LSA has now met these requirements and the implementation of the additional airspace for CTA10 (Known as CTA10X) was approved and has been implemented in September 2022 AIRAC. (CTA11 has not been progressed as part of the ACP.)

1.13.4. The CTA10X volume of airspace is in the baseline and will be included in the development of options for this ACP.

1.13.5. **Figure 4** shows additional volume of CTA10X and **Figure 5** shows the new associated airspace map.

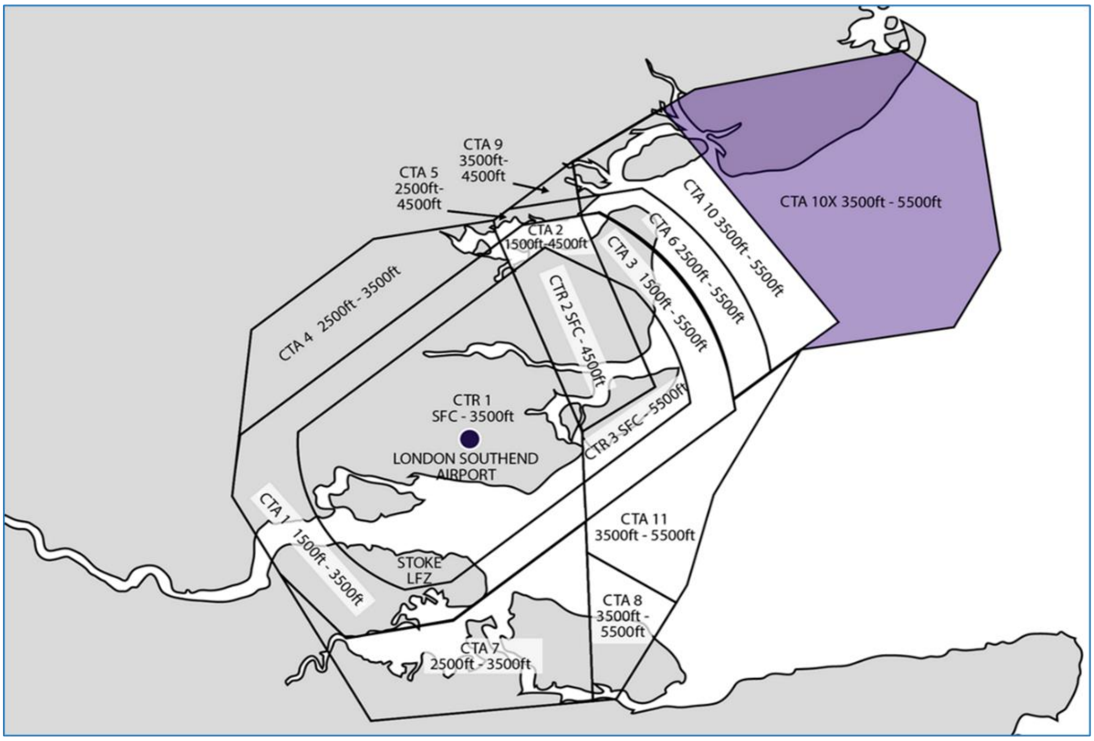

Figure 4: CTA 10X

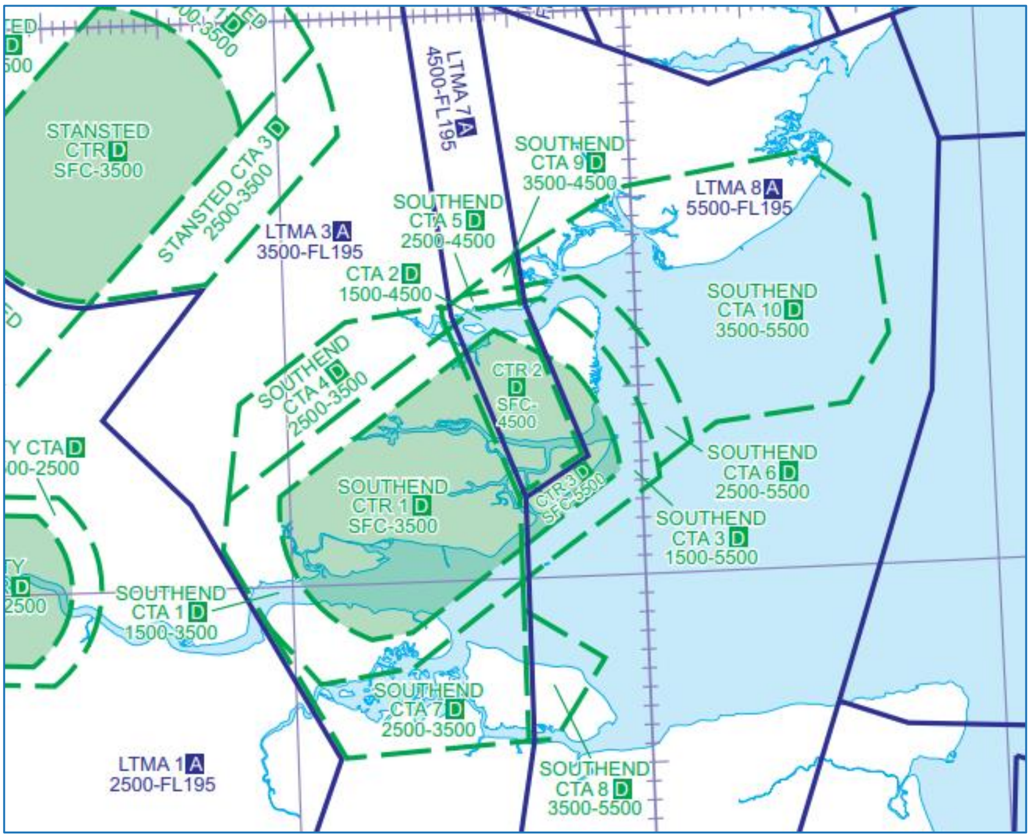

Figure 5: LSA Airspace Map

1.14. Known Constraints

1.14.1. Shoeburyness Range (D136/D138) is typically active 0800-1600hrs Monday to Friday. The nature of the activity in this Danger Area precludes LSA from being able take aircraft through it during these hours. This is not considered to be a constraint that can be challenged. However, outside of the published hours of activity, the airspace becomes available and may afford more advantageous routings for aircraft.

1.14.2. Departures from LSA are currently required to transit through ‘gates’ as part of a Letter of Agreement with Thames Radar operated by NERL. These ‘gates’ (EKNIV to the South and EVNAS to the North) are positioned such that they are known channels through which departing aircraft will pass at an altitude of 3,000ft. LSA departing traffic is often forced into a stepped climb i.e., they are often held for a period at 3,000ft. It is unknown whether this constraint can be amended. Not all the departure options developed will meet this existing requirement.

1.14.3. Arrivals to Runway 23 at LSA must be spaced in a 10 Nautical Mile (NM) trail to allow the preceding aircraft to backtrack on the runway. There is not a taxiway alternative to conducting a 180 degree turn on the runway and backtracking. Arrivals to Runway 05 are not constrained in the same way and require only a 5NM spacing to be applied.

1.15. Noise Abatement Procedures & Section 106 Agreement

1.15.1. LSA operates a Preferred Runway Usage Scheme as follows:

‘Subject to over-riding Pilot and ATC safety/performance and separation requirements, whenever the tailwind component is 5 KT or less, the preferred runway for departures is Runway 05, and for arrivals is Runway 23.’

1.15.2. Furthermore, on departure, aircraft of more than 5.7 tonnes Maximum Certified Weight are required to adhere to the following:

- When departing Runway 05 shall climb straight ahead until a range of 1 DME (I-SO or I-ND) and an altitude of 1500 FT is reached before turning;
- When departing Runway 23 shall climb straight ahead until a range of 2.5 DME (I-SO or I-ND) and an altitude of 1500 FT is reached before turning; and
- Aircraft of more than 5.7 tonnes weight intending to operate at below 1500 FT altitude shall conform to the DME distances above before commencing any turn on track.

1.15.3. **LSA is not seeking an amendment to these requirements and accordingly any options developed will continue to adhere to these requirements.**

1.16. Design Principles

1.16.1. The following table details the Design Principles established at the end of Stage 1 that have passed through the CAA CAP1616[2] ‘DEFINE’ Gateway. These Design Principles will be used to evaluate each of the options in turn.

Design Principle Number & Title	Description
1- Importance of Safety	The airspace design and its operation must maintain or where possible, enhance current levels of safety.
2- Overflight	The new procedures should not increase the number of people overflown by aircraft using the Airport and where possible options that provide a level of dispersion should also be considered.
3- Noise Footprint	The design should limit, and where practicable reduce, the impact of noise to stakeholders on the ground and where possible periods of built in respite should be considered.
4- Tranquillity	Where practical, route designs should limit effects upon sensitive areas. These may include cultural or historic assets, tranquil or rural areas, sites of care or education and AONB's.
5- Emissions and Air Quality	The proposed design should minimise CO2 emissions per flight.
6- Operational Requirements	The new procedures should address the needs of most operators at LSA.
7- Airspace Dimensions	The volume and classification of controlled airspace required for LSA should be the minimum necessary to deliver an efficient airspace design, considering the needs of all airspace users.
8- Airspace Complexity	The airspace design should seek to reduce complexity and bottlenecks in controlled and uncontrolled airspace and contribute to a reduction in airspace infringements.
9- Technical Requirements	The design shall be fully compliant with PANS-OPS and UK CAA criteria to meet the technical capability requirements of aircraft using the airport.
10- Systemisation	The arrival transitions and departure procedures shall be deconflicted and integrate with the en-route network, as per the FASI(S) programme, and in the case of the arrival transitions shall integrate with the Instrument Approach Procedures (IAPs) reducing the requirement for tactical coordination.
11- Operational Cost	Provided it does not have an adverse impact of community disturbance, procedures should be designed to optimise fuel efficiency.
12- AMS Realisation	This ACP must serve to further, and not conflict with, the realisation of the AMS.
13- PBN	The new procedures should capitalise on as many of the potential benefits of PBN implementation as are practicable.

Figure 6: Design Principles

2. Options Development Methodology

2.1. Swathes

2.1.1. Having considered the Operational Requirement, the team conceived unconstrained options i.e. a 'blank sheet of paper' approach. Whilst it was accepted that this may result in unrealistic options, it was important to think broadly to identify a wide range of options.

2.1.2. The long list of options described hereafter, will be refined to a short list through a process of:

- Design Principle Evaluation;
- Stakeholder Engagement; and
- Options Appraisal (Step 2b).

2.1.3. The Options developed are purely swathes at this stage (i.e. areas within which a final departure or arrival nominal track might ultimately be designed). It is intended that the fine tuning from swathes to definitive options (actual tracks) will take place during Stage 3 of the process ahead of the Formal Consultation.

2.1.4. It is accepted that not all available options may have been identified in the work done by our consultants. Therefore, stakeholders were invited to provide any other options for consideration in the Options Development Workshops.

2.2. Stakeholder Workshops

2.2.1. Two separate Stakeholder Workshops were held on the 8th of April 2022, with stakeholders invited to attend either in person or online. The purpose of this engagement was to introduce stakeholders to the airspace design options and our approach to assessing them against the Design Principles they helped us to shape.

2.2.2. Prior to the workshops the stakeholders were split into two groups, technical stakeholders (airports, GA, etc.) and non-technical stakeholders (community groups, local councils, environmental bodies etc.). Each group received the same presentation with the same information, one group in the morning and the other in the afternoon. This was done so we could focus the discussions on the topics each group was most interested in. Following on from our Stage 1 engagement it became clear that Noise, Tranquillity and Overflight were more emotive issues to the non-technical stakeholders, where the technical group had more interest in airspace issues, like complexity and airspace dimensions. We approached our Stage 2 engagement with this in mind.

2.2.3. A presentation was delivered which outlined the options development process. It included the Comprehensive List of Options and our initial assessment of these options against the Design Principles established in Stage 1. The presentation can be found on the ACP Portal titled 'LSA Stakeholder Workshop Stage 2a Presentation'[6].

2.2.4. After the workshops, an email was forwarded to all the Stakeholders on the 19th of April 2022 asking them to provide feedback on the Design Principle Evaluation and add additional comments through an Online Survey. The responses were requested by Friday 6th May

2022. After several requests from Stakeholders, on the 26th of April 2022 LSA sent an email extending the deadline for responses to the 16th of May 2022.

2.2.5. We received 13 responses from stakeholders who included

- Heathrow Airport
- Biggin Hill Airport
- London Stansted Airport
- Tillingham Airstrip Users
- Manston Airport
- NATS (NERL)
- MOD
- Natural England
- Private Pilots
- Local Councils

2.2.6. Responses received from the Stakeholders were assessed and incorporated into the Design Principle Evaluation document[7] available on the ACP Portal. The feedback they provided is included in its entirety and addressed in the document.

3. Departure Procedures

3.1. Overview

3.1.1. The Options conceived for each runway and departure direction are depicted in this Section of the report in three figures:

I. Google Earth Mapping with existing NTK data;
II. En-Route Chart; and
III. Google Maps Mapping.

3.1.2. The relative pros and cons of each option are not considered at this stage; the Options are simply presented and explained. The extent to which each option does or does not meet the Design Principles is covered in the Design Principle Evaluation document[7] on the ACP Portal.

3.1.3. It is possible more than one option may be progressed for each departure direction, through to implementation. Such a scenario would facilitate dispersion of impacts and the potential for relief and respite.

3.2. Runway 05 – Northeast

Baseline

Departures to the Northeast off Runway 05 typically route straight ahead with a slight deviation to the left of track, as is evidenced by the green NTK tack data **in Figure 7** (taken over a three-month period in 2019- pre pandemic). Options have been assessed against these nominal tracks. Whilst these tracks fall inside the parameters of Option A, they occupy a small geographical portion within the option. The option was assessed individually and in its entirety against the baseline tracks.

Options

Two option swathes were considered, a straight-ahead option (D05-NE-A) and a left turn towards the Northeast (D05-NE-B). The Option to turn right was considered invalid owing to the routine activity in Shoeburyness Range and the desired direction of travel.

Figure 7: RW05 Northeast Departures with NTK Google Earth

Figure 8: RW05 Northeast Departures with En-route (ENR) Chart

Figure 9: RW05 Northeast Departures on Google Maps

3.3. Runway 05 – Northwest

Baseline

Departures to the Northwest off Runway 05, turn after adherence to the Noise Abatement Procedures (NAPs) directly to the Northwest. However, as can be seen by the track data in **Figure 10** (taken over a three-month period in 2019- pre pandemic), these tracks disperse quite broadly once North-abeam the Airport. These tracks provide the Baseline for these options and form part of Option A. Whilst these tracks fall inside the parameters of Option A, they occupy a small geographical portion within the option. The option was assessed individually and in its entirety against the baseline tracks.

Options

The two options considered looked at an early turn (D05-NW-A) as per the existing operation, or a shallower turn (D05-NW-B), resulting in a swathe that is displaced to the North.

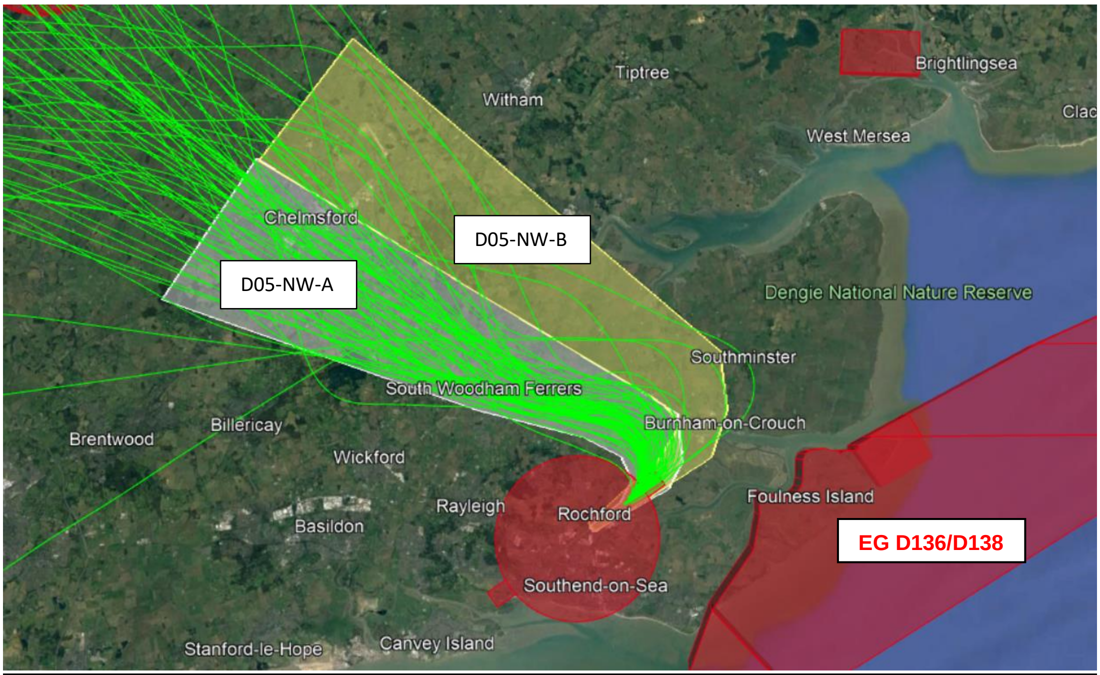

Figure 10: RW05 Northwest Departures with NTK on Google Earth

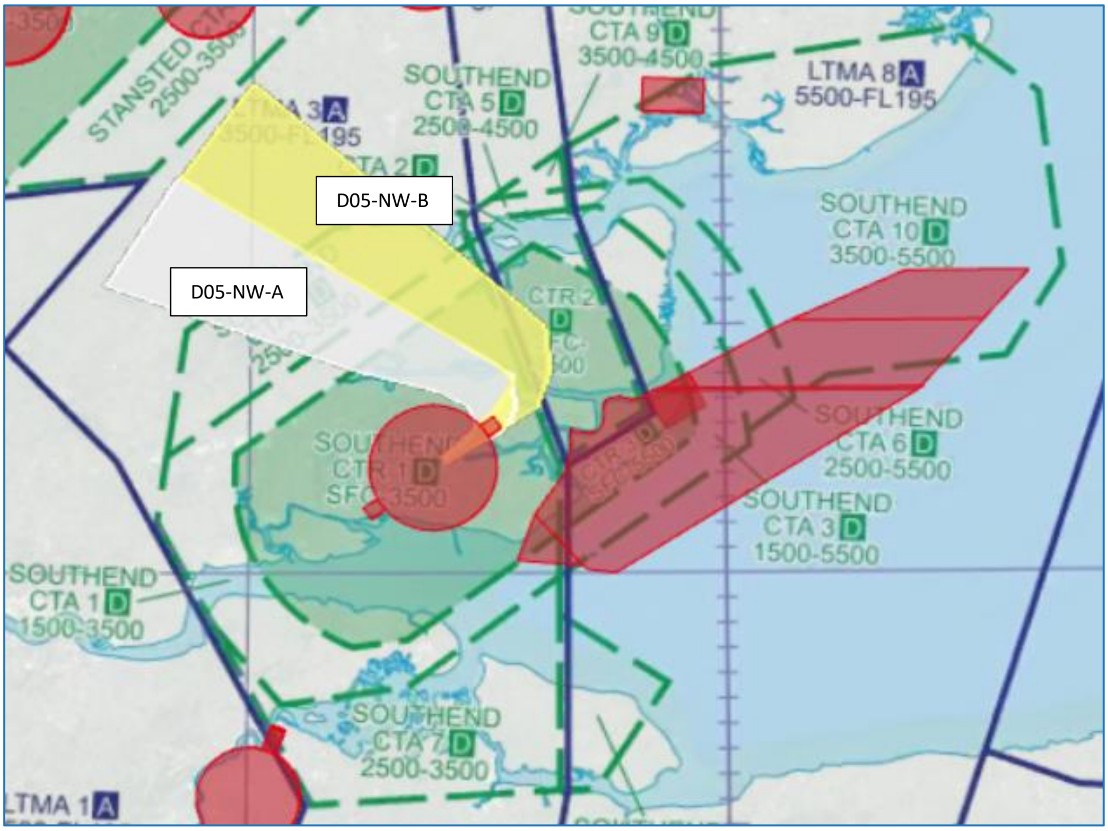

Figure 11: RW05 Northwest Departures with ENR Chart

Figure 12: RW05 Northwest Departures on Google Maps

3.4. Runway 05 – South/Southeast

Baseline

The Departures to the South off Runway 05 turn once they have adhered to the NAPs and route directly to the South. Shown in **Figure 13** by the green track data (taken over a three-month period in 2019- pre pandemic). These tracks provide the Baseline for these options and form part of Option A. Whilst these tracks fall inside the parameters of Option A, they occupy a small geographical portion within the option. The option was assessed individually and in its entirety against the baseline tracks.

Options

Option A (D05-S-A) replicates the current departure tracks, the alternatives considered include a wraparound to the North (D05-S-B) and a shallower right-turn (D05-S-C) through Shoeburyness Range (albeit only available when the Range is inactive).

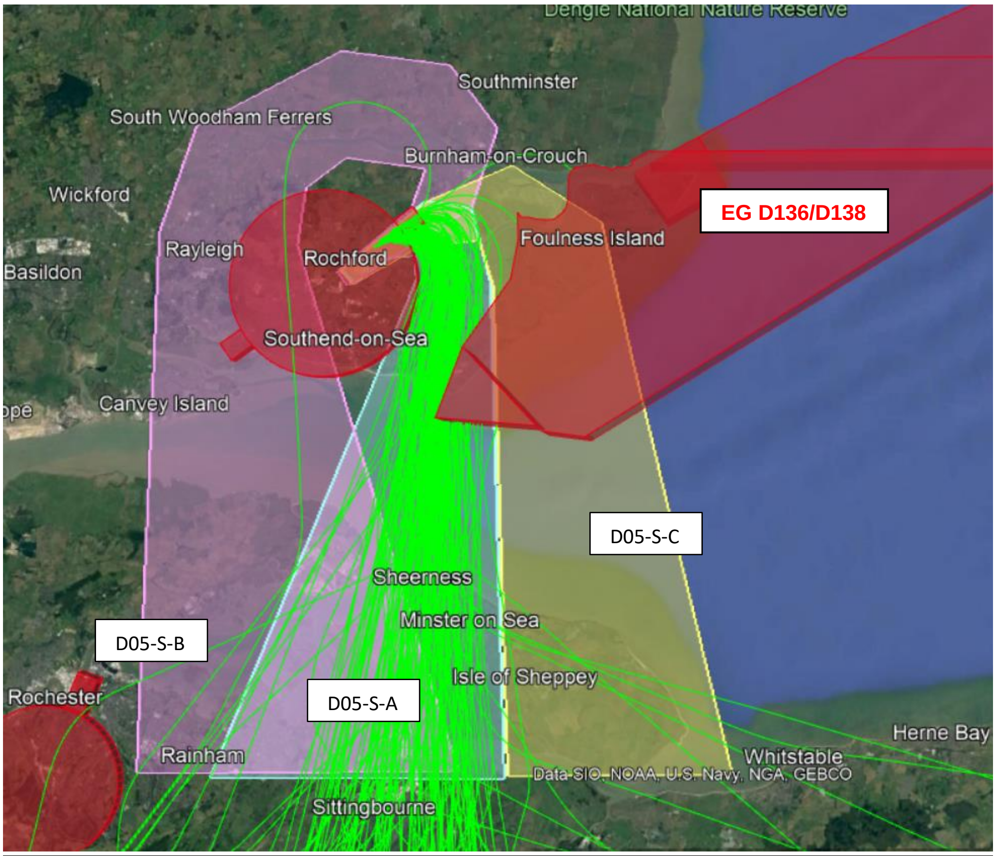

Figure 13: RW05 South Departures with NTK on Google Earth

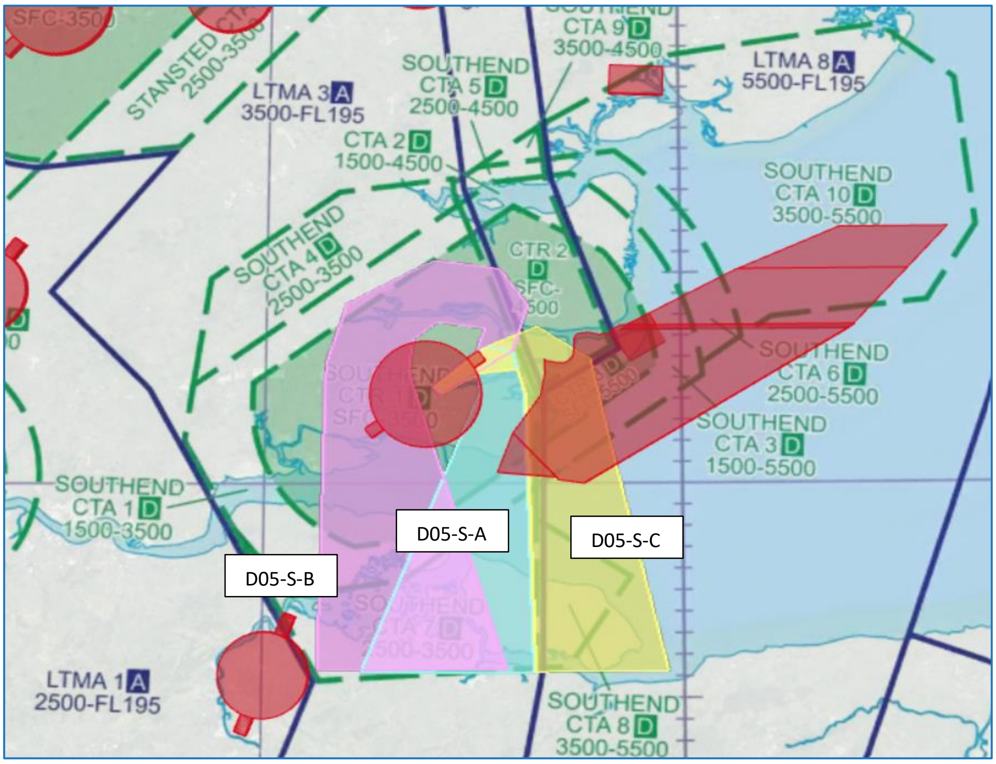

Figure 14: RW05 South Departures with ENR Chart

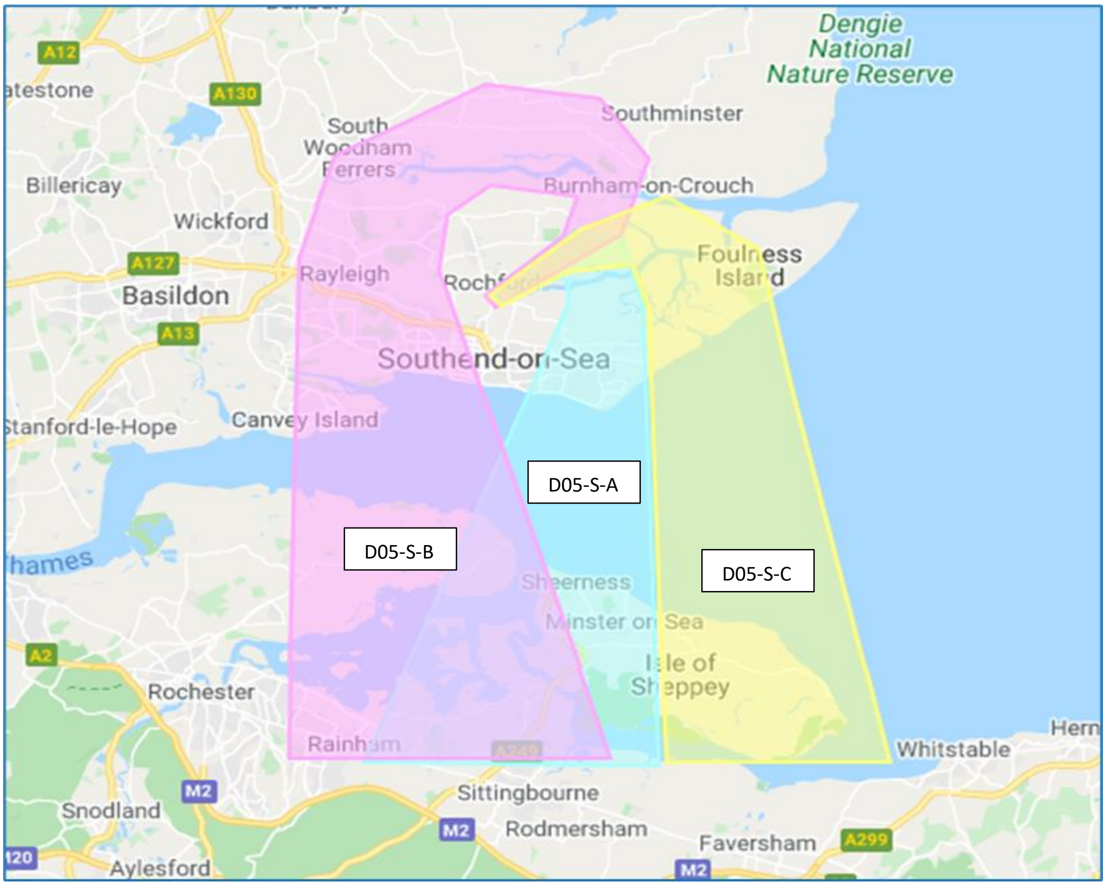

Figure 15: RW05 South Departures on Google Maps

3.5. Runway 05 - All Options

Figure 16 depicts all the options considered for departures off Runway 05.

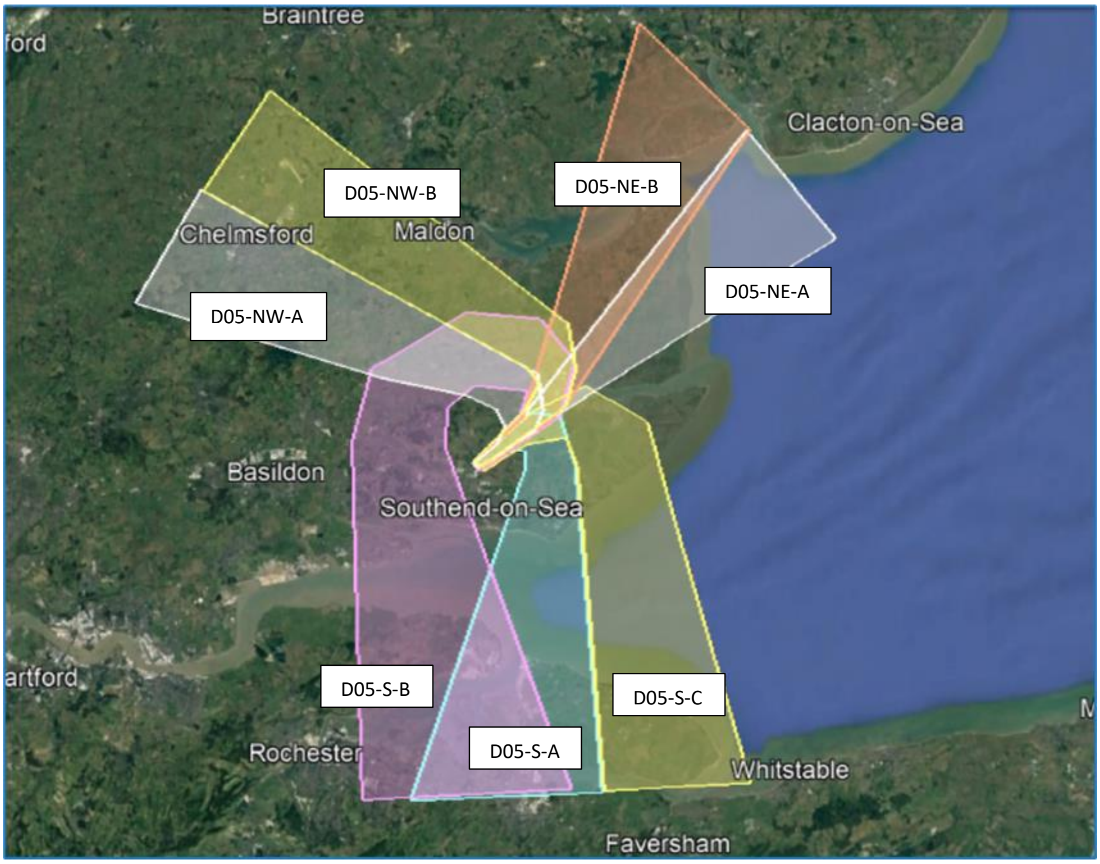

Figure 16: RW05 Departure Options

3.6. Runway 23 – Northeast

Baseline

Departures bound for the Northeast off Runway 23 turn to comply with the NAPs and remain in a tight and direct Northeasterly swathe. This is replicated in Option A (D23-NE-A). Options were assessed against these nominal tracks, depicted by the green lines in **Figure 17** (taken over a three-month period in 2019- pre pandemic). Whilst these tracks fall inside the parameters of Option A, they occupy a small geographical portion within the option. The option was assessed individually and in its entirety against the baseline tracks.

Options

A shallower right turn to the Northeast was considered (D23-NE-B) with a Northeasterly track displaced to the North. A left-turn out proceeding a track North of the Range (D23-NE-C) and one with an outbound track South of the Range (D23-NE-D) make up the other options for this departure procedure.

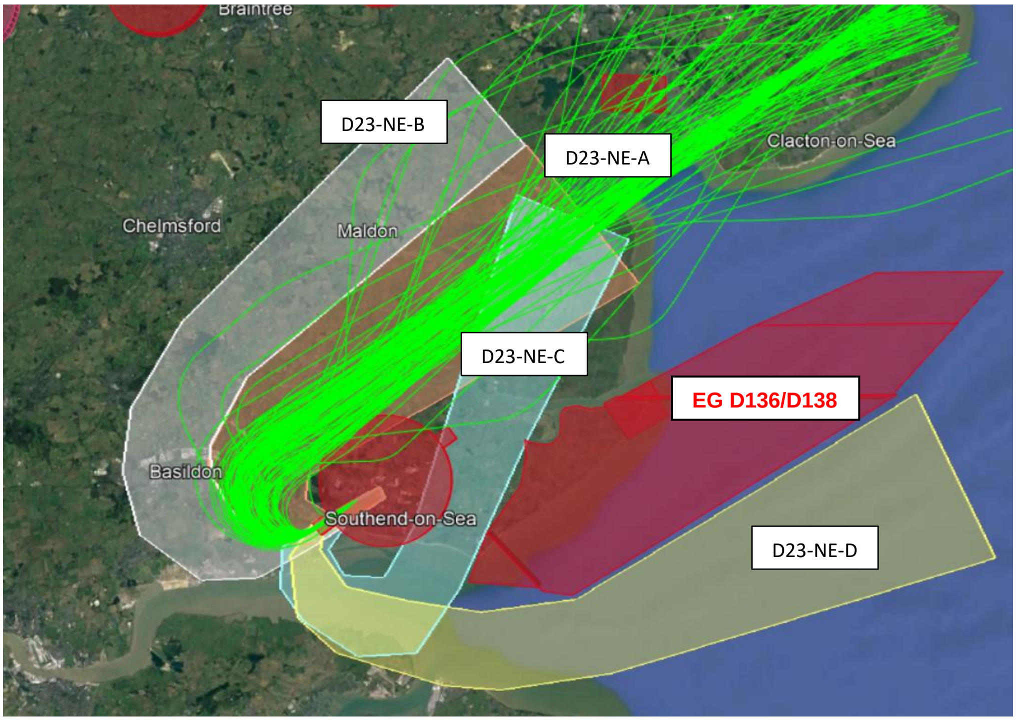

Figure 17: RW23 Northeast Departures with NK on Google Earth

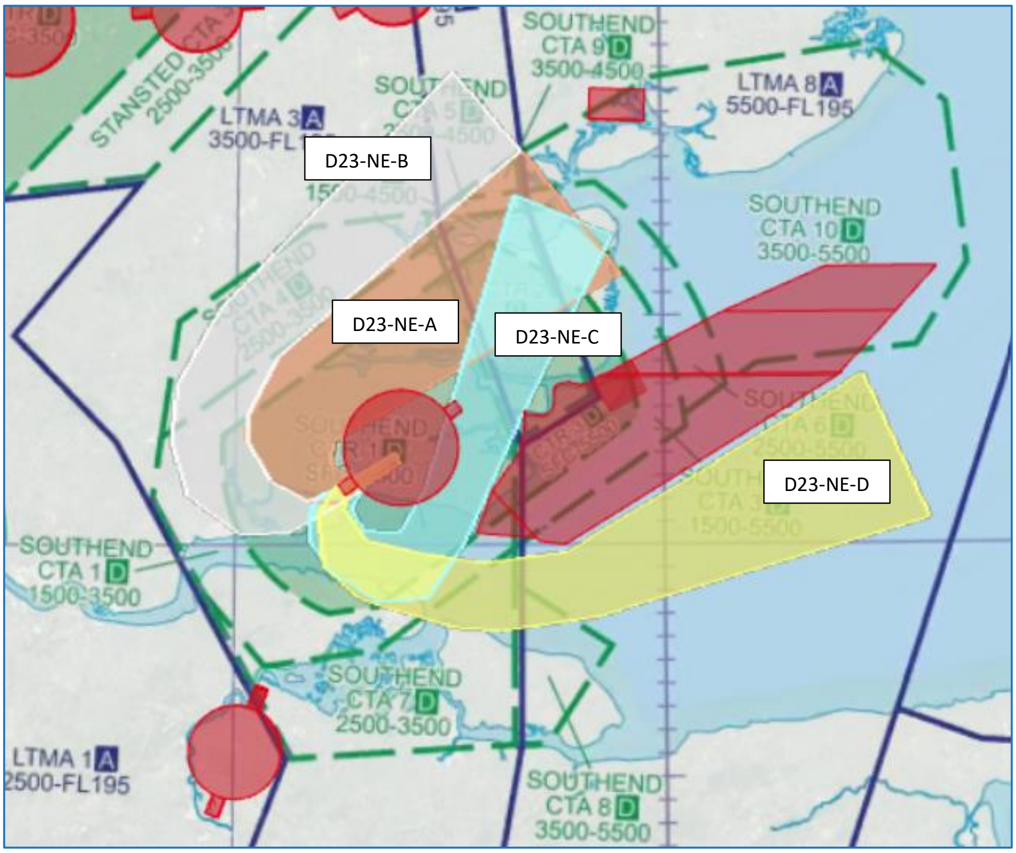

Figure 18: RW23 Northeast Departures with ENR Chart

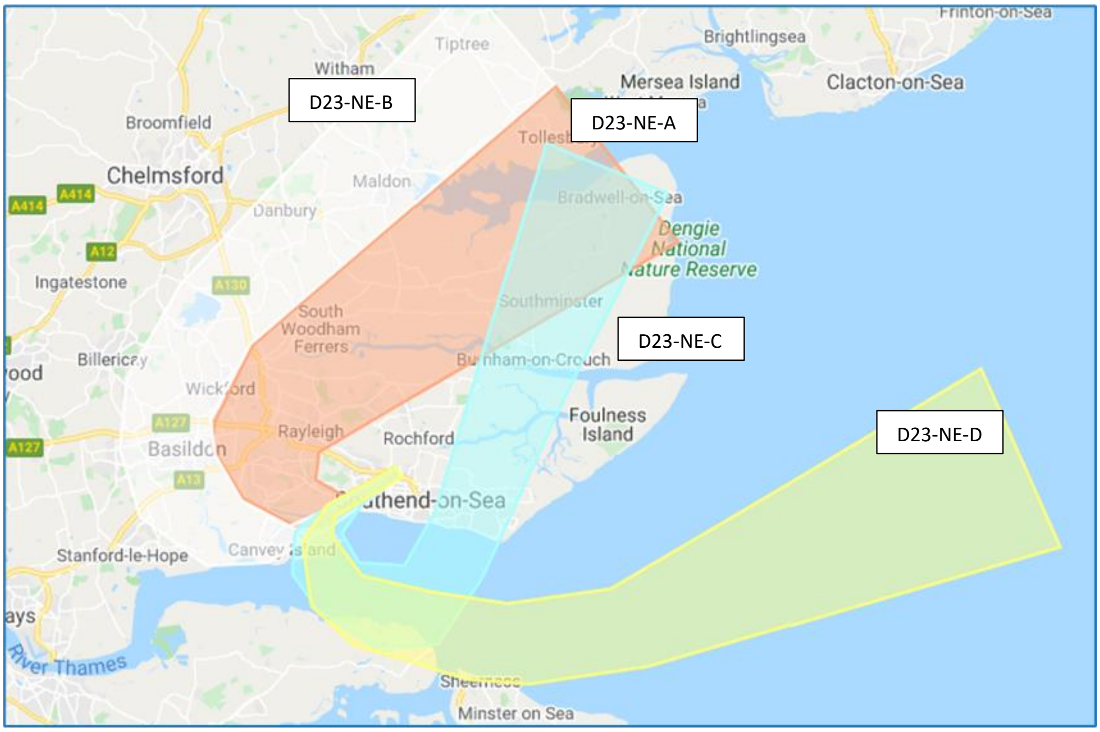

Figure 19: RW23 Northeast Departures on Google Earth

3.7. Runway 23 – Northwest

Baseline

Departures to the Northwest off Runway 23 turn to comply with the NAPs and do not fan out broadly until aircraft are 15-20NMs Northwest of LSA. Option C (D23-NW-C) would replicate the current operation. Options were assessed against these nominal tracks, depicted by the green lines in **Figure 20** (taken over a three-month period in 2019- pre pandemic). Whilst these tracks fall inside the parameters of Option C, they occupy a small geographical portion within the option. The option was assessed individually and in its entirety against the baseline tracks.

Options

An earlier turn (i.e., routing East of the existing tracks) provided Option A (D23-NW-A) and a later right-turn with a track displacement to the West became Option B (D23-NW-B).

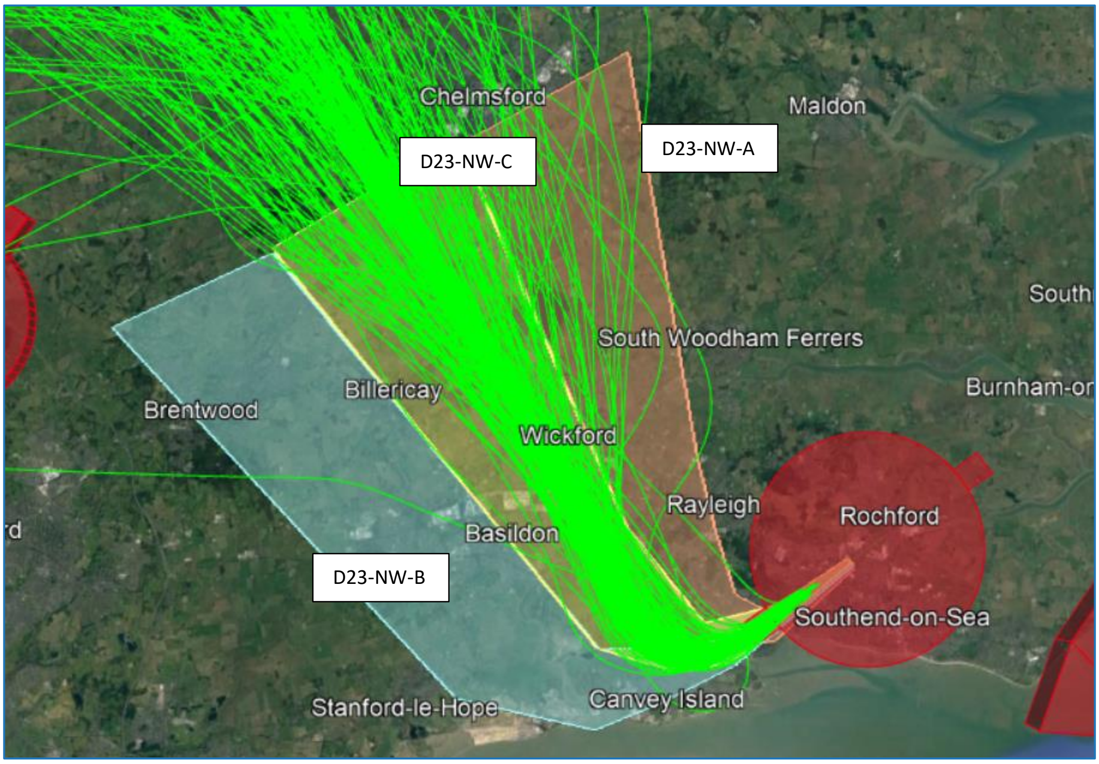

Figure 20: RW23 Northwest Departures with NTK on Goole Earth

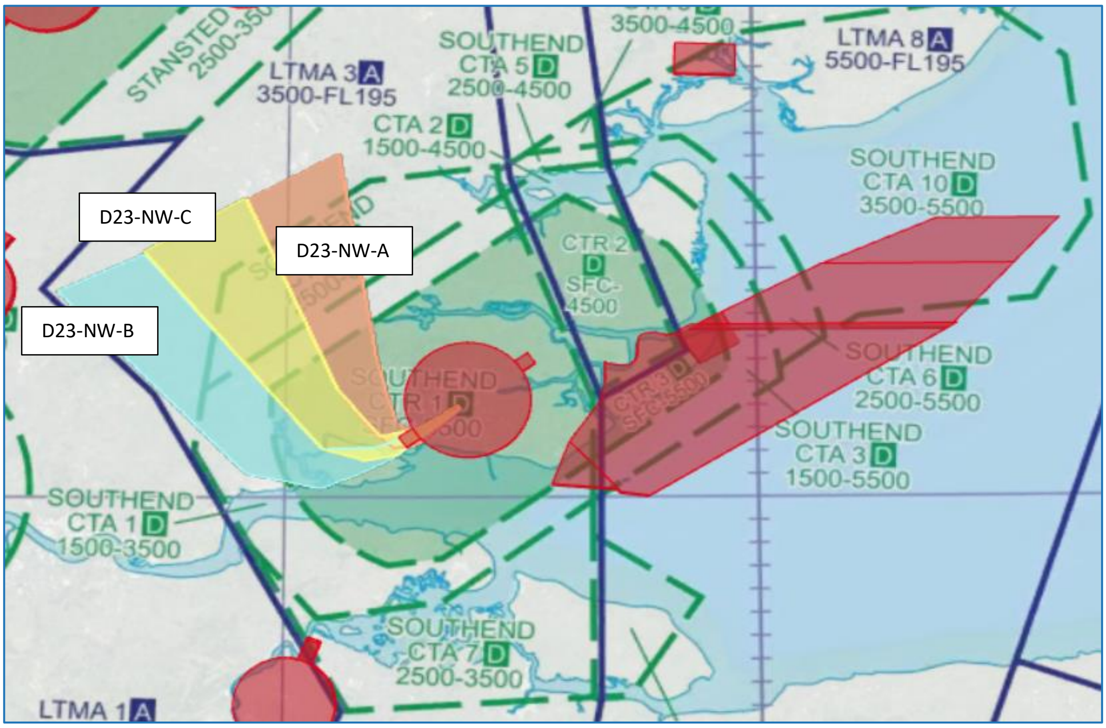

Figure 21: RW23 Northwest Departures with ENR Chart

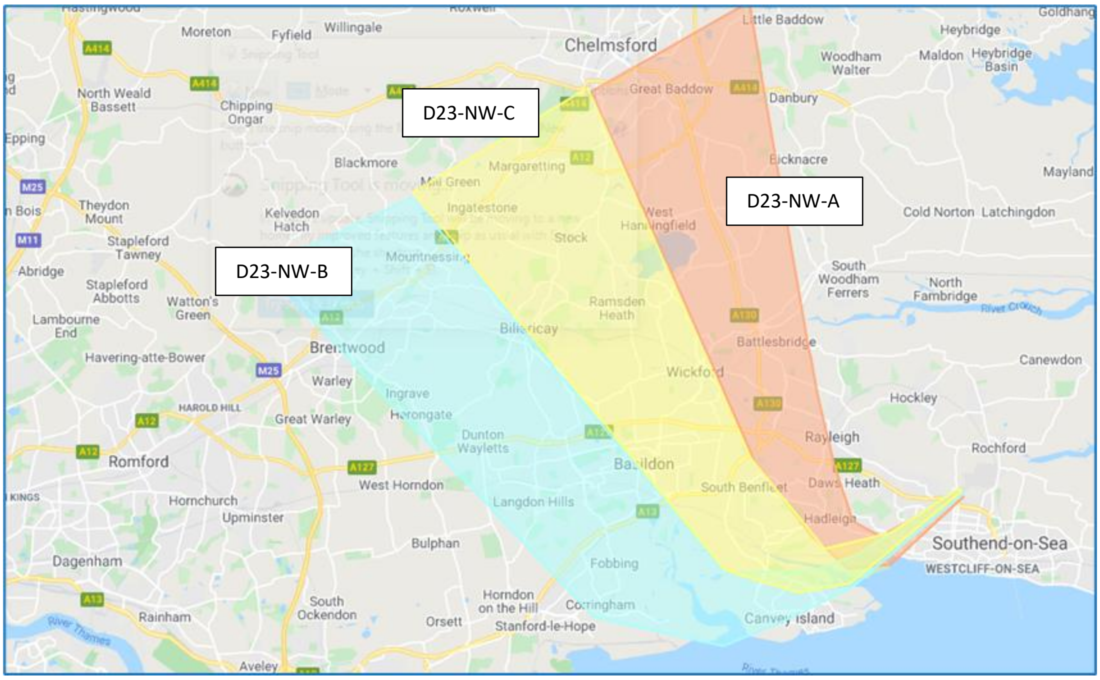

Figure 22: RW23 Northwest Departures on Google Maps

3.8. Runway 23 – South/Southeast

Baseline

Departures to the South off Runway 23 turn South upon adherence to the NAPs and start to fan out approximately 10-15nms from take-off. Options have been assessed against these nominal tracks, depicted by the green lines in **Figure 23** (taken over a three-month period in 2019- pre pandemic). Whilst these tracks fall inside the parameters of Option B, they occupy a small geographical portion within the option. The option was assessed individually and in its entirety against the baseline tracks.

Options

Options A and B (D23-S-A and D23-S-B) are a variance on the existing operation with Option A (D23-S-A) displacing the main outbound track to the East. Option C (D23-S-C) has a later turn to the South displacing the tracks to the West of where they go today.

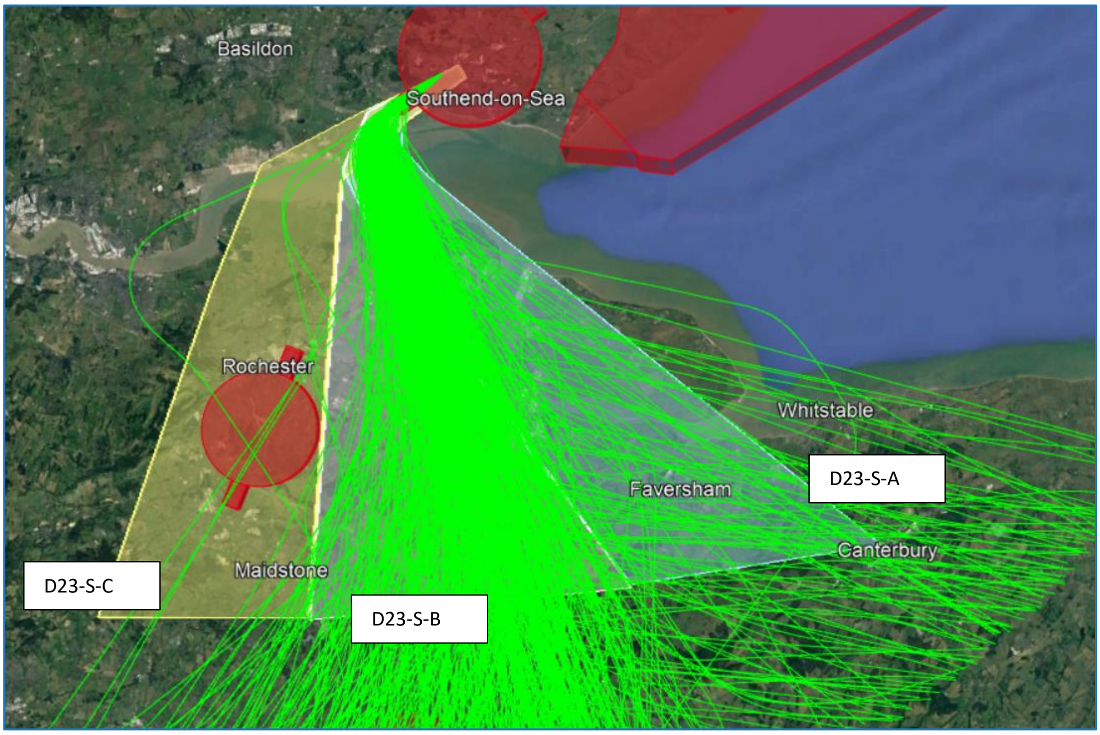

Figure 23: RW23 South Departures with NTK on Google Earth

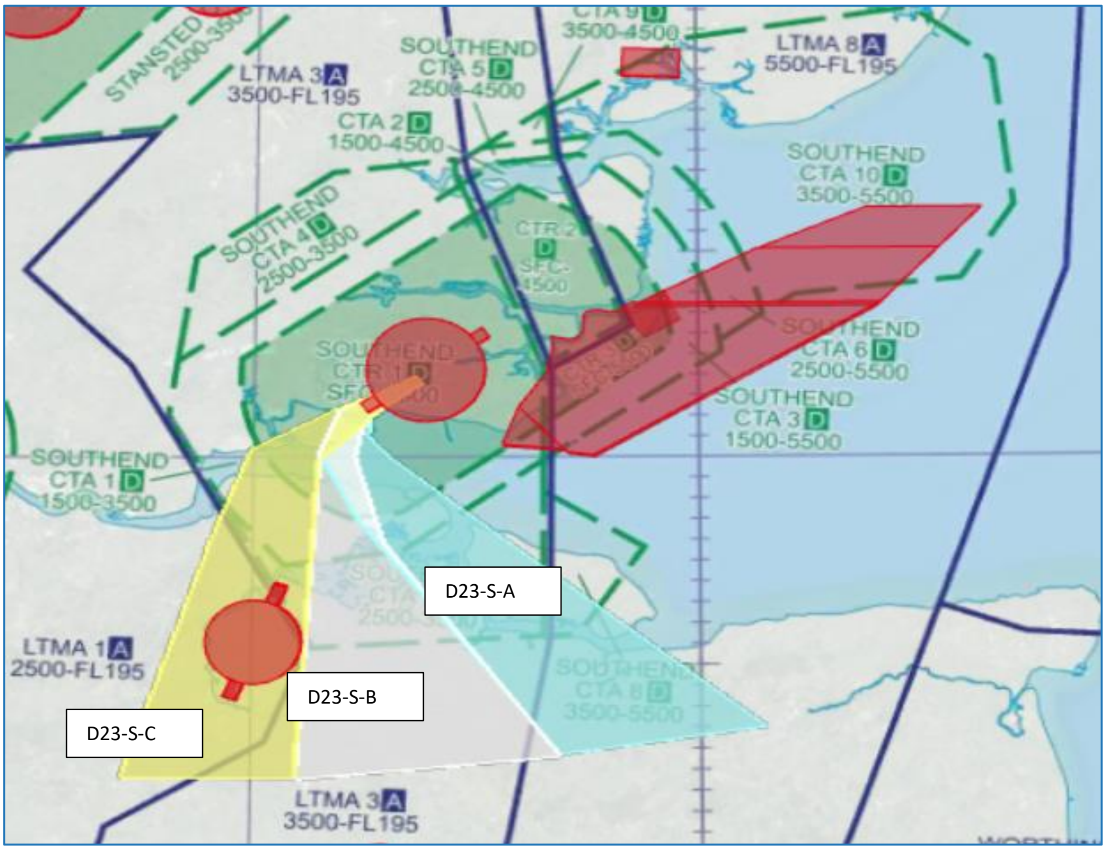

Figure 24: RW23 South Departures with ENR Chart

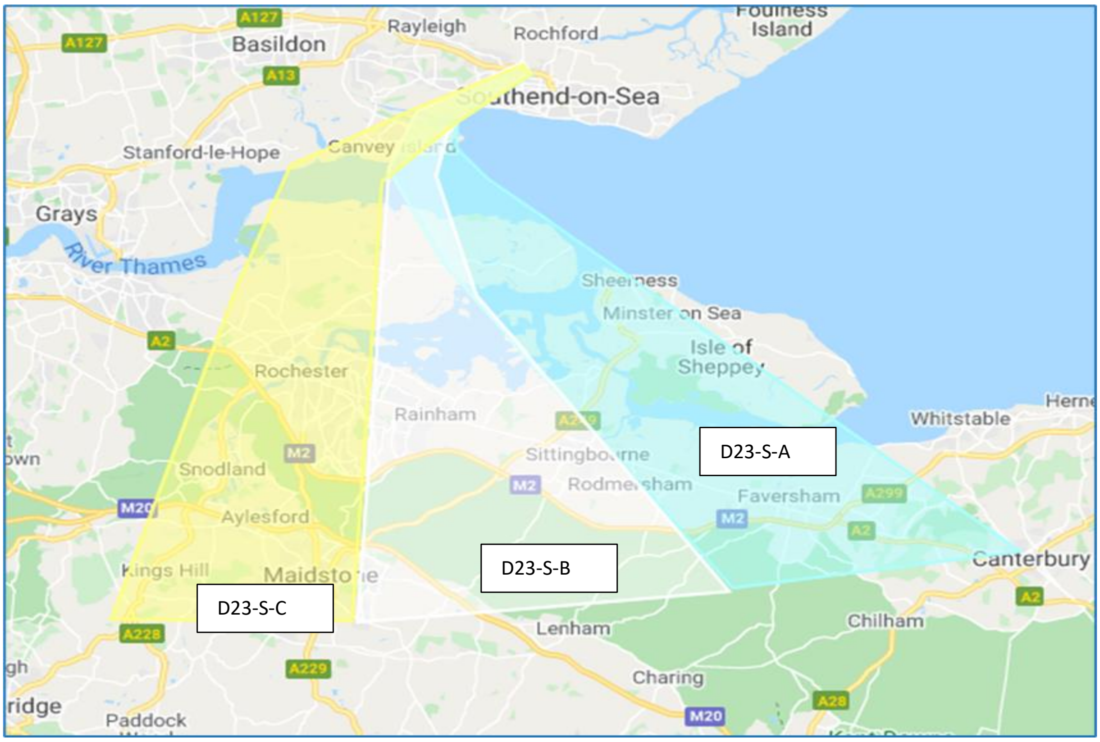

Figure 25: RW23 South Departures on Google Maps

3.9. Runway 23 - All Options

Figure 25 depicts all the options considered for Runway 23 departures .

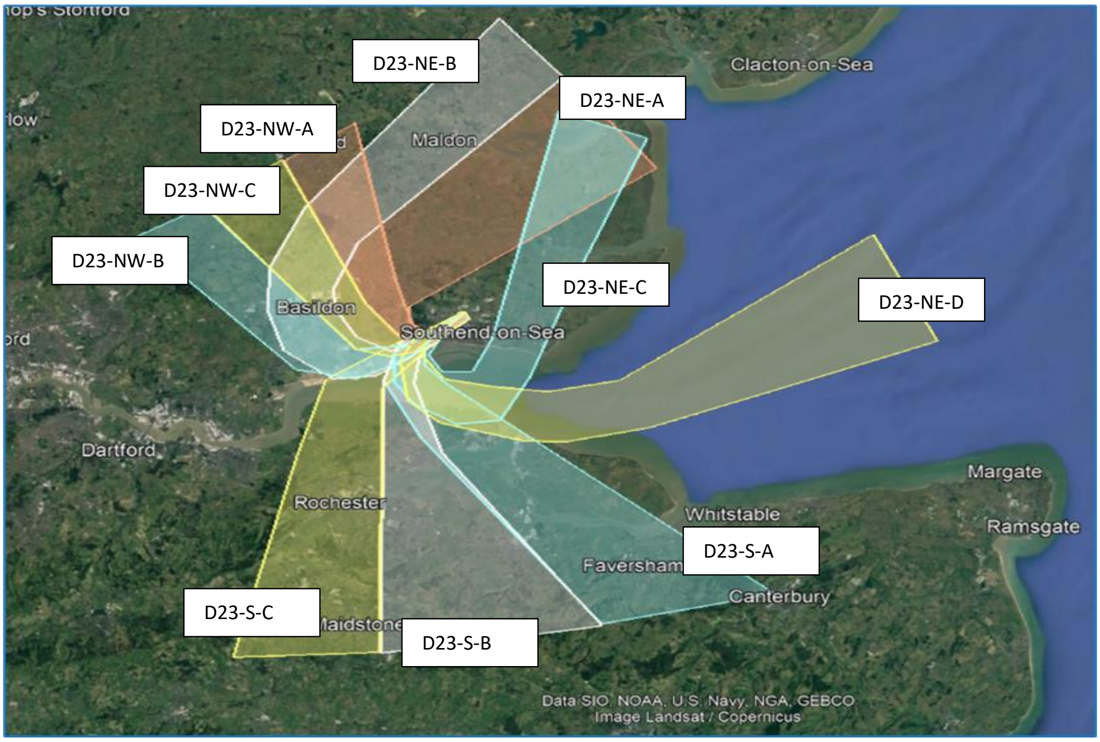

Figure 26: RW23 Departure Options

4. Arrival Procedures

4.1. Runway 05 Arrivals from Northwest

Baseline

The existing Standard Arrival (STAR) from Barkway (BWY) routes to BRAIN and then a hold in the vicinity of MAYLA, shown below and by the red track in **Figure 28**. This forms our Baseline for these options.

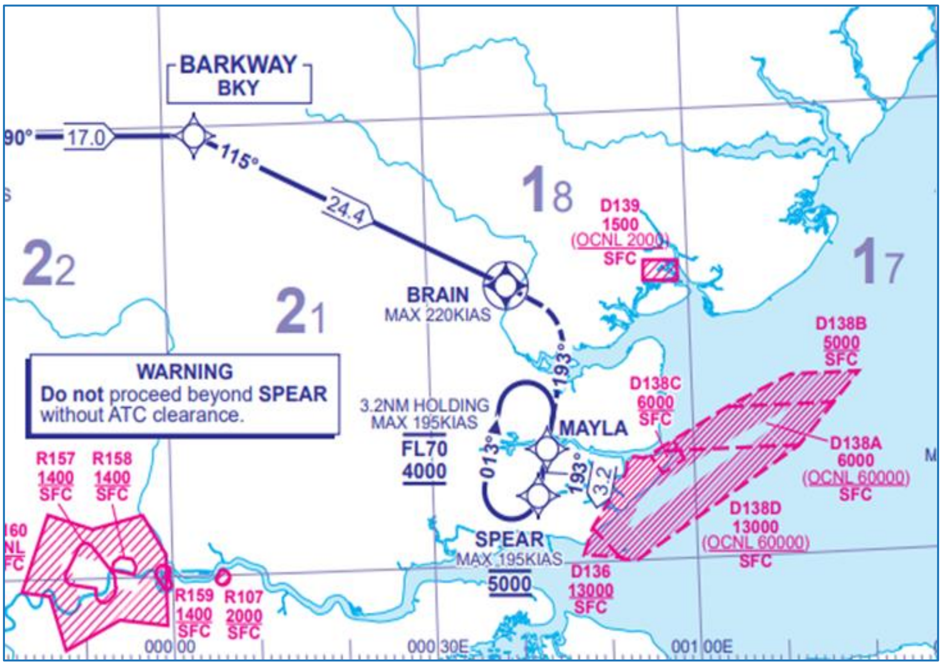

Figure 27: BRAIN and MAYLA Options

Options

The Options presented below sought to turn right off the STAR and take a variety of direct routings (some more expeditious than others). Option D (A05-NW-D) looked at the potential to route directly from BWY.

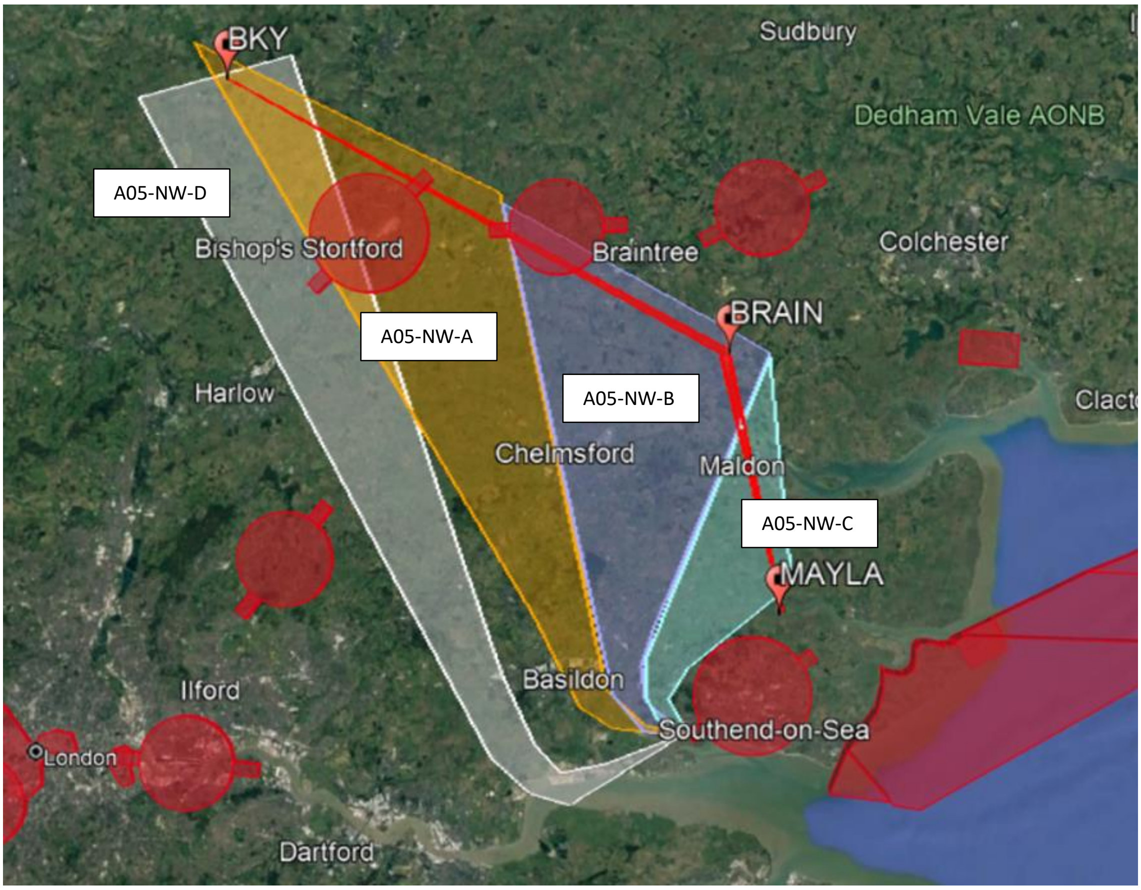

Figure 28: RW05 Arrival Options from Northwest Google Earth

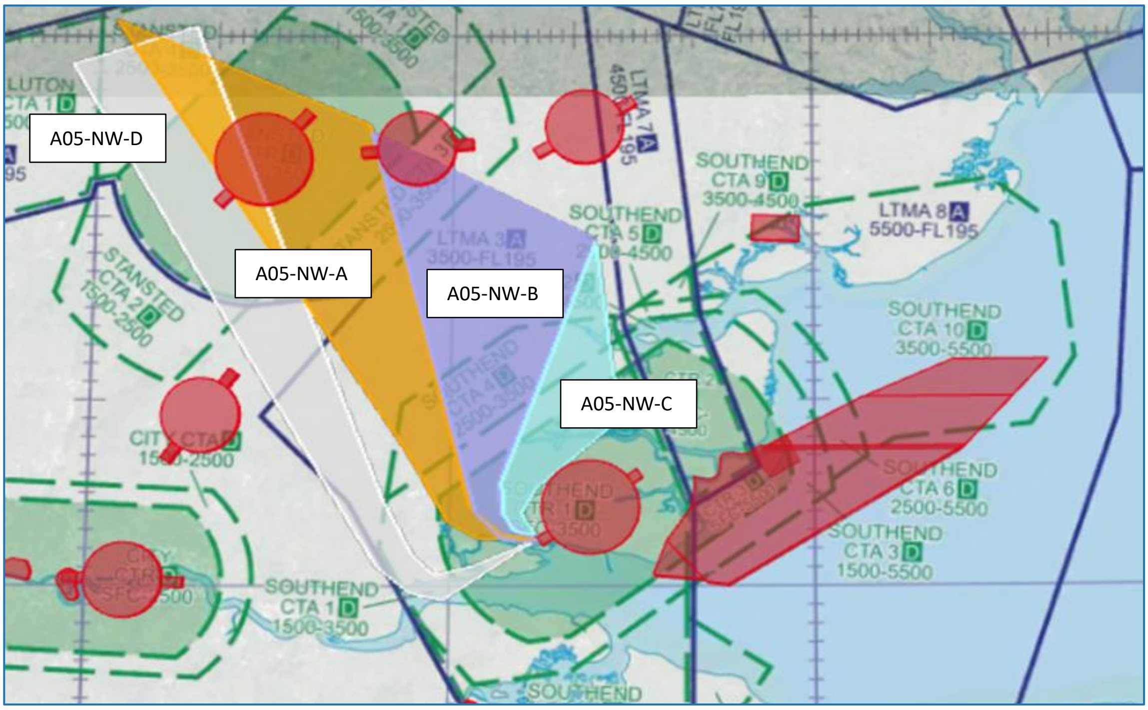

Figure 29: RW05 Arrival Options from Northwest ENR Chart

4.2. Runway 05 Arrivals from the South and the East

Baseline

The existing STAR from the South and the East routes to ADVAS and then the hold at GEGMU. This is shown by Option G and forms our Baseline for these options.

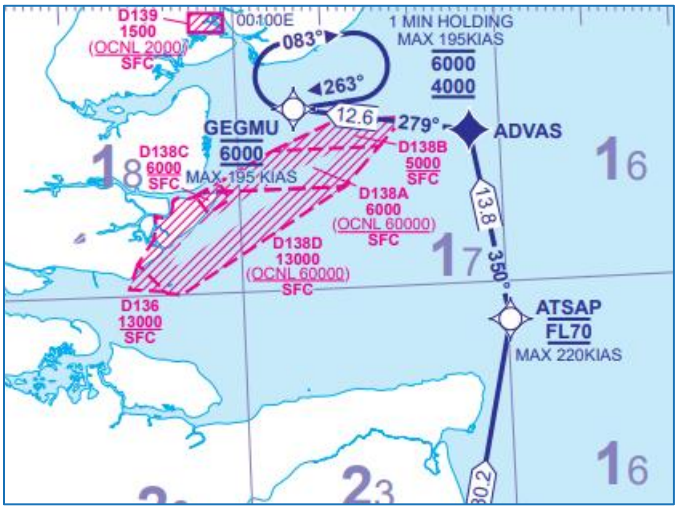

Figure 30: South and East Routes

The arrival traffic data shows aircraft routing across the fan of options (**Figure 31)**. The GEGMU option (A05-SE-G) serves as the most likely option from the East although it would be possible to route south of Shoeburyness Range (A05-SE-F). Notably, the GEGMU option has already been designed to introduce GNSS approaches and submitted as part of the 2018 ACP.

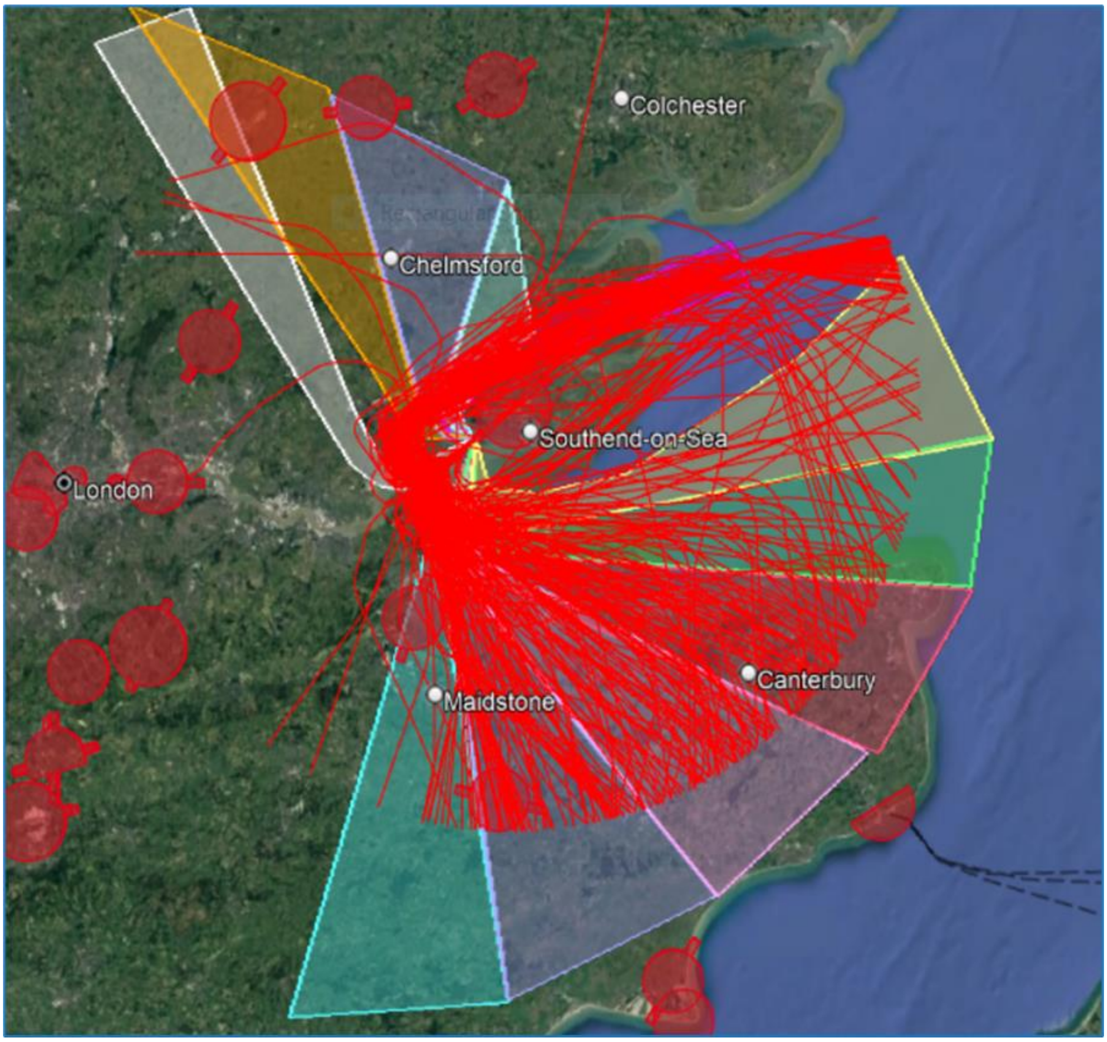

Figure 31: All Arrival Option RW05 with NTK

<u>Options</u>

The Options for arrivals from the South consist of a fan array.

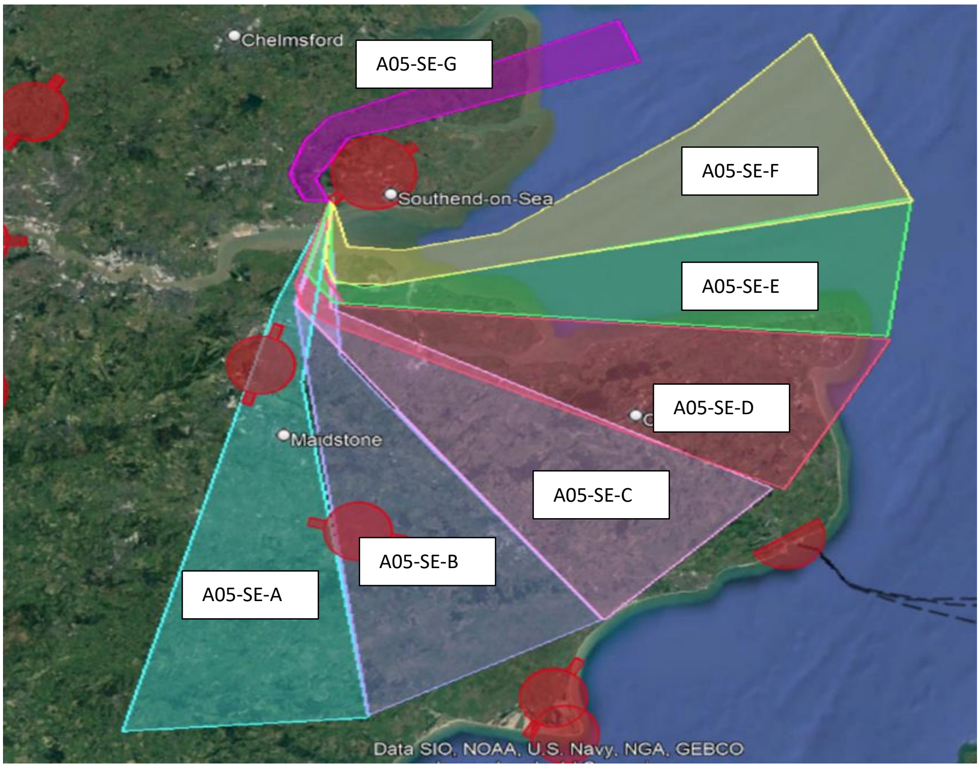

Figure 32: RW05 Arrival Options from the South and the East Google Earth

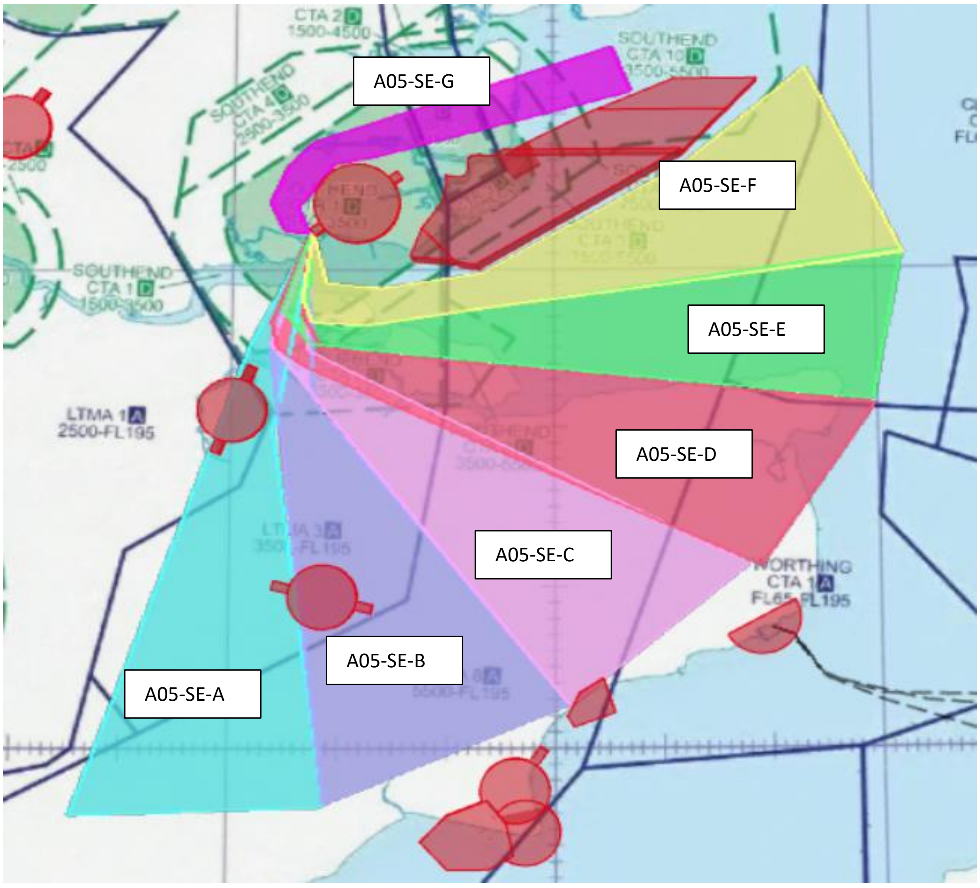

Figure 33: RW05 Arrival Options from the South and the East ENR Chart

4.3. Runway 23 Arrivals from the Northwest

Baseline

The arrival options to Runway 23 from the Northwest largely follow the existing track of the STAR as it represents the most expeditious routing and forms our Baseline.

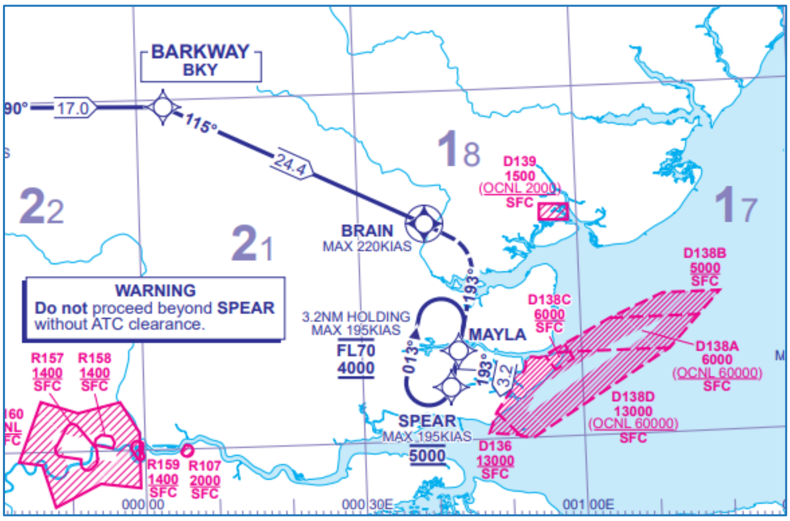

Figure 34: Arrivals from the Northwest

Options

Option A (A23-NW-A) then turns at TOLNO whilst Option B (A23-NW-B) does not.

Figure 35: RW23 Arrival Options from the Northwest Google Earth

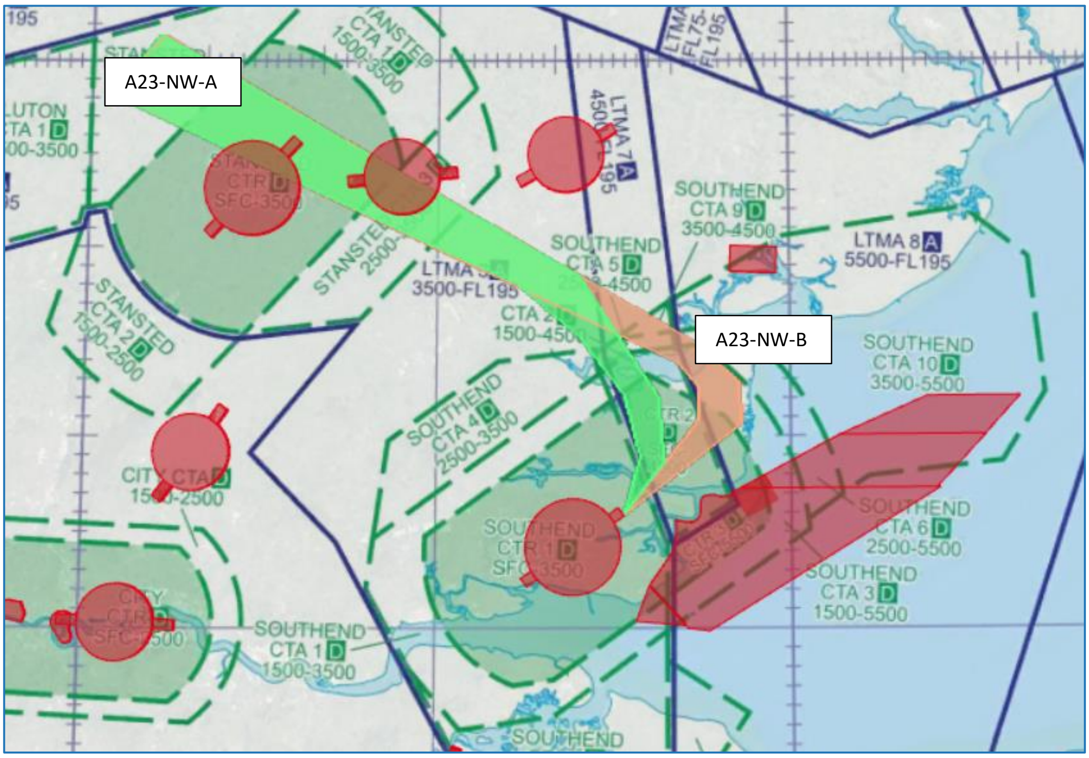

Figure 36: RW23 Arrival Options from the Northwest ENR Chart

4.4. Runway 23 Arrivals from the South and the East

Baseline

The existing STAR from the South and the East, routes to ADVAS and then the hold at GEGMU, as shown in **Figure 37**. This is captured in Option A and forms our Baseline for these options.

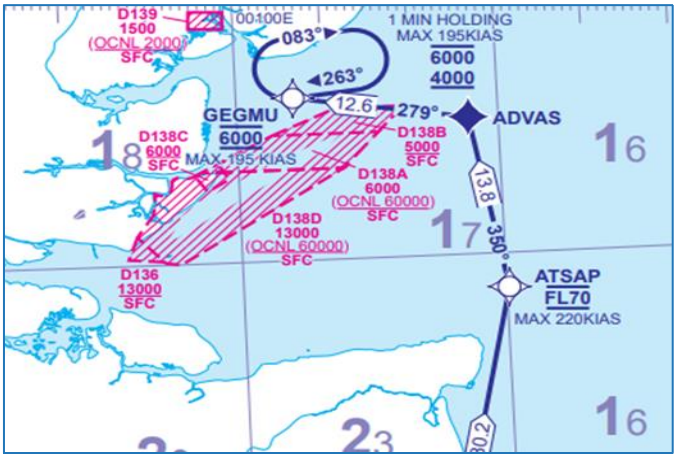

Figure 37: Arrivals from the South and the East

It is interesting to note from the data presented in **Figure 38**, that the array of arrivals fan out across the land to the Southeast of Southend and that the arrivals from the Northwest do not follow the STAR closely. There are also many tracks that route through Shoeburyness Range even when it is inactive. The Options developed capture most of these routes.

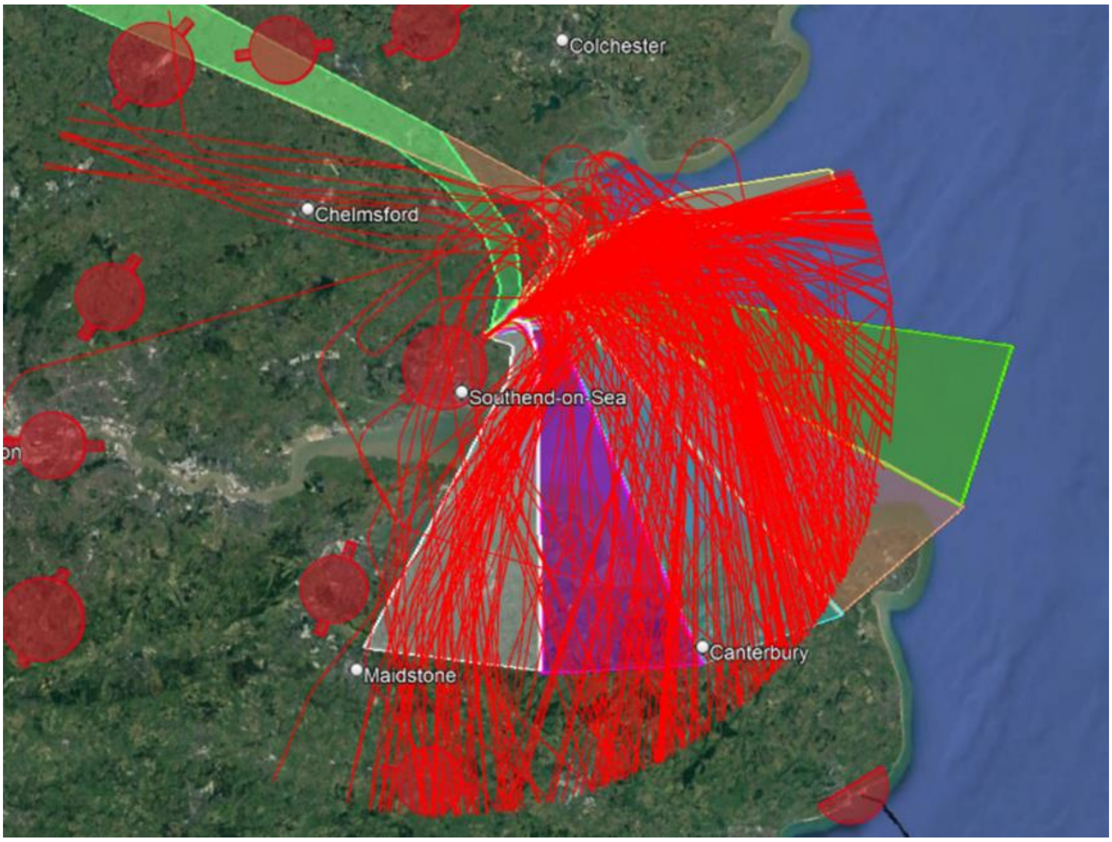

Figure 38: All Arrival Options RW23 with NTK

<u>Options</u>

A fan array of options is available for arrivals from the South. The arrival traffic data shows aircraft routing across these options (**Figure 38).** The GEGMU (A23-SE-A) is the preferred option for traffic during the day (Mon-Fri 0800-1600hrs) when Shoeburyness Range is active. It would be possible to route more directly over this area when the Range is inactive.

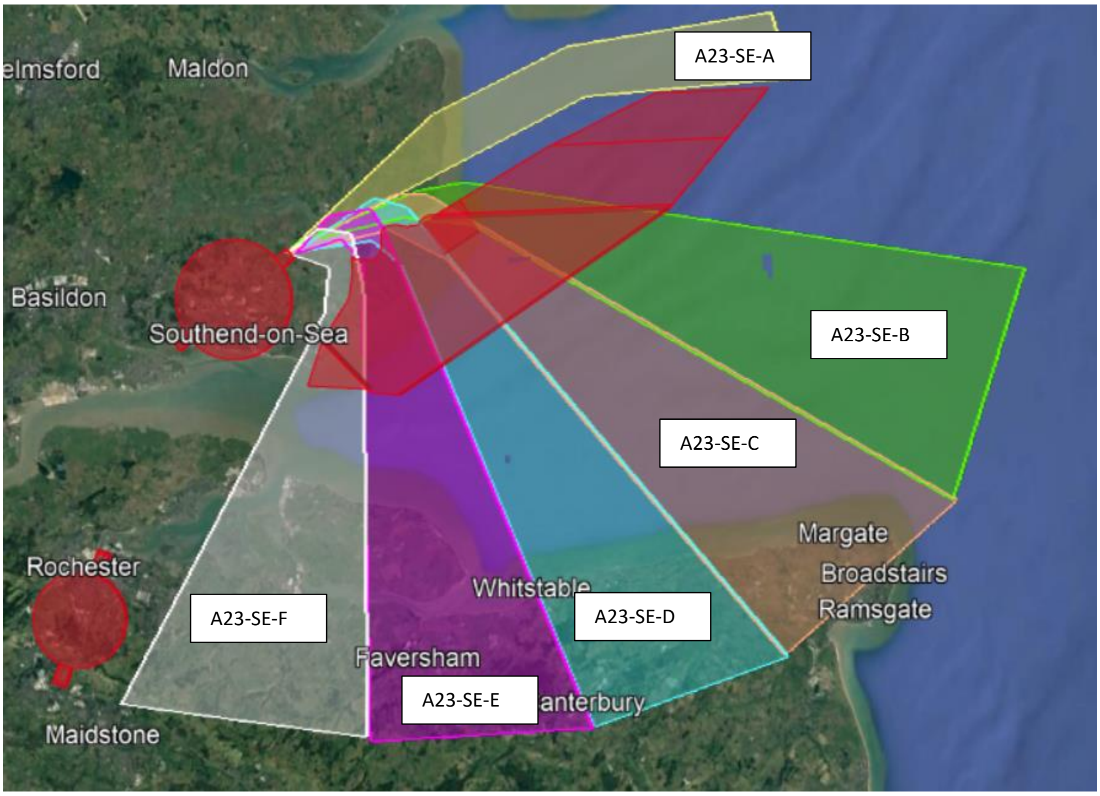

Figure 39: RW23 Arrival Options from the South and the East Google Earth

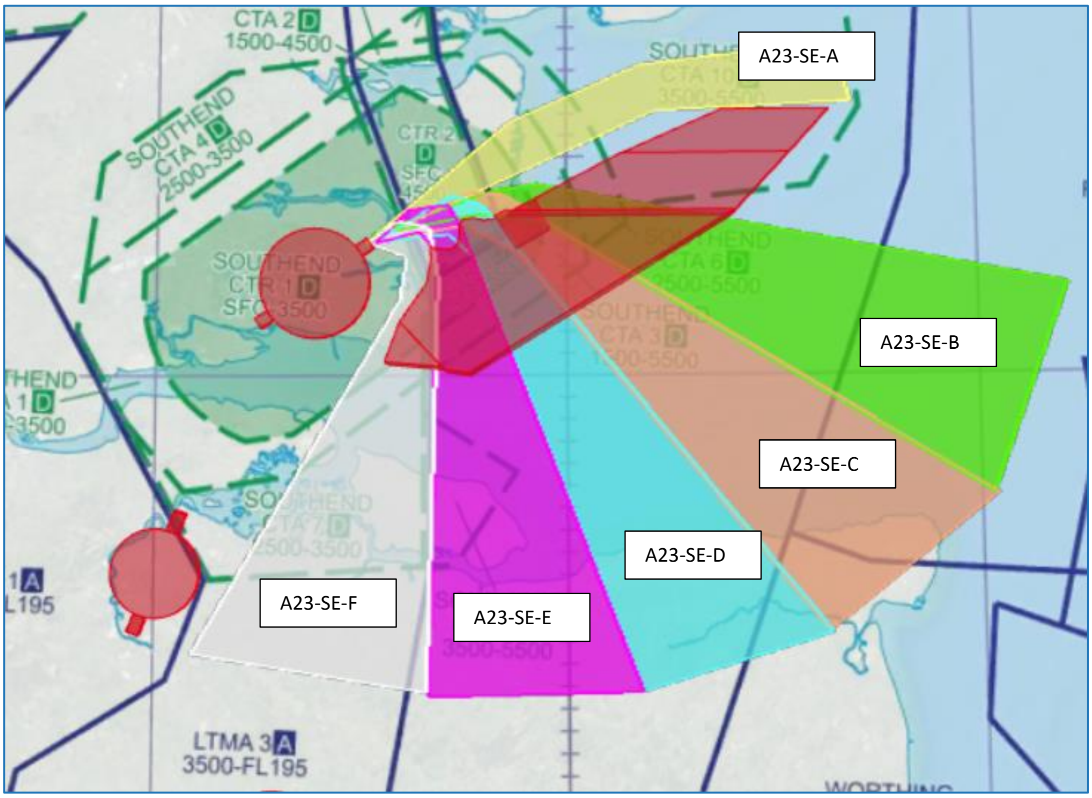

Figure 40: RW23 Arrival Options from the South and the East ENR Chart

5. Design Principle Evaluation

5.1. Methodology

5.1.1. The Design Principle Evaluation takes each of the options and qualitatively assesses them against the Design Principles developed in Stage 1 (detailed in **Section 1.16** Design Principles). Prior to the Stakeholder workshops on the 8th of April 2022, the Team at Cyrrus and LSA conducted an internal Design Principle evaluation on all of the Options. This was a basic assessment of the Options, where each swathe was assessed against each Design Principle and assigned a colour depending on whether it was deemed to meet the Design Principle:

- fully met (Green).
- partially met (Amber).
- not met (Red).

5.1.2. This was presented to the Stakeholders at the workshop and their feedback was requested.

5.1.3. Stakeholders were invited to take part in an online survey from the 13th of April 2022 to the 16th of May 2022. This survey asked whether the stakeholders felt we had applied the Design Principles correctly and consistently to each of our options. It provided an opportunity to comment on areas they felt this may not have been the case.

5.1.4. The feedback from the stakeholders was incorporated into the Design Principle Evaluation, which is summarised in **Section 7**. The full evaluations and stakeholder feedback are contained within the Design Principles Evaluation document[7].

5.2. Design Principle Evaluation Assessment Criteria

5.2.1. To ensure consistency when evaluating each option, we have followed the assessment criteria detailed in Annex A below for all the options.

6. Stakeholder Feedback

6.1. Survey Feedback

6.1.1. Following on from the Stakeholder Workshops and associated survey we reviewed the Design Principle Evaluation and adjusted our assessments against each Design Principle accordingly. The feedback received from the Stakeholders is contained in the Design Principles Evaluation document[7] which is on the ACP Portal.

6.2. Non-Survey Feedback

6.2.1. In addition to the survey responses, we received letters from:

- Essex County Council;
- Southend-on-Sea City Council; and
- Natural England.

6.2.2. These responses have helped us shape the Design Principle Evaluation and will be addressed further during Stage 2B and the Options Appraisal.

7. Design Principle Evaluation Summary

7.1. Assessments

7.1.1. Full details of the Design Principle Evaluation can be found in the Design Principles Evaluation document[7] which is on the ACP Portal.

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	DP12	DP13
D05-NE-A													
D05-NE-B													

Table 1: Departures Runway 05 - Northeast DP Assessment

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	DP12	DP13
D05-NW-A													
D05-NW-B													

Table 2: Departures Runway 05 - Northwest DP Assessment

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	DP12	DP13
D05-S-A													
D05-S-B													
DO5-S-C													

Table 3: Departures Runway 05 - South/Southeast DP Assessment

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	DP12	DP13
D23-NE-A													
D23-NE-B													
D23-NE-C													
D23-NE-D													

Table 4: Departures Runway 23 - Northeast DP Assessment

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	DP12	DP13
D23-NW-A													
D23-NW-B													
D23-NW-C													

Table 5: Departures Runway 23 - Northwest DP Assessment

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	DP12	DP13
D23-S-A													
D23-S-B													
D23-S-C													

Table 6: Departures Runway 23 - South/Southeast DP Assessment

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	DP12	DP13
A05-NW-A													
A05-NW-B													
A05-NW-C													
A05-NW-D													

Table 7: Arrivals Runway 05 - Northwest DP Assessment

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	DP12	DP13
A05-SE-A													
A05-SE-B													
A05-SE-C													
A05-SE-D													
A05-SE-E													
A05-SE-F													
A05-SE-G													

Table 8: Arrivals Runway 05 - South and East DP Assessment

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	DP12	DP13
A23-NW-A													
A23-NW-B													

Table 9: Arrivals Runway 23 - Northwest DP Assessment

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	DP12	DP13
A23-SE-A													
A23-SE-B													
A23-SE-C													
A23-SE-D													
A23-SE-E													
A23-SE-F													

Table 10: Arrivals Runway 23 - South and East DP Assessment

8. Next Steps

8.1. Overview

8.1.1. In the next stage of this ACP, we will take each of the Options in this report through an Initial Options Appraisal as stipulated in CAP1616 Stage 2B.

Extract from CAP1616 below:

'Step 2B requires the change sponsor to carry out an 'Initial' appraisal of the impacts of each of the viable options identified in Step 2A using the design criteria against which the options are being assessed (the first of three iterative phases of options appraisal, as explained below). The Initial appraisal should, as a minimum, contain qualitative assessments of the different options. This highlights to change sponsors, stakeholders, and the CAA the relative differences between the impacts, both positive and negative, of each option. The change sponsor assesses each option against a 'do nothing' scenario (the 'counterfactual'), even where there is only a single change option, to understand these impacts.'

8.1.2. LSA has a January 2023 Gateway for Stage 2 which requires the Initial Options Appraisal to be completed and uploaded onto the ACP Online Portal by the end of December 2022.

A. Design Principle Evaluation Criteria

Design Principle		Qualitative Assessment	Green	Amber	Red
1.	**Importance of Safety –** The airspace design and its operation must maintain or where possible, enhance current levels of safety.	Initial qualitative assessment to determine any potential safety concerns.	No safety concerns	Work needed to make safe	Unsafe
2.	**Overflight**-The new procedures should not increase the number of people overflown by aircraft using the Airport and where possible options that provide a level of dispersion should also be considered.	High level qualitative assessment of people overflown- more detailed assessment conducted in Stage 2B	No different to today or less people overflown	Different not necessarily more	More AND different
3.	**Noise Footprint** – The design should limit, and where practicable reduce, the impact of noise to stakeholders on the ground and where possible periods of built-in respite should be considered.	Initial high level qualitative assessment of noise impact to stakeholders on the ground (approximately 4000ft and below).	No different to today or less people overflown	Different not necessarily more	More AND different
4.	**Tranquillity -** Where practical, route designs should limit effects upon sensitive areas. These may include cultural or historic assets, tranquil or rural areas, sites of care or education and AONB's.	Initial high level qualitative assessment- more detailed assessment conducted in Stage 2B.	No different to today or less people overflown	Different not necessarily more	More AND different
5.	**Emissions and Air Quality** – The proposed design should minimise CO2 emissions per flight.	Initial high level qualitative assessment- more detailed assessment conducted in Stage 2B.	No different or less than today	Different and more	Extra track miles - significantly more than baseline
6.	**Operational Requirements** – The new procedures should address the needs of most operators at LSA.	Initial high level qualitative assessment. This DP will be assessed more thoroughly in Stage 3 when the options are refined to give more precise routes- currently the option will be considered to have met this Design Principle if there is somewhere within the swathe that can meet this requirement.	Fully	Partially	Not Met
7.	**Airspace Dimensions** – The volume and classification of controlled airspace required for LSA should be the minimum necessary to deliver an efficient airspace design, considering the needs of all airspace users.	High level qualitative assessment of the airspace required for each option. This DP will be assessed more thoroughly in Stage 3 when the options are refined to give more precise routes.	Contained within existing controlled airspace	Would require more controlled airspace- but the minimum necessary	Significant new volume of controlled airspace required (minimum necessary)
8.	**Airspace Complexity** – The airspace design should seek to reduce complexity and bottlenecks in controlled and uncontrolled airspace and contribute to a reduction in airspace infringements.	High level qualitative assessment against the baseline 'do nothing' option.	No worse or different to today	Potential for more complexity	Marked increase in complexity

	Technical Requirements – The design shall be fully compliant with PANS-OPS and UK CAA criteria to meet the technical capability requirements of aircraft using the airport.	This DP is difficult to evaluate at this stage of the process. With the options as they currently stand, we believe that within each swathe there will be an available route that would meet this Design Principle. As such, all options have been assessed as fully meeting this DP. Further, more detailed, analysis will be conducted within Stage 3 of this process when the options have been refined to individual routes rather than high level swathes.	Fully	Partially	Not Met
	Systemisation – The arrival transitions and departure procedures shall be deconflicted and integrate with the en-route network, as per the FASI(S) programme, and in the case of the arrival transitions shall integrate with the Instrument Approach Procedures (IAPs) reducing the requirement for tactical coordination.	Qualitatively assessed between the different arrival and departure options for conflictions and also interdependencies between neighbouring airports current and planned routes.	No current conflicts	Possibility of resolvable conflicts	Unable to be separated from other interdependent airports current procedures
	Operational Cost – Provided it does not have an adverse impact of community disturbance, procedures should be designed to optimise fuel efficiency.	Assessed similarly to DP5 - Emissions and Air Quality, more track miles will incur more fuel cost. Initial high level qualitative assessment- more detailed assessment conducted in Stage 2B.	No different or less than today	Different and more	Extra track miles, significantly more than baseline
	AMS Realisation – This ACP must serve to further, and not conflict with, the realisation of the AMS.s	This DP is difficult to evaluate at this stage of the process. With the options as they currently stand, we believe that within each swathe there will be an available route that would meet this Design Principle. As such, all options have been assessed as fully meeting this DP. Further, more detailed, analysis will be conducted within Stage 3 of this process when the options have been refined to individual routes rather than high level swathes.	Fully	Partially	Not Met
	PBN – The new procedures should capitalise on as many of the potential benefits of PBN implementation as are practicable.	This DP is difficult to evaluate at this stage of the process. With the options as they currently stand, we believe that within each swathe there will be an available route that would meet this Design Principle. As such, all options have been assessed as fully meeting this DP. Further, more detailed, analysis will be conducted within Stage 3 of this process when the options have been refined to individual routes rather than high level swathes.	Fully	Partially	Not Met

B. Stakeholder List

B.1. Community Stakeholders

LSA Consultative Committee (ACC) members	
Castle Point Borough Council	Southend Residents Association (including West Leigh Residents Association)
Essex County Council	Independent Representative
Leigh Town Council	Essex Chambers of Commerce
Maldon District Council	Rochford Board of Trade
Rochford District Council	Southend Business Partnership
Rochford Hundred Association of Local Councils	Southend Flying Clubs
Southend-on-Sea Borough Council	

Community Stakeholders	
Friends of North Kent Marshes	Kent County Council
RSPB – Wallasea Island	
SAEN (Stop Airport Expansion & Noise)	

B.2. Environmental Stakeholders

Environmental Bodies	
CPRE Essex	Friends of the Earth
CPRE Kent	National Trust
English Heritage	Natural England
Environment Agency	Kent Downs AONB

B.3. Technical Stakeholders

Air Navigation Services Providers/ATC/DA Operators	
NATS En-Route Ltd (NERL)	D&D (Distress & Diversion)
LTC (London Terminal Control)	QinetiQ (Operator of Danger Area)

Aircraft Operators	
ASL Airlines	TBMI Aviation
easyJet	Titan
Essex Air Ambulance	Wizz

Aircraft Operators	
Essex PASU	2Excel Aviation
Vista Jet ltd	Net Jets
London Executive Aviation (LUX)	Muskany Ltd

B.4. Local Aviation Stakeholders

Neighbouring Airports/Airfields/Flying Clubs/LSA Tenants	
London Luton Airport	London City Airport
London Stansted Airport	London Gatwick Airport
London Heathrow Airport	London Biggin Hill Airport
Headcorn Aerodrome	Stapleford Aerodrome
Rochester Airport	Earls Colne Airfield
St Lawrence Aerodrome	Stoke Airfield
Tillingham Aerodrome	Barling Airfield
Stow Maries Great War Aerodrome	Maylandsea (Paragliding)
Avionicare Ltd	Air Livery Ltd
Seawing Flying Club	Southend Flying Club
Canewdon Paragliding	Essex and Suffolk Gliding Club
Kent Gliding Club	Manston Airport

B.5. Statutory Aviation Stakeholders

National Air Traffic Management Advisory Committee	
Airspace4All	General Aviation Alliance (GAA)
Airfield Operators Group (AOG)	Honourable Company of Air Pilots (HCAP)
Aircraft Owners and Pilots Association (AOPA)	Helicopter Club of Great Britain (HCGB)
Aviation Environment Federation (AEF)	Isle of Man CAA
British Airways (BA)	Light Aircraft Association (LAA)
BAe Systems	Low Fare Airlines
British Airline Pilots Association (BALPA)	Military Aviation Authority (MAA)
British Balloon and Airship Club	Ministry of Defence - Defence Airspace and Air Traffic Management (MoD DAATM)
British Gliding Association (BGA)	NATS

National Air Traffic Management Advisory Committee	
British Helicopter Association (BHA)	PPL/IR (Europe)
British Microlight Aircraft Association (BMAA) / General Aviation Safety Council (GASCo)	UK Airprox Board (UKAB)
British Parachute Association (BPA)	

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