Airspace Change Consultation Document

Glasgow Prestwick Airport

Contents

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/1 Introduction

Ron Smith, Chief Executive Officer, Glasgow Prestwick Airport

In our Strategic Plan 2017-2022 (ref 1) we underlined our commitment to the UK-wide airspace change programme. We fully support the need to ensure the skies above us remain safe and that air traffic is controlled efficiently.
The navigation aids in the west of Scotland are scheduled to be removed next year and we're taking the opportunity to make our airspace management even more accurate and efficient. We're doing this by working with the UK national air traffic control provider to move over to new procedures using satellite-based technology.

We are also using this as an opportunity to identify if there are any improvements that we can make to the way we manage our airspace to make it more accurate and efficient. For example, our proposed designs have placed the new flight paths as close as possible to those being used currently, so they will fly the same routes, but just using newer equipment to navigate. And we have also been looking at where we can move flights away from areas of population to reduce noise in those communities.

We are very lucky to have a community around us which supports the work we do. We are committed to keeping the local community informed of our activities. A key part of air space redesign will be sharing our plans, advising people of what this may mean for them and listening to views. We will then consider these views and any action we may need to take in light of feedback. This will form part of our submission to the Civil Aviation Authority outlining our intentions for managing our airspace.

The following document outlines the steps we've taken so far, and those we intend to take before submitting a full proposal. It details our current departure and arrival routes, as well as our proposed changes. It explains how we engage with our local community and stakeholders, and how their views influence the decisions we make.

/2 Glossary

Acronym/ Abbreviation	Short For...	Definition
ACP	Airspace Change Proposal	A proposal submitted to the CAA outlining the changes being requested and their justification
ATC	Air Traffic Control	The team responsible for ensuring the safe, orderly, and expeditious operation of aircraft within their area of responsibility
CAA	Civil Aviation Authority	The statutory corporation which oversees and regulates all aspects of civil aviation in the UK
DfT	Department for Transport	The government department responsible for the UK's transport infrastructure including aviation
FAF	Final Approach Fix	The point on an IAP where aircraft commence their final stabilised descent toward the runway
FAS	Future Airspace Strategy	A plan to modernise airspace across the UK and Ireland
GA	General Aviation	A term used to refer to all civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire
GPA	Glasgow Prestwick Airport	
IAF	Initial Approach Fix	A point at the start of an IAP that aircraft are directed to by ATC when it is safe to commence an approach
IAP	Instrument Approach Procedure	An IFP that takes an aircraft from an IAF to land on a runway or execute a missed approach
IF	Intermediate Fix	The point on an IAP where aircraft turn onto the extended runway centreline
IFP	Instrument Flight Procedure	A defined route through the sky which ensures aircraft remain within controlled airspace and are safe from any terrain or obstacles
IFR	Instrument Flight Rules	Flight rules prescribing how aircraft are operated when flying in instrument conditions
ILS	Instrument Landing System	A navigation aid used to provide precise lateral and vertical guidance to aircraft landing on a runway
IMC	Instrument Meteorological Conditions	Weather conditions that do not meet the requirements for VFR flight and therefore require aircraft to fly under IFR
Leq	Equivalent Continuous Sound Level	The average amount of noise experienced during the busiest 16 hours of the day
MAPt	Missed Approach Point	The point on an IAP where an aircraft must commence a missed approach if it is unable to commit to landing on the runway
NATS		The UK's air traffic service provider
NDB	Non-Directional Beacon	A type of conventional radio navigation aid beacon
NGY	New Galloway	An NDB located just northeast of Galloway Forest
NM	Nautical Miles	The standard unit of distance measurement used in aviation; equal to 1,852 metres
NPR	Noise Preferential Route	A defined corridor which aircraft are required to fly within when departing from an airport
PBN	Performance Based Navigation	The general term for all navigation systems which rely primarily on satellite based guidance rather than conventional navigation aids
RNAV	Area Navigation	A type of PBN navigation specification which does not require the aircraft to be able to independently monitor its navigation accuracy
RNP	Required Navigation Performance	A type of PBN navigation specification which requires the aircraft to be able to independently monitor its navigation accuracy
SEL	Sound Exposure Level	The total amount of noise generated by a single aircraft movement
SID	Standard Instrument Departure	An IFP that takes an aircraft departing from a runway to a point at which it can join the airways network
STAR	Standard Instrument Arrival	An IFP that takes an aircraft from the airways network to a point where it can hold until ATC give it permission to commence an approach
TRN	Turnberry	A VOR located approximately 2,800 metres east of Turnberry golf course
VFR	Visual Flight Rules	Flight rules prescribing the visibility and separation requirements for aircraft flying visually
VMC	Visual Meteorological Conditions	Weather conditions that meet or exceed the requirements for VFR flight
VOR	VHF Omnidirectional Range	A type of conventional radio navigation aid beacon

/3 Overview

Glasgow Prestwick Airport is undergoing an Airspace Change Process. This is a programme many UK airports are undertaking. It is needed because of the removal of old navigation aids as part of a national replacement programme. Airports have operated routes based on this old equipment since the mid-1960s and need to update their procedures to be compatible with new, state of the art satellite-based systems.

This change forms part of the UK Civil Aviation Authority's (CAA) Future Airspace Strategy (FAS) (ref 2) for the UK and Ireland. This programme of changes will upgrade the airspace throughout the UK and Ireland to increase capacity and efficiency while maintaining safety. A video describing the FAS programme is available on our website at **www.glasgowprestwick.com/airspace**

The CAA has also produced a reference document, CAP 1379 (ref 3), which provides more background on how UK airspace is operated.

The Airspace Change Process is a series of steps defined by the UK Civil Aviation Authority (CAA) who regulate all airspace within the UK to keep it safe, efficient and cost effective. The process that must be followed is detailed in CAP 725 (ref 4). The steps are there to ensure all airports follow the same process whenever they make a change such as this, and many involve a consultation with the public. The results from this consultation and our response to the feedback are then included in our final submission, which will be considered by the CAA for approval.

The changeover from analogue to digital infrastructure is part of a five-year national programme which started in 2014. The navigation aids that assist aircraft to fly in and out of Glasgow Prestwick Airport are due to be taken out of service in 2018, and in preparation for this, we need to design upgraded routes now before the current equipment reaches the end of its working life.

Our intention is to replicate the existing conventional routes as closely as possible. However, as our current routes were designed decades before satellite-based navigation was available, some changes are required to meet the more modern design criteria. We are also taking the opportunity to future-proof our airspace to ensure it will accommodate growth and development whilst also looking for improvements to the departure routes in terms of noise impact or environmental efficiency. And because these changes apply to all of the different aviation services we operate (passenger, cargo, military, general aviation and executive), we are taking into consideration how we manage flights to all destinations to ensure they are as efficient as possible.

3.1 Departures

Our current departure routes take aircraft to the southeast and southwest, which works well for aircraft bound for England, Wales, or southern Europe. However, aircraft travelling to North America, Northern Europe, or the Far East have to fly away from their destination before turning back to the east or west. We have therefore proposed two new departure routes from the airport: one taking aircraft east towards Northumberland and the other taking aircraft west towards Kintyre.

The following diagrams show an overview of the current and proposed routes. All images are available in Appendix A (ref 5).

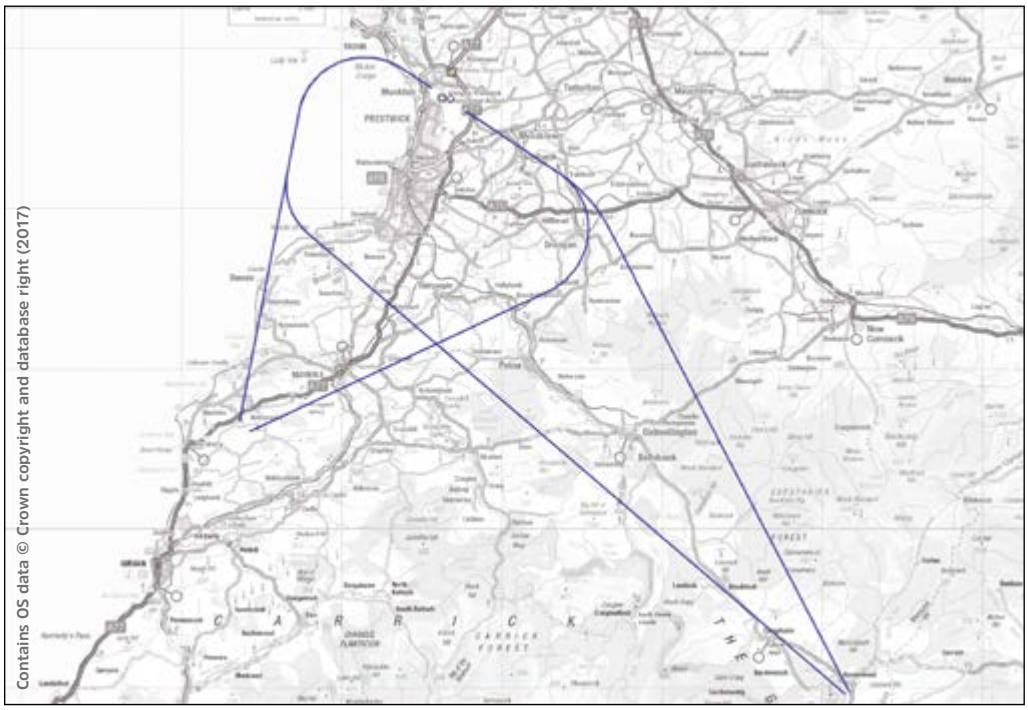

Figure 1 - Current Departure Routes

Figure 2 – Proposed Departure Routes

For the departures from one of our runways (Runway 30), the current procedures turn to the south at a point approximately 1,500 metres from the end of the runway. However, the current international design criteria prohibit this turn point from being defined any closer than 1,950 metres from the end of the runway, and we have therefore placed the new turn point at this new location. The result of this change is that aircraft travel further over the water and are therefore slightly higher when they cross the shore resulting in less noise impact on the ground, albeit slightly higher CO_2 emissions.

For the departures from the other end of the runway (Runway 12) the current procedures to the southwest directly overfly Drongan. We are proposing a new route for departures to the west and southwest that will turn slightly earlier and pass between Drongan and Hillhead. This route is approximately 5km shorter than the current route and is aimed at reducing the total number of people exposed to noise on the ground by avoiding the main built up areas.

3.2 Arrivals

The new arrival procedures we have designed replicate the existing approach procedures as closely as possible, but with the addition of modern "T-Bar" tracks. These allow aircraft arriving from any direction to fly a stable approach procedure without having to make any extreme turns.

An approach procedure starts at an Initial Approach Fix (IAF) that aircraft can either fly directly to or follow an arrival route to. From the IAF the procedure takes aircraft to an Intermediate Fix (IF), which is a point on the extended runway centreline where an aircraft can turn onto the final approach track. This is followed by the Final Approach Fix (FAF), which is where the aircraft commences its final stabilised descent towards the runway. For a "T-Bar" approach the IAFs are located so that the turn at the IF is 90°. (See Figure 3)

In this example, aircraft arriving from the north would fly to the top IAF to join the procedure and aircraft arriving from the south would fly to the bottom IAF to join the procedure. A central IAF is optional. In this example, aircraft arriving from the east would fly directly to the IF to join the procedure. (Aircraft arriving from the west would fly to the most appropriate IAF based on their location relative to the airport.)

We are also proposing new arrival routes that take aircraft from the arrival points to the start of an appropriate "T-Bar" track. These routes are designed to keep aircraft over the water or open countryside as much as possible.

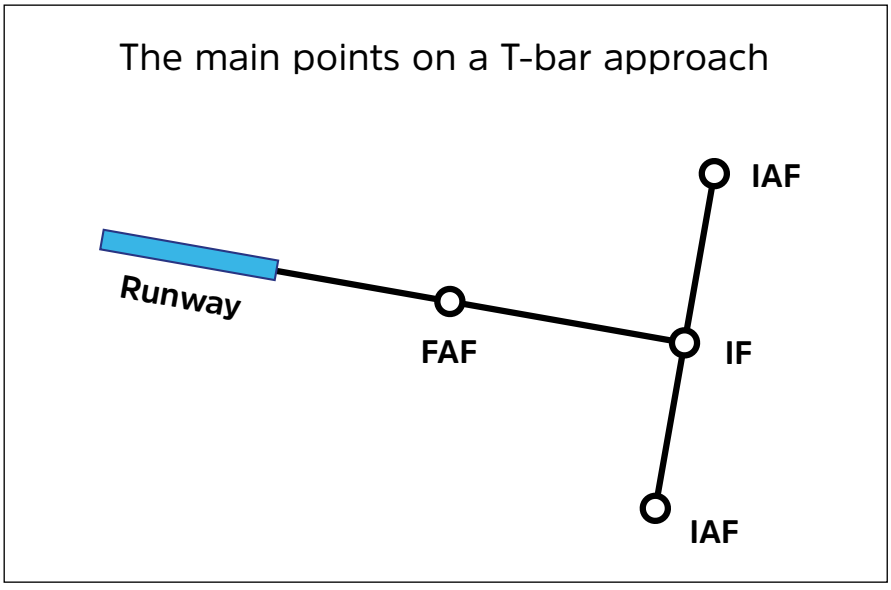

Figure 3 - T-Bar Approach Diagram

The following diagrams show an overview of the current and proposed routes. All images are available in Appendix A (ref 5).

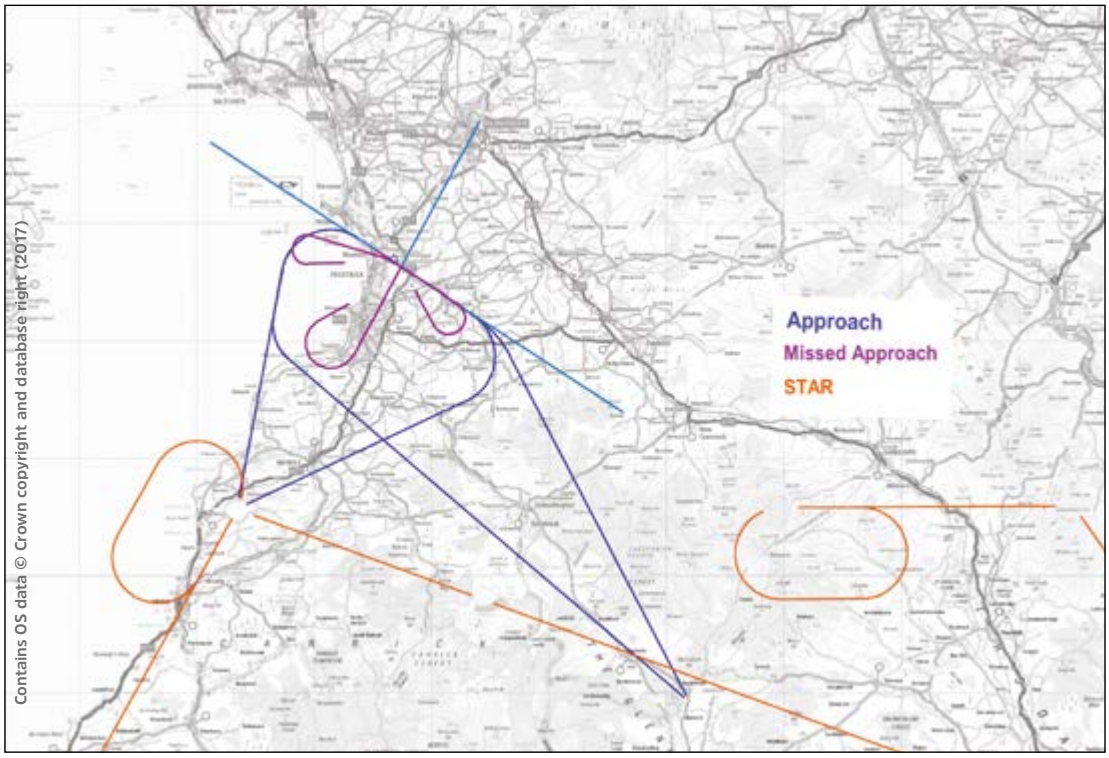

Figure 4 – Current Arrival Routes

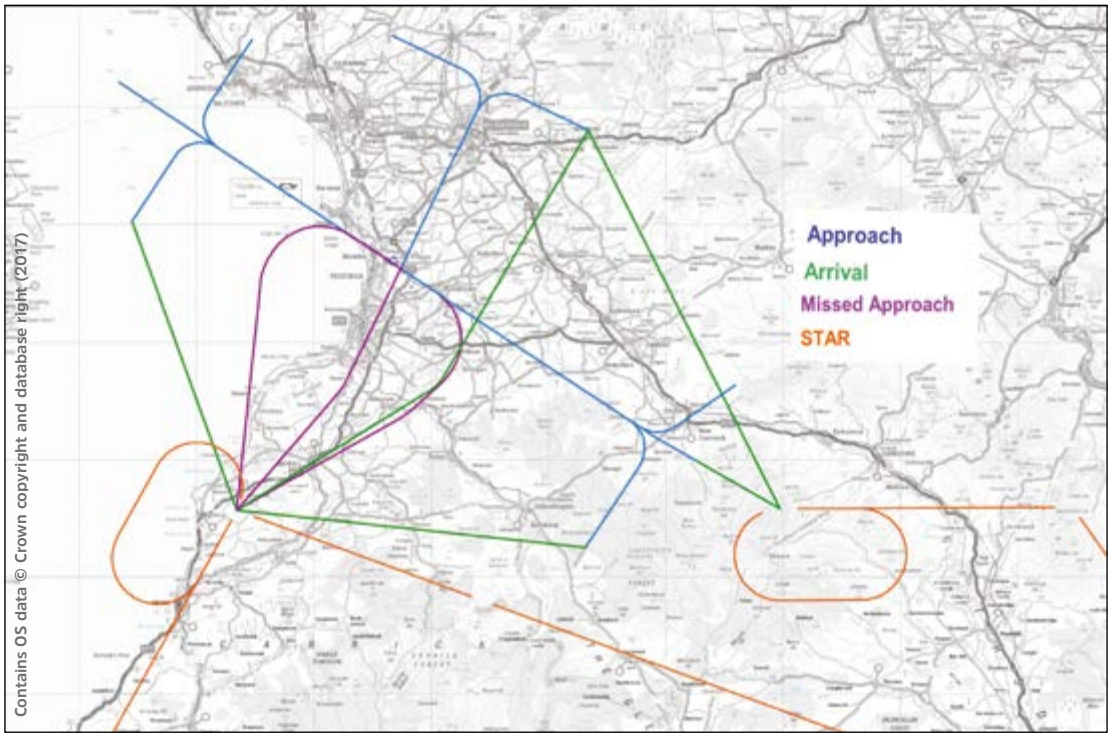

Figure 5 - Proposed Arrival Routes

/4 How to get involved

This is a consultation process that will form part of the Glasgow Prestwick Airport Airspace Change Proposal which will be considered by the Civil Aviation Authority later this year. It's important to us that the local community has the opportunity to see and contribute to the changes we are considering.

We will be inviting views for a **13 week period** starting on **14th June** and ending on **13th September.**

You'll also be able to see details of the proposed routes and leave feedback on our website, which is **www.glasgowprestwick.com/airspace**

We will also be providing materials at the following public libraries around the area for those people without access to the internet.

East Ayrshire Council

Auchinleck Community Library

Bellfield Community Library

Burns House Museum and Library (Mauchline)

Burns Monument Centre (Kilmarnock)

Crosshouse Community Library

Cumnock Community Library

Dalrymple Community Library

Darvel Community Library

Drogan Community Library

Glaston Community Library

Newmilns Community Library

Patna Community Library

South Ayrshire Council

Alloway Library

Carnegie Library

Forehill Library

John Rodie Library (Mossblown)

Maybole Library

Prestwick Library

Symington Library

Tarbolton Library

Troon Library

North Ayrshire Council

Ardrossan Library

Beattie Library (Stevenston)

Bourtreehil Library

Dreghorn Library

Irvine Library

Kilwinning Library

Saltcoats Library

Springside Library

West Kilbride Library

We will be hosting three public exhibitions, all of which will take place between 10:00 and 19:00 and provide you with the opportunity to view our proposals, speak to members of the design team and leave your feedback.

These will take place on:

- **Thursday 22nd June at Glasgow Prestwick Airport, Aviator Suite**
- **Tuesday 27th June at Kilmarnock Grand Hall**
- **Wednesday 5th July at Coylton Parish Church Hall**

We've chosen these venues because they are accessible by public transport and are in the areas which could be most affected. We'll also be speaking to the local authorities, MSPs and MPs.

All feedback received during the consultation period will be reviewed and further work will be carried out on the technical design if required. Final proposals along with a report on the feedback received, the consideration given to this feedback, and any action taken will be submitted to the CAA in October 2017.

If the changes are approved by the CAA, we expect the new procedures to be active from May 2018.

5 Current Situation

5.1 Runway Usage

Glasgow Prestwick Airport has two runways and these are named based on their magnetic heading in each direction (see figure 6).

The main runway is therefore named 12/30 (124° for Runway 12 and 304° for Runway 30). This runway is almost 3,000 metres long and is used for most commercial operations (passenger, cargo, and military flights).

The second runway is named 03/21 (027° for Runway 03 and 207° for Runway 21). This runway is just over 1,900 metres long and is primarily used by small general aviation (GA) aircraft or by Boeing 737 passenger aircraft when the main runway is closed for maintenance.

Helicopters may fly the standard approaches to either of the runways but also have the option of doing a visual approach to the helicopter aiming point midway along Runway 12/30. This allows them to fly a shorter approach route and minimises the distance they have to travel on the runway to reach the exit taxiway. Military or search and rescue helicopter flights are also permitted to operate to or from the helipads situated to the north of the main runway.

In the summer of 2016, 90% of all aircraft movements used Runway 12/30, with only 6% using Runway 03/21, and 4% used the helipads.

It is safest for aircraft to take off and land into a head wind. The direction of use for each runway is therefore determined primarily based on the prevailing wind conditions. However, in light wind conditions and low traffic demand aircraft may request or accept a departure or arrival with a slight tail wind. Because of the orientation of the main runway and the typical origins and destinations of flights to and from the airport, there is a preference for arrivals to use Runway 30 and departures to use Runway 12.

In the summer of 2016, Runway 30 was used for 67% of the arrivals and 55% of the departures whilst Runway 12 was used for 25% of the arrivals and 35% of the departures with the remainder using Runway 03/21 or the helipads.

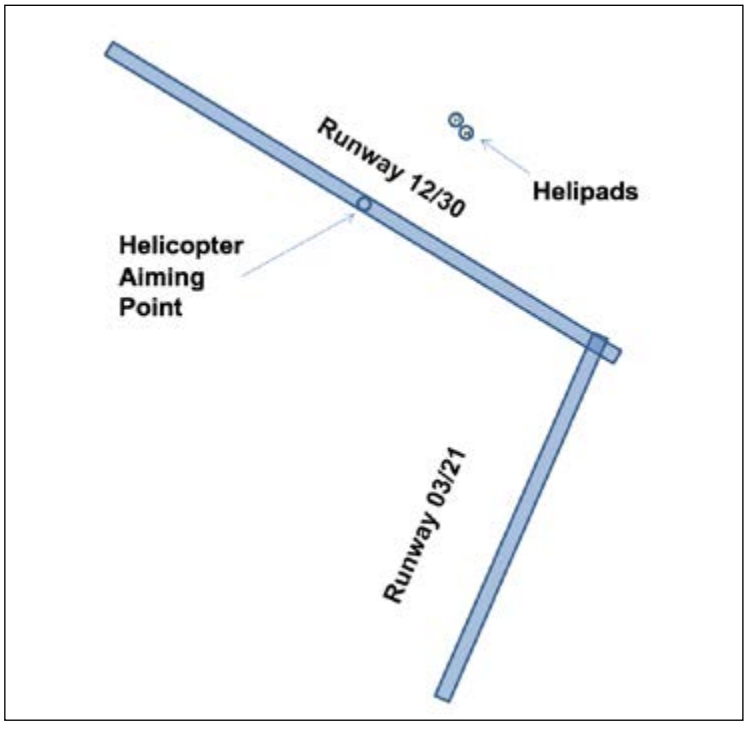

Figure 6 - Airport Plan

5.2 Flight Rules

Aircraft can be operated under two different sets of rules: Visual Flight Rules (VFR) and Instrument Flight Rules (IFR). Aircraft flying under IFR must follow published Instrument Flight Procedures (IFPs) and comply with Air Traffic Control (ATC) instructions. The combination of IFPs and ATC instructions ensure that IFR aircraft remain safely separated from obstacles on the ground and other aircraft in the air. Most commercial flights are conducted under IFR.

Aircraft flying under VFR are responsible for maintaining their own separation from obstacles and aircraft. They achieve this by maintaining visual contact with the ground and other aircraft around them. For this reason, aircraft can only fly under VFR when the weather conditions are such that the pilot can maintain the minimum required visibility and remain a specified distance from any clouds. Most VFR flights are conducted by small private single propeller aircraft.

This Airspace Change Project covers changes to the IFPs and ATC operations at Glasgow Prestwick Airport. However, over 50% of the arrivals and departures at the airport are conducted by small aircraft flying under VFR. These aircraft will continue to be able to operate in the same manner they do today. They are not required to follow the departure routes after take-off and may join the final approach track much closer to the airport than the commercial aircraft do. Please note that the flight-path density maps do not include these VFR aircraft flying locally without a flight plan, i.e. not general aviation or training flights.

The flight-path density maps are based on a 14-day sample of radar data taken between 4-18 July 2016.

5.3 Departure Procedures

The airport currently has two Standard Instrument Departures (SIDs) published from each of runways 12 and 30. These SIDs are used by air traffic control to simplify the procedures followed by departing aircraft in the first part of the flight. They ensure that aircraft can depart safely on routes that avoid obstacles or high terrain and also help ensure that aircraft fly a predictable track. At the end of the SID, the aircraft will join the en-route structure within the main air traffic control network.

These SIDs are primarily used by the commercial operators in order to provide predictable routes that can be flown in any visibility conditions. General aviation aircraft are less likely to fly at night or on very cloudy days, so typically will depart visually rather than following a SID. In the summer of 2016, 35% of the departures flew a SID while the remainder flew visual departures.

Each runway at Prestwick has a SID to the southwest, which currently ends at the Turnberry (TRN) navigation aid (located approximately 2,800 metres east of Turnberry golf course). Each runway also has a SID to the southeast, which currently ends at the New Galloway (NGY) navigation aid (located just northeast of Galloway Forest Park).

In addition, all medium to heavy aircraft and all light jet aircraft are required to follow the current noise preferential routes (NPRs) when departing from GPA. These NPRs specify a ground track to be flown until passing an altitude of 3,000ft above mean sea level. The published SIDs follow these NPRs and therefore an aircraft flying a SID will automatically comply. However, once an aircraft has passed 3,000ft air traffic control (ATC) are allowed to issue instructions to an aircraft that take it off the published SID. This may be done to provide a more efficient route for the aircraft or to provide separation from another aircraft. Figure 7 shows the density of departing aircraft over 14 days in 2016 and you can see that, while there is a concentration of traffic along the published SID route, there is also some traffic to either side of the SID.

Whilst SIDs are established for routes to the south, there is currently no SID for aircraft travelling across the Atlantic to the west. At present aircraft are permitted to request a departure route to the west via a point called HERON, but in the absence of a published procedure, these departures have to be managed on an individual basis by ATC. They will ensure the aircraft remains within the NPRs until it reaches 3,000ft and then instruct a turn to HERON when it is safe to do so. This results in increased workload for ATC, a lack of predictability for the flight crew and inconsistency in terms of the flight tracks.

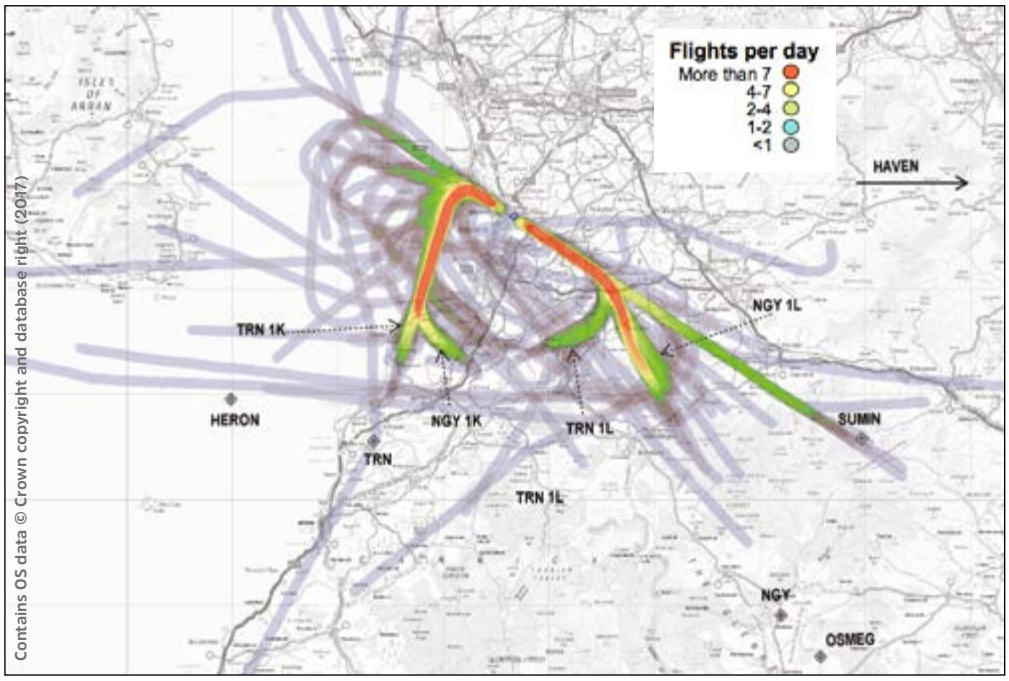

Figure 7 - Current Departure Routes

5.4 Arrival Procedures

Commercial aircraft inbound to Glasgow Prestwick Airport either arrive at a hold overhead the Turnberry (TRN) navigation aid or are routed to a point called SUMIN to the east of the airport. From these locations Air Traffic Control (ATC) issue them with instructions that direct them on to the appropriate extended runway centreline at an altitude from which they can safely commence an approach to land.

On the main runway the approach is typically conducted using the Instrument Landing System (ILS). This is an airport navigation aid that provides precise lateral (left/right) and vertical guidance to aircraft coming in to land.

The use of the ILS results in a tight concentration of aircraft on the extended runway centreline. However, the variability inherent in the paths aircraft fly when receiving instructions from ATC means that the aircraft flying to join the final approach track are dispersed over quite a wide area. You can see in the image below that there is a fairly wide swathe within which ATC typically direct aircraft.

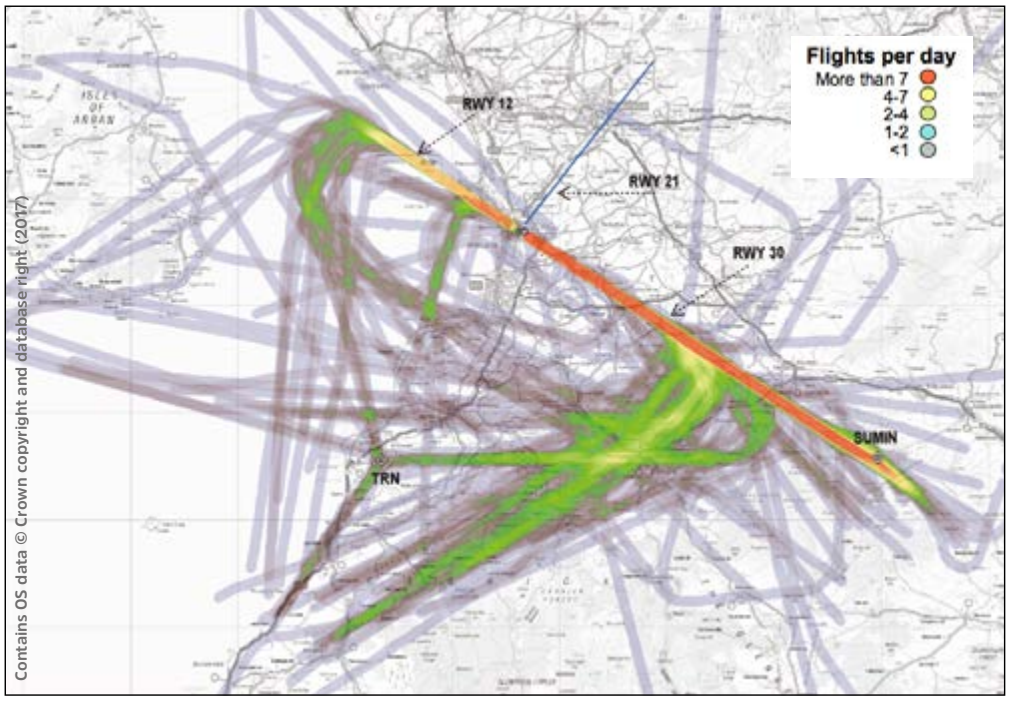

Figure 8 - Current Arrival Routes

6 Proposed Routes & Environmental Impacts

6.1 Introduction

6.1.1 Design Considerations

When designing the new routes we first looked at whether we could make the new routes identical to the current ones, whilst also complying with the current design criteria (ref 6 &7). The current routes were designed decades ago, before satellite based navigation was available and the design criteria were very different. We therefore had to make some changes as turn points, turn angles, and/or level restrictions had to be adjusted. Once we had replicated the routes as closely as possible we then looked for opportunities to improve the routes for noise and/or emissions benefits.

Department for Transport (DfT) guidance (ref 8) sets out altitude-based priorities for use when designing new routes:

- In the airspace from the ground to 4,000ft the priority is to minimise the noise impact of aircraft and the number of people on the ground significantly affected by it.
- Where options for route design below 4,000ft are similar in terms of impact on densely populated areas, preference should be given to minimising the number of new people affected by aircraft noise.
- In the airspace from 4,000ft to 7,000ft there should be a balance between minimising the noise impact and minimising aircraft emissions.
- In the airspace above 7,000ft the priority is to make the most efficient use of the airspace with a view to minimising aircraft emissions.

Our design process therefore looked for communities that lay under the portion of the route below 7,000ft to see if we could move the centreline of the route away from them to reduce the noise impact.

We also considered the number of turns above 4,000ft to see if aircraft could route more directly to reduce emissions.

6.1.2 Communities Overflown

The Civil Aviation Authority (CAA) has published CAP 1498 (ref 9), which examines the issue of “overflight” and how to define it. Their conclusion is that overflight can be defined as “An aircraft in flight passing an observer at an elevation angle that is greater than an agreed threshold and at an altitude below 7,000 ft.” Based on their research they have proposed two possible angles to use as a definition of overflight.

At an angle of 60° above the horizon, an aircraft will be approximately 1.5 decibel (dB) quieter than an aircraft directly overhead. However, it is generally accepted that 3 dB is the smallest difference between two noise levels that the average person can perceive. Taking all of the factors into account, 48.5° above the horizon has been calculated to be the point at which an aircraft will be approximately 3 dB quieter than an aircraft directly overhead. (For more information regarding the definition of overflight please refer to CAP 1498, ref 9.)

We have analysed historic departure data from the last 10 months of 2016 to calculate the range of climb and descent performance typical of aircraft operating at the airport. We have then applied the average climb and descent performance to determine the altitude of the average aircraft every 2,000 metres along the proposed routes. For each of those points we have then calculated the "overflight width" using the 48.5° elevation angle to indicate which areas will be "overflown". The expected altitudes and overflight areas for each route are shown in the relevant sections of this document.

In order to calculate the number of people being overflown by each route we have used the 2017 UK Population Estimates and Projections from CACI Ltd. This data has been used to calculate the number of people within the "overflight area" for each route. The table below provides some guidance as to which routes have the potential to impact on specific communities around Glasgow Prestwick Airport.

Type	Departures								Arrivals					Approaches		
Runway	30				12				30		12	21		30	12	21
Direction	SW	W	SE	E	SW	W	SE	E	S	E	S	S	E			
Consult Doc, Section	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	6.10	6.11	6.12	6.13	6.14	6.15	6.16	6.17
Annbank					■	■	■	■						■	■	
Auchinleck								■								
Ayr	■	■	■	■	■	■	■									■
Catrine								■								
Coylton					■	■	■								■	
Crookedholm																■
Cumnock								■								
Dalrymple					■	■									■	
Darvel													■			■
Drongan					■	■	■	■						■	■	
Dunure	■															
Fenwick																■
Galston												■	■			■
Hillhead					■	■	■	■						■	■	
Hollybush					■	■									■	
Kilmarnock																■
Kilmaurs																■
Mansfield														■		
Mauchline												■				
Mossblown					■	■	■	■						■	■	
New Cumnock										■				■		
Newmilns												■	■			■
Ochiltree								■						■		
Patna															■	
Rankinston							■									
Saltcoats															■	
Sorn													■			
Stewarton																■
Symington																■
Tarbolton								■				■				
Troon	■	■	■	■										■	■	

■ The preferred route overflies all or part of this community

■ The preferred route or one of the alternative routes fly within 3,000 metres of this community

■ Neither the preferred route or any of the alternative routes fly within 3,000 metres of this community

Note: the table above only lists communities with a population over approximately 100 people. It is only intended as a guide and readers are ultimately responsible for determining which routes they are affected by.

6.1.3 Noise Impact

As stated previously, Department for Transport (DfT) guidance (ref 8) states that, in the airspace from the ground to 4,000ft, the Government's environmental priority is to minimise the noise impact of aircraft and the number of people on the ground significantly affected by it.

Civil Aviation Authority (CAA) guidance (ref 4) requires that anyone who is requesting an airspace change calculate the noise impact both before and after the change using two different metrics, one for daytime and one for night time.

For daytime noise impact the "equivalent continuous sound level" or Leq metric is used. This can be thought of as the average sound level (including all routes and all aircraft movements) and is calculated for the busiest 16 hours of the day, between 0700 and 2300 local time for the period from 16 June to 15 September. These Leq contours have been calculated for the current routes using the forecast traffic just before the proposed implementation date, the proposed new routes using the forecast traffic just after the proposed implementation date, and the proposed new routes using the forecast for five years after the proposed implementation date. The Leq contours are shown below. (See Figure 9, Figure 10, and Figure 11)

For night-time noise impact the "sound exposure level" or SEL metric is used. This can best be described as the total amount of noise generated by a single aircraft movement. These are shown as SEL footprints and indicate the area that will have over 80dBA and 90dBA of noise from a single flight by a particular aircraft type. Department of Transport (a forerunner of DfT) research shows that for aircraft noise events below 90 dBA SEL the average person's sleep is unlikely to be disturbed. (B.56 on page 83 of ref 4) The SEL footprints for the most common aircraft type and noisiest aircraft type on each route are shown in the relevant sections of this document.

The full report covering the Leq and SEL analysis (ref 10) for both the current and proposed routes is available on the airport website. In order to further clarify the noise impact on the communities around the airport, we have commissioned additional noise analysis, which will be available on the airport website by the end of June 2017.

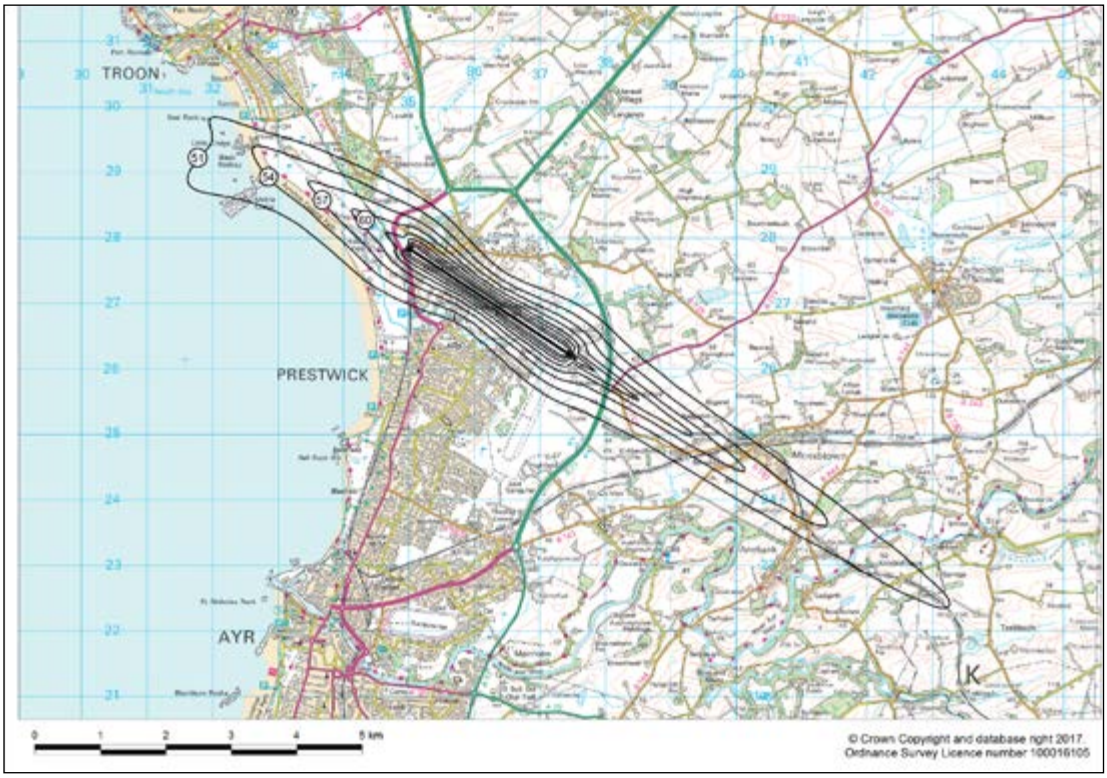

Figure 9 - 2018 Average Summer Day 51-72 dBA Leq Noise Contours - Current Routes

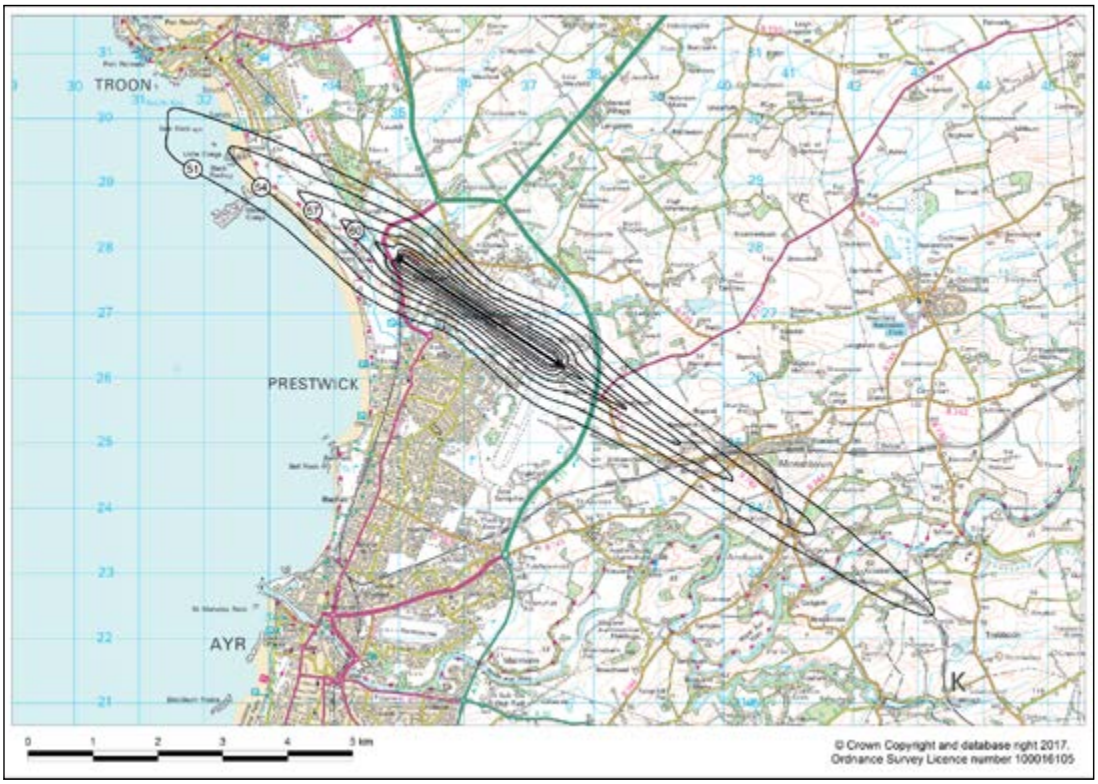

Figure 10 - 2018 Average Summer Day 51-72 dBA Leq Noise Contours - Proposed Routes

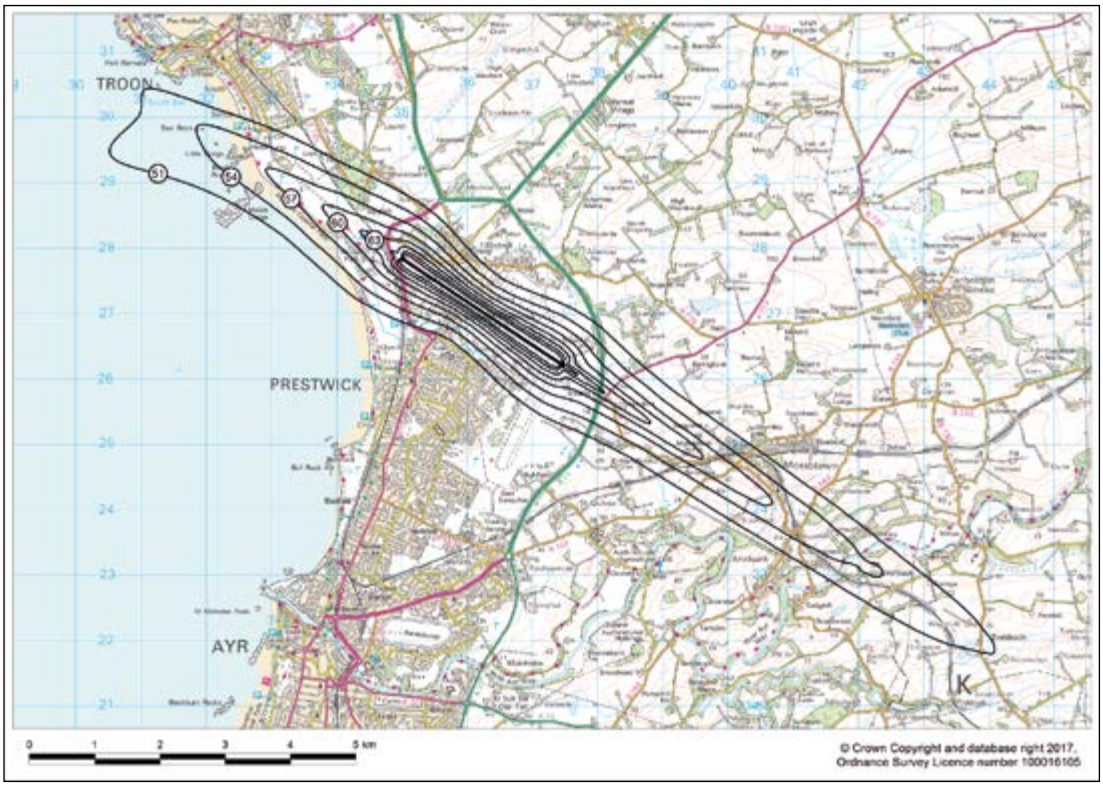

Figure 11 - 2023 Average Summer Day 51-72 dBA Leq Noise Contours - Proposed Routes

6.1.4 Environmental Impact

Department for Transport (DfT) guidance (ref 8) states that in the airspace above 7,000ft, the designs should make the most efficient use of the airspace with the goal of minimising aircraft emissions. In practice, this means trying to provide uninterrupted climbs or descents, and seeking to design out unnecessary turns. For the portion of each route where aircraft are expected to be above 7,000ft we have therefore attempted to design the most direct route possible while still ensuring the safety of the airspace.

CAA Guidance (ref 4) determines that if changes alter flight paths below 1,000ft, Local Air Quality analysis is required. Above 1,000ft, due to atmospheric mixing, there is no significant effect on local air quality at ground level. The proposals described in this document do not change flight paths below 1,000ft, therefore there will be no impact on local air quality and analysis is not required. There are also no direct impacts anticipated on flora, fauna or biodiversity due to the proposed changes.

Impact on tranquillity is very closely aligned with noise impacts (as described in sections 6.2 to 6.17). Separate analysis of tranquillity and visual intrusion have not been undertaken since the proposed changes do not overfly any National Parks or National Scenic Areas (NSAs).

6.1.5 Concentration vs. Dispersal

With modern navigation systems aircraft fly extremely accurately, and are not as widely spread out as with systems based on legacy navigation aids. More accurate forms of navigation have led to increased concentration of flights close to the centreline of each route. This can also mean that a reduced total number of people are affected by flights along the route.

There are certain methods that can be used to disperse traffic over a wider area such as requiring aircraft to turn when they reach a certain altitude. This results in a much larger area being subject to aircraft noise but on a less frequent basis. This may be preferable if a concentrated route would overfly a particular community whereas a dispersed route would spread the noise impact over a swathe of countryside. There will always be a certain amount of dispersal of flight paths where the route requires aircraft to turn. This is because of the differences in the speed, altitude, and bank angle of each individual aircraft. Each route has a number of turn points and the size and location of the area within which the aircraft are likely to be will depend on the type of turn specified in the route in relation to these points.

Most turns are defined as “fly-by” turns where the aircraft will calculate where it needs to start turning in order to smoothly intercept the next segment of the route, and will “fly-by” the navigation point. For these turns there will be a limited amount of dispersal around the inside of the turn.

However, turns can also be defined as “fly-over” turns where the aircraft will fly all the way to the turn point before starting to turn. These turns result in a larger amount of dispersal around the outside of the turn, because the aircraft won’t start the turn until passing the defined point, and each aircraft will be flying at a slightly different speed and altitude.

DfT guidance (ref 8) suggests that concentration generally provides the best overall benefits to the communities around the airport. However, it recognises that there may be situations where dispersal may be preferable due to specific local circumstances. We have therefore attempted to concentrate traffic on the fewest routes below 4,000ft wherever possible.

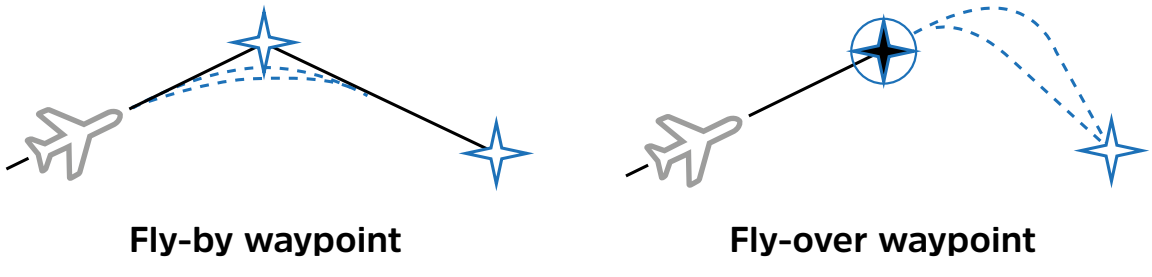

Figure 12 - Fly-by Waypoints vs. Fly-over Waypoints

6.1.6 Preferred vs. Alternative Routes

For each route we have considered a number of options during the design process. By evaluating the advantages and disadvantages of these options we have selected a preferred route that we believe provides the best balance which minimises noise impact, minimises environmental impact, and maximises operational efficiency. In this document we have presented our preferred routes as well as a limited amount of information about the alternatives so that you can let us know if you think there are any factors we should have considered in selecting our preferred routes.

6.1.7 Proposed Route Usage

Based on our analysis of the current traffic at Glasgow Prestwick Airport we anticipate that the proposed departure routes would lead to the following distribution of traffic.

Route	Destinations	Traffic %
Southwest	Scotland, Ireland, Southern Europe, Africa	24.4%
West	Iceland, North America, South America	6.8%
Southeast	England, Wales, Central Europe, Middle East	64.5%
East	Northern Europe, Russia, Far East	4.3%

6.1.8 Aircraft Types

The majority of aircraft operating at Glasgow Prestwick Airport are currently small single engine propeller aircraft or Boeing 737-800s operated by Ryanair. The table below shows all aircraft types making up at least 1.0% of the movements at the airport totalling 72.8% of the total movements..

Type Code	Manufacturer / Model	Description	Traffic %
PA28/C152/ DR46/AA5/ EURO/C172/C182	Piper PA-28 Cherokee Cessna 152/172/182 Robin DR400, etc.	2-5 seat single engine propeller	27.1%
B738	Boeing 737-800	184 passenger commercial jet	25.7%
S92	Sikorsky S-92	Coastguard Helicopter	4.8%
A320	Airbus A320	164 passenger commercial jet	3.4%
C130	Lockheed C-130 Hercules	4 engine turboprop medium military transport/cargo	2.7%
A319	Airbus A319	134 passenger commercial jet	2.5%
SC3	Short 330	2 engine turboprop medium	1.9%
HAWK	BAE Systems Hawk	Military trainer (e.g. Red Arrows)	1.4%
B206	Bell 206 JetRanger	7 seat helicopter	1.2%
DHC6	De Havilland Canada DHC 6 Twin Otter	2 engine turboprop 19 passenger	1.2%
B752	Boeing 757-200	200 passenger commercial jet	1.1%
DHC8	Bombardier Dash 8	2 engine turboprop 70 passengers	1.1%
B744	Boeing 747-400	Large 4 engine jet cargo	1.0%
B748	Boeing 747-800	Large 4 engine jet cargo	1.0%
Other			23.9%

6.1.9 Omnidirectional Departures

Most modern aircraft are already equipped to fly new routes based on satellite navigation systems. However, there are still some aircraft operating from Glasgow Prestwick Airport that will not have the required equipment, training, or certification to operate these routes. We will therefore need to provide an alternative way for these aircraft to continue to operate. To allow these aircraft to depart safely, we have designed an "omnidirectional departure" from each runway end.

An omnidirectional departure is a simple method of ensuring obstacle clearance for aircraft departing from an airport. Once the aircraft is above a safe altitude Air Traffic Control (ATC) is able to instruct the aircraft to turn in a suitable direction to join the airways network. As the omnidirectional departures don't define a specific track over the ground there is no route to consult on so they do not appear as a specific route in this consultation.

The intention is that only aircraft that are unable to fly the new departure routes would use the omnidirectional departure procedure. ATC would then provide instructions to the aircraft so that it followed the track of the appropriate route as closely as possible. The omnidirectional departures may also be used by Search and Rescue helicopters deployed on emergency missions to the north of the airport.

6.1.10 General Aviation and Training Flights

General Aviation (GA) aircraft typically only fly during good visibility conditions and therefore depart visually rather than using a departure procedure. These aircraft are likely to continue to operate in this manner and may therefore overfly areas not covered in this consultation.

Glasgow Prestwick Airport also has a large number of aircraft flying training circuits. These aircraft will fly an approach procedure but rather than landing will climb back up above 1,500ft and circle back around to prepare for another approach. Training flights are likely to continue to operate in this manner and may therefore overfly areas not covered in this consultation.

6.2 Runway 30 Departures to the Southwest

6.2.1 Purpose of the route and number of aircraft

This is a replacement for the existing "TRN 1K" departure route (see Figure 7). This route will be used by aircraft departing to destinations such as Scotland, Ireland, Southern Europe, or Africa. It will also be used by any aircraft departing to Iceland, North America, or South America that are unable to achieve the level restrictions on the departure route to the west.

We anticipate the number of aircraft of any type flying this route per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	18	22	24	25	25	26

6.2.2 Factors influencing the design

Departures from Runway 30 (see Figure 7) currently fly straight ahead for approximately 1,500 metres before turning to the southwest over the Firth of Clyde. The current design criteria prohibit the turn point from being defined any closer than 1,950 metres from the end of the runway. This slight extension to the straight flight has a small noise impact on the town of Troon. The preferred route then turns to the south and climbs over the Firth before crossing the shore again at Dunure and continuing toward a point overhead the old Turnberry (TRN) navigation aid.

6.2.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

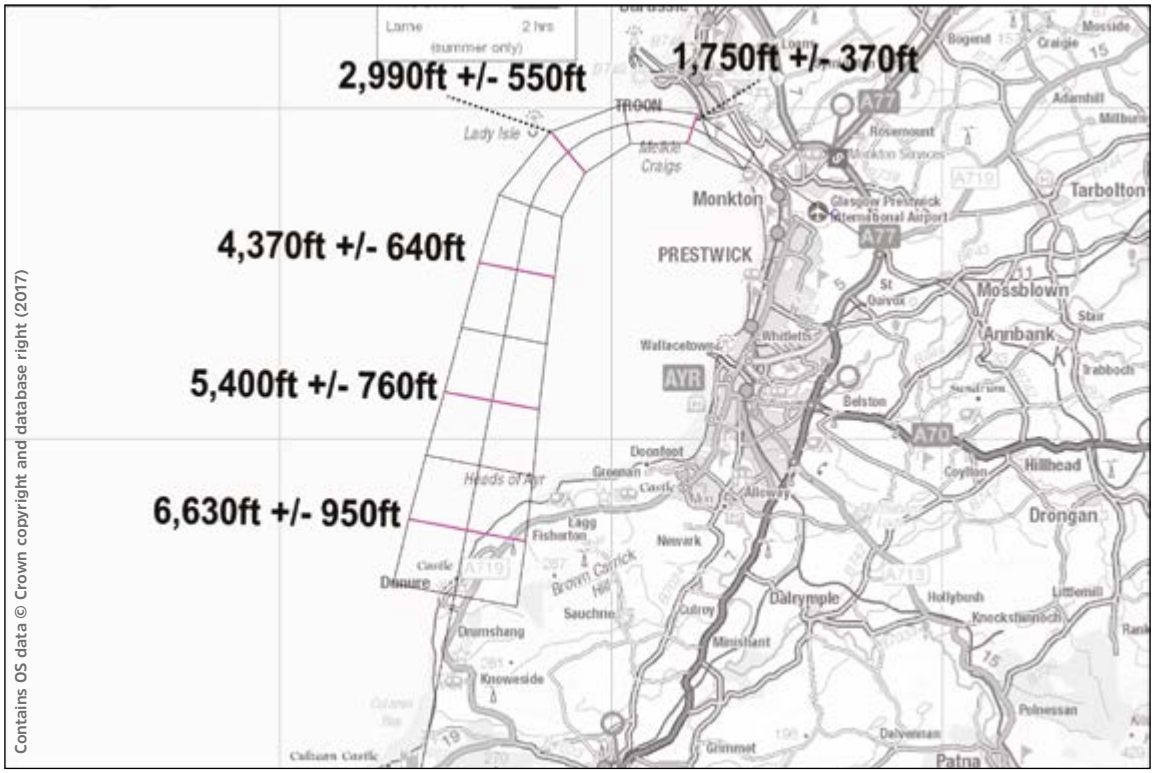

Figure 13 - Runway 30 Departures to the Southwest – Preferred Route with Expected Altitudes and Overflight Swathe

Once an aircraft is above 3,000ft air traffic control is allowed to issue instructions to it in order to enable greater efficiency for the aircraft in question or for the system as a whole. This could therefore result in some aircraft being taken off the departure route early. However, we expect most aircraft will be left on the route to the end.

The diagrams below show the noise impact of our preferred route (typical and worst-case).

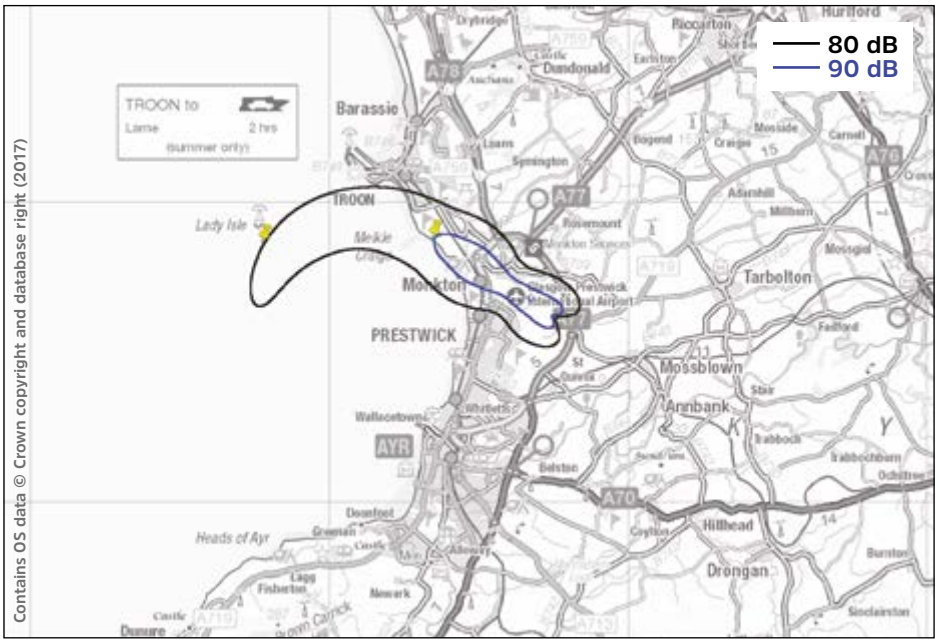

Figure 14 - Runway 30 Departures to the Southwest - Boeing 737 SEL Footprints

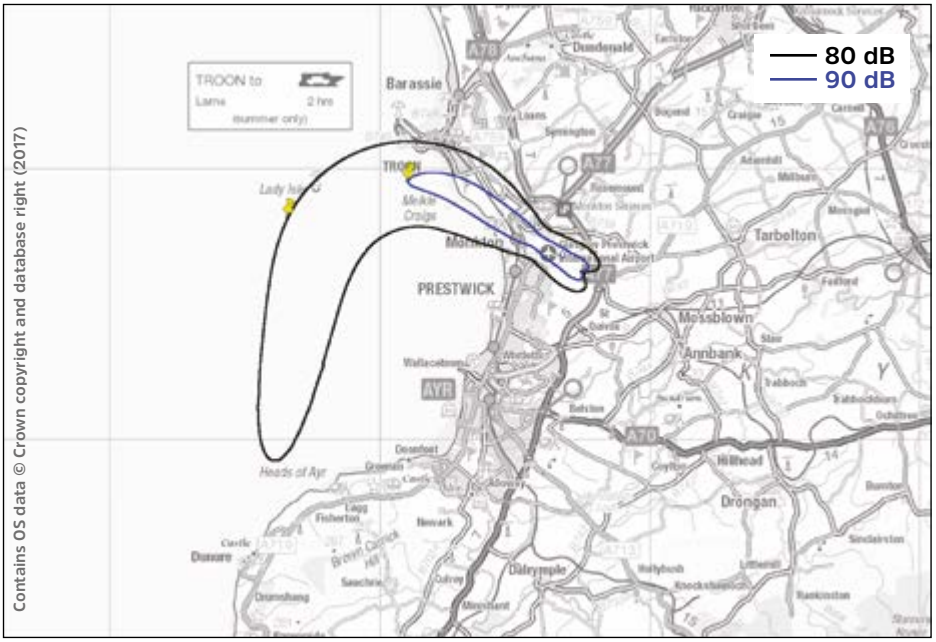

Figure 15 - Runway 30 Departures to the Southwest - Boeing 747 SEL Footprints

The footprint in Figure 14 is for the Boeing 737 aircraft, which is the most common aircraft type typically operating from the airport. The footprint in Figure 15 is for the Boeing 747 aircraft, which is the loudest aircraft type typically operating from the airport. However, this aircraft type only makes up approximately 2% of the total aircraft movements. The footprints represent the total noise impact of a single flight. Further noise analysis is taking place and will be available on the airport website in late June 2017.

6.2.4 Alternative routes

Alternative 1 We considered designing the route using a "fly-by" turn rather than a "fly-over" turn. The preferred route uses a "fly-over" turn to ensure that all aircraft start their turn at the defined point.

Fly-by turns are the standard turn type for the routes as they allow aircraft to turn from one track onto another smoothly using the most appropriate turn radius for the aircraft.

However, the turn point has to be placed at a sufficient distance to ensure the fastest aircraft doesn't start turning before 1,950 metres from the end of the runway. This will result in more aircraft continuing to fly straight next to Troon before starting their turn to the southwest.

Alternative 2 We considered specifying the initial turn to the south based on a specified altitude above the ground. This has the environmental advantage of ensuring aircraft turn as soon as they reach a safe altitude.

However, it also causes significant dispersion of the traffic as lighter aircraft that climb well will turn much earlier while heavier aircraft will take a lot longer (and travel further) to reach the same altitude and will therefore turn later.

This dispersion makes it very difficult for air traffic control to integrate the traffic together and ensure airspace containment.

Alternative 3 We considered designing a route that complies with the design criteria for the initial turn then brings aircraft back onto the current conventional route.

This would have the same impact on Troon as the preferred route and would result in slightly increased track mileage / slightly increased CO_2 emissions.

The diagram below shows the preferred and alternative routes over a flight path density map of the current traffic.

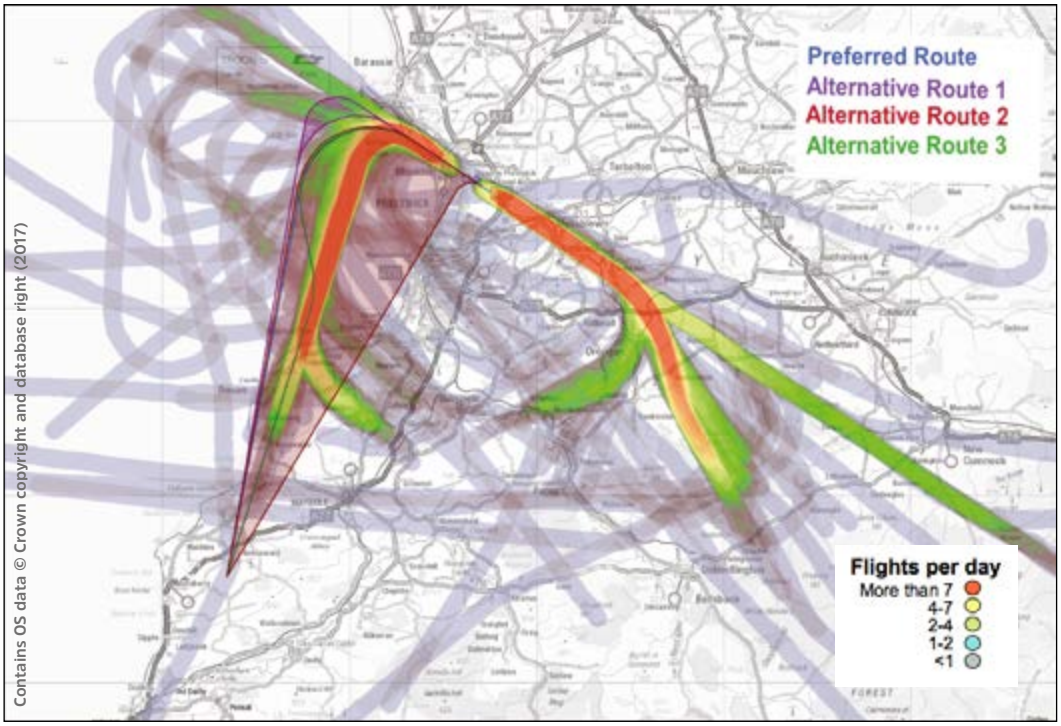

Figure 16 - Runway 30 Departures to the Southwest – Preferred and Alternative Routes over Flight Path Density Map

The diagram below shows the preferred and alternative routes over a “population density” map.

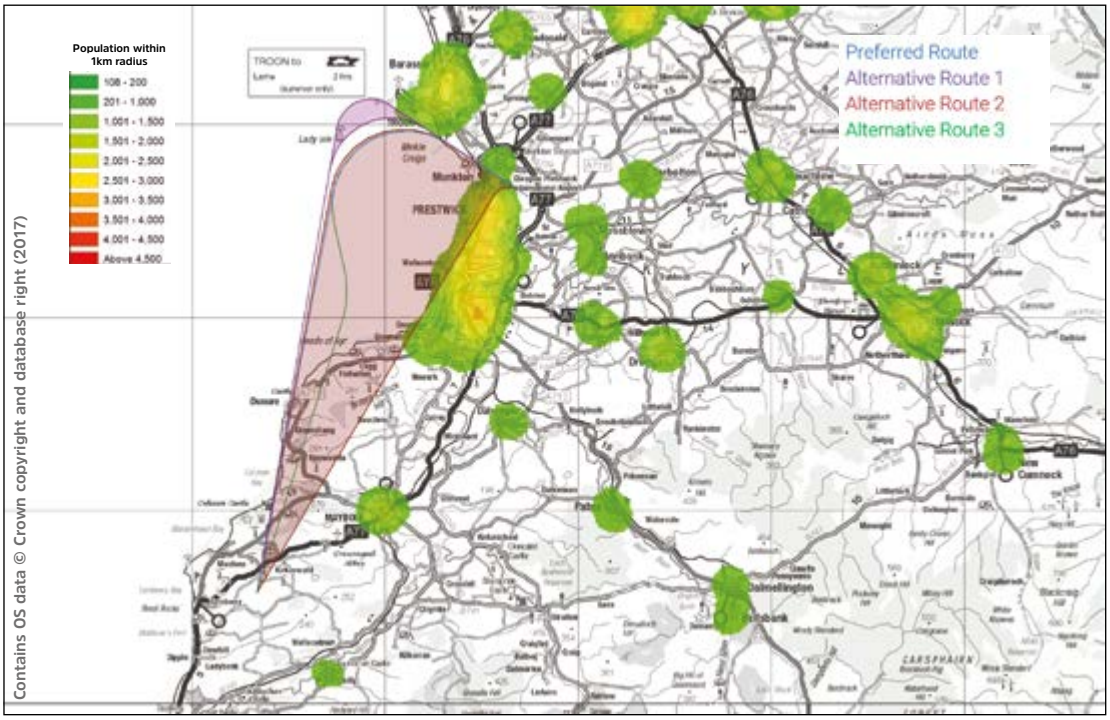

Figure 17 - Runway 30 Departures to the Southwest - Preferred and Alternative Routes over Population Density Map

In order to assess the various options we have put together the following table to compare the impact of each route.

	Preferred	Alt. 1	Alt. 2	Alt. 3
CO_2 emissions	More	More	Variable	More
Noise – Population Overflown	550	968	11,548	572
Noise – New Population	0	0	10,655	0
Concentration / Dispersal	Concentration	Concentration	Dispersal	Concentration
Technical Feasibility	Good	Good	Difficult	Good
Community	Impact (compared to current day)			
Troon	Closer	Closer	Closer	Closer
Dunure	Similar	Similar	Similar	Same
Ayr	Same	Same	Partially Overflown	Same

6.3 Runway 30 departures to the West

6.3.1 Purpose of the route and number of aircraft

This is a new route intended to provide a more efficient route for aircraft departing to destinations such as Iceland, North America, or South America. This would replace the current tactical situation where aircraft are cleared to route directly to a point called HERON (see Figure 7).

We anticipate the number of aircraft of any type flying this route per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	5	7	7	7	7	8

6.3.2 Factors influencing the design

Departures from Runway 30 (see Figure 7) currently fly straight ahead for approximately 1,500 metres before turning to the southwest over the Firth of Clyde. The current design criteria prohibit the turn point from being defined any closer than 1,950 metres from the end of the runway. This slight extension to the straight flight has a small noise impact on the town of Troon. The preferred route then turns to the southwest and climbs over the Firth to connect to HERON on the airway leading to the Atlantic.

6.3.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

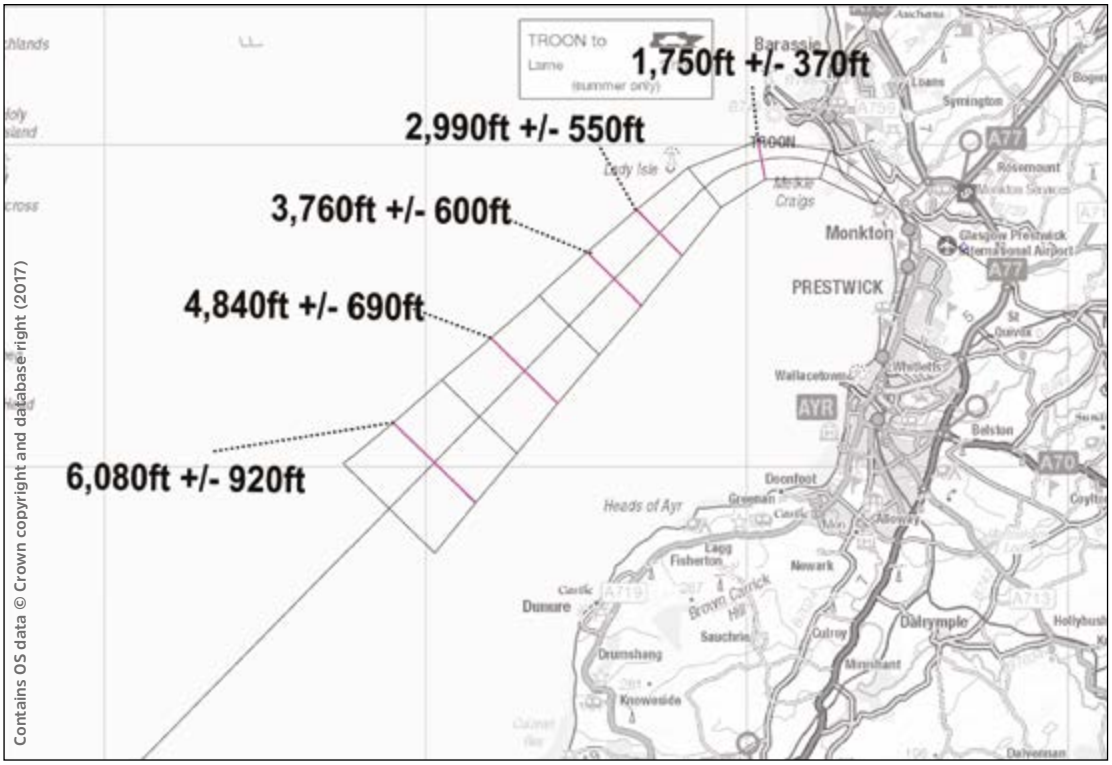

Figure 18 - Runway 30 Departures to the West - Preferred Route with Expected Altitudes and Overflight Swathe

Once an aircraft is above 3,000ft air traffic control is allowed to issue instructions to it in order to enable greater efficiency for the aircraft in question or for the system as a whole. This could therefore result in some aircraft being taken off the departure route early. However, we expect most aircraft will be left on the route to the end.

The diagrams below show the noise impact of our preferred route (typical and worst-case).

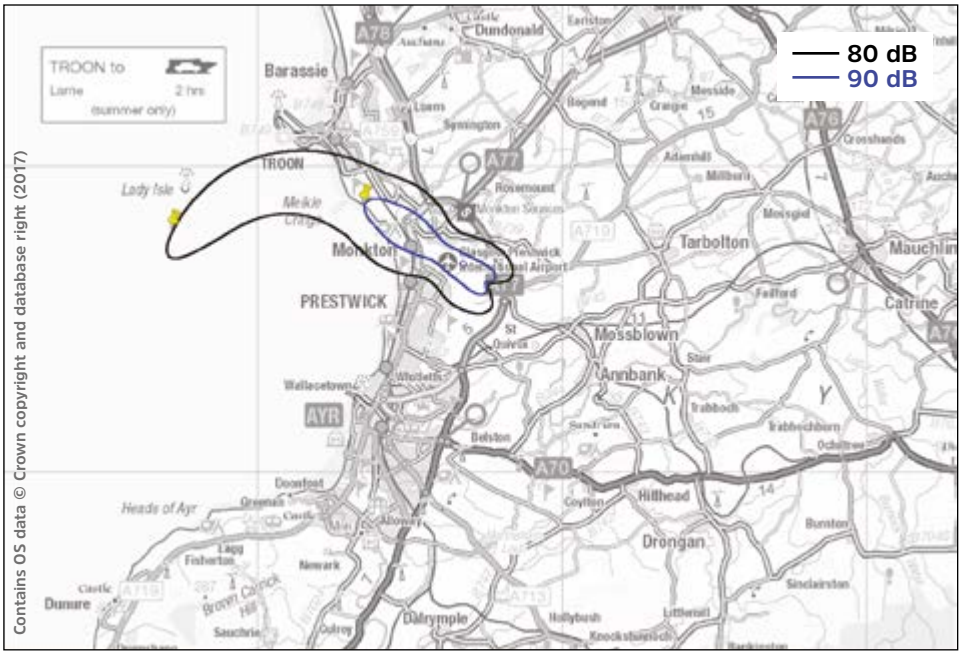

Figure 19 – Runway 30 Departures to the West – Boeing 737 SEL Footprints

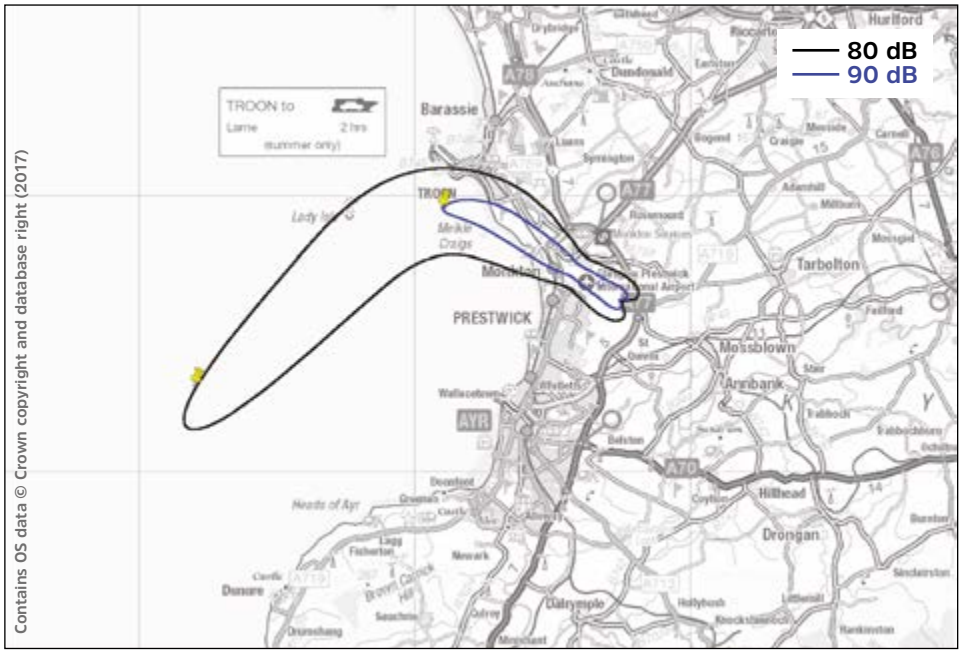

Figure 20 – Runway 30 Departures to the West – Boeing 747 SEL Footprints

The footprint in Figure 19 is for the Boeing 737 aircraft, which is the most common aircraft type typically operating from the airport. The footprint in Figure 20 is for the Boeing 747 aircraft, which is the loudest aircraft type typically operating from the airport. However, this aircraft type only makes up approximately 2% of the total aircraft movements. The footprints represent the total noise impact of a single flight. Further noise analysis is taking place and will be available on the airport website in late June 2017.

6.3.4 Alternative routes

Alternative 1 We considered designing the route using a “fly-by” turn rather than a “fly-over” turn. The preferred route uses a “fly-over” turn to ensure that all aircraft start their turn at the defined point.

Fly-by turns are the standard turn type for the routes as they allow aircraft to turn from one track onto another smoothly using the most appropriate turn radius for the aircraft.

However, the turn point has to be placed at a sufficient distance to ensure the fastest aircraft doesn’t start turning before 1,950 metres from the end of the runway. This will result in more aircraft continuing to fly over the water next to Troon before starting their turn to the southwest.

Alternative 2 We considered specifying the initial turn to the south based on a specified altitude above the ground. This has the environmental advantage of ensuring aircraft turn as soon as they reach a safe altitude.

However, it also causes significant dispersion of the traffic as lighter aircraft that climb well will turn much earlier while heavier aircraft will take a lot longer (and travel further) to reach the same altitude and will therefore turn later.

This dispersion makes it very difficult for air traffic control to integrate the traffic together and ensure airspace containment.

The diagram below shows the preferred and alternative routes over a flight path density map of the current traffic.

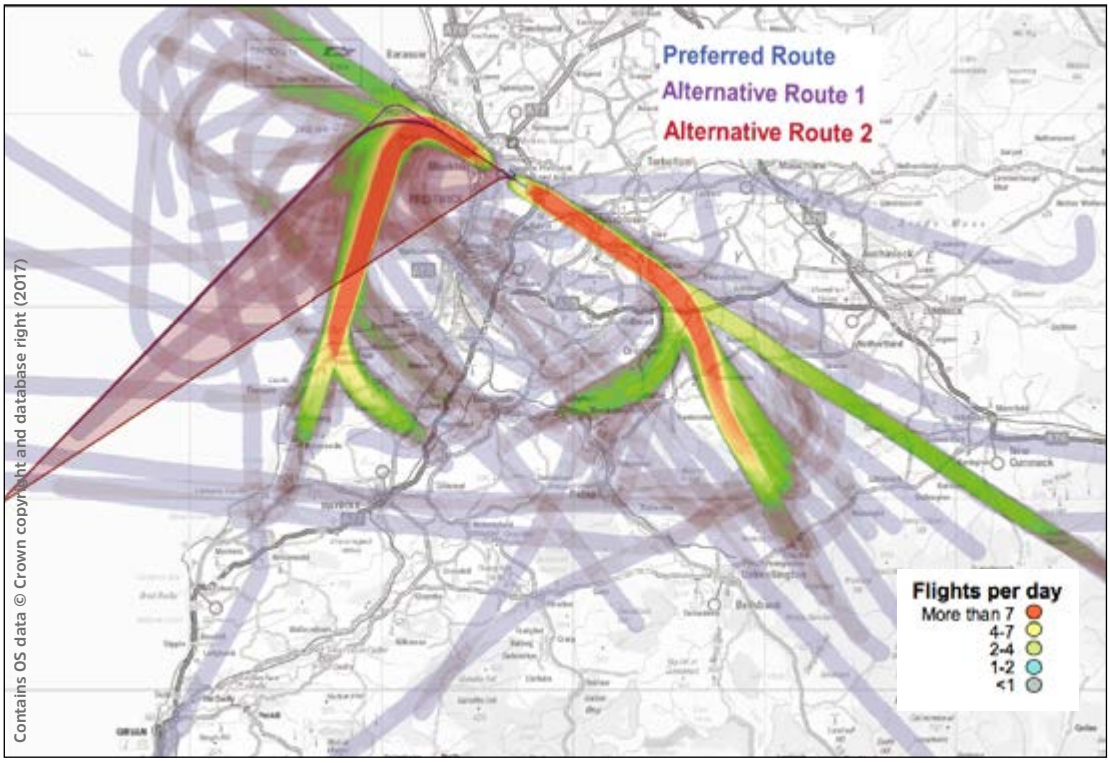

Figure 21 - Runway 30 Departures to the West - Preferred and Alternative Routes over Flight Path Density Map

The diagram below shows the preferred and alternative routes over a “population density” map.

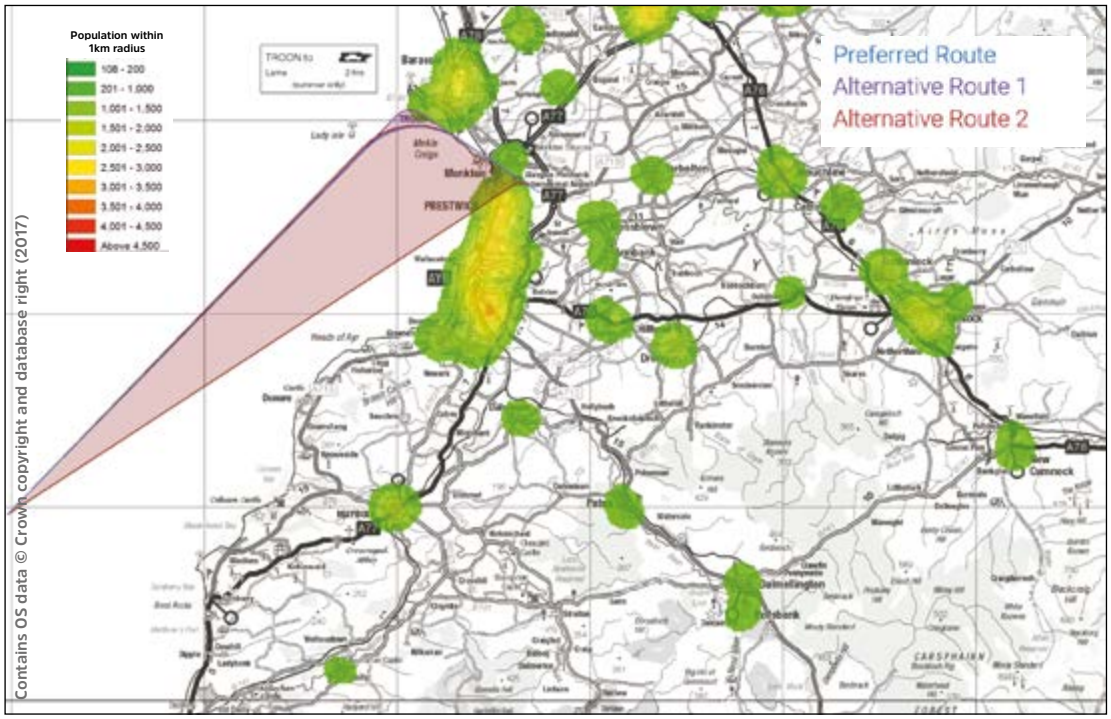

Figure 22 - Runway 30 Departures to the West - Preferred and Alternative Routes over Population Density Map

In order to assess the various options we have put together the following table to compare the impact of each route.

	Preferred	Alt. 1	Alt. 2
CO_2 emissions	Less	Less	Variable
Noise – Population Overflown	105	141	3,283
Noise – New Population	0	0	1,296
Concentration / Dispersal	Concentration	Concentration	Dispersal
Technical Feasibility	Good	Good	Difficult
Community	Impact (compared to current day)		
Troon	Closer	Closer	Closer
Dunure	Further	Further	Further
Ayr	Same	Same	Partially Overflown

6.4 Runway 30 departures to the Southeast

6.4.1 Purpose of the route and number of aircraft

This is a replacement for the existing “NGY 1K” departure route (see Figure 7). This route will be used by aircraft departing to destinations such as England, Wales, Central Europe, or the Middle East.

We anticipate the number of aircraft of any type flying this route per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	52	65	70	72	74	76

6.4.2 Factors influencing the design

Departures from Runway 30 (see Figure 7) currently fly straight ahead for approximately 1,500 metres before turning to the southwest over the Firth of Clyde. The current design criteria prohibit the turn point from being defined any closer than 1,950metres from the end of the runway. This slight extension to the straight flight has a small noise impact on the town of Troon. The preferred route then turns to the south and climbs over the Firth before turning to the southeast and crossing the shore at Fisherton. To improve the integration of these aircraft into the airways network this route will now end at a point called OSMEG (see Figure 7), which is approximately 6,000 metres southeast of the old New Galloway (NGY) navigation aid.

6.4.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

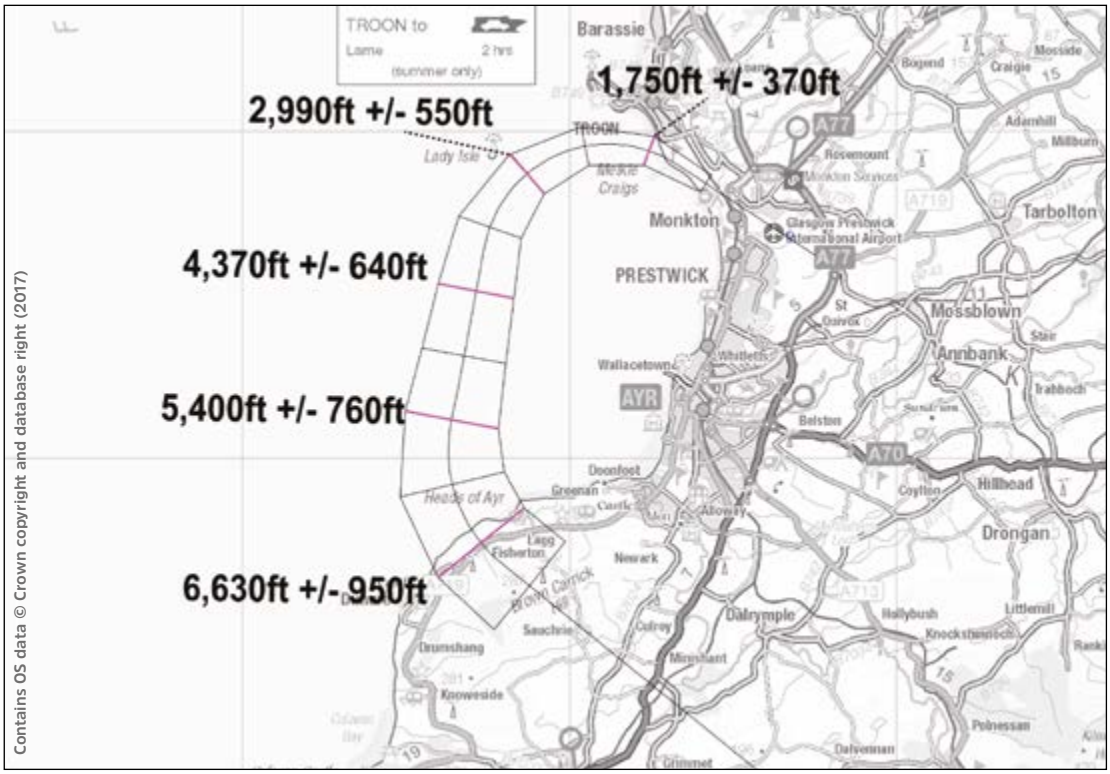

Figure 23 - Runway 30 Departures to the Southeast - Preferred Route with Expected Altitudes and Overflight Swathe

Once an aircraft is above 3,000ft air traffic control is allowed to issue instructions to it in order to enable greater efficiency for the aircraft in question or for the system as a whole. This could therefore result in some aircraft being taken off the departure route early. However, we expect most aircraft will be left on the route to the end.

The diagrams below show the noise impact of our preferred route (typical and worst-case).

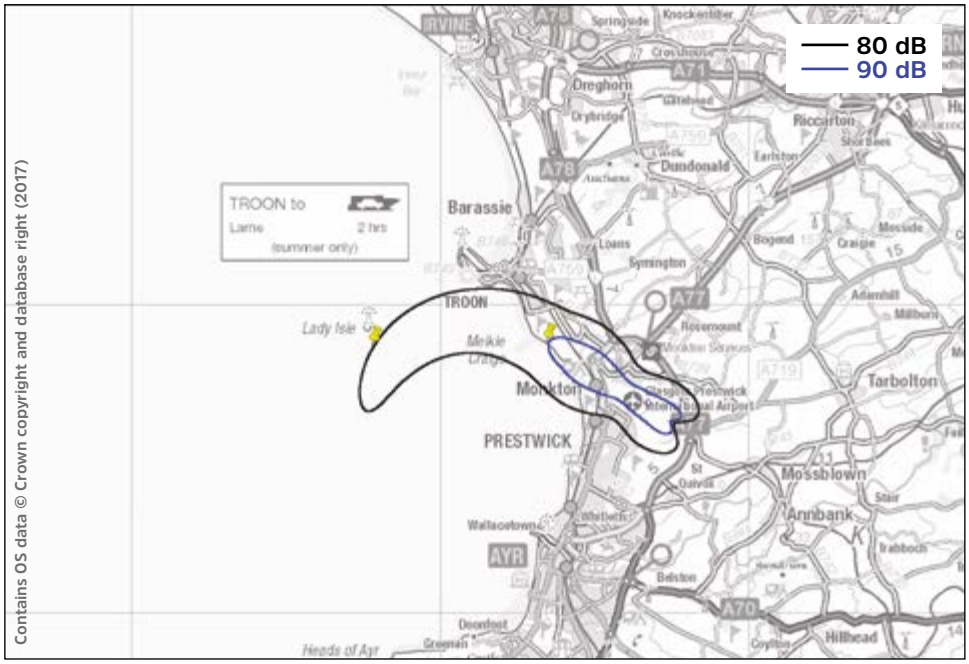

Figure 24 - Runway 30 Departures to the Southeast - Boeing 737 SEL Footprints

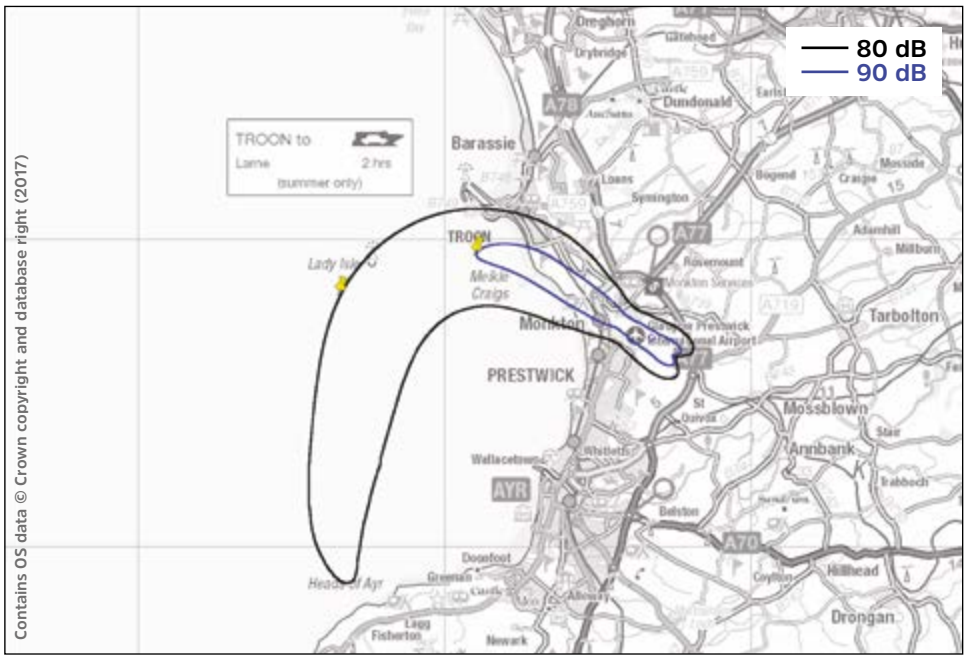

Figure 25 - Runway 30 Departures to the Southeast - Boeing 747 SEL Footprints

The footprint in Figure 24 is for the Boeing 737 aircraft, which is the most common aircraft type typically operating from the airport. The footprint in Figure 25 is for the Boeing 747 aircraft, which is the loudest aircraft type typically operating from the airport. However, this aircraft type only makes up approximately 2% of the total aircraft movements. The footprints represent the total noise impact of a single flight. Further noise analysis is taking place and will be available on the airport website in late June 2017.

6.4.4 Alternative routes

Alternative 1 We considered designing the route using a "fly-by" turn rather than a "fly-over" turn. The preferred route uses a fly-over turn to ensure that all aircraft start their turn at the defined point.

Fly-by turns are the standard turn type for the routes as they allow aircraft to turn from one track onto another smoothly using the most appropriate turn radius for the aircraft.

However, the turn point has to be placed at a sufficient distance to ensure the fastest aircraft doesn't start turning before 1,950 metres from the end of the runway. This will result in more aircraft continuing to fly straight next to Troon before starting their turn to the south.

Alternative 2 We considered specifying the initial turn to the south based on a specified altitude above the ground. This has the environmental advantage of ensuring aircraft turn as soon as they reach a safe altitude.

However, it also causes significant dispersion of the traffic as lighter aircraft that climb well will turn much earlier while heavier aircraft will take a lot longer (and travel further) to reach the same altitude and will therefore turn later.

This dispersion makes it very difficult for air traffic control to integrate the traffic together and ensure airspace containment.

Alternative 3 We considered designing a route that complies with the design criteria for the initial turn then brings aircraft back onto the current conventional route.

This would have the same impact on Troon as the preferred route and would result in problems with aircraft flying the route due to the number of turns in close proximity.

The diagram below shows the preferred and alternative routes over a flight path density map of the current traffic.

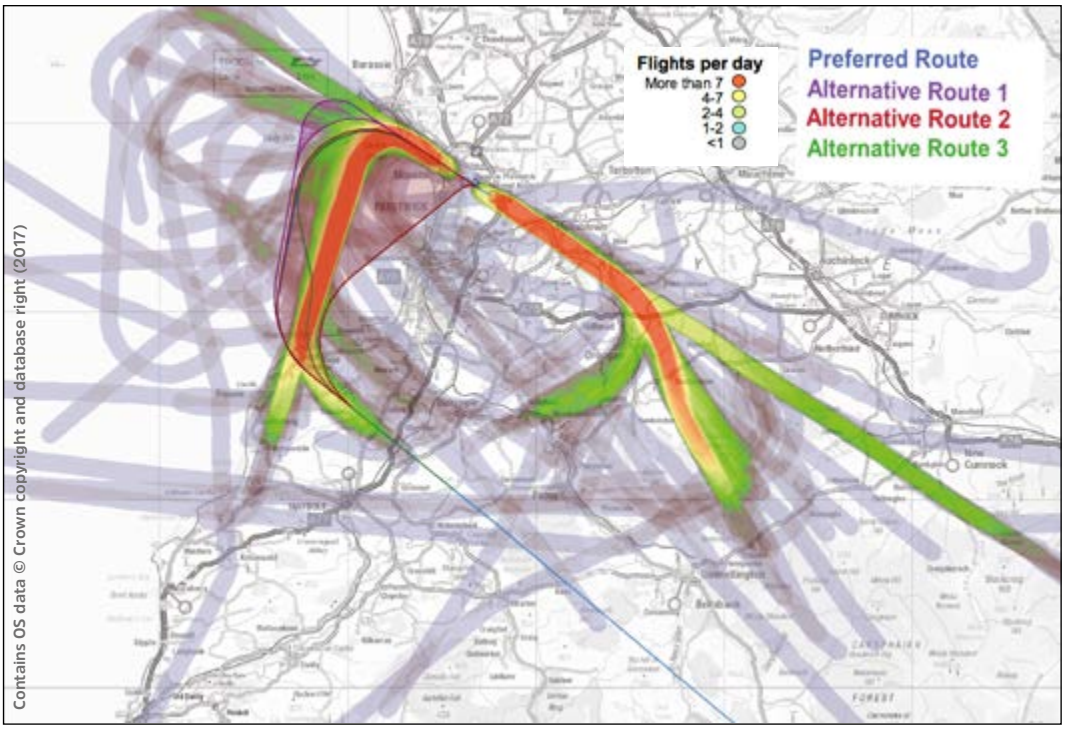

Figure 26 – Runway 30 Departures to the Southeast – Preferred and Alternative Routes over Flight Path Density Map

The diagram below shows the preferred and alternative routes over a “population density” map.

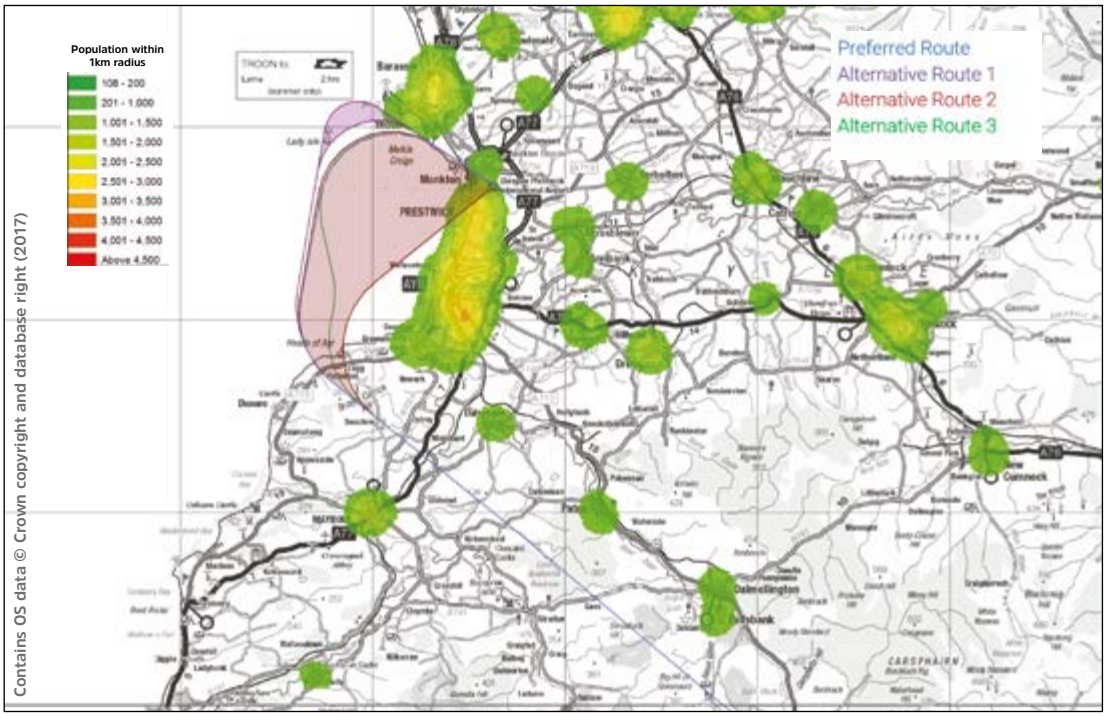

Figure 27 - Runway 30 Departures to the Southeast - Preferred and Alternative Routes over Population Density Map

In order to assess the various options we have put together the following table to compare the impact of each route.

	Preferred	Alt. 1	Alt. 2	Alt. 3
CO_2 emissions	More	More	Variable	More
Noise – Population Overflown	324	181	2,934	326
Noise – New Population	0	0	1,608	0
Concentration / Dispersal	Concentration	Concentration	Dispersal	Concentration
Technical Feasibility	Good	Good	Difficult	Good
Community	Impact (compared to current day)			
Troon	Closer	Closer	Closer	Closer
Ayr	Same	Same	Partially Overflown	Same

6.5 Runway 30 departures to the East

6.5.1 Purpose of the route and number of aircraft

This is a new route intended to provide a more environmentally efficient route for aircraft departing to destinations such as Northern Europe, Russia, or the Far East. This would replace the current situation where aircraft depart on the south-easterly route then turn back to the northeast.

We anticipate the number of aircraft of any type flying this route per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	3	4	4	4	5	5

6.5.2 Factors influencing the design

Departures from Runway 30 (see Figure 7) currently fly straight ahead for approximately 1,500 metres before turning to the southwest over the Firth of Clyde. The current design criteria prohibit the turn point from being defined any closer than 1,950 metres from the end of the runway. This slight extension to the straight flight has a small noise impact on the town of Troon. The preferred route then turns to the south and climbs over the Firth before turning to the southeast and crossing the shore at Fisherton. At a point close to Patna the route turns east to a point called SUMIN (see Figure 8) where it turns northeast to a point called HAVEN (see Figure 7), which is on the airway leading to the East.

6.5.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

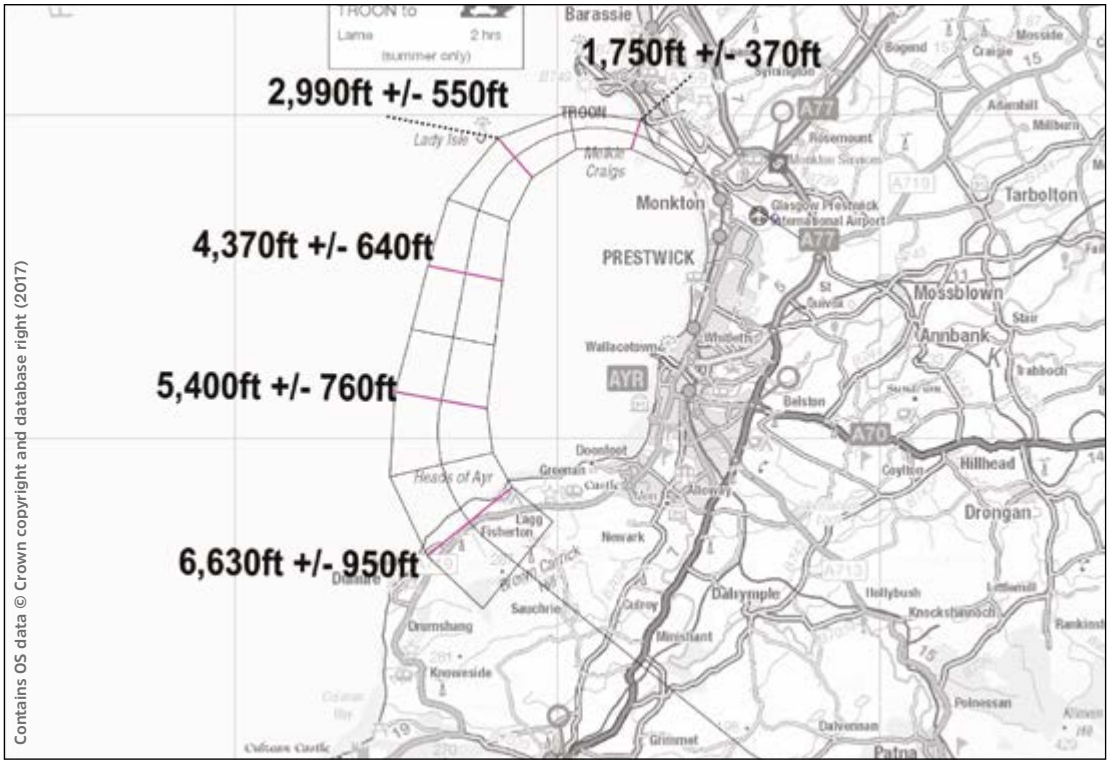

Figure 28 - Runway 30 Departures to the East - Preferred Route with Expected Altitudes and Overflight Swathe

Once an aircraft is above 3,000ft air traffic control is allowed to issue instructions to it in order to enable greater efficiency for the aircraft in question or for the system as a whole. This could therefore result in some aircraft being taken off the departure route early. However, we expect most aircraft will be left on the route to the end.

The diagrams below show the noise impact of our preferred route (typical and worst-case).

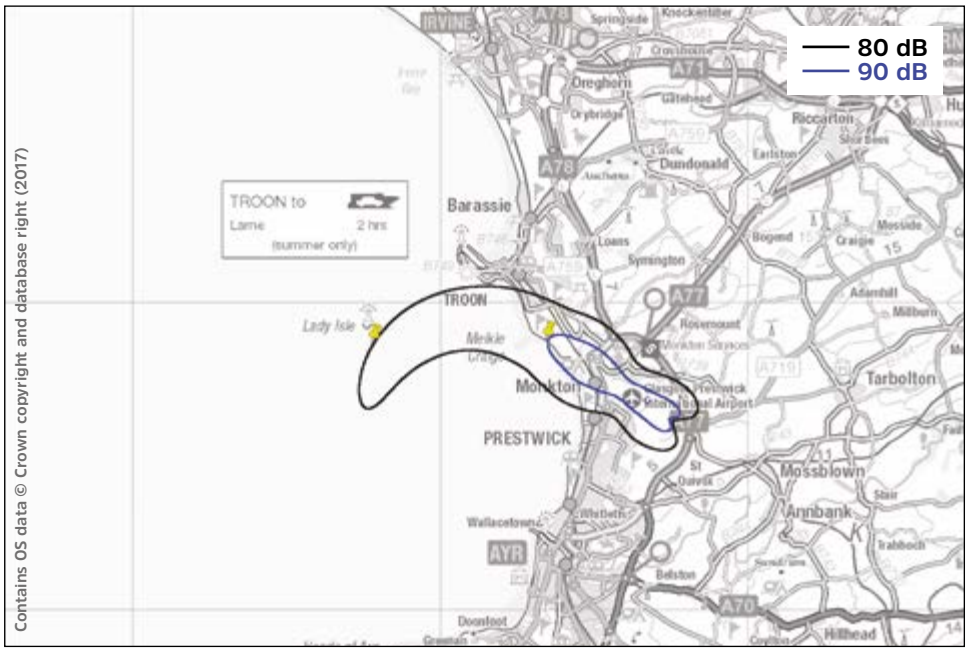

Figure 29 – Runway 30 Departures to the East – Boeing 737 SEL Footprints

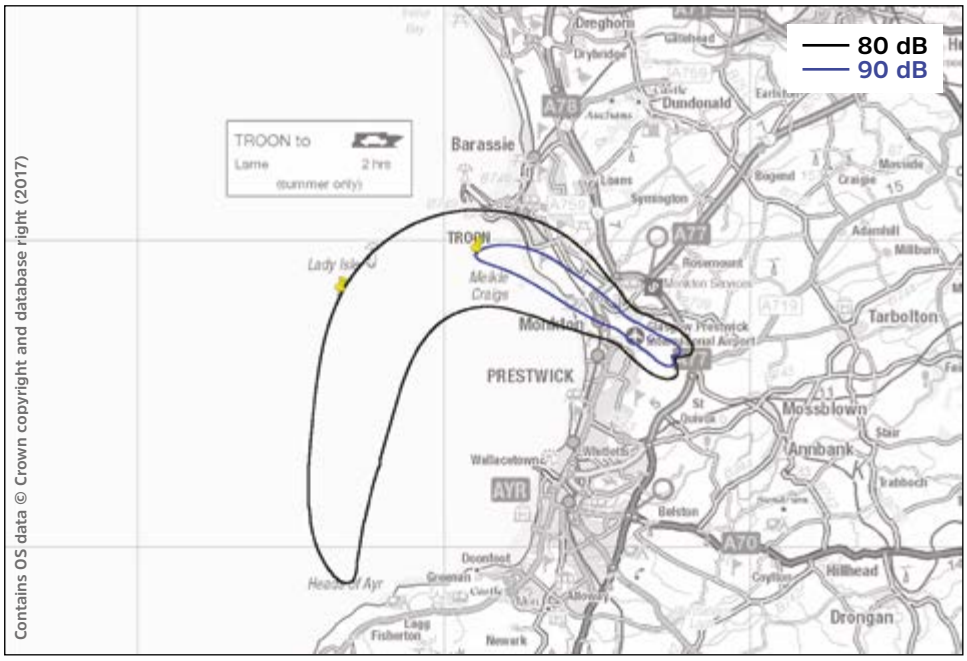

Figure 30 – Runway 30 Departures to the East – Boeing 747 SEL Footprints

The footprint in Figure 29 is for the Boeing 737 aircraft, which is the most common aircraft type typically operating from the airport. The footprint in Figure 30 is for the Boeing 747 aircraft, which is the loudest aircraft type typically operating from the airport. However, this aircraft type only makes up approximately 2% of the total aircraft movements. The footprints represent the total noise impact of a single flight. Further noise analysis is taking place and will be available on the airport website in late June 2017.

6.5.4 Alternative routes

Alternative 1 We considered designing the route using a “fly-by” turn rather than a “fly-over” turn. The preferred route uses a fly-over turn to ensure that all aircraft start their turn at the defined point.

Fly-by turns are the standard turn type for the routes as they allow aircraft to turn from one track onto another smoothly using the most appropriate turn radius for the aircraft.

However, the turn point has to be placed at a sufficient distance to ensure the fastest aircraft doesn’t start turning before 1,950 metres from the end of the runway. This will result in more aircraft continuing to fly straight next to Troon before starting their turn to the south.

Alternative 2 We considered specifying the initial turn to the south based on a specified altitude above the ground. This has the environmental advantage of ensuring aircraft turn as soon as they reach a safe altitude.

However, it also causes significant dispersion of the traffic as lighter aircraft that climb well will turn much earlier while heavier aircraft will take a lot longer (and travel further) to reach the same altitude and will therefore turn later.

This dispersion makes it very difficult for air traffic control to integrate the traffic together and ensure airspace containment.

Alternative 3 We considered designing a route that complies with the design criteria for the initial turn then brings aircraft back onto the current conventional route.

This would have the same impact on Troon as the preferred route and would result in problems with aircraft flying the route due to the number of turns in close proximity.

The diagram below shows the preferred and alternative routes over a flight path density map of the current traffic.

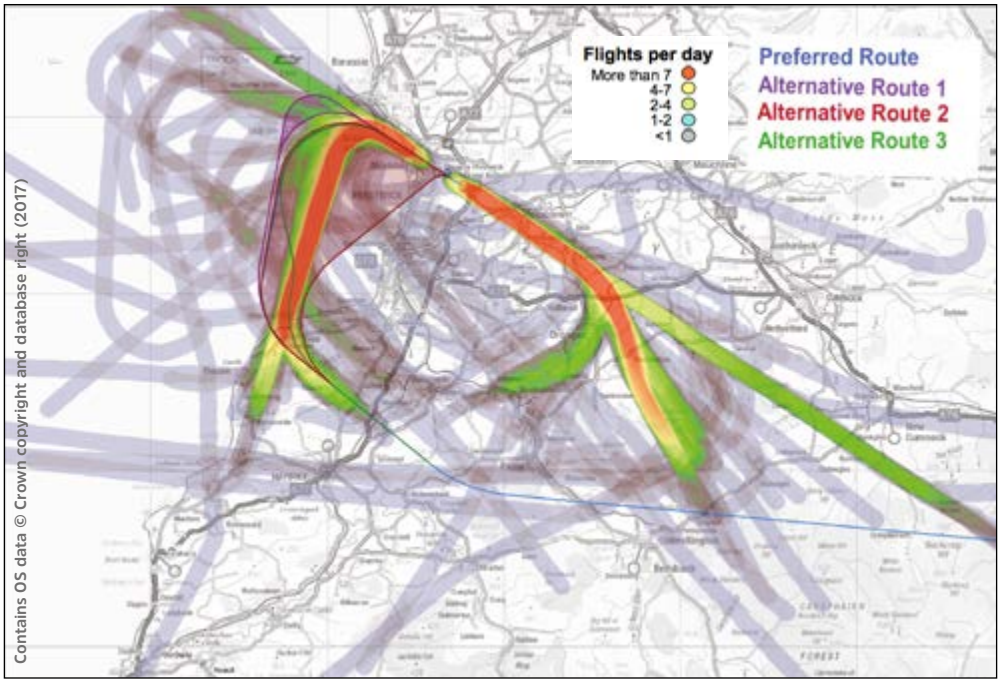

Figure 31 - Runway 30 Departures to the East - Preferred and Alternative Routes over Flight Path Density Map

The diagram below shows the preferred and alternative routes over a "population density" map.

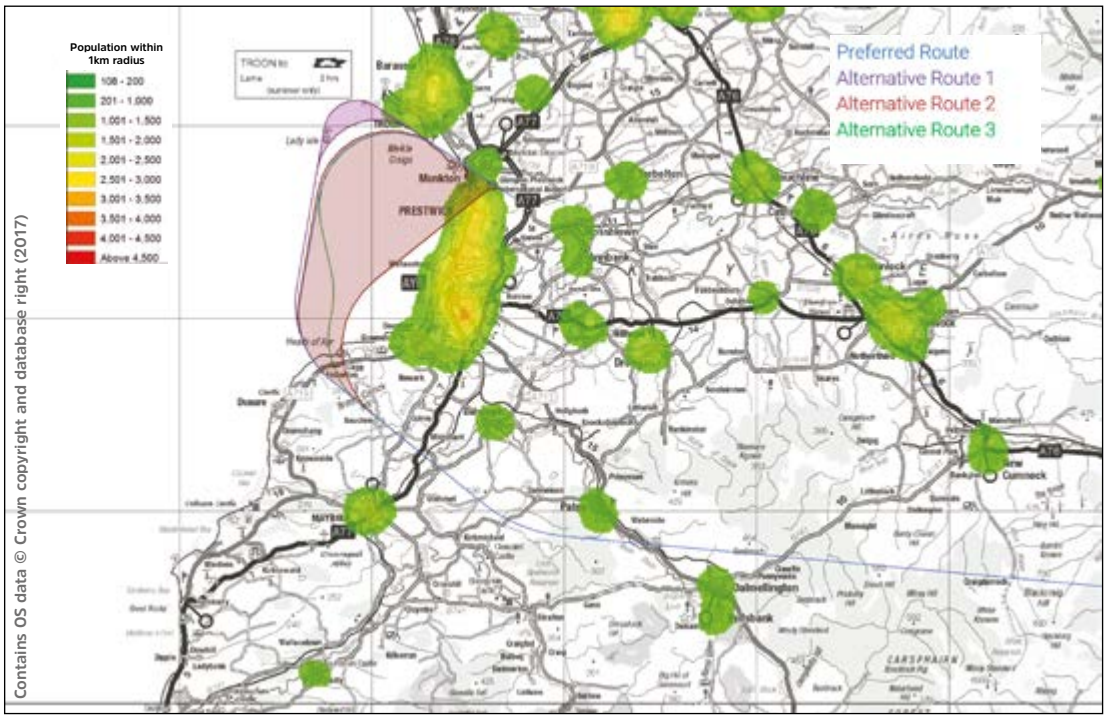

Figure 32 - Runway 30 Departures to the East - Preferred and Alternative Routes over Population Density Map

In order to assess the various options we have put together the following table to compare the impact of each route.

	Preferred	Alt. 1	Alt. 2	Alt. 3
CO_2 emissions	Less	Less	Variable	Less
Noise – Population Overflown	324	181	2,934	326
Noise – New Population	0	0	1,608	0
Concentration / Dispersal	Concentration	Concentration	Dispersal	Concentration
Technical Feasibility	Good	Good	Difficult	Good
Community	Impact (compared to current day)			
Troon	Closer	Closer	Closer	Closer
Ayr	Same	Same	Partially Overflown	Same

6.6 Runway 12 departures to the Southwest

6.6.1 Purpose of the route and number of aircraft

This is a replacement for the existing "TRN 1L" departure route (see Figure 7). This route will be used by aircraft departing to destinations such as Scotland, Ireland, Southern Europe, or Africa. It will also be used by any slow climbing aircraft departing to Iceland, North America, or South America.

We anticipate the number of aircraft of any type flying this route per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	10	13	14	14	14	15

6.6.2 Factors influencing the design

The current departure route from Runway 12 (see Figure 7) to the southwest flies over or close to several villages. As part of the redesign project we wanted to explore possible options to minimise the noise impact on these communities. The route options considered have potential impacts on the communities of Mossblown, Annbank, Drongan, Hillhead, Coylton, and Dalrymple. The preferred route initially passes between Mossblown and Annbank. The route then passes over Trabboch before turning to the south and overflying the eastern side of Hillhead and the western side of Drongan.

All the routes are designed and evaluated according to the design principles listed in section 6.1.1. In order to minimise the noise impact for the greatest number of people we have maintained the current track between Mossblown and Annbank rather than making an earlier turn to the south. However, we have moved the turn point slightly closer to the airport in order to reduce the noise impact on Drongan. This puts the centreline of the proposed route slightly closer to Hillhead and Coylton but the centre of the noise footprint is in the countryside between Hillhead and Drongan. The new route then re-joins the current route in the vicinity of Hollybush and turns toward a point overhead the old Turnberry (TRN) navigation aid.

6.6.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

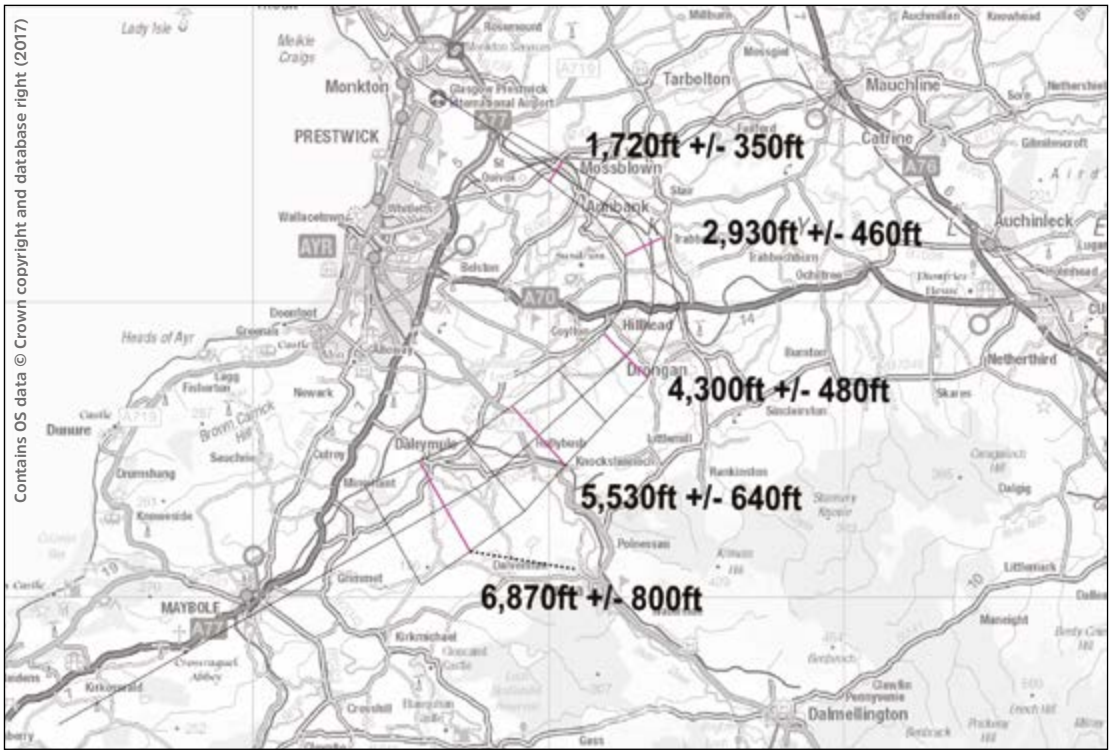

Figure 33 - Runway 12 Departures to the Southwest - Preferred Route with Expected Altitudes and Over-flight Swathe

Once an aircraft is above 3,000ft air traffic control is allowed to issue instructions to it in order to enable greater efficiency for the aircraft in question or for the system as a whole. This could therefore result in some aircraft being taken off the departure route early. However, we expect most aircraft will be left on the route to the end.

The diagrams below show the noise impact of our preferred route (typical and worst-case).

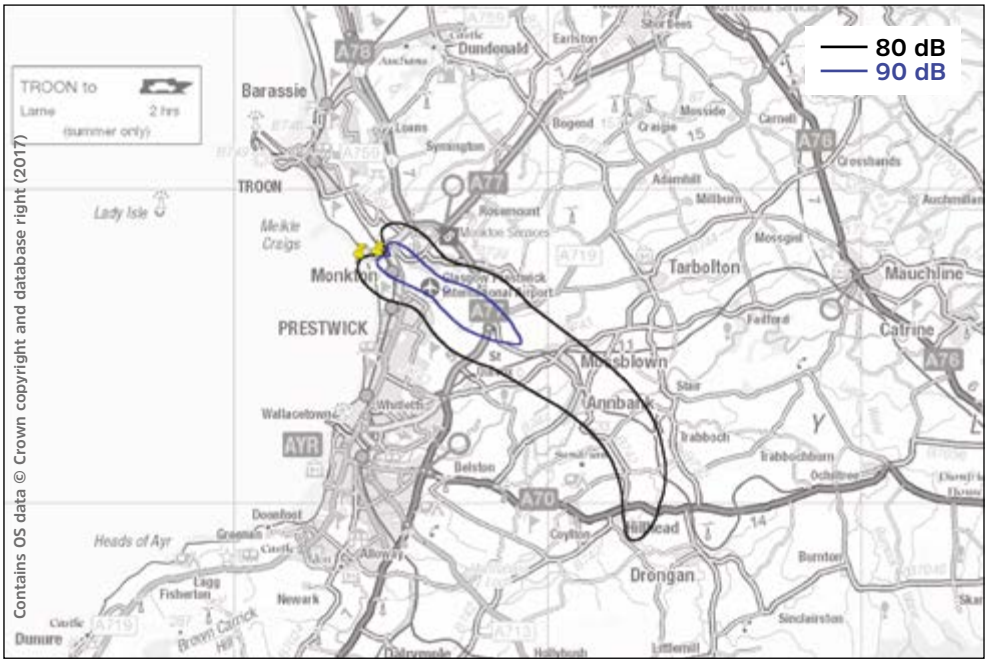

Figure 34 - Runway 12 Departures to the Southwest - Boeing 737 SEL Footprints

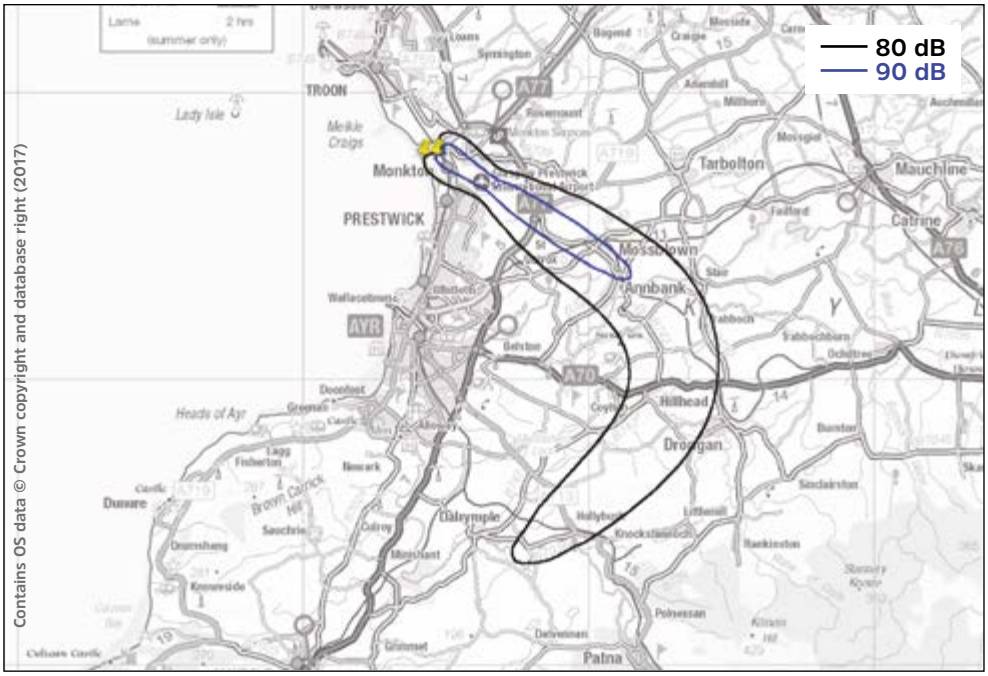

Figure 35 - Runway 12 Departures to the Southwest - Boeing 747 SEL Footprints

The footprint in Figure 34 is for the Boeing 737 aircraft, which is the most common aircraft type typically operating from the airport. The footprint in Figure 35 is for the Boeing 747 aircraft, which is the loudest aircraft type typically operating from the airport. However, this aircraft type only makes up approximately 2% of the total aircraft movements. The footprints represent the total noise impact of a single flight. Further noise analysis is taking place and will be available on the airport website in late June 2017.

6.6.4 Alternative routes

Alternative 1 We considered specifying the turn to the south as soon as possible from the end of the runway. However, this route would directly overfly Annbank as well as Coylton.

While the reduced track mileage would result in lower CO_2 emissions, CAA guidance states that minimising noise impact should be the priority below 4,000ft; therefore this isn't our preferred route.

Alternative 2 We considered specifying the initial turn to the south based on a specified altitude above the ground. This has the environmental advantage of ensuring aircraft turn as soon as they reach a safe altitude.

However, it also causes significant dispersion of the traffic as lighter aircraft that climb well will turn much earlier while heavier aircraft will take a lot longer (and travel further) to reach the same altitude and will therefore turn later.

This results in a much larger area being subject to overflight albeit on less frequent but unpredictable basis.

Alternative 3 We considered replicating the current departure route as closely as possible. This does not introduce any new problems but it doesn't provide any improvement for the people in Drongan and doesn't provide any environmental benefit.

The diagram below shows the preferred and alternative routes over a flight path density map of the current traffic.

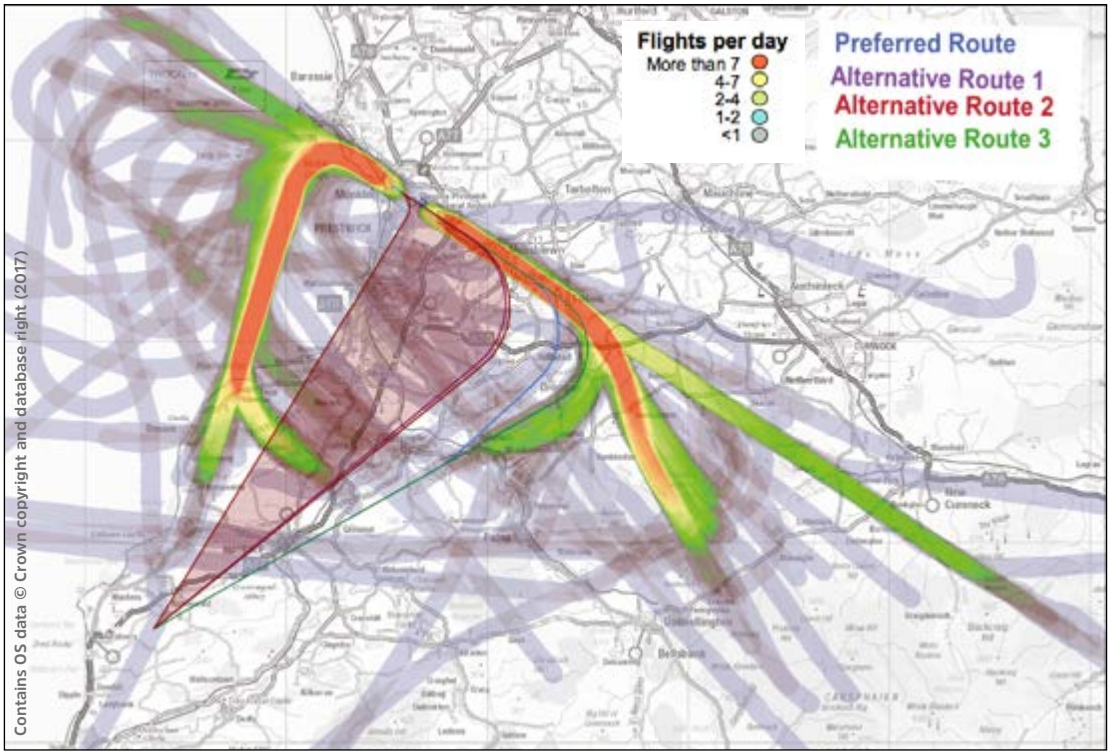

Figure 36 - Runway 12 Departures to the Southwest - Preferred and Alternative Routes over Flight Path Density Map

The diagram below shows the preferred and alternative routes over a "population density" map.

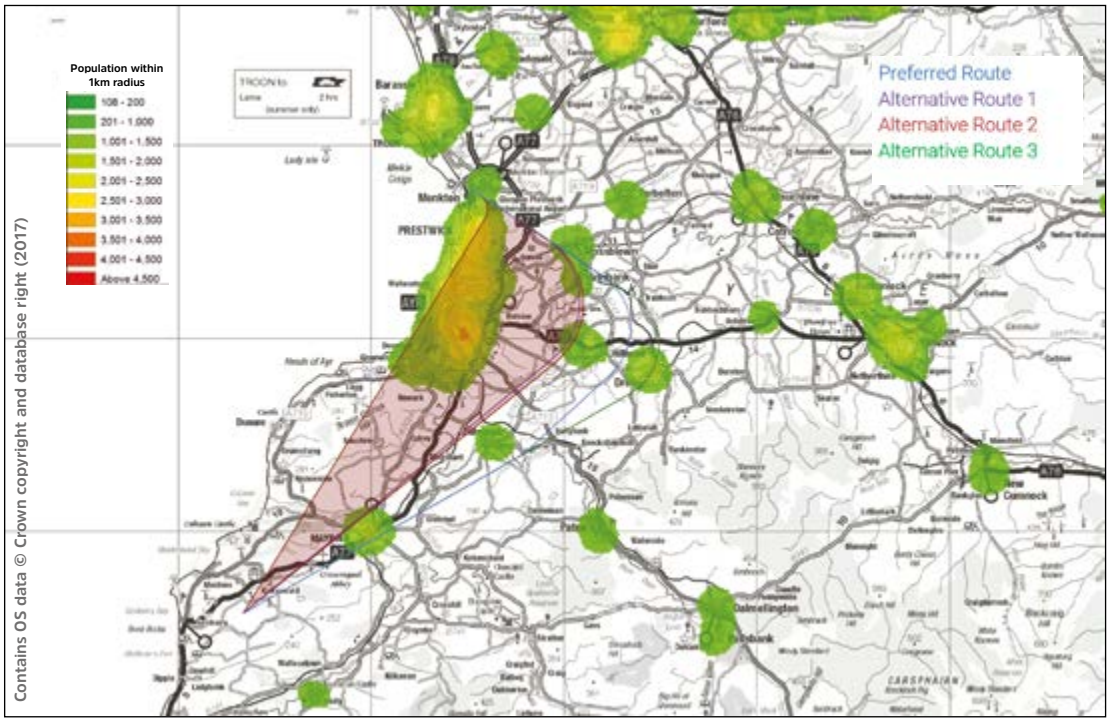

Figure 37 - Runway 12 Departures to the Southwest - Preferred and Alternative Routes over Population Density Map

In order to assess the various options we have put together the following table to compare the impact of each route.

	Preferred	Alt. 1	Alt. 2	Alt. 3
CO_2 emissions	Less	Less	Variable	Same
Noise – Population Overflown	7,598	10,060	14,896	6,570
Noise – New Population	6,515	8,441	14,102	2,430
Concentration / Dispersal	Concentration	Concentration	Dispersal	Concentration
Technical Feasibility	Good	Good	Difficult	Good
Community	Impact (compared to current day)			
Mossblown	Same	Similar	Similar	Same
Annbank	Same	More Overflown	More Overflown	Same
Drongan	Further	Further	Overflown	Same
Hillhead	Partially Overflown	Similar	Overflown	Same
Coylton	Closer	Overflown	Overflown	Same
Hollybush	Similar	Further	Overflown	Same
Dalrymple	Similar	Similar	Overflown	Same
Rankinston	Further	Further	Further	Same
Ayr	Same	Closer	Partially Overflown	Same

6.7 Runway 12 departures to the West

6.7.1 Purpose of the route and number of aircraft

This is a new route intended to provide a more environmentally efficient route for aircraft departing to destinations such as Iceland, North America, or South America. This would replace the current tactical situation where aircraft are cleared to route directly to a point called HERON (see Figure 7).

We anticipate the number of aircraft of any type flying this route per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	3	3	3	3	3	4

6.7.2 Factors influencing the design

The current departure route from Runway 12 (see Figure 7) to the southwest flies over or close to several villages. As part of the redesign project we wanted to explore possible options to minimise the noise impact on these communities. The route options considered have impacts on the communities of Mossblown, Annbank, Drongan, Hillhead, Coylton, and Dalrymple. The preferred route initially passes between Mossblown and Annbank. The route then passes over Trabboch before turning to the south and overflying the eastern side of Hillhead and the western side of Drongan.

All routes are designed and evaluated according to the design principles listed in section 6.1.1. In order to minimise the noise impacts for the greatest number of people, we have maintained the current track between Mossblown and Annbank rather than making an earlier turn to the south. However, we have moved the turn point slightly closer to the airport in order to reduce the noise impact on Drongan. This puts the centreline of the proposed route slightly closer to Hillhead and Coylton but the centre of the noise footprint is in the countryside between Hillhead and Drongan.

The route then turns to the west and continues to HERON on the airway leading to the Atlantic.

6.7.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

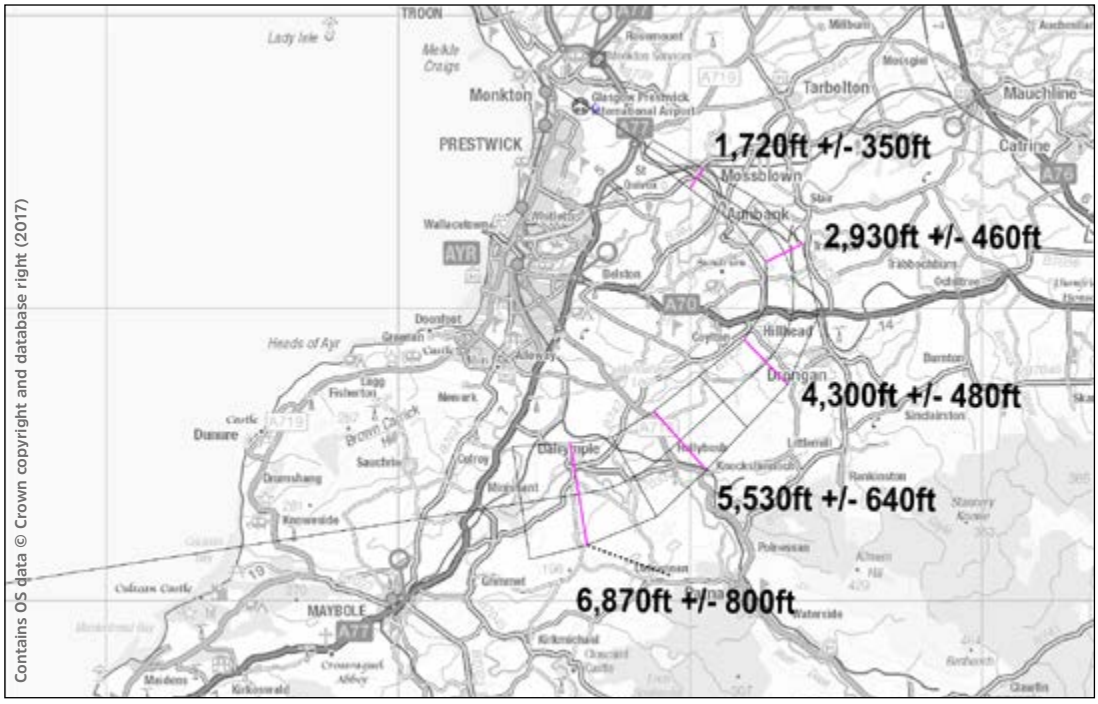

Figure 38 - Runway 12 Departures to the West - Preferred Route with Expected Altitudes and Overflight Swathe

Once an aircraft is above 3,000ft air traffic control is allowed to issue instructions to it in order to enable greater efficiency for the aircraft in question or for the system as a whole. This could therefore result in some aircraft being taken off the departure route early. However we expect most aircraft will be left on the route to the end.

The following diagrams show the noise impact of our preferred route (typical and worst-case).

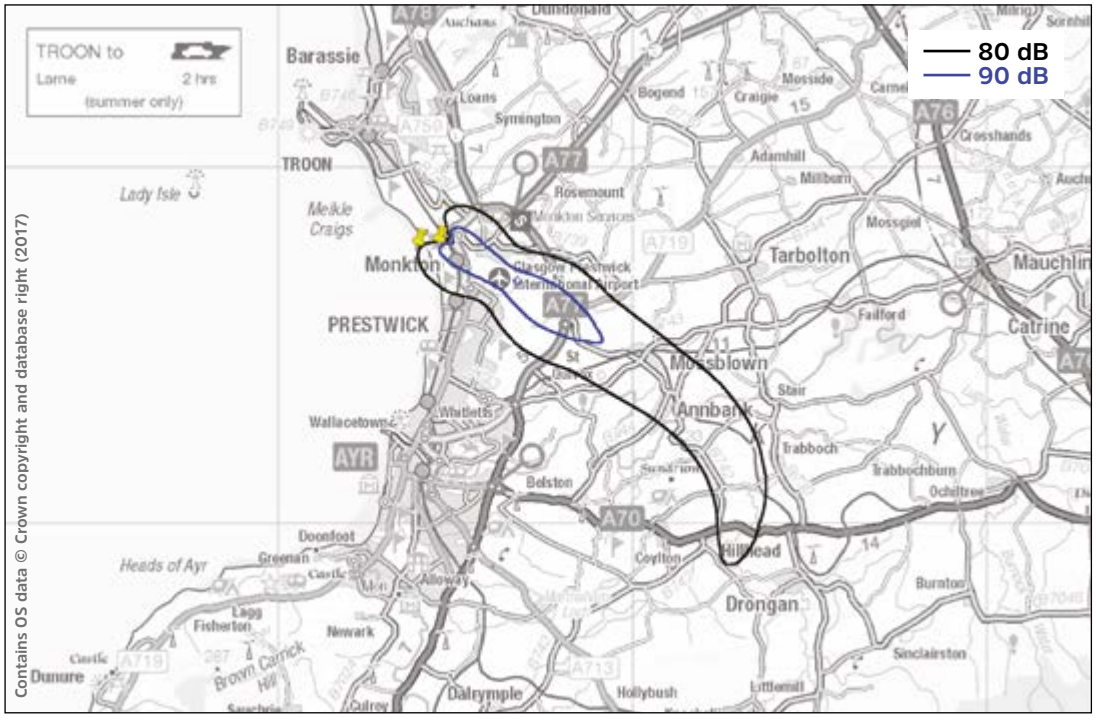

Figure 39 - Runway 12 Departures to the West - Boeing 737 SEL Footprints

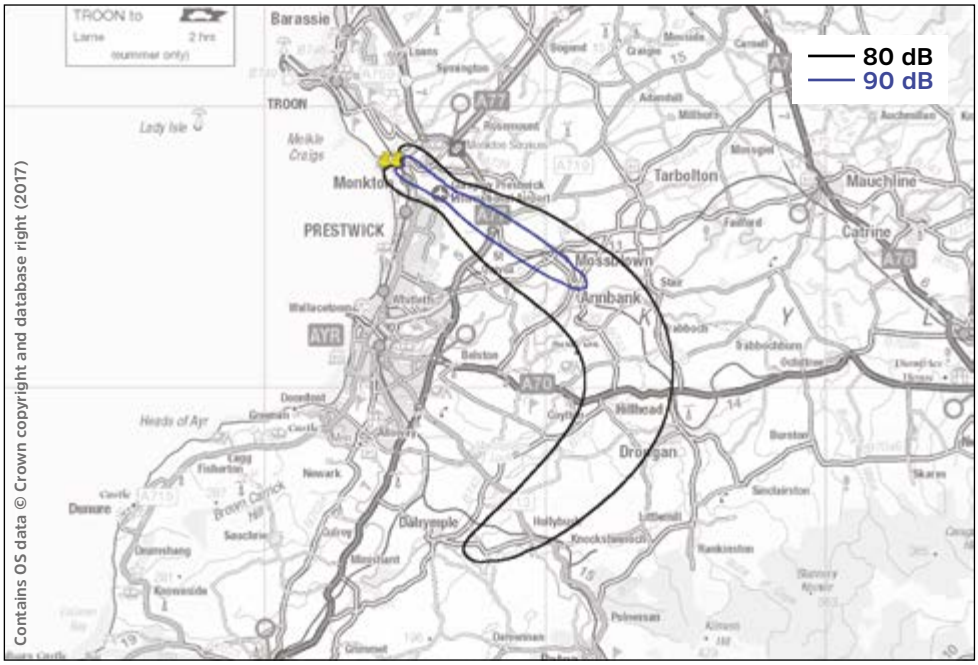

Figure 40 - Runway 12 Departures to the West - Boeing 747 SEL Footprints

The footprint in Figure 39 is for the Boeing 737 aircraft, which is the most common aircraft type typically operating from the airport. The footprint in Figure 40 is for the Boeing 747 aircraft, which is the loudest aircraft type typically operating from the airport. However, this aircraft type only makes up approximately 2% of the total aircraft movements. The footprints represent the total noise impact of a single flight. Further noise analysis is taking place and will be available on the airport website in late June 2017.

6.7.4 Alternative routes

Alternative 1 We considered specifying the turn to the south as soon as possible from the end of the runway. However, this route would directly overfly Annbank as well as Coylton.

While the reduced track mileage would result in lower CO_2 emissions, CAA guidance states that minimising noise impact should be the priority below 4,000ft; therefore this isn't our preferred route.

Alternative 2 We considered specifying the initial turn to the south based on a specified altitude above the ground. This has the environmental advantage of ensuring aircraft turn as soon as they reach a safe altitude.

However, it also causes significant dispersion of the traffic as lighter aircraft that climb well will turn much earlier while heavier aircraft will take a lot longer (and travel further) to reach the same altitude and will therefore turn later.

This results in a much larger area being subject to overflight albeit on a less frequent but unpredictable basis.

Alternative 3 We considered replicating the initial turn of the current departure route as closely as possible. This does not introduce any new problems but it doesn't provide any improvement for the people in Drongan and doesn't provide any environmental benefit.

The diagram below shows the preferred and alternative routes over a flight path density map of the current traffic.

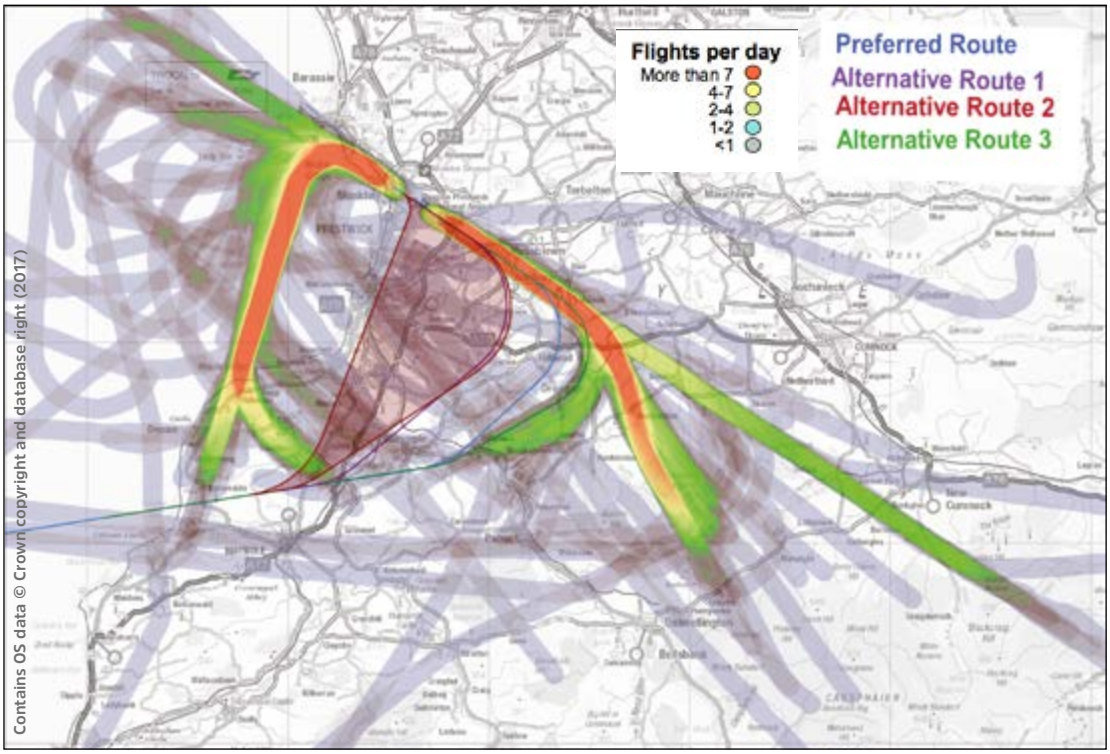

Figure 41 - Runway 12 Departures to the West - Preferred and Alternative Routes over Flight Path Density Map

The diagram below shows the preferred and alternative routes over a "population density" map.

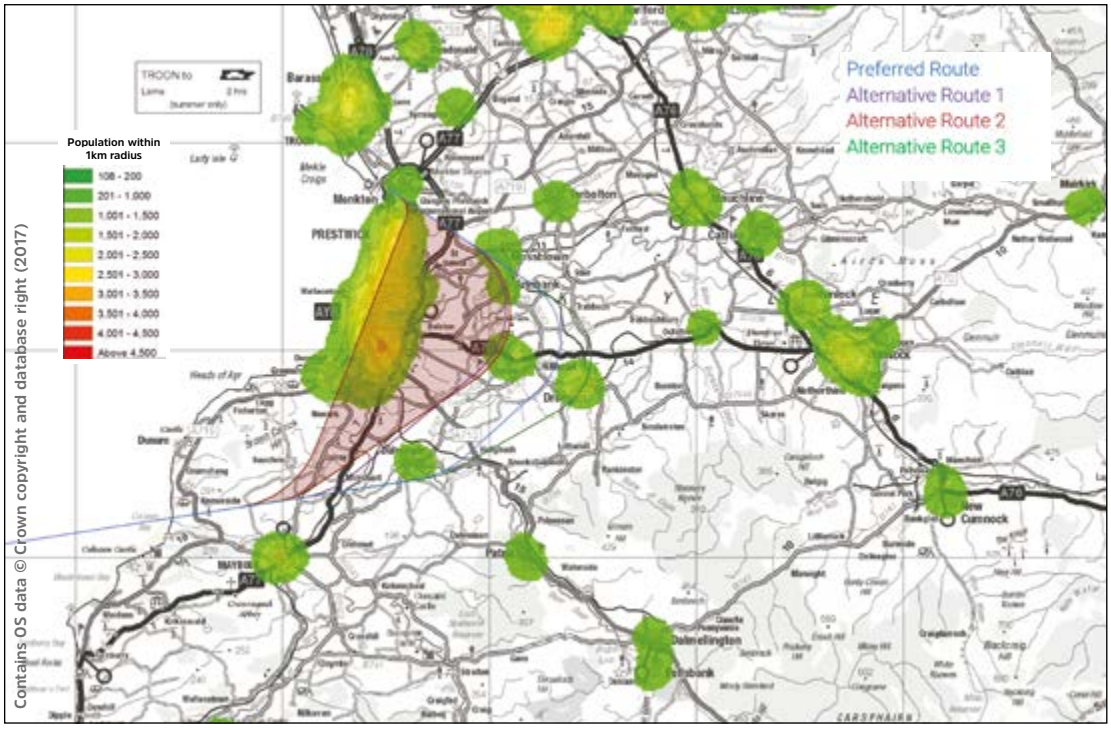

Figure 42 - Runway 12 Departures to the West - Preferred and Alternative Routes over Population Density Map

In order to assess the various options we have put together the following table to compare the impact of each route.

	Preferred	Alt. 1	Alt. 2	Alt. 3
CO_2 emissions	Less	Less	Variable	Less
Noise – Population Overflown	3,201	19,118	4,222	6,540
Noise – New Population	2,153	18,664	3,063	2,415
Concentration / Dispersal	Concentration	Concentration	Dispersal	Concentration
Technical Feasibility	Good	Good	Difficult	Good
Community	Impact (compared to current day)			
Mossblown	Same	Similar	Similar	Same
Annbank	Same	More Overflown	More Overflown	Same
Drongan	Partially Overflown	Further	Further	Same
Hillhead	Partially Overflown	Similar	Overflown	Same
Coylton	Closer	Overflown	Overflown	Same
Hollybush	Similar	Further	Similar	Same
Dalrymple	Same	Similar	Overflown	Same
Ayr	Same	Closer	Partially Overflown	Same

6.8 Runway 12 departures to the Southeast

6.8.1 Purpose of the route and number of aircraft

This is a replacement for the existing "NGY 1L" departure route (see Figure 7). This route will be used by aircraft departing to destinations such as England, Wales, Central Europe, or the Middle East. This would replace the current situation where aircraft depart on the south-easterly route then turn back to the northeast.

We anticipate the number of aircraft of any type flying this route per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	21	27	29	30	31	32

6.8.2 Factors influencing the design

The current departure route from Runway 12 (see Figure 7) to the southeast flies close to several villages. As part of the redesign project we wanted to explore possible options to minimise the noise impact on these communities. The route options considered have impacts on the communities of Mossblown, Annbank, Drongan, Hillhead, Coylton, and Rankinston. The preferred route initially passes between Mossblown and Annbank. The centreline of the route then passes over Trabboch before turning to the southeast and passing close to Drongan.

All routes are designed and evaluated according to the design principles listed in section 6.1.1. In order to minimise the noise impact for the greatest number of people we have maintained the current track between Mossblown and Annbank rather than making an earlier turn to the southeast. We have then used the same turning point as the routes to the southwest and west for the turn to the southeast. This puts the centreline of the proposed route slightly further to the east and reduces the noise impact on Drongan

To improve the integration of these aircraft into the airways network this departure route will now end at a point called OSMEG (see Figure 7), which is approximately 6,000 metres southeast of the old New Galloway (NGY) navigation aid.

6.8.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

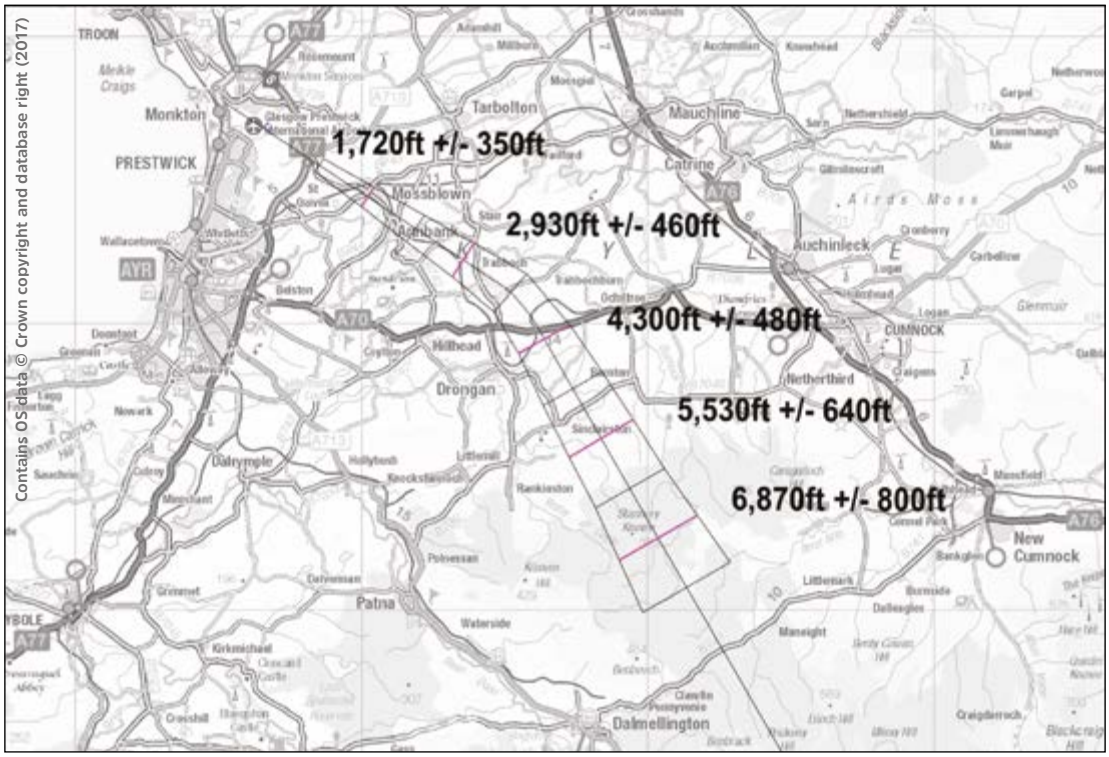

Figure 43 - Runway 12 Departures to the Southeast - Preferred Route with Expected Altitudes and Overflight Swathe

Once an aircraft is above 3,000ft air traffic control is allowed to issue instructions to it in order to enable greater efficiency for the aircraft in question or for the system as a whole. This could therefore result in some aircraft being taken off the departure route early. However, we expect most aircraft will be left on the route to the end.

The diagrams below show the noise impact of our preferred route (typical and worst-case).

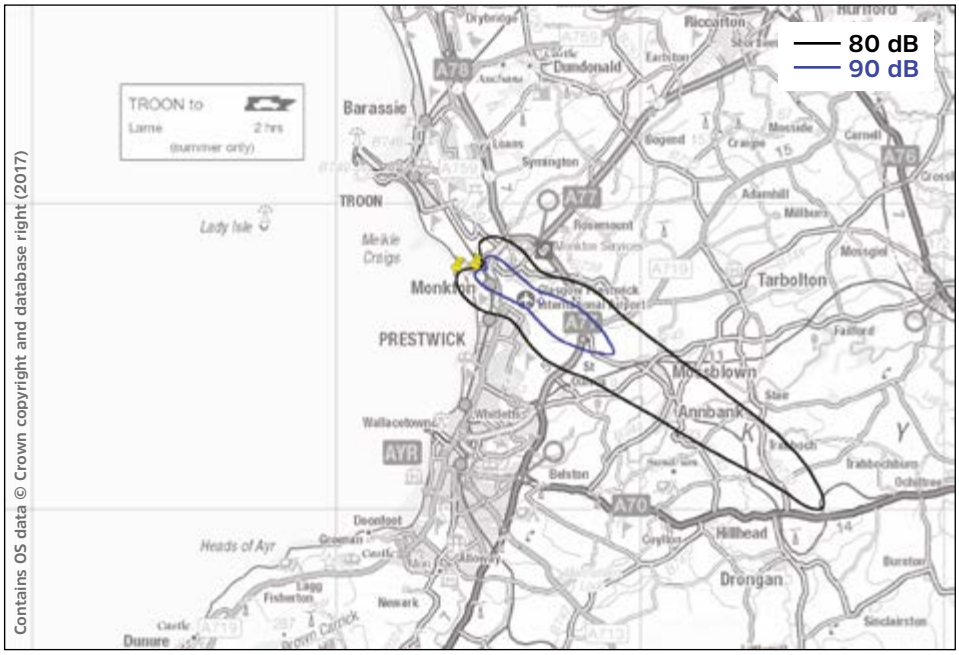

Figure 44 - Runway 12 Departures to the Southeast - Boeing 737 SEL Footprints

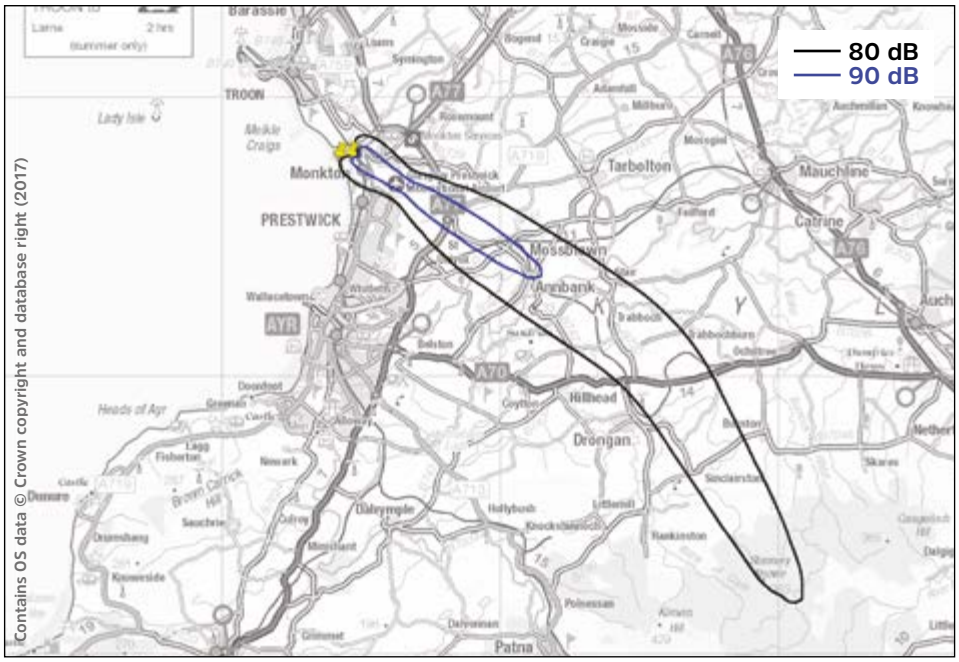

Figure 45 - Runway 12 Departures to the Southeast - Boeing 747 SEL Footprints

The footprint in Figure 44 is for the Boeing 737 aircraft, which is the most common aircraft type typically operating from the airport. The footprint in Figure 45 is for the Boeing 747 aircraft, which is the loudest aircraft type typically operating from the airport. However, this aircraft type only makes up approximately 2% of the total aircraft movements. The footprints represent the total noise impact of a single flight. Further noise analysis is taking place and will be available on the airport website in late June 2017.

6.8.4 Alternative routes

Alternative 1 We considered specifying the turn to the southeast as soon as possible from the end of the runway. However, this route would directly overfly Annbank as well as Drongan.

While the reduced track mileage would result in lower CO2 emissions, CAA guidance states that minimising noise impact should be the priority below 4,000ft; therefore this isn't our preferred route.

Alternative 2 We considered specifying the initial turn to the southeast based on a specified altitude above the ground. This has the environmental advantage of ensuring aircraft turn as soon as they reach a safe altitude.

However it also causes significant dispersion of the traffic as lighter aircraft that climb well will turn much earlier while heavier aircraft will take a lot longer (and travel further) to reach the same altitude and will therefore turn later.

Alternative 3 We considered replicating the current departure route as closely as possible. This does not introduce any new problems but it doesn't provide any improvement for the people in Drongan.

The diagram below shows the preferred and alternative routes over a flight path density map of the current traffic.

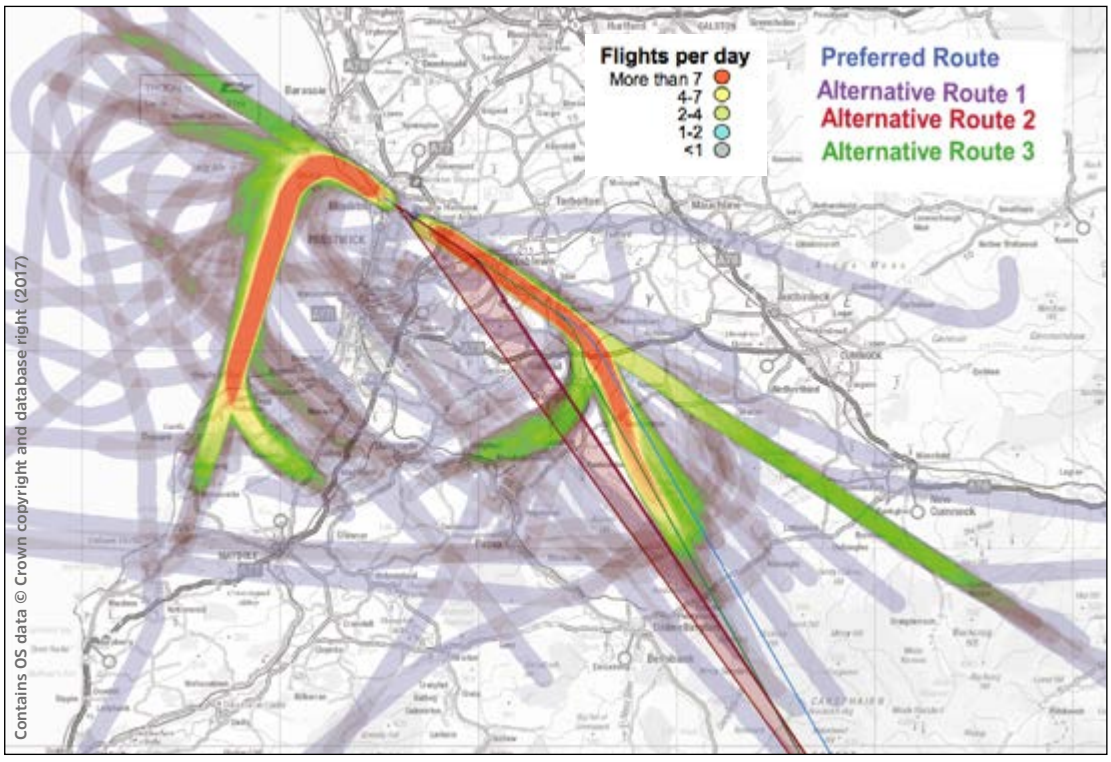

Figure 46 - Runway 12 Departures to the Southeast - Preferred and Alternative Routes over Flight Path Density Map

The diagram below shows the preferred and alternative routes over a “population density” map.

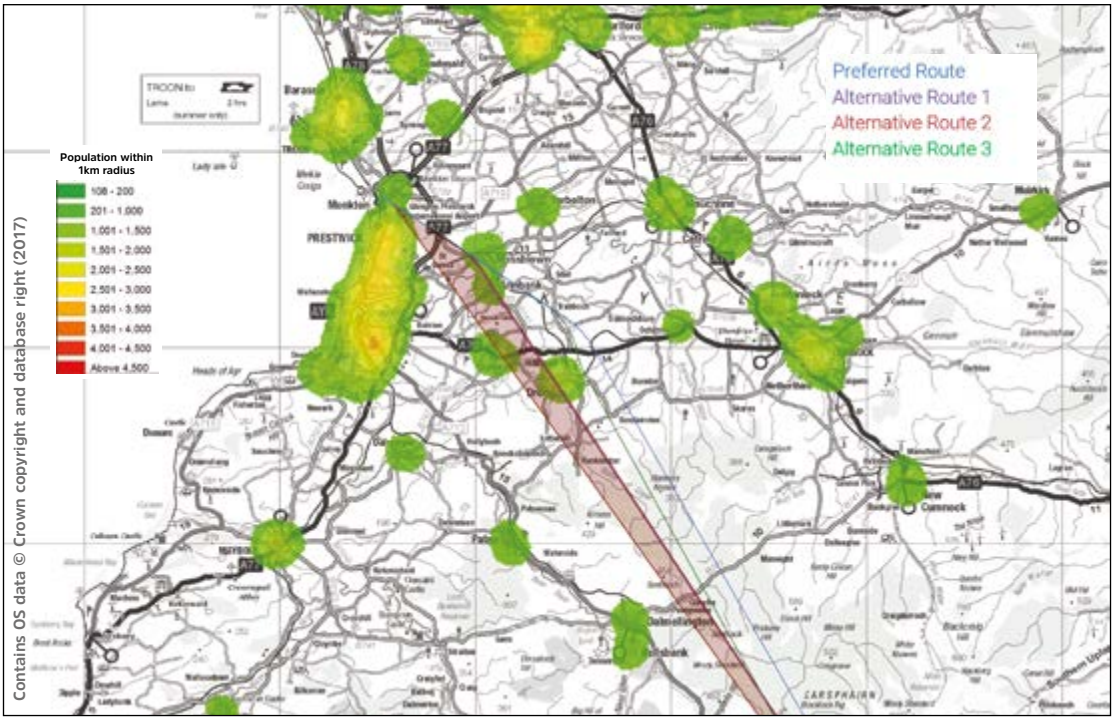

Figure 47 - Runway 12 Departures to the Southeast - Preferred and Alternative Routes over Population Density Map

In order to assess the various options we have put together the following table to compare the impact of each route.

	Preferred	Alt. 1	Alt. 2	Alt. 3
CO_2 emissions	Similar	Less	Variable	Same
Noise – Population Overflown	2,037	4,445	3,076	4,737
Noise – New Population	0	578	3,024	751
Concentration / Dispersal	Concentration	Concentration	Dispersal	Concentration
Technical Feasibility	Good	Good	Moderate	Good
Community	Impact (compared to current day)			
Mossblown	Same	Similar	Similar	Same
Annbank	Same	More Overflown	More Overflown	Same
Drongan	Similar	Overflown	Overflown	Same
Hillhead	Similar	Overflown	Overflown	Same
Coylton	Similar	Closer	Overflown	Same
Rankinston	Further	Overflown	Overflown	Same
Ayr	Same	Same	Closer	Same

6.9 Runway 12 departures to the East

6.9.1 Purpose of the route and number of aircraft

This is a new route intended to provide a more environmentally efficient route for aircraft departing to destinations such as Northern Europe, Russia, or the Far East.

We anticipate the number of aircraft of any type flying this route per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	2	2	2	2	2	2

6.9.2 Factors influencing the design

The current departure route from Runway 12 (see Figure 7) to the southwest flies over or close to several villages. As part of the redesign project we wanted to explore possible options to minimise the noise impact on these communities. The route options considered have impacts on the communities of Mossblown, Annbank, Ochiltree, Catrine, Auchinleck, and Cumnock. The preferred route initially passes between Mossblown and Annbank. The route then passes over Trabboch before turning slightly to the east to a point called SUMIN (see Figure 7) where it turns northeast to a point called HAVEN (see Figure 7), which is on the airway leading to the East.

All routes are designed and evaluated according to the design principles listed in Section 6.1.1. In order to minimise the noise impact for the greatest number of people we have maintained the current track between these two villages rather than making an earlier turn to the east. We have then used the same turning point as the routes to the southwest and west for the turn to SUMIN. This keeps aircraft away from all other significant population areas until they are above 7,000ft at which point the CAA guidance states that minimising emissions should be the priority.

6.9.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

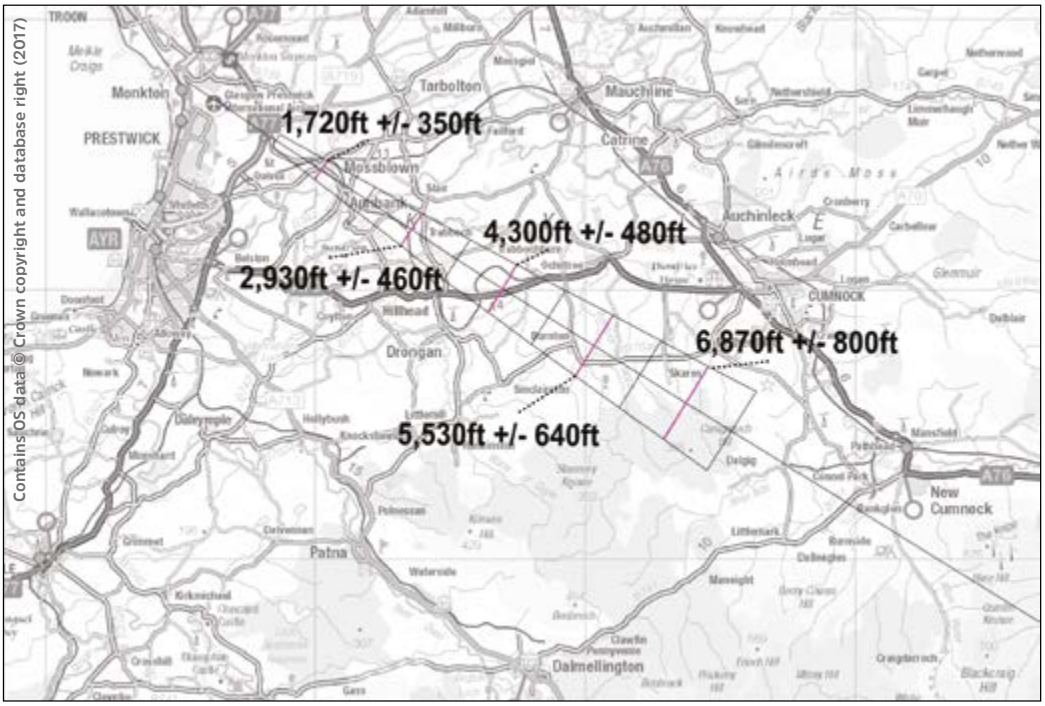

Figure 48 - Runway 12 Departures to the East - Preferred and Alternative Routes over Flight Path Density Map

Once an aircraft is above 3,000ft air traffic control is allowed to issue instructions to it in order to enable greater efficiency for the aircraft in question or for the system as a whole. This could therefore result in some aircraft being taken off the departure route early. However we expect most aircraft will be left on the route to the end.

The diagrams below show the noise impact of our preferred route (typical and worst-case).

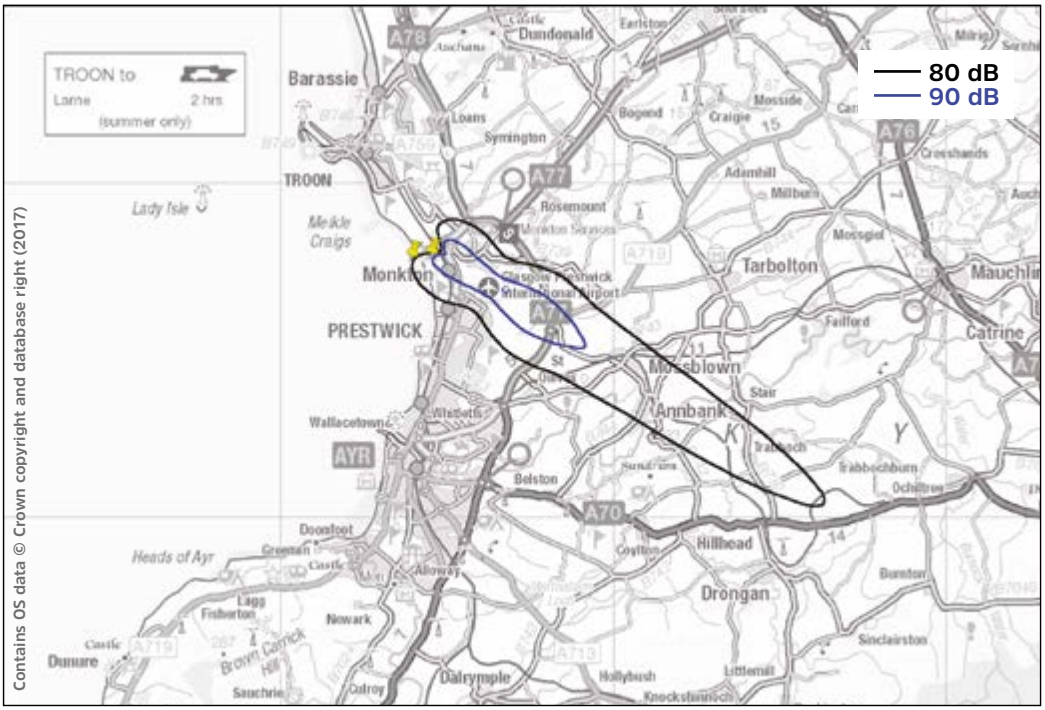

Figure 49 - Runway 12 Departures to the East - Boeing 737 SEL Footprints

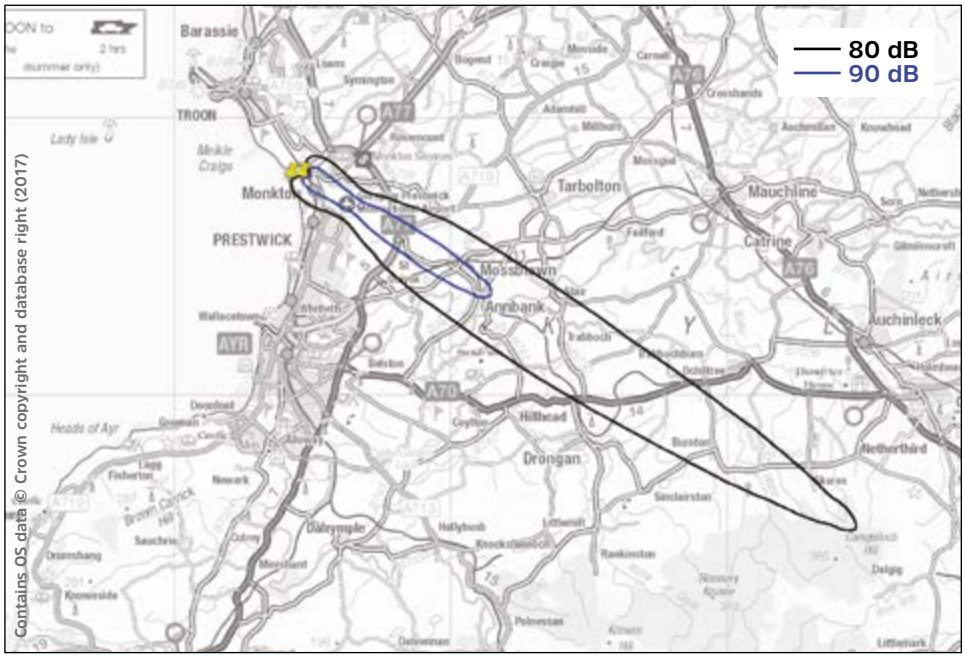

Figure 50 - Runway 12 Departures to the East - Boeing 747 SEL Footprints

The footprint in Figure 49 is for the Boeing 737 aircraft, which is the most common aircraft type typically operating from the airport. The footprint in Figure 50 is for the Boeing 747 aircraft, which is the loudest aircraft type typically operating from the airport. However, this aircraft type only makes up approximately 2% of the total aircraft movements. The footprints represent the total noise impact of a single flight. Further noise analysis is taking place and will be available on the airport website in late June 2017.

6.9.4 Alternative routes

Alternative 1 We considered using the same turning point as the routes to the southwest and west but turning directly to HAVEN. However, this route would pass very close to Ochiltree and overfly Cumnock.

While the reduced track mileage would result in lower CO_2 emissions, CAA guidance states that minimising noise impact should be the priority below 4,000ft; therefore this isn't our preferred route.

This option would also present significant air traffic control challenges due to the increased interactions with Glasgow and Edinburgh traffic.

Alternative 2 We considered specifying the turn toward HAVEN as soon as possible from the end of the runway. However, this route would directly overfly Mossblown. As noise impact is the priority below 4,000ft this has been prioritised vs. reduced track mileage / reduced CO_2 emissions.

This option would also present significant air traffic control challenges due to the increased interactions with Glasgow and Edinburgh traffic.

Alternative 3 We considered specifying the initial turn toward HAVEN based on a specified altitude above the ground. This has the environmental advantage of ensuring aircraft turn as soon as they reach a safe altitude.

However, it also causes significant dispersion of the traffic as lighter aircraft that climb well will turn much earlier while heavier aircraft will take a lot longer (and travel further) to reach the same altitude and will therefore turn later.

This option would also present significant air traffic control challenges due to the increased interactions with Glasgow and Edinburgh traffic.

The diagram below shows the preferred and alternative routes over a flight path density map of the current traffic

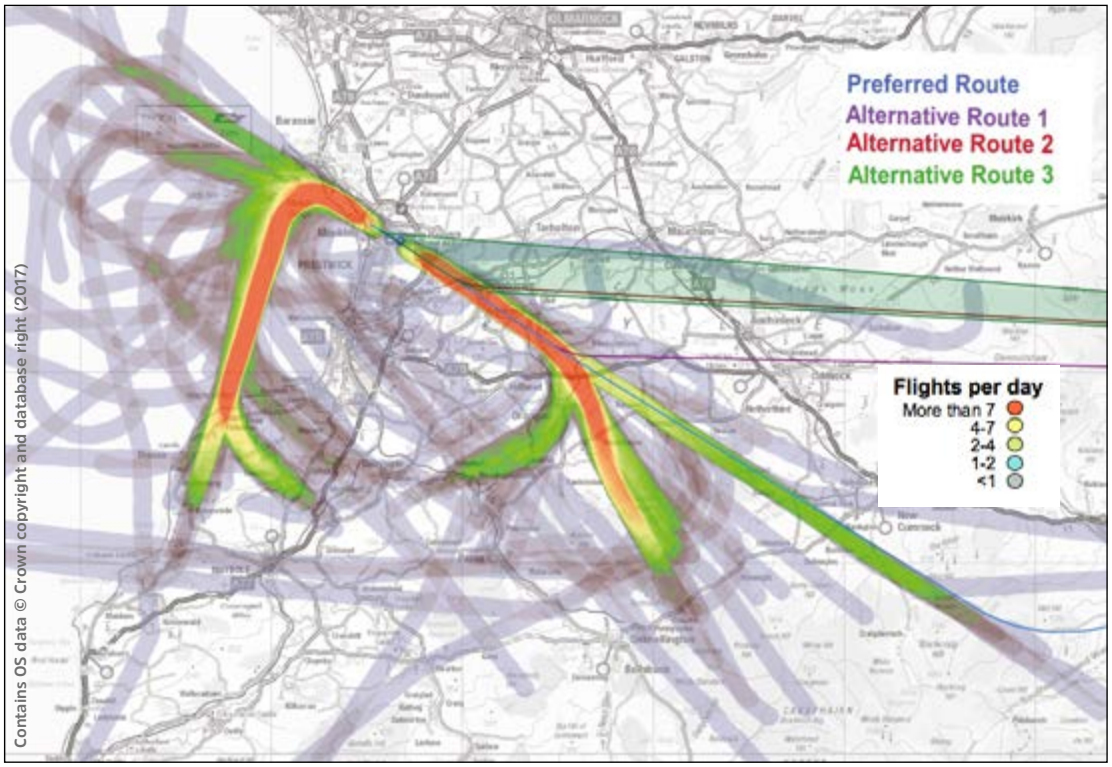

Figure 51 - Runway 12 Departures to the East - Preferred and Alternative Routes over Flight Path Density Map

The diagram below shows the preferred and alternative routes over a "population density" map.

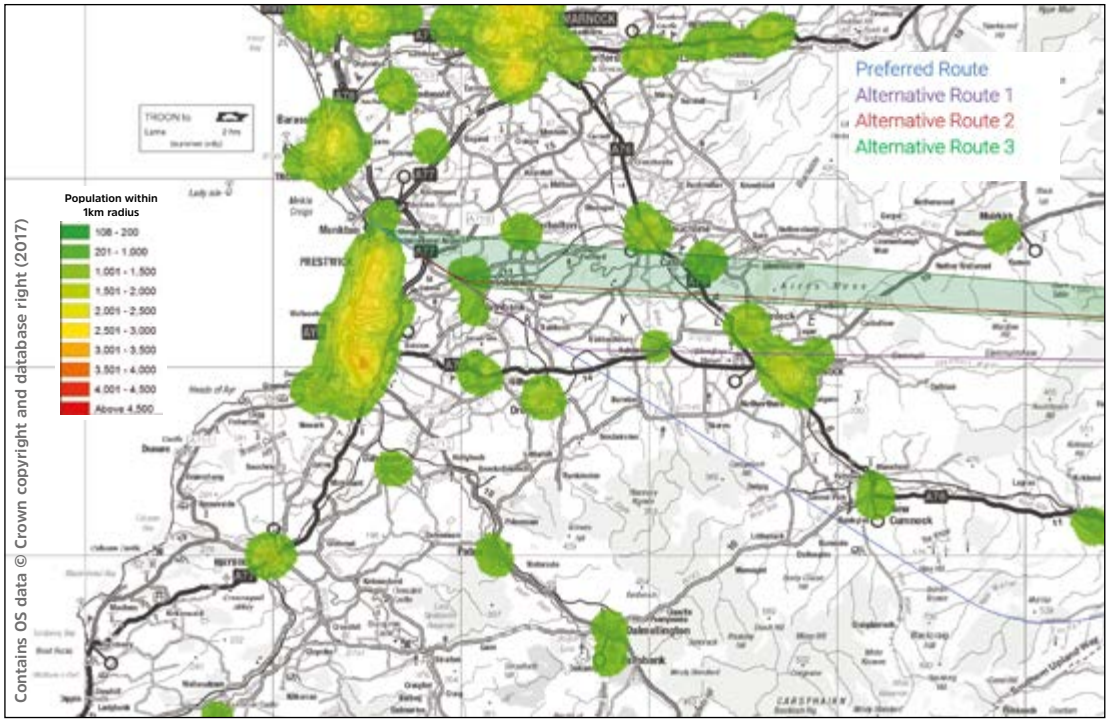

Figure 52 - Runway 12 Departures to the East - Preferred and Alternative Routes over Population Density Map

In order to assess the various options we have put together the following table to compare the impact of each route.

	Preferred	Alt. 1	Alt. 2	Alt. 3
CO_2 emissions	Less	Less	Less	Variable
Noise – Population Overflown	11,376	4,026	4,491	6,958
Noise – New Population	10,660	2,577	2,969	6,950
Concentration / Dispersal	Concentration	Concentration	Concentration	Dispersal
Technical Feasibility	Good	Difficult	Difficult	Difficult
Community	Impact (compared to current day)			
Mossblown	Same	Same	More Overflown	More Overflown
Annbank	Same	Same	Similar	Similar
Ochiltree	Closer	Overflown	Closer	Closer
Catrine	Similar	Similar	Closer	Overflown
Auchinleck	Similar	Overflown	Partially Overflown	Overflown
Cumnock	Closer	Overflown	Closer	Closer
Mauchline	Same	Same	Closer	Overflown
Tarbolton	Same	Same	Closer	Overflown
Drongan	Same	Same	Further	Further
Hillhead	Similar	Similar	Further	Further

6.10 Runway 30 arrivals from the South

6.10.1 Purpose of the route and number of aircraft

This route will be used by aircraft arriving at the airport via one of the Standard Instrument Arrivals (STARs) that end at a point overhead the old Turnberry (TRN) navigation aid. Aircraft will hold at TRN until instructed by Air Traffic Control to leave the hold. This route will then deliver them to the start of the approach procedure for Runway 30.

We anticipate the number of aircraft of any type flying this route per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	78	97	105	108	110	113

6.10.2 Factors influencing the design

As the majority of this route remains above 7,000ft the main priority has been to minimise emissions. This route is therefore a straight line from TRN to the southern entry to the runway 30 approach procedure.

6.10.3 Proposed route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

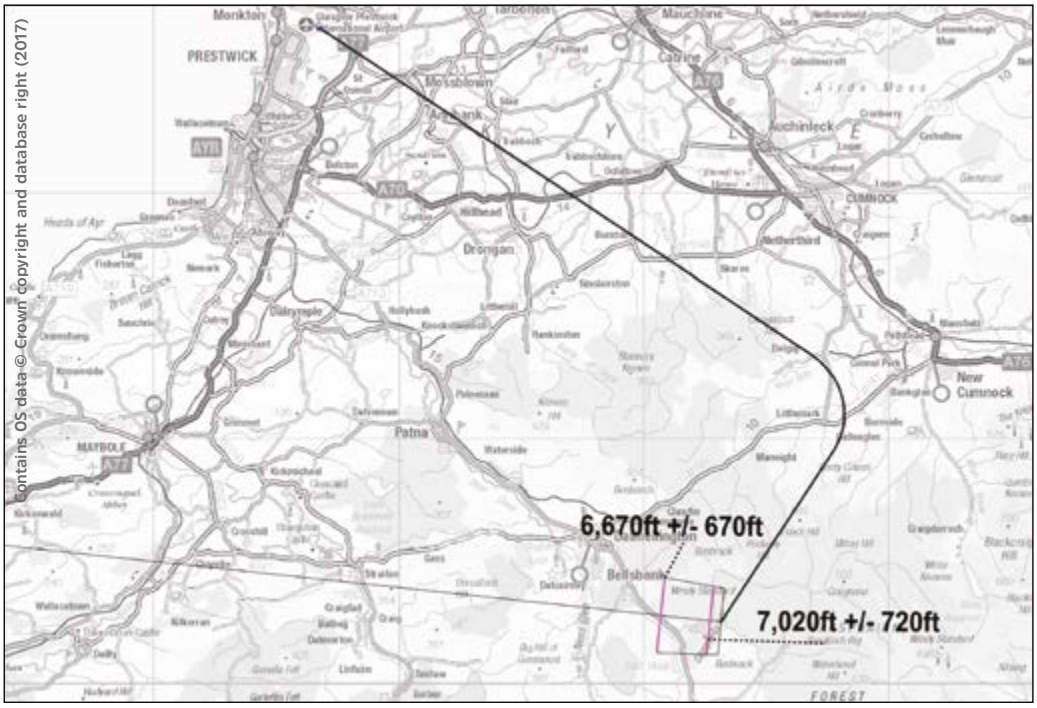

Figure 53 - Runway 30 Arrivals from the South - Preferred Route with Expected Altitudes and Overflight Swathe

When several aircraft arrive at the airport in close succession Air Traffic Control may decide to give each aircraft individual instructions rather than having them follow the published arrival route. This may be to improve operational efficiency, minimise delays to subsequent aircraft, or to ensure the correct separation between aircraft is applied. In such instances the aircraft are likely to fly within the same swathe as is currently seen.

The diagram below shows the preferred route over a flight path density map of the current traffic.

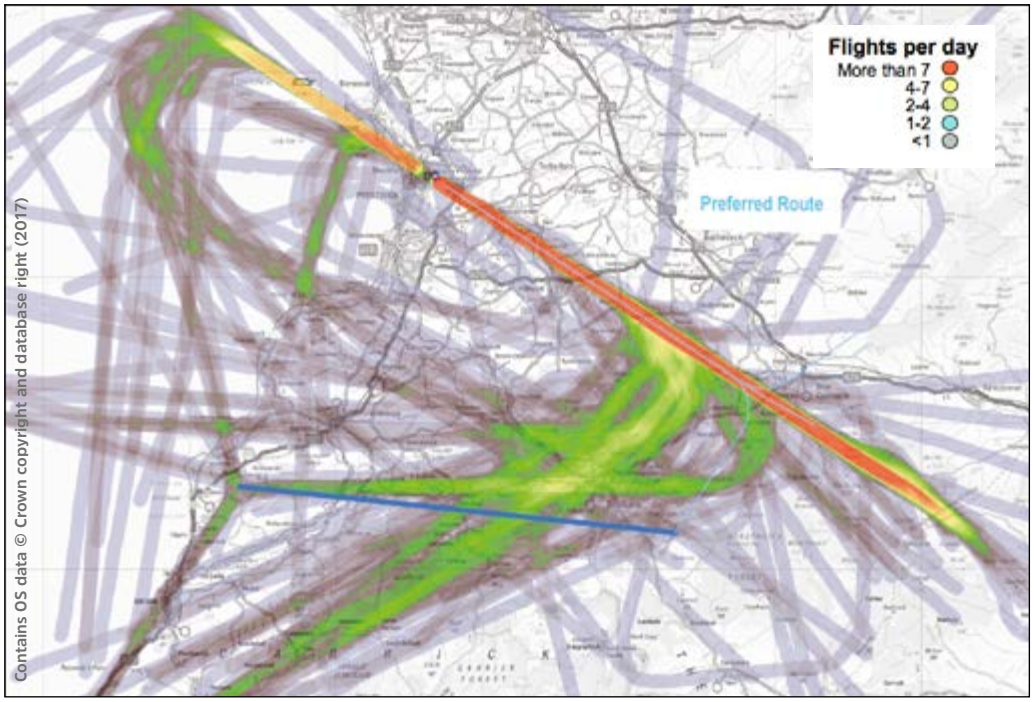

Figure 54 - Runway 30 Arrivals from the South - Preferred Route over Flight Path Density Map

The diagram below shows the preferred route over a “population density” map.

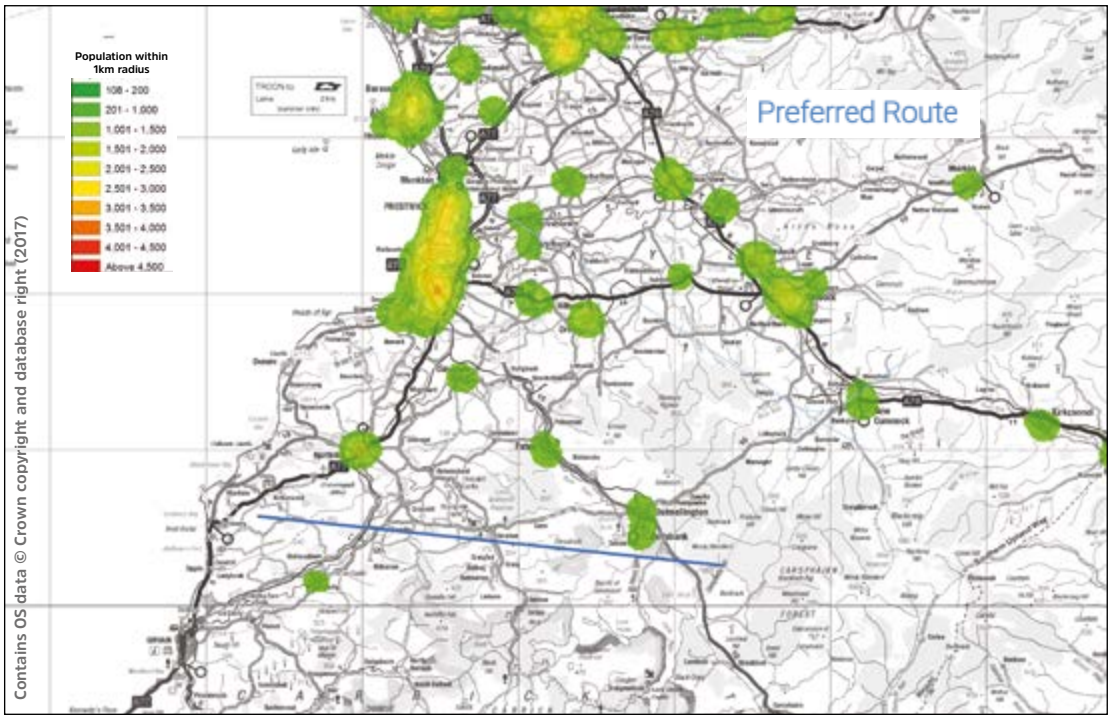

Figure 55 - Runway 30 Arrivals from the South - Preferred Route over Population Density Map

6.11 Runway 30 arrivals from the East

6.11.1 Purpose of the route and number of aircraft

This route will be used by aircraft arriving at the airport via one of the Standard Instrument Arrivals (STARs) that ends at the point called SUMIN. Aircraft are only sent to SUMIN when the traffic situation allows them to continue directly to an approach without holding. This route will then deliver them to the start of the approach procedure for Runway 30.

We anticipate the number of aircraft of any type flying this route per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	78	97	105	108	110	113

6.11.2 Factors influencing the design

As the majority of this route remains above 7,000ft the main priority has been to minimise emissions. This route is therefore a straight line from SUMIN to the eastern entry to the Runway 30 approach procedure.

6.11.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

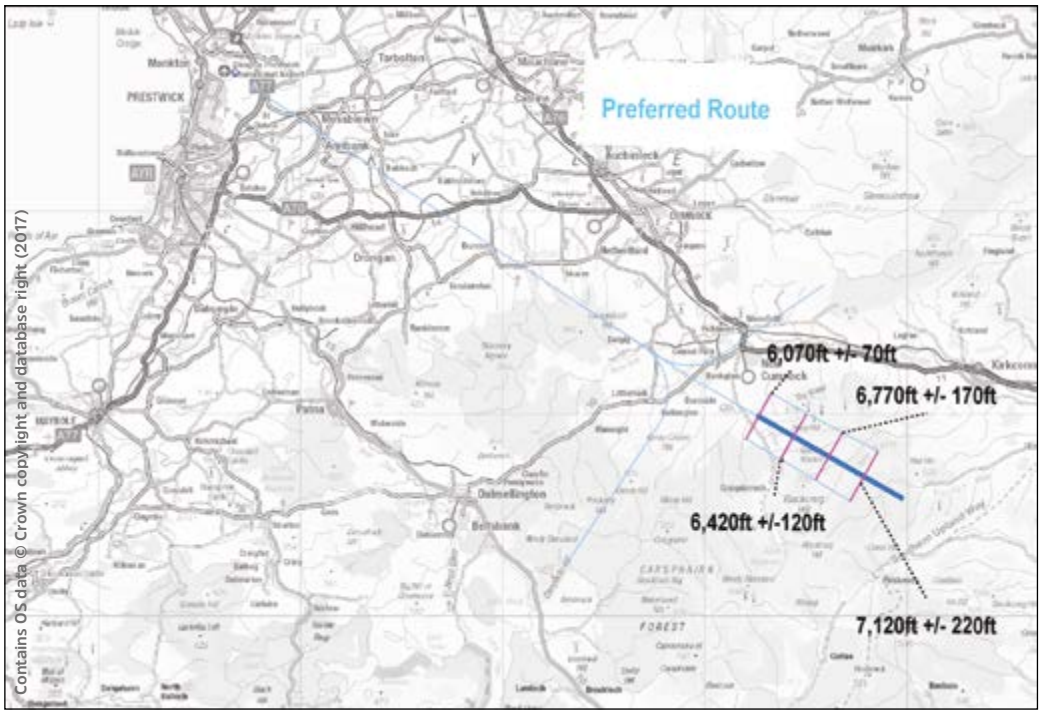

Figure 56 - Runway 30 Arrivals from the East - Preferred Route with Expected Altitudes and Overflight Swathe

When several aircraft arrive at the airport in close succession Air Traffic Control may decide to give each aircraft individual instructions rather than having them follow the published arrival route. This may be to improve operational efficiency, minimise delays to subsequent aircraft, or to ensure the correct separation between aircraft is applied. In such instances the aircraft are likely to fly within the same swathe as is currently seen.

The diagram below shows the preferred route over a flight path density map of the current traffic.

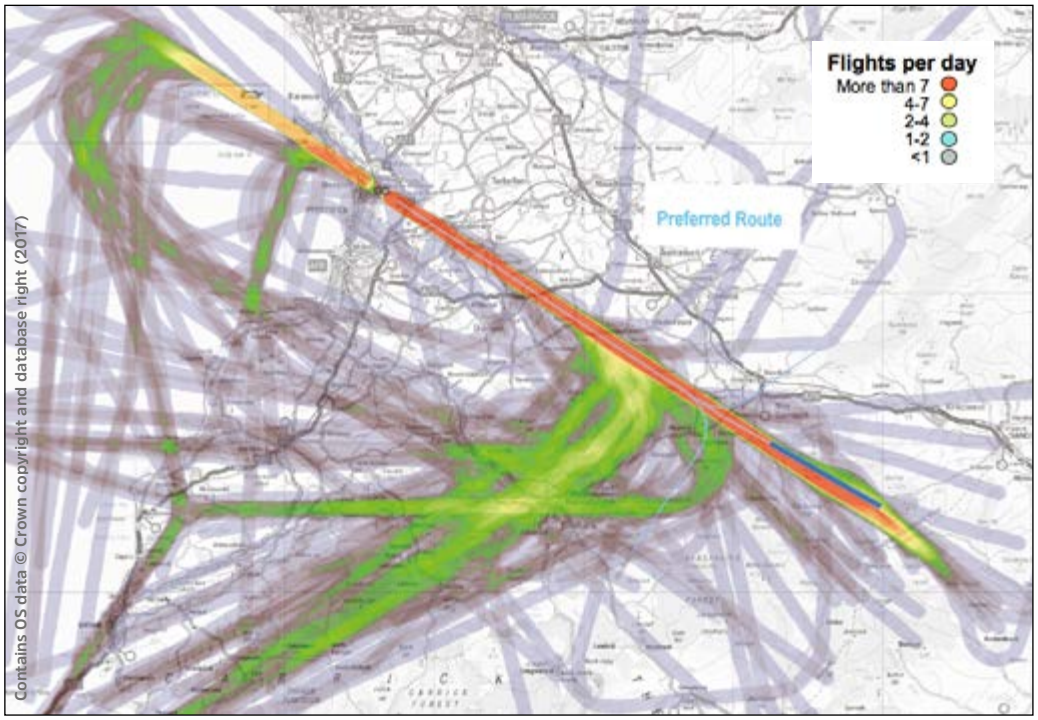

Figure 57 - Runway 30 Arrivals from the East - Preferred Route over Flight Path Density Map

The diagram below shows the preferred route over a “population density” map.

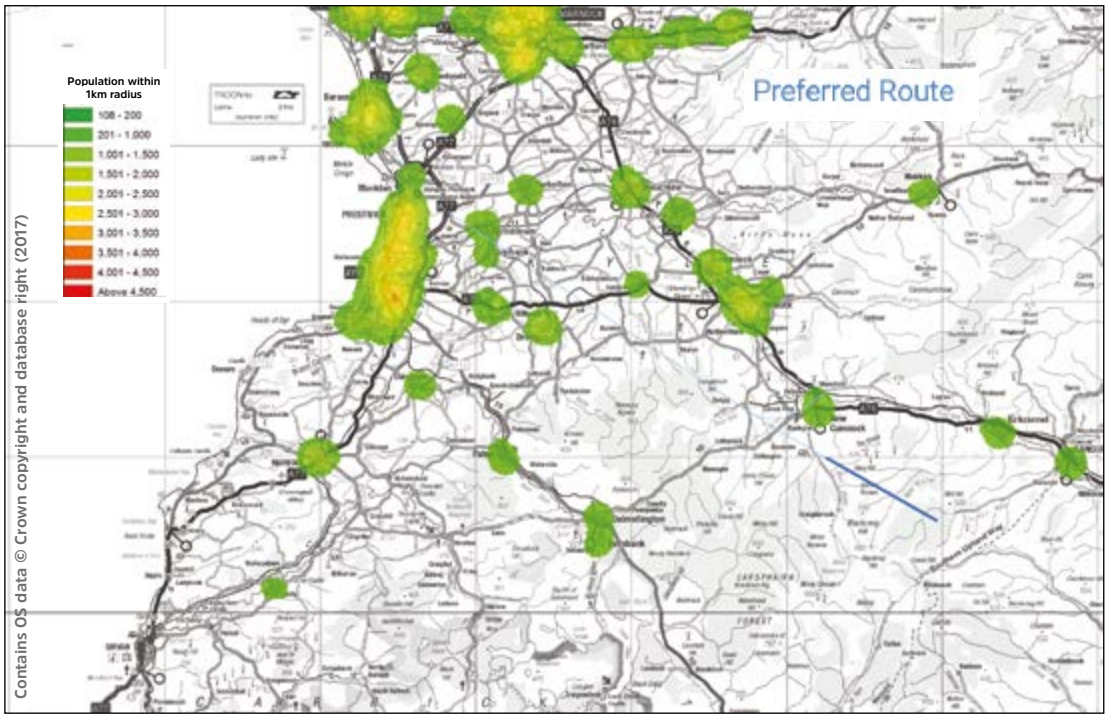

Figure 58 - Runway 30 Arrivals from the East - Preferred Route over Population Density Map

6.12 Runway 12 arrivals from the South

6.12.1 Purpose of the route and number of aircraft

This route will be used by aircraft arriving at the airport via one of the Standard Instrument Arrivals (STARs) that end at a point overhead the old Turnberry (TRN) navigation aid. Aircraft will hold at TRN until instructed by Air Traffic Control to leave the hold. This route will then deliver them to the start of the approach procedure for Runway 12.

We anticipate the number of aircraft of any type flying this route per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	39	49	53	54	56	57

6.12.2 Factors influencing the design

As the majority of this route remains above 7,000ft the main priority has been to minimise emissions. This route is therefore a straight line from TRN to the southern entry to the Runway 12 approach procedure.

6.12.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

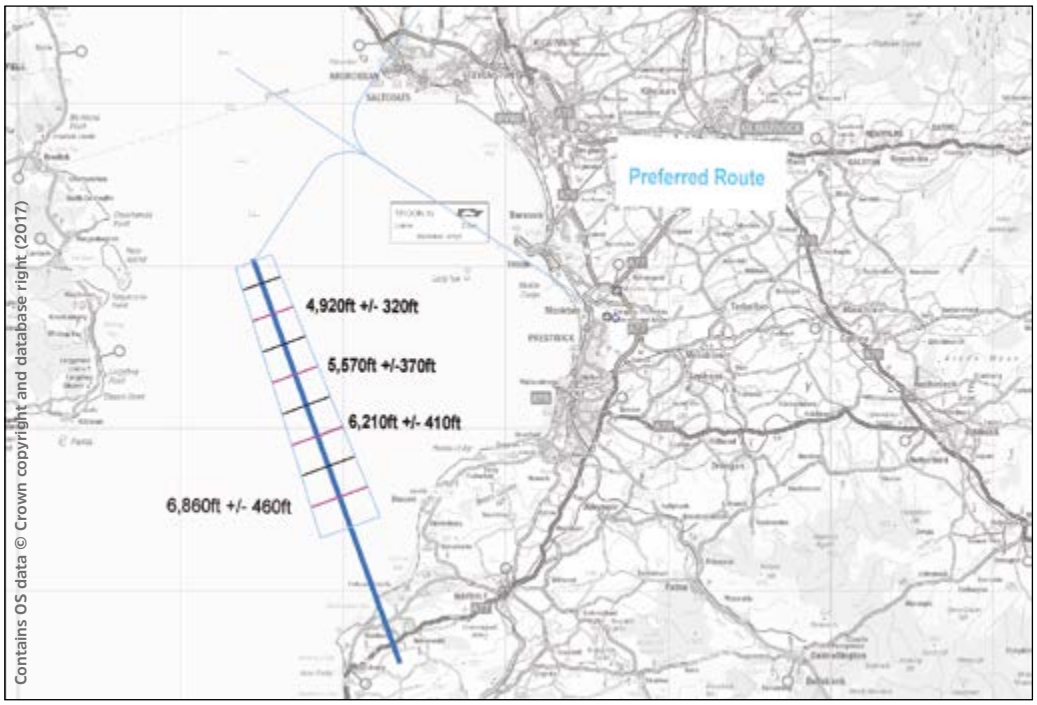

Figure 59 - Runway 12 Arrivals from the South - Preferred Route with Expected Altitudes and Overflight Swathe

When several aircraft arrive at the airport in close succession Air Traffic Control may decide to give each aircraft individual instructions rather than having them follow the published arrival route. This may be to improve operational efficiency, minimise delays to subsequent aircraft, or to ensure the correct separation between aircraft is applied. In such instances the aircraft are likely to fly within the same swathe as is currently seen.

The diagram below shows the preferred route over a flight path density map of the current traffic.

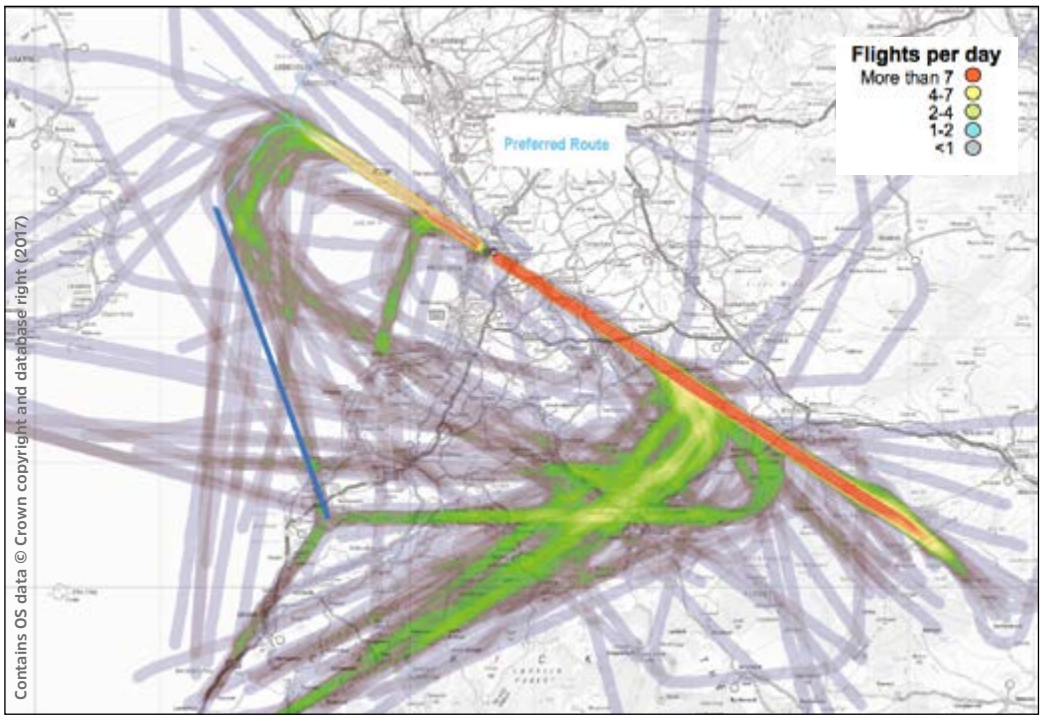

Figure 60 - Runway 12 Arrivals from the South - Preferred Route over Flight Path Density Map

The diagram below shows the preferred route over a “population density” map.

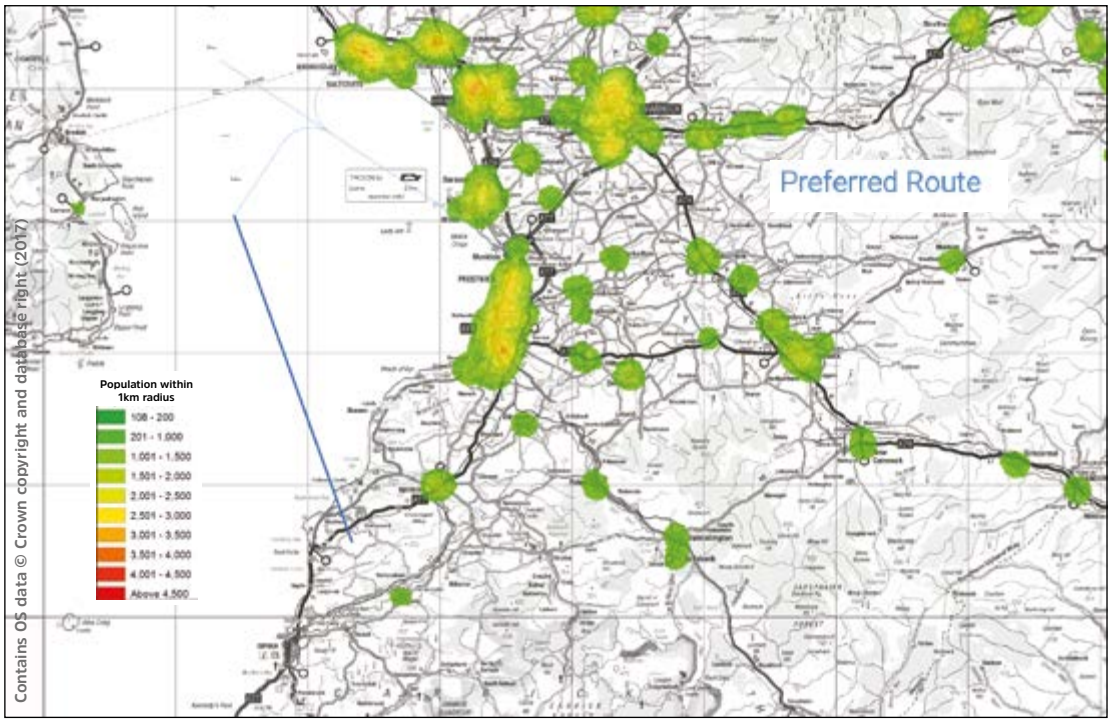

Figure 61 - Runway 12 Arrivals from the South - Preferred Route over Population Density Map

6.13 Runway 21 arrivals from the South

6.13.1 Purpose of the route and number of aircraft

This route will be used by aircraft arriving at the airport via one of the Standard Instrument Arrivals (STARs) that end at a point overhead the old Turnberry (TRN) navigation aid. Aircraft will hold at TRN until instructed by Air Traffic Control to leave the hold. This route will then deliver them to the start of the approach procedure for Runway 21.

As Runway 21 is only used in extreme weather conditions or when the main runway is closed for any reason, it is difficult to predict how my aircraft are likely to fly this route. However, on historic evidence it is unlikely to average more than 1 aircraft per week.

6.13.2 Factors influencing the design

As the majority of this route remains above 7,000ft the main priority has been to minimise emissions..
This route takes aircraft to the northeast initially until they are approximately 10,000m east of the runway centreline. The route then turns north to go parallel to the runway in a straight line to the eastern entry to the Runway 21 approach procedure.

6.13.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

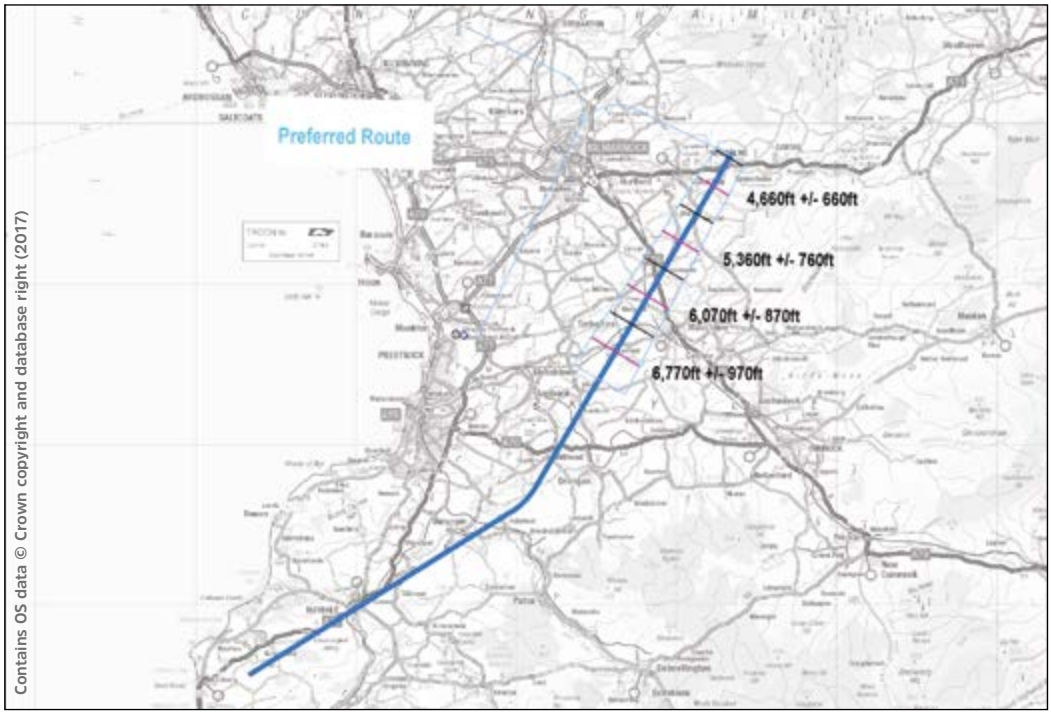

Figure 62 - Runway 21 Arrivals from the South - Preferred Route with Expected Altitudes and Overflight Swathe

When several aircraft arrive at the airport in close succession Air Traffic Control may decide to give each aircraft individual instructions rather than having them follow the published arrival route. This may be to improve operational efficiency, minimise delays to subsequent aircraft, or to ensure the correct separation between aircraft is applied. In such instances the aircraft are likely to fly within the same swathe as is currently seen.

The diagram below shows the preferred route over a flight path density map of the current traffic.

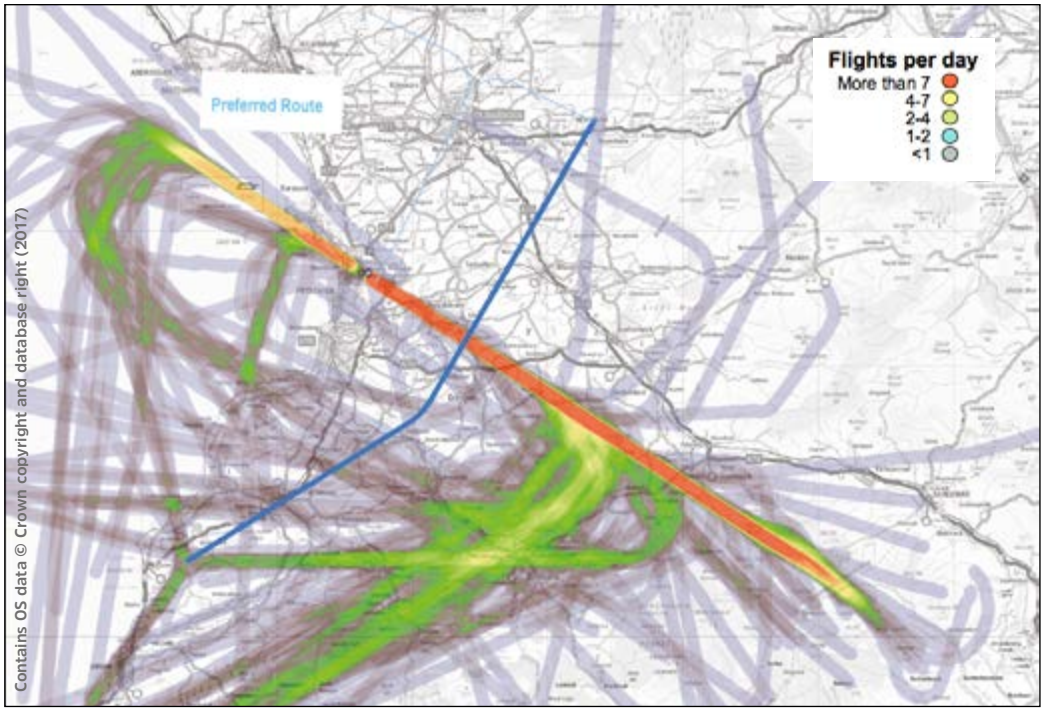

Figure 63 - Runway 21 Arrivals from the South - Preferred Route over Flight Path Density Map

The diagram below shows the preferred route over a “population density” map.

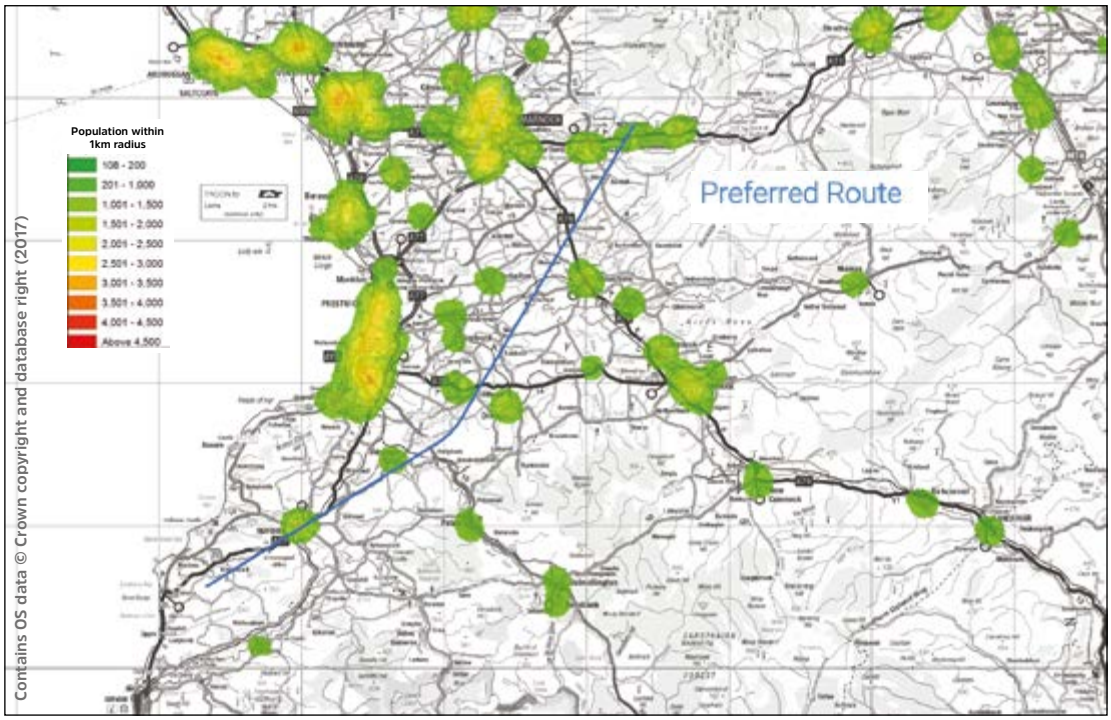

Figure 64 - Runway 21 Arrivals from the South - Preferred Route over Population Density Map

6.14 Runway 21 arrivals from the East

6.14.1 Purpose of the route and number of aircraft

This route will be used by aircraft arriving at the airport via one of the Standard Instrument Arrivals (STARs) that ends at the point called SUMIN. Aircraft are only sent to SUMIN when the traffic situation allows them to continue directly to an approach without holding. This route will then deliver them to the start of the approach procedure for Runway 21.

As Runway 21 is only used in extreme weather conditions or when the main runway is closed for any reason, it is difficult to predict how my aircraft are likely to fly this route. However, on historic evidence it is unlikely to average more than 1 aircraft per week.

6.14.2 Factors influencing the design

As the majority of this route remains above 7,000ft the main priority has been to minimise emissions. This route is therefore a straight line from SUMIN to the eastern entry to the Runway 21 approach procedure.

6.14.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

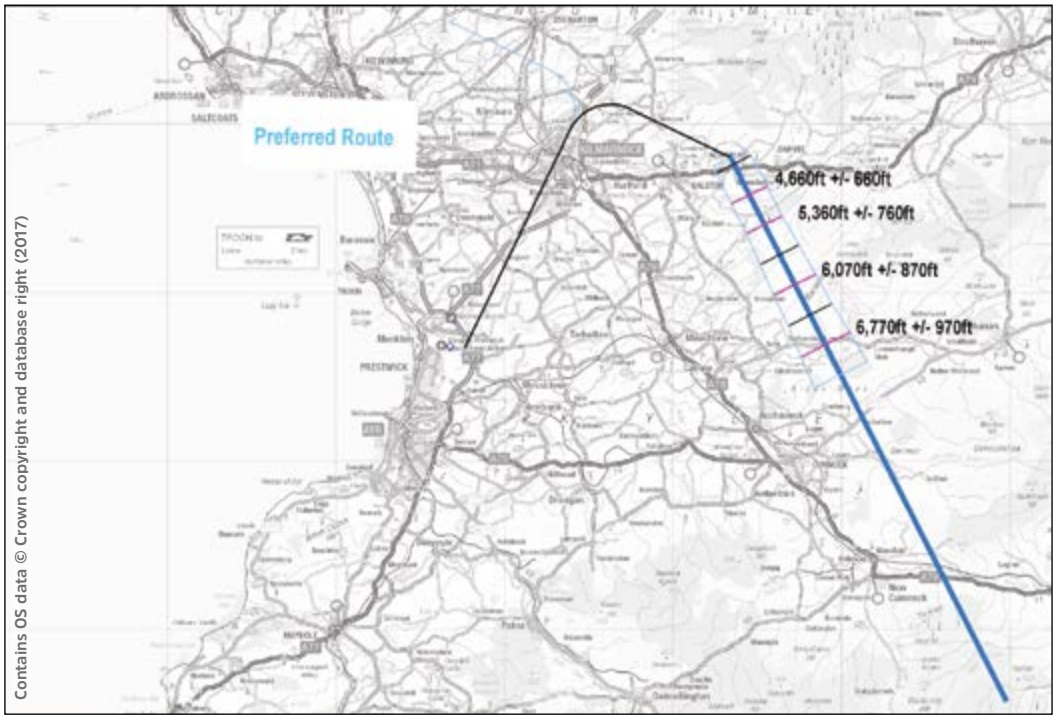

Figure 65 - Runway 21 Arrivals from the East - Preferred Route with Expected Altitudes and Overflight Swathe

When several aircraft arrive at the airport in close succession Air Traffic Control may decide to give each aircraft individual instructions rather than having them follow the published arrival route. This may be to improve operational efficiency, minimise delays to subsequent aircraft, or to ensure the correct separation between aircraft is applied. In such instances the aircraft are likely to fly within the same swathe as is currently seen.

The diagram below shows the preferred route over a flight path density map of the current traffic.

Figure 66 - Runway 21 Arrivals from the East - Preferred Route over Flight Path Density Map

The diagram below shows the preferred route over a “population density” map.

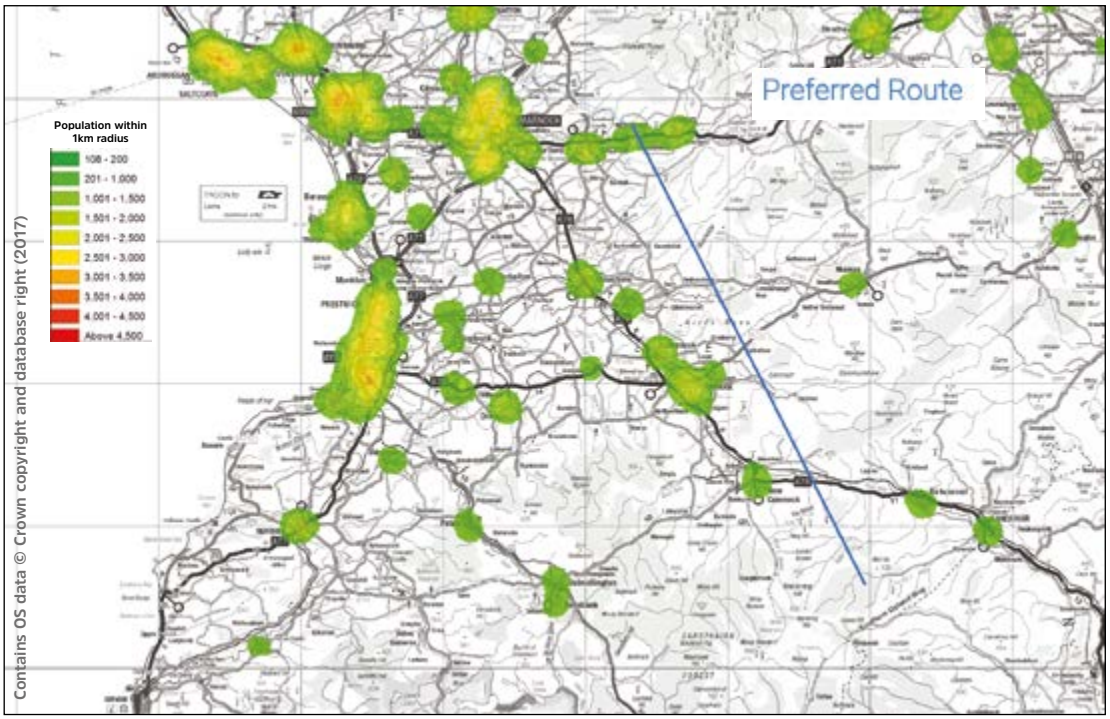

Figure 67 - Runway 21 Arrivals from the East - Preferred Route over Population Density Map

6.15 Runway 30 Approaches

6.15.1 Purpose of the route and number of aircraft

This is a replication of the existing conventional approach procedure to Runway 30. The new route adds two “T-Bar” legs which facilitate arrivals from north and south without the need for Air Traffic Control (ATC) intervention. (See section 3.2) This procedure will primarily be flown by training aircraft practicing the new procedure type. However, it is also likely to become the preferred backup approach procedure for use when the conventional navigation aids for Runway 30 are unavailable for any reason.

We anticipate the number of aircraft of any type flying an instrument approach procedure to Runway 30 per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	78	97	105	108	110	113

These numbers cover aircraft flying the current conventional approach and aircraft flying the new satellite based approach.

6.15.2 Factors influencing the design

The design is primarily driven by the dimensions of the controlled airspace to the east of the airport. (This is the airspace within which ATC direct aircraft to get them into and out of the airport in the most efficient way.) The route should be contained within this controlled airspace which requires the final approach to the runway to commence at an altitude of 3,500ft. This route has been designed with a descent angle of 3.5° to exactly match with the current route which places the Final Approach Fix (FAF) 16,854 metres away from the end of the runway at this altitude of 3,500ft.

For the Runway 30 approach we have been able to increase the length of the southern segment to 11,112 metres which will maximise the distance available for aircraft to descend. However, due to the dimensions of the controlled airspace around the Intermediate Fix (IF), we have had to rotate the northern segment to provide the maximum distance available but it is still shorter than the standard. This has resulted in the nominal track overflying communities in the vicinity of New Cumnock. However, the northern segment is unlikely to be used very often as the majority of traffic arrives from the south.

We have also designed a new missed approach procedure for this runway. The missed approach procedure is designed to cater for the infrequent situations where an aircraft is unable to land for some reason. (Approximately three missed approaches occur at Glasgow Prestwick Airport (GPA) per week at the moment.) This could be due to a problem with the aircraft, low cloud preventing the pilots from being able to see the runway in time, or an obstruction on the runway. The missed approach must end at a location where the aircraft can hold in case there are technical issues to be resolved and where the aircraft can either commence another approach or divert to an alternative airport. The new missed approach procedure takes aircraft straight ahead over the water before turning left and returning to a point overhead the old Turnberry (TRN) navigation aid.

6.15.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

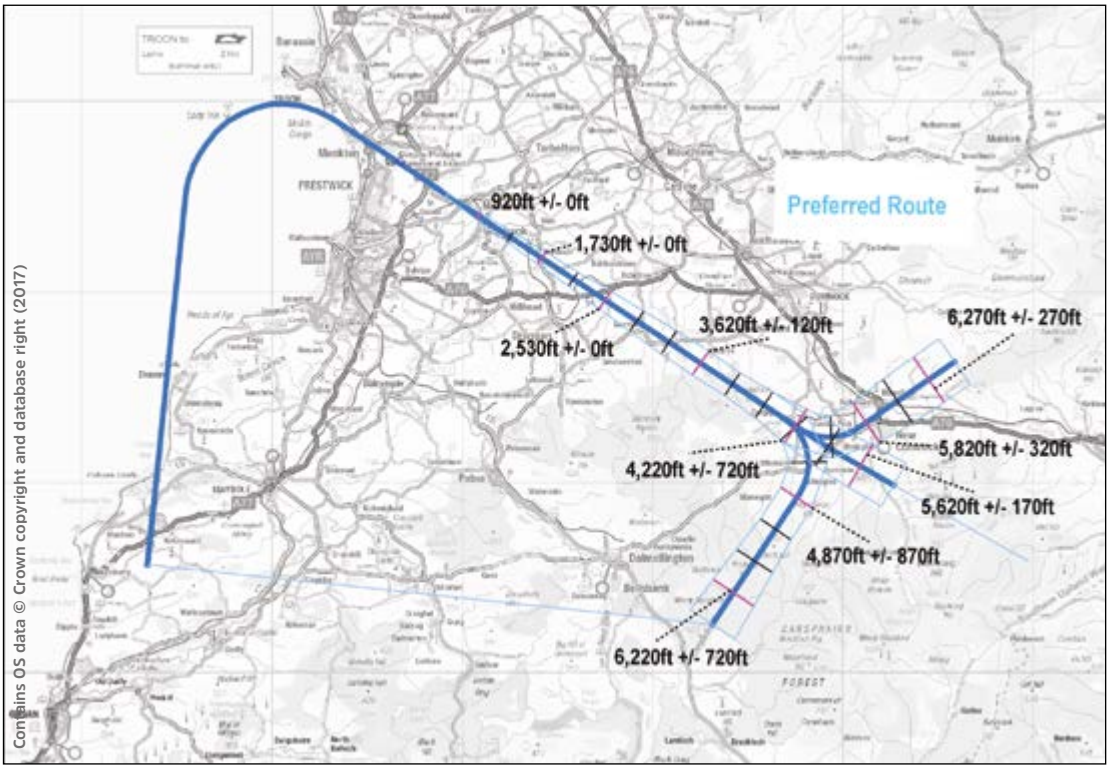

Figure 68 - Runway 30 Approaches - Preferred Route with Expected Altitudes and Overflight Swathes

The diagrams below show the noise impact of our preferred route (typical and worst-case).

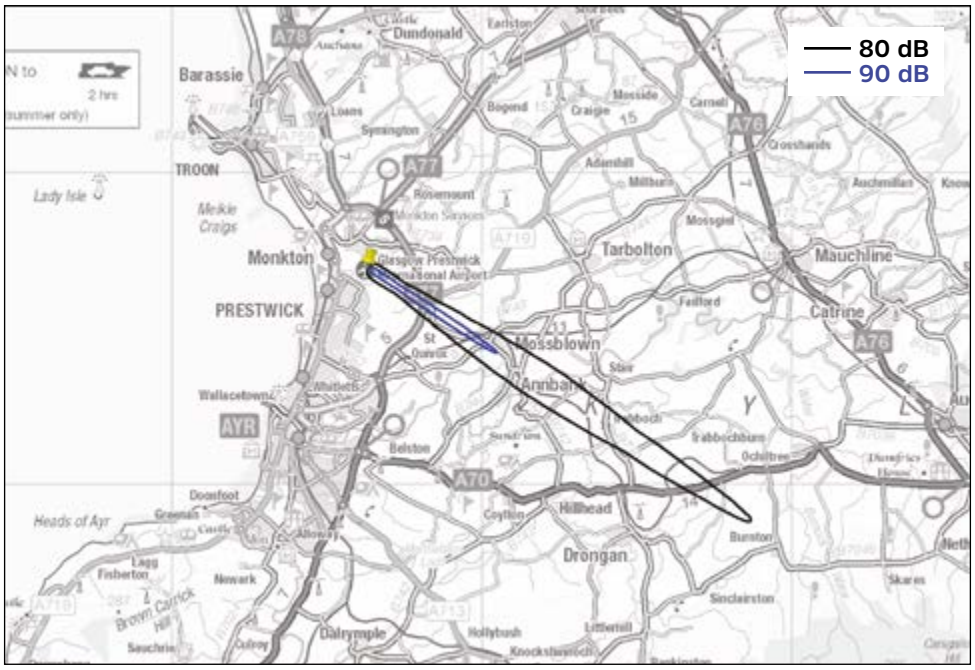

Figure 69 - Runway 30 Approaches - Boeing 737 SEL Footprints

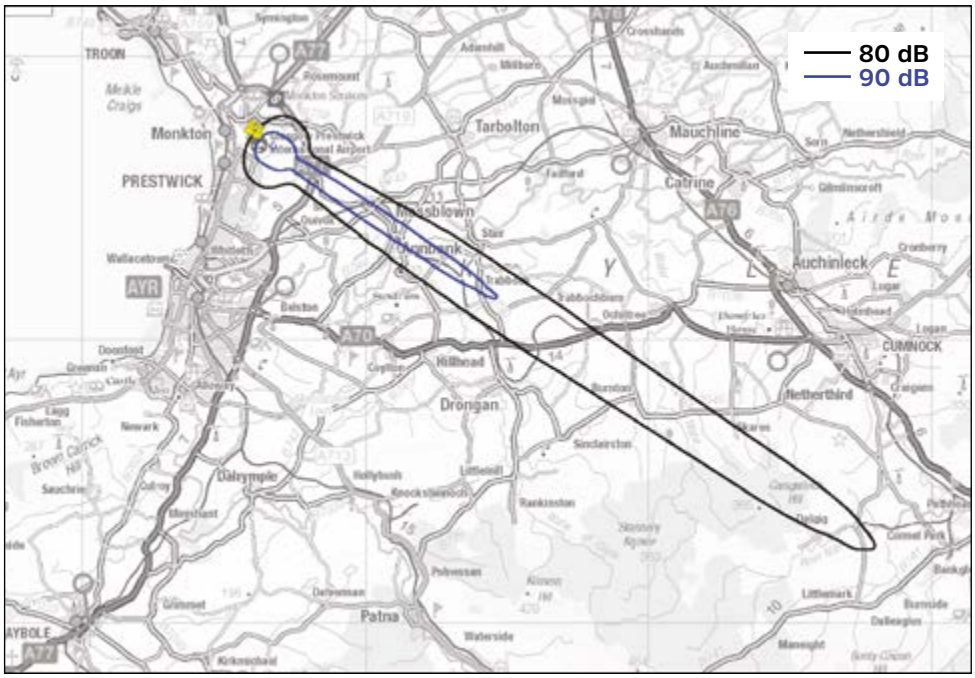

Figure 70 - Runway 30 Approaches - Boeing 747 SEL Footprints

The footprint in Figure 69 is for the Boeing 737 aircraft, which is the most common aircraft type typically operating to the airport. The footprint in Figure 70 is for the Boeing 747 aircraft, which is the loudest aircraft type typically operating to the airport. However, this aircraft type only makes up approximately 2% of the total aircraft movements. The footprints represent the total noise impact of a single flight. Further noise analysis is taking place and will be available on the airport website in late June 2017.

6.15.4 Alternative routes

Alternative 1 We looked at designing the route with a standard "T-Bar" configuration. However, this would have caused problems for both the northern and southern segments.

The start of the northern segment would have been in an area of controlled airspace where aircraft are required to be at least 6,000ft. This would have meant that aircraft have to stay at 6,000ft until reaching the IF and would then have insufficient distance to descend to 3,500ft by the FAF.

The start of the southern segment would have been safely inside an area of controlled airspace where aircraft are required to be at least 4,500ft. Aircraft could therefore have started their descent from 6,000ft at the beginning of the southern segment, however, the descent gradient would still have been slightly steep.

Alternative 2 We looked at replicating the current missed approach procedure for the new route. However, the current missed approach has aircraft turning back to the airport and holding overhead. This results in more track miles for aircraft and doesn't place them in a good location from which to commence another approach or divert.

For this reason aircraft conducting missed approaches using the current procedures are typically given alternative instructions by ATC in order to maintain operational efficiency.

The diagram below shows the preferred and alternative routes over a flight path density map of the current traffic.

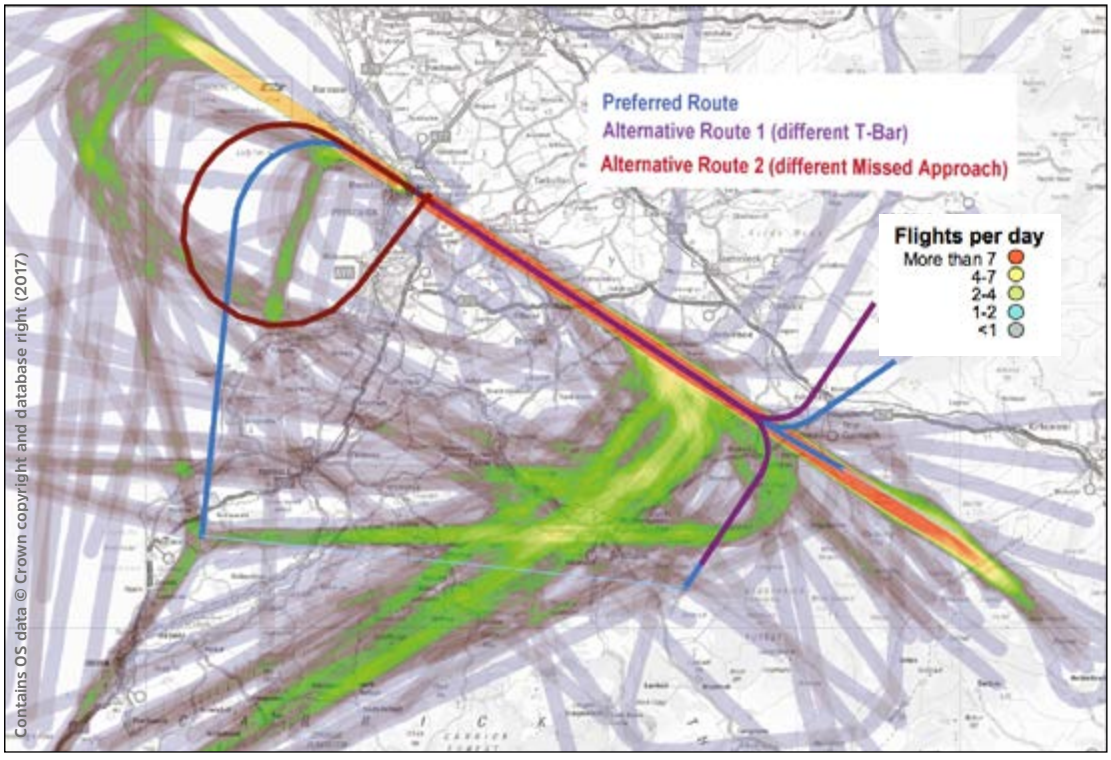

Figure 71 - Runway 30 Approaches - Preferred and Alternative Routes over Flight Path Density Map

The diagram below shows the preferred and alternative routes over a “population density” map.

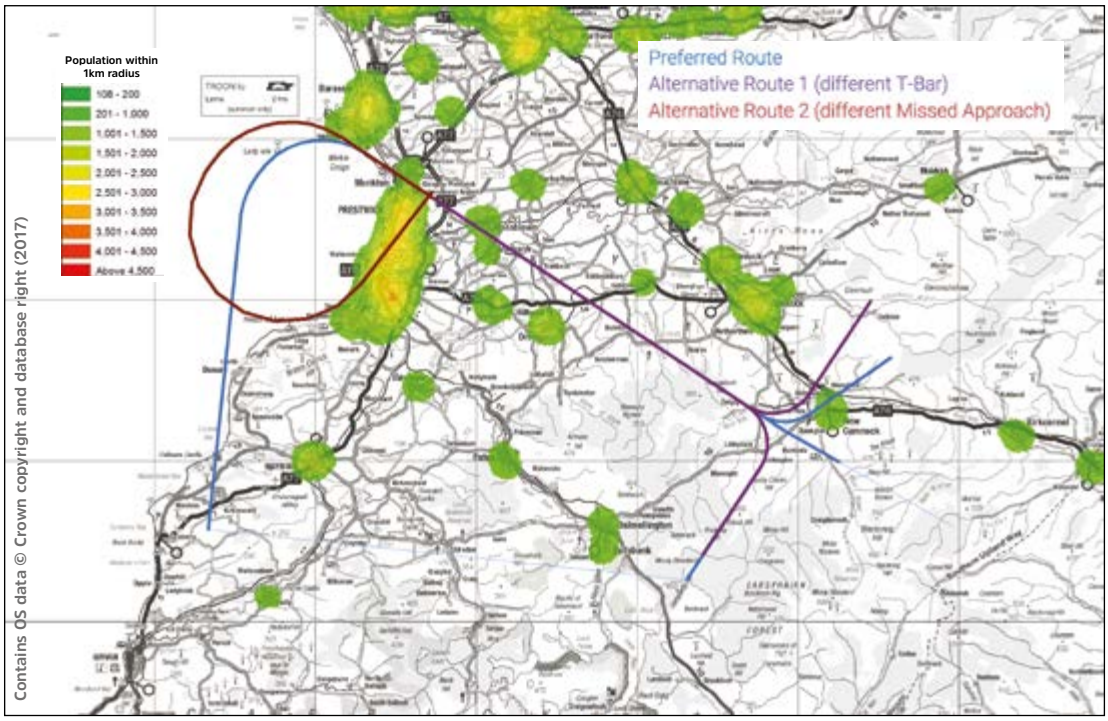

Figure 72 - Runway 30 Approaches - Preferred and Alternative Routes over Population Density Map

In order to assess the various options we have put together the following table to compare the impact of each route.

	Preferred	Alt. 1	Alt. 2
CO_2 emissions	More	More	Similar
Noise – Population Overflown	3,326	1,125	*
Noise – New Population	2,150	720	*
Concentration / Dispersal	Concentration	Concentration	Dispersal
Technical Feasibility	Good	Difficult	Difficult
Community	Impact (compared to current day)		
New Cumnock (only northern segment)	Infrequently Overflown	Closer	Same
Annbank	Same	Same	Same
Mossblown	Same	Same	Same
Troon (only missed approach)	Same	Same	Same
Ochiltree	Same	Same	Same
Drongan	Same	Same	Same
Hillhead	Same	Same	Same
Mansfield (only northern segment)	Infrequently Overflown	Closer	Same

* Population figures not calculated as missed approaches are infrequently flown.

6.16 Runway 12 Approaches

6.16.1 Purpose of the route and number of aircraft

This is a replication of the existing conventional approach procedure to Runway 12. The new route adds three "T-Bar" legs which facilitate arrivals from the north, south, and west without the need for Air Traffic Control (ATC) intervention. (See section 3.2) This procedure will primarily be flown by training aircraft practicing the new procedure type. However, it is also likely to become the preferred backup approach procedure for use when the conventional navigation aids for Runway 12 are unavailable for any reason.

We anticipate the number of aircraft of any type flying an instrument approach procedure to Runway 12 per week over the first five years of operation to be as follows:

	2018	2019	2020	2021	2022	2023
Aircraft per Week	39	49	53	54	56	57

These numbers cover aircraft flying the current conventional approach and aircraft flying the new satellite based approach.

6.16.2 Factors influencing the design

The design is primarily driven by the dimensions of the controlled airspace to the west of the airport. (This is the airspace within which ATC direct aircraft to get them into and out of the airport in the most efficient way). The route should be contained within this controlled airspace which requires the final approach to the runway to commence at an altitude of 2,000ft. This route has been designed with a descent angle of 3.0° to exactly match with the current route which places the Final Approach Fix (FAF) 11,103 metres away from the end of the runway at this altitude of 2,000ft.

For the Runway 12 approach, due to the limited amount of controlled airspace available, the Intermediate Fix (IF) has been placed slightly closer than normal at only 7,593 metres before the FAF. There is then adequate controlled airspace to include the standard northern and southern segments. The design criteria also provide the option for a straight segment prior to the IF and this has been included for this runway although the segment is only 7,408 metres long. However, the northern segment is unlikely to be used very often as the majority of traffic arrives from the south or west.

We have also designed a new missed approach procedure for this runway. The missed approach procedure is designed to cater for the infrequent situations where an aircraft is unable to land for some reason. (Approximately three missed approaches occur at Glasgow Prestwick Airport (GPA) per week at the moment.) This could be due to a problem with the aircraft, low cloud preventing the pilots from being able to see the runway in time, or an obstruction on the runway. The missed approach must end at a location where the aircraft can hold in case there are technical issues to be resolved and where the aircraft can either commence another approach or divert to an alternative airport. The new missed approach procedure takes aircraft straight ahead beyond Drongan before turning right and returning to a point overhead the old Turnberry (TRN) navigation aid.

6.16.3 Factors influencing the design

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

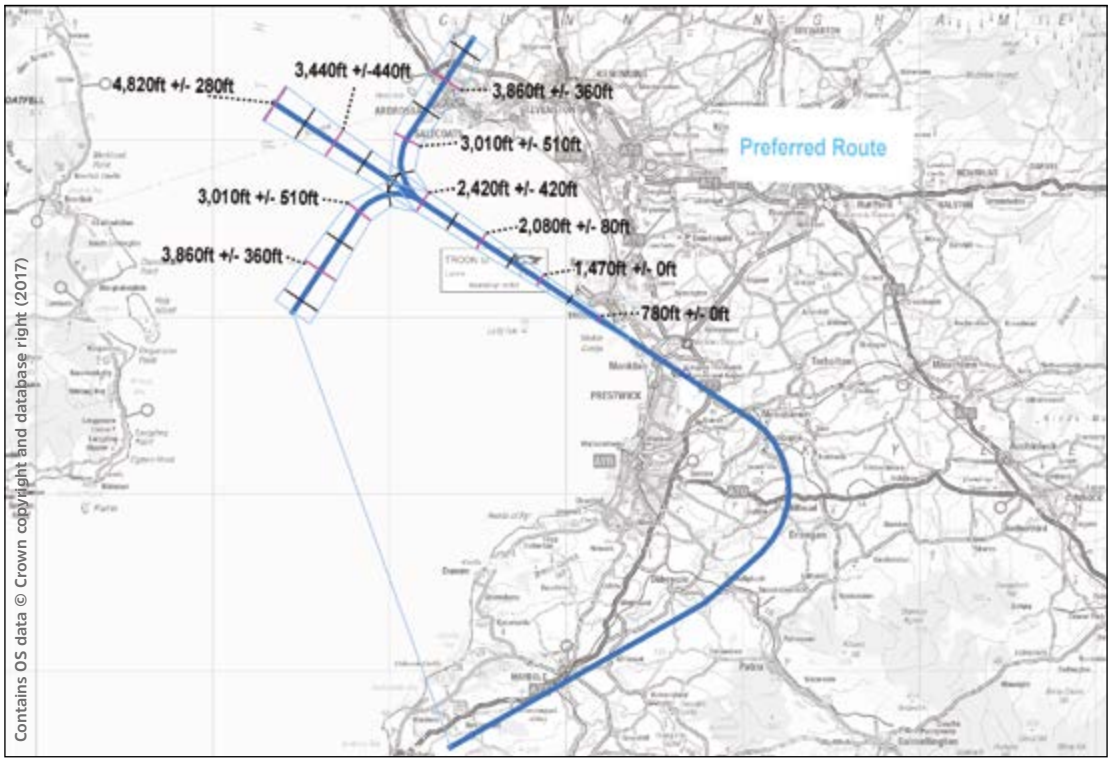

Figure 73 - Runway 12 Approaches - Preferred Route with Expected Altitudes and Overflight Swathes

The following diagrams show the noise impact of our preferred route (typical and worst-case).

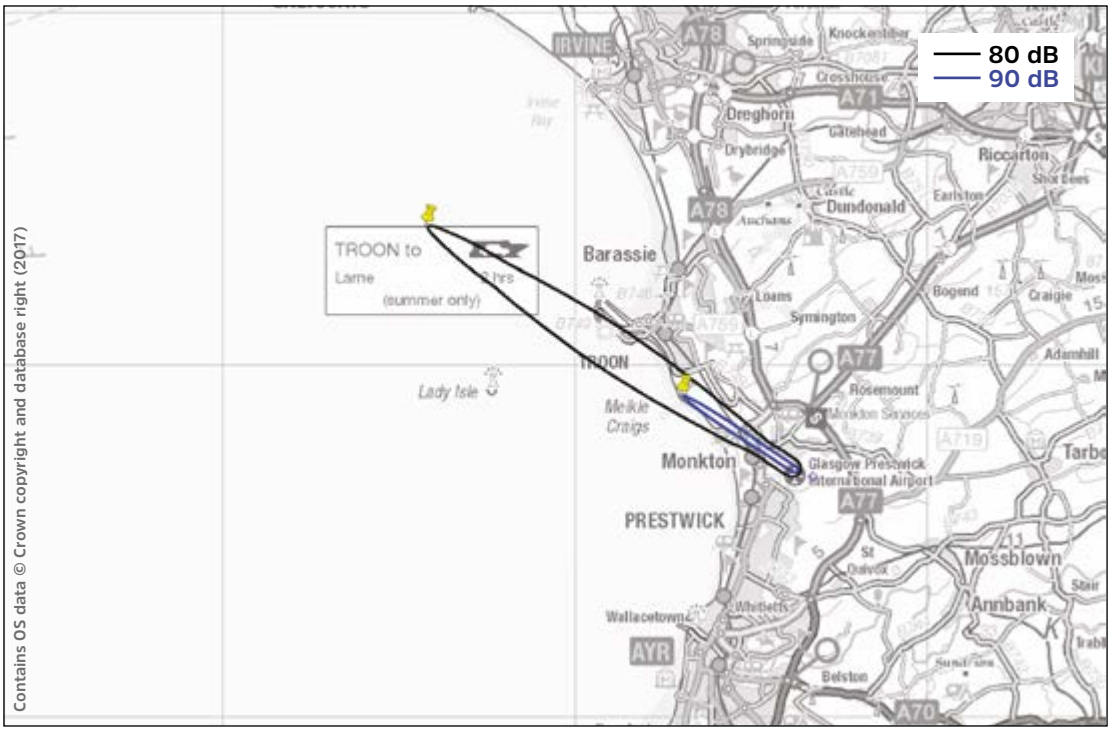

Figure 74 - Runway 12 Approaches - Boeing 737 SEL Footprints

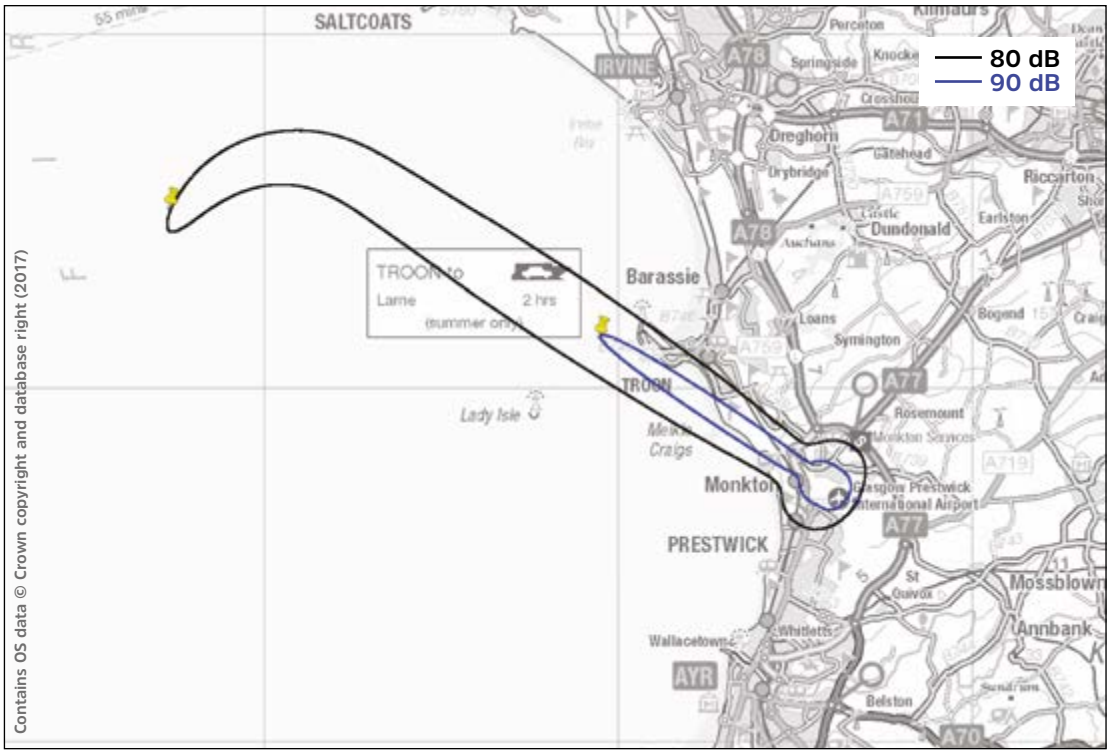

Figure 75 - Runway 12 Approaches - Boeing 747 SEL Footprints

The footprint in Figure 74 is for the Boeing 737 aircraft, which is the most common aircraft type typically operating to the airport. The footprint in Figure 75 is for the Boeing 747 aircraft, which is the loudest aircraft type typically operating to the airport. However, this aircraft type only makes up approximately 2% of the total aircraft movements. The footprints represent the total noise impact of a single flight. Further noise analysis is taking place and will be available on the airport website in late June 2017.

6.16.4 Alternative routes

Alternative 1 We looked at designing the route with the IF 9,260 metres before the FAF. However this would have put the northern and southern segments very close to the edge of controlled airspace.

This increases the risk of conflicts with aircraft flying on their own outside controlled airspace.

Alternative 2 We looked at replicating the current missed approach procedure for the new route. However, the current missed approach has aircraft turning back to the airport and holding overhead. This results in more track miles for aircraft and doesn't place them in a good location from which to commence another approach or divert.

For this reason aircraft conducting missed approaches using the current procedures are typically given alternative instructions by Air Traffic Control (ATC) in order to maintain operational efficiency.

The diagram below shows the preferred and alternative routes over a flight path density map of the current traffic.

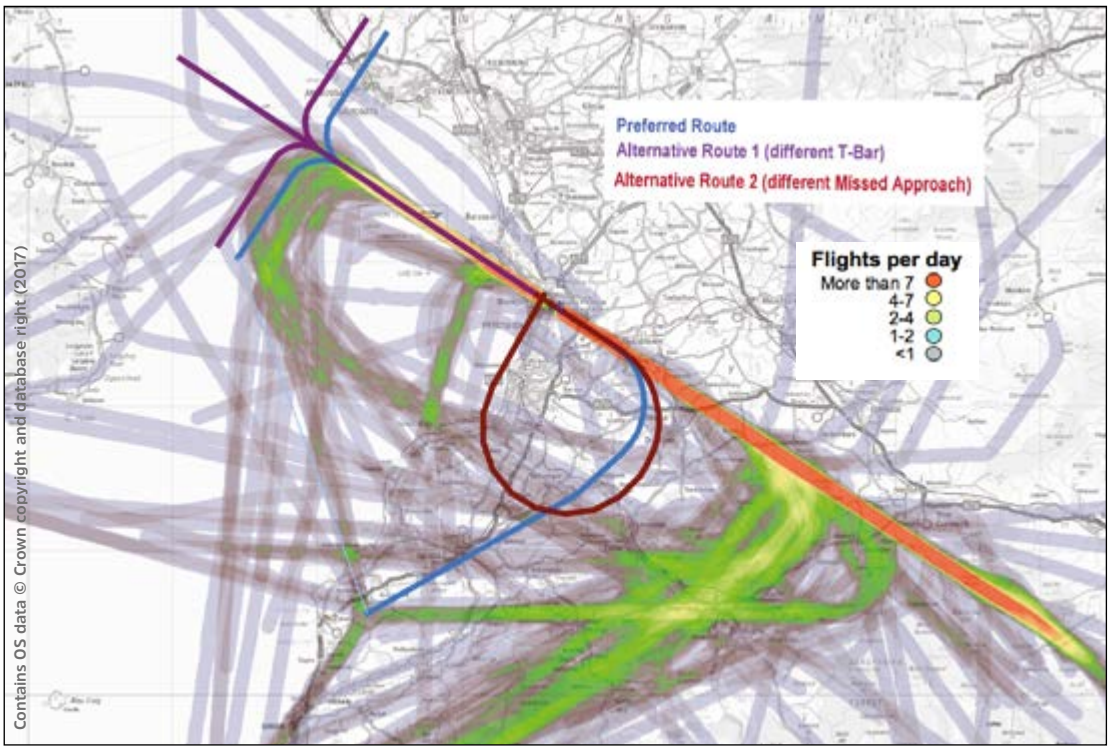

Figure 76 - Runway 12 Approaches - Preferred and Alternative Routes over Flight Path Density Map

The diagram below shows the preferred and alternative routes over a "population density" map.

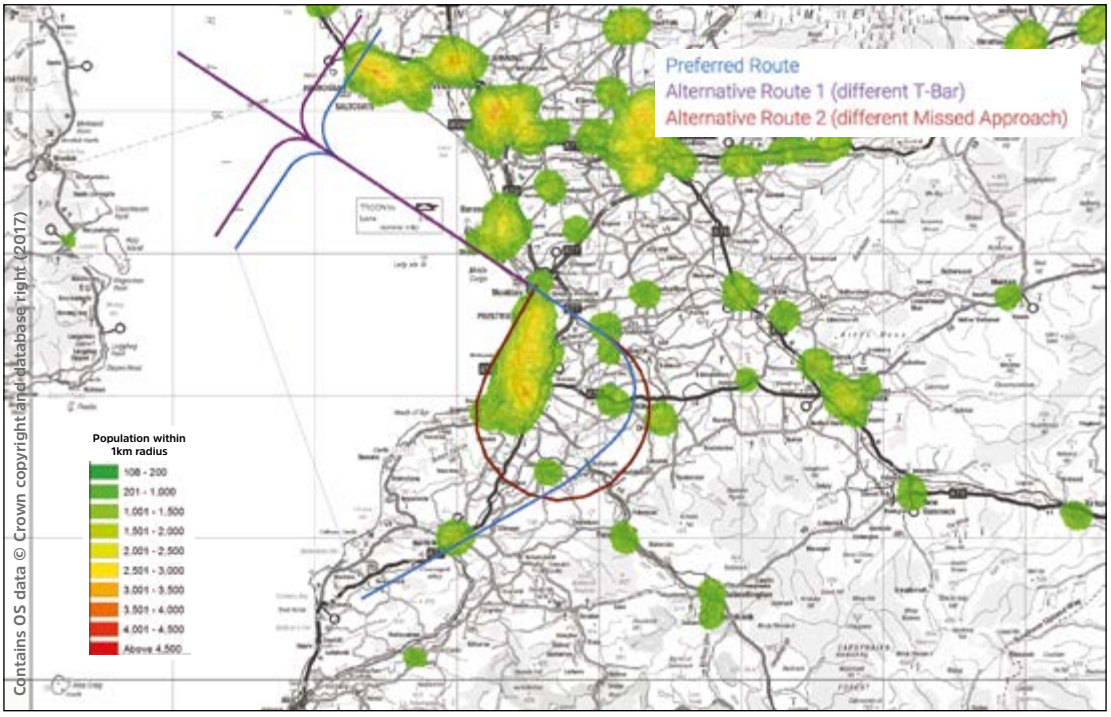

Figure 77 - Runway 12 Approaches - Preferred and Alternative Routes over Population Density Map

In order to assess the various options we have put together the following table to compare the impact of each route.

	Preferred	Alt. 1	Alt. 2
CO_2 emissions	Similar	More	Similar
Noise – Population Overflown	10,292	131	*
Noise – New Population	10,292	131	*
Concentration / Dispersal	Concentration	Concentration	Dispersal
Technical Feasibility	Good	Difficult	Difficult
Community	Impact (compared to current day)		
Saltcoats (only northern segment)	Infrequently Overflown	Closer	Same
Troon	Same	Same	Same
Annbank (only missed approach)	Same	Same	Same
Mossblown (only missed approach)	Same	Same	Same
Patna (only missed approach)	Further	Same	Same
Drongan (only missed approach)	Same	Same	Same
Hillhead (only missed approach)	Same	Same	Same
Coylton (only missed approach)	Same	Same	Same
Dalrymple (only missed approach)	Same	Same	Same

* Population figures not calculated as missed approaches are infrequently flown.

6.17 Runway 21 Approaches

6.17.1 Purpose of the route and number of aircraft

This is a replacement for the existing conventional approach procedure to Runway 21. The new route adds two “T-Bar” legs which facilitate arrivals from the east and west without the need for Air Traffic Control (ATC) intervention. (See section 3.2) This procedure is likely to become the preferred approach procedure to Runway 21.

As Runway 21 is only used in extreme weather conditions or when the main runway is closed for any reason, it is difficult to predict how my aircraft are likely to fly this route, however on historic evidence it is unlikely to average more than 1 aircraft per week.

6.17.2 Factors influencing the design

The current conventional approach procedure is offset to the east of the runway centreline by approximately 2°. To comply with current design criteria the route has to be aligned with the runway. The centreline of the preferred route is therefore approximately 460 metres to the west of the current route as aircraft pass over Kilmarnock.

This route has been designed with a descent angle of 3.5° which is the maximum permitted by the design criteria for this type of approach. (The current route has a descent angle of approximately 3.6°.) The Final Approach Fix (FAF) has been set at 2,100ft to match with the current route which places the FAF 10,027 metres away from the end of the runway at this altitude of 2,100ft. This places aircraft outside controlled airspace which is not ideal but is the same as the current procedure.

For the Runway 21 approach, due to the proximity of Glasgow International Airport, the Intermediate Fix (IF) has been placed slightly closer than normal at only 7,567 metres before the FAF. We have then included the standard eastern and western segments. However, the western segment is unlikely to be used very often as the majority of traffic arrives from the east.

We have also designed a new missed approach procedure for this runway. The missed approach procedure is designed to cater for the infrequent situations where an aircraft is unable to land for some reason. (Approximately three missed approaches occur at Glasgow Prestwick Airport (GPA) per week at the moment.) This could be due to a problem with the aircraft, low cloud preventing the pilots from being able to see the runway in time, or an obstruction on the runway. The missed approach must end at a location where the aircraft can hold in case there are technical issues to be resolved and where the aircraft can either commence another approach or divert to an alternative airport. The new missed approach procedure takes aircraft straight ahead to a point overhead the old Turnberry (TRN) navigation aid.

6.17.3 Preferred route

Our preferred route is shown in the diagram below along with the expected altitudes of aircraft on this route.

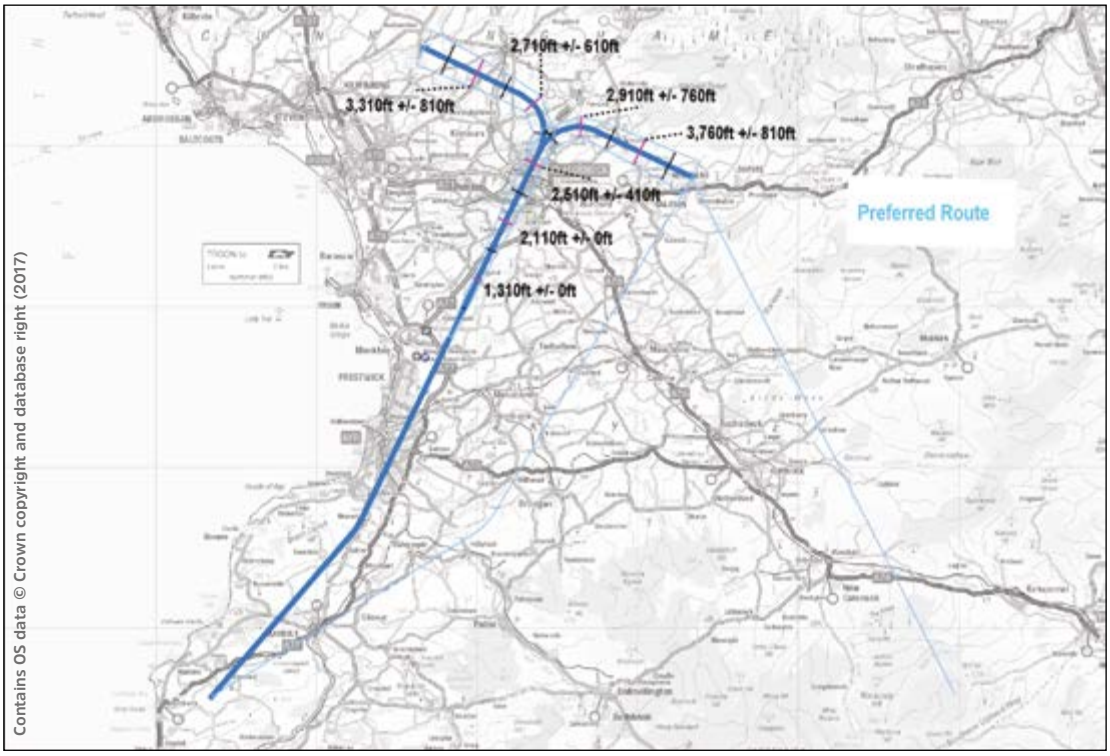

Figure 78 - Runway 21 Approaches - Preferred Route with Expected Altitudes and Overflight Swathes

Due to the low numbers of aircraft operating to this runway it hasn't been possible to produce SEL footprints.

6.17.4 Alternative routes

Alternative 1

We looked at designing the route with a FAF at 1,600ft in order to keep the route closer to Glasgow Prestwick Airport and reduce the potential interaction with Glasgow International Airport.

However this would have the effect of putting aircraft over Kilmarnock 500ft lower than they are currently and did not provide the required obstacle clearance.

Alternative 2

We looked at replicating the current missed approach procedure for the new route. However, the current missed approach has aircraft turning back to the airport and holding overhead. This results in more track miles for aircraft and doesn't place them in a good location from which to commence another approach or divert.

For this reason aircraft conducting missed approaches using the current procedures are typically given alternative instructions by ATC in order to maintain operational efficiency.

The diagram below shows the preferred and alternative routes over a flight path density map of the current traffic.

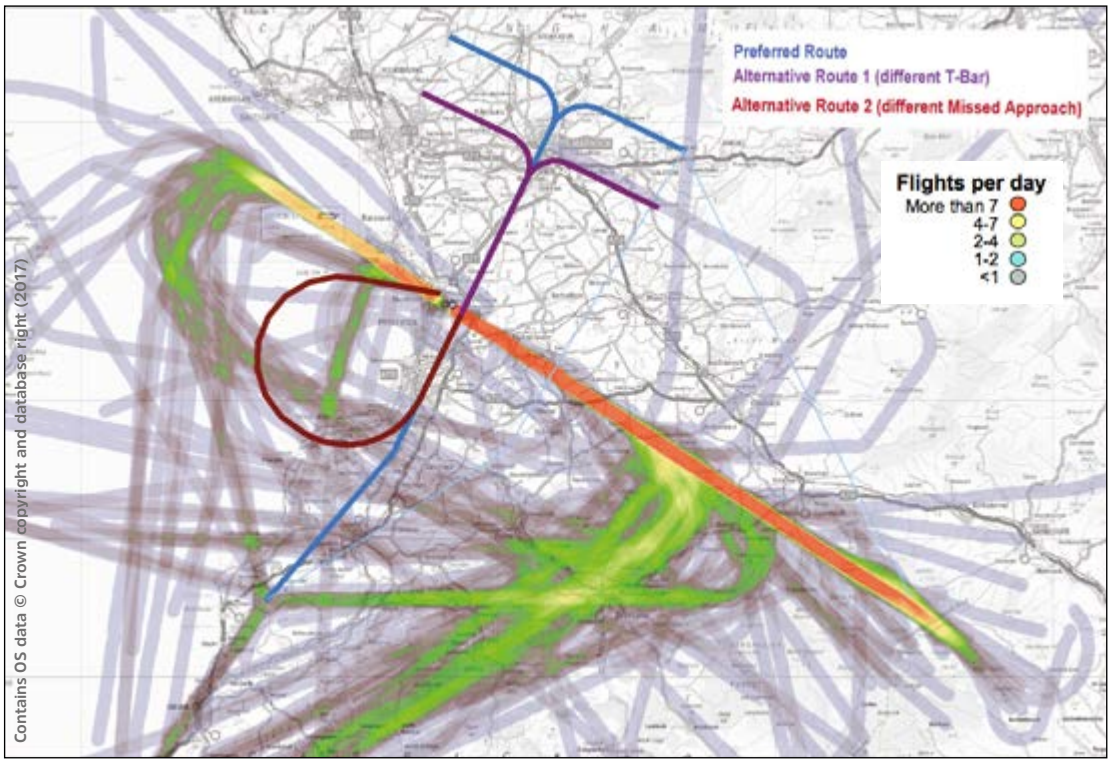

Figure 79 - Runway 21 Approaches - Preferred and Alternative Routes over Flight Path Density Map

The diagram below shows the preferred and alternative routes over a “population density” map.

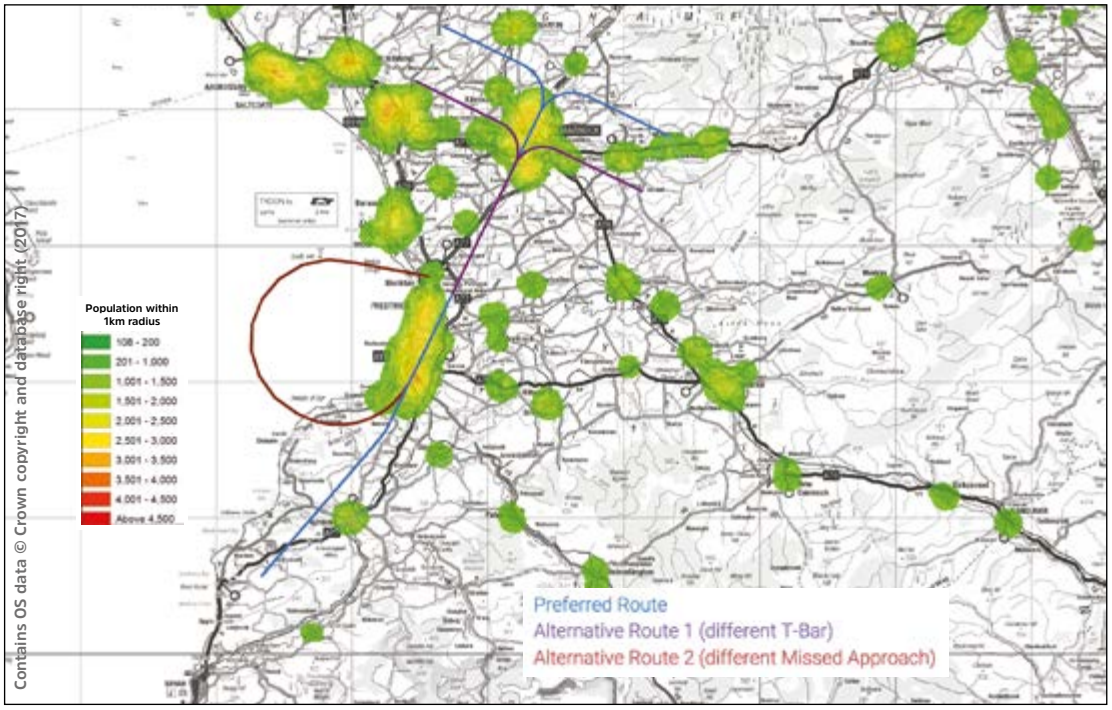

Figure 80 - Runway 21 Approaches - Preferred and Alternative Routes over Population Density Map

In order to assess the various options we have put together the following table to compare the impact of each route.

	Preferred	Alt. 1	Alt. 2
CO_2 emissions	Similar	Less	Similar
Noise – Population Overflown	16,788	15,200	*
Noise – New Population	10,561	15,200	*
Concentration / Dispersal	Concentration	Concentration	Dispersal
Technical Feasibility	Good	Difficult	Difficult
Community	Impact (compared to current day)		
Galston	Similar	Overflown	Similar
Newmilns	Similar	Further	Similar
Darvel	Similar	Further	Similar
Fenwick	Similar	Further	Similar
Kilmarnock	Similar	Similar but 500ft Lower	Similar
Kilmaurs (only western segment)	Similar	Similar	Similar
Symington	Same	Same	Same
Ayr (only missed approach)	Same	Same	Same
Stewarton	Similar	Further	Similar
Crookedholm	Similar	Overflown	Same

* Population figures not calculated as missed approaches are infrequently flown.

7 Aviation Stakeholders

7.1 Fuel Burn and CO_2 Emissions

The table below shows the track mileage, fuel burn and CO_2 emissions differences for the preferred departure routes.

Runway	Current Route	Proposed Route	Track Mileage Change (NM)	2018 Flight Count	Fuel Savings per Flight (kg)	Annual Fuel Savings (T)	Annual CO2 Difference (T)
30	TRN 1K	Southwest	+1.2 *	924	+12.1 *	+11.2 *	+35.5 *
30	TRN 1K	West	-3.7	276	-38.9	-10.7	-34.1
30	NGY 1K	Southeast	+1.7 *	2700	+17.7 *	+47.9 *	+152.2 *
30	NGY 1K	East	-3.7	168	-39.2	-6.6	-20.9
12	TRN 1L	Southwest	-1.2	520	-13.0	-6.8	-21.5
12	TRN 1L	West	-2.4	132	-24.7	-3.3	-10.4
12	NGY 1L	Southeast	-0.1	1116	-.06	-0.7	-2.1
12	NGY 1L	East	-8.8	84	-92.9	-7.8	-24.8
					TOTAL	**+23.2**	**+73.9**

* The increase in fuel usage and CO_2 emissions on these two routes is a result of current design criteria requiring the initial turn point to be further away from the runway than the current procedure.

The departure routes in this document are shown as far as TRN, HERON, OSMEG, and HAVEN. However, when they are published, we anticipate that the SIDs will be truncated to a suitable waypoint and the remainder of the route will be published as a link route to the termination point.

7.2 Controlled Airspace

Wherever possible the proposed routes are designed to remain within controlled airspace. Where this is not possible this has been noted in the specific comments below. There is currently no intention to request a change to the controlled airspace boundaries as part of this airspace change proposal.

7.3 Performance Based Navigation Specification (PBN)

The table below shows the current level of Performance Based Navigation equipage for the aircraft operating at Glasgow Prestwick Airport.

Airport	RNAV5	RNAV1	RNP1	RNP APCH
Prestwick	96.4%	86.9%	83.9%	83.9%

The SIDs and Transitions will be designed using the RNAV1 navigation specification. The Approaches will be designed using the RNP APCH navigation specification.

7.4 Helicopter and General Aviation Operations

Helicopters and General Aviation aircraft that are certified to the navigation specifications mentioned above will be able to fly the new departure, arrival, and approach procedures.

Those that don't meet the navigation specifications will be able to depart in IMC using the omnidirectional departures. (See section 6.1.9) The existing conventional approach procedures will remain available for approaches in IMC from the PIK NDB.

Helicopters and General Aviation aircraft will still be able to arrive and depart visually to / from both runways and helicopters will still be able to arrive and depart visually directly to / from the helipads situated to the north of the main runway.

7.5 Specific Route Notes

7.5.1 Runway 30 Departures

These routes require aircraft to maintain a climb gradient of approximately 8.9% (540 ft/NM) for the first 7.3NM of the route in order to remain inside controlled airspace.

7.5.2 Runway 30 Departures to the West

This route requires aircraft to maintain a climb gradient of approximately 9.9% (600 feet/NM) for the duration of the procedure in order to achieve FL110 at HERON and remain inside controlled airspace. Aircraft that are unable to meet the level restrictions on this route will be cleared on a departure to the southwest instead and will then join N562 at TRN.

7.5.3 Runway 12 Departures

These routes require aircraft to maintain a climb gradient of approximately 7.9% (480 ft/NM) for the first 7.1NM of the route in order to remain inside controlled airspace.

7.5.4 Runway 30 Arrivals from the East

In order to remain within controlled airspace aircraft must not descend below 6,000ft until they have entered CTA-6. However, the distance to the FAF is only 7.1NM which equates to 3.3°, 5.8%, or 352ft/NM without providing a level segment. Aircraft unable to achieve this descent profile may need to commence their descent from 6,000ft before reaching the boundary of CTA-6 and risk descending out of controlled airspace.

7.5.5 Runway 21 Arrivals from the South

This procedure takes aircraft to an IAF that is below the base of controlled airspace. Any aircraft following this procedure will leave controlled airspace approximately 6.2NM before reaching the IAF. This is similar to the current conventional procedure which puts aircraft outside controlled airspace while flying the base turn.

7.5.6 Runway 21 Arrivals from the East

This procedure takes aircraft to an IAF that is below the base of controlled airspace. Any aircraft following this procedure will leave controlled airspace approximately 8.2NM before reaching the IAF. This is similar to the current conventional procedure which puts aircraft outside controlled airspace while flying the base turn.

7.5.7 Runway 30 Approaches

The northern initial leg for this procedure is shorter than the standard 5NM and will require a descent gradient of up to 5.7% (350 ft/NM) in order to achieve 4,500ft at the IF.

7.5.8 Runway 12 Approaches

The western initial leg for this procedure is shorter than the standard 5NM and will require a descent gradient of up to 8.2% (500 ft/NM) in order to achieve 2,000ft at the IF.

7.5.9 Runway 21 Approaches

Both initial legs take aircraft below the base of controlled airspace. Any aircraft flying an approach to Runway 21 will be outside controlled airspace at the IAF and will establish on the final approach track in uncontrolled airspace. The aircraft will re-join controlled airspace on final approach approximately 4.0NM before the threshold. This is similar to the current conventional procedure which puts aircraft outside controlled airspace while establishing on the final approach track.

8 What Happens Next?

This consultation has been circulated to stakeholders, both aviation and non-aviation related, who may have an interest in the proposed airspace change at Glasgow Prestwick Airport. The aviation stakeholders have been identified and agreed as appropriate in conjunction with the CAA. A list of the aviation stakeholders invited to participate in this consultation is available in Appendix B (ref 11).

In accordance with Civil Aviation Authority (CAA) guidance, consultees will be given a 13 week consultation period to consider and respond to this proposal. The original consultation duration of 12 weeks has been extended by one week to account for the summer holiday period.

A feedback report will be made available on the Glasgow Prestwick Airport website shortly after the consultation period closes. This will include summarised details of the key issues raised by stakeholders during the consultation.

We will review all feedback and consider the best ways to address any major concerns. This may involve us making adjustments to the preferred route, either laterally or vertically. We may decide to select one of the alternative routes instead of the preferred route. Or we may determine that the benefits of the preferred route outweigh the concerns raised and therefore decide to proceed with the preferred route.

After the consultation has concluded and any concerns have been dealt with suitably, Glasgow Prestwick Airport will submit an Airspace Change Proposal for the final routes to the CAA. The proposal is used to demonstrate that the planned airspace design achieves the best possible balance between safety, community impact, and environmental efficiency.

It is a requirement of the consultation process that Glasgow Prestwick Airport provide the CAA with full details of the Consultation (including copies of responses and correspondence) together with all documentation necessary for the initiation of the proposed routes. This will include feedback from the flight validation activities where the designed procedures are rigorously tested within a simulator to ensure the designs can be flown safely in a range of potential weather and aircraft conditions.

The CAA will review the proposal (which can take up to 17 weeks) and reach a Regulatory Decision. If the proposal is approved, the implementation process will then commence, which will involve the publishing of the procedures and the training of staff. The target date for the approved routes to come into operation is 24 May 2018.

Flight paths followed by aircraft are defined by formal routes listed in the UK Aeronautical Information Publication (AIP), which contains aeronautical information, updated every 28 days. Any change in routes would be notified in the UK AIP after successful CAA approval. The final stage of the process is for the CAA to commence a post-implementation review, usually around 12 months after implementation. This will allow Glasgow Prestwick Airport to carry out a rigorous assessment and for the CAA to evaluate the impacts and benefits of the change.

9 References

(1) Strategic Plan 2017 – 2022, Glasgow Prestwick Airport, http://www.glasgowprestwick.com/wp-content/uploads/2017/06/GPA_Strat_Plan_16_AW3_Online_SinglePages.pdf

(2) Future Airspace Strategy for the United Kingdom 2011 to 2030, Civil Aviation Authority, https://www.caa.co.uk/WorkArea/DownloadAsset.aspx?id=4294978317

(3)CAP 1379, Description of Today's ATC Route Structure and Operational Techniques, Civil Aviation Authority, March 2016

(4)CAP 725, CAA Guidance on the Application of the Airspace Change Process, Civil Aviation Authority, March 2016

(5) Appendix A, High-Resolution Consultation Images, Glasgow Prestwick Airport, http://www.glasgowprestwick.com/airpsace

(6) Doc. 8168, Procedures for Air Navigation Services – Aircraft Operations – Volume II, International Civil Aviation Organisation, November 2016

(7)CAP 778, Policy and Guidance for the Design and Operation of Departure Procedures in UK Airspace, Civil Aviation Authority

(8) Guidance to the Civil Aviation Authority on Environmental Objectives Relating to the Exercise of its Air Navigation Functions, Department for Transport, January 2014

(9)CAP 1498, Definition of Overflight, Civil Aviation Authority, April 2017,

(10) Glasgow Prestwick Airport – New Routes ACP Noise Assessment, Civil Aviation Authority, http://www.glasgowprestwick.com/airspace

(11) Appendix B, Consultation Stakeholders List, Glasgow Prestwick Airport, http://www.glasgowprestwick.com/airspace

Glasgow Prestwick Airport

Version 1.1 19/06/2017