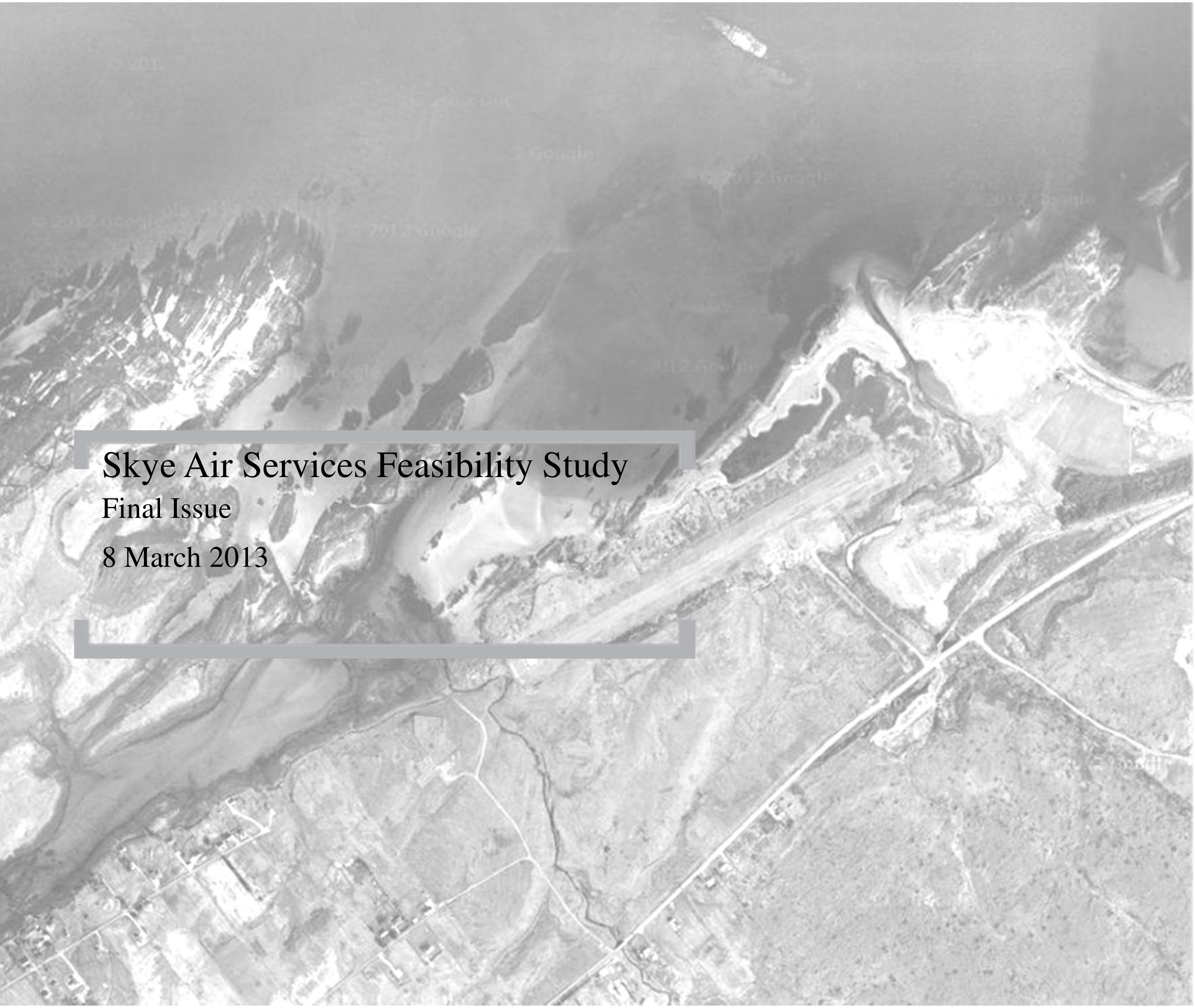


Skye Air Services Feasibility Study

Final Issue

8 March 2013

HITRANS
THE HIGHLANDS AND ISLANDS TRANSPORT PARTNERSHIP

HIE
Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean

The Highland Council
Comhairle na Gàidhealtachd

rdcaviation

ARUP

Limitations of Report

In accordance with the terms of reference set out in our agreement with HITRANS, this report documents our findings in relation to the feasibility of operating air services at Broadford Airfield, Skye.

This report takes into account the particular requirements of HITRANS, Highland Council and HIE. It was prepared solely for the purpose of providing supporting data to HITRANS, Highland Council and HIE in assessing the feasibility of operating air service to Skye and should not be relied on for any other purposes.

This report is not intended for, and should not be relied on, by any third party and no responsibility is undertaken to any third party.

Contents

1. Introduction

1. Introduction

Introduction

- Arup in conjunction with rdc aviation has been commissioned to deliver this Skye Air Services Feasibility Study.

- The study has a number of components, namely:
  - To assess the demand for passenger air services between Skye and the Central Belt.
  - To review the feasibility, costs of development and operational costs of a number of previously studied airfield options in the context of recent developments in GPS navigation landing assistance systems.
  - Assess the aircraft types that might be able to operate at the developed airfield and the commercial viability of establishing regular scheduled services to the airfield.
  - Conduct a passenger demand survey to support the passenger demand forecast analysis.
  - Carry out an associated high level wider economic benefit assessment.

2. Study Background

2. Study Background

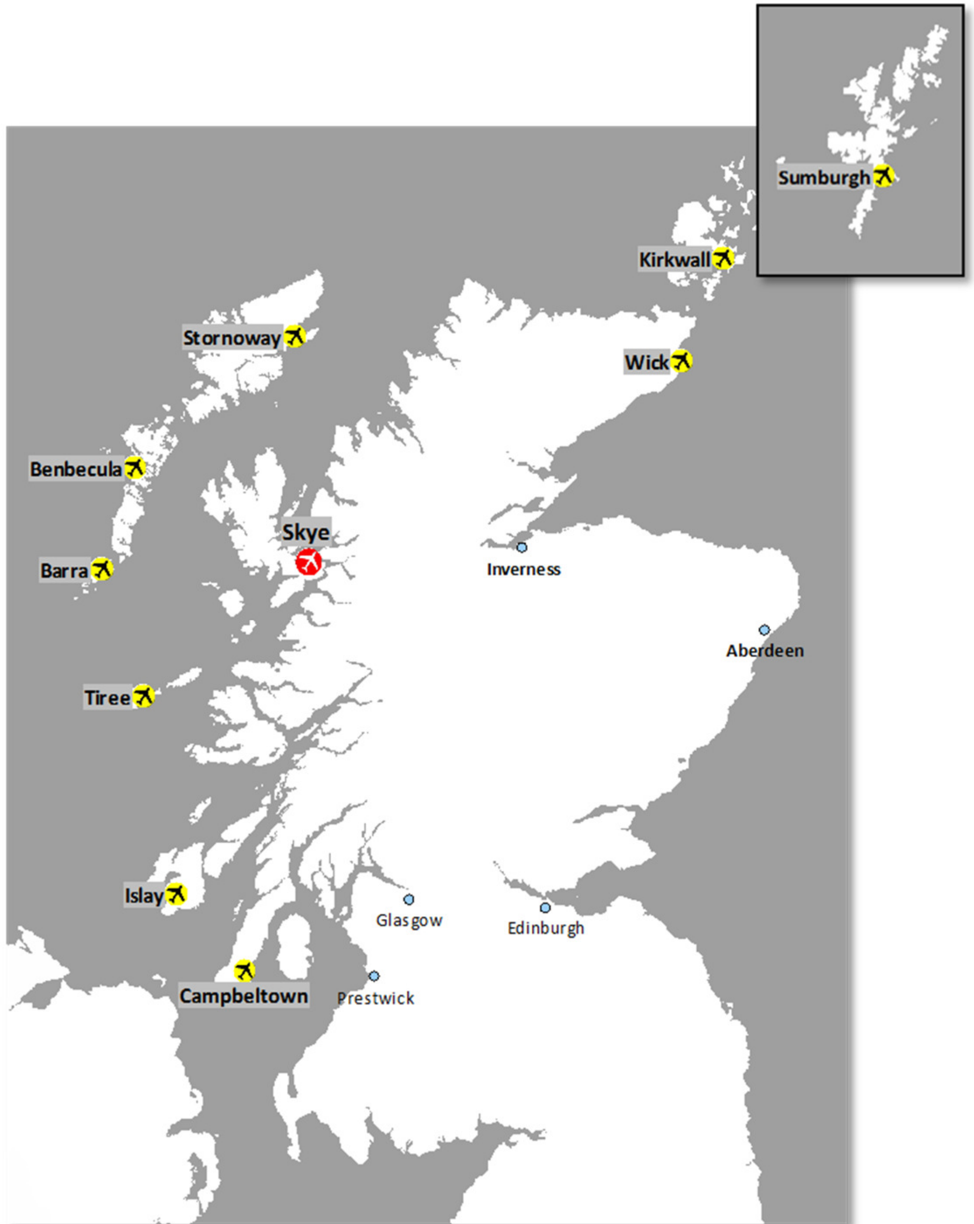
2.3 Benchmarking review of other air service routes

Benchmark Airport Group

- The HIAL Airport group has been chosen as a benchmark group due to their similarities with Skye in terms of serving remote regions and having limited/time-consuming journeys to the main Scottish lowland area.
- In terms of location, only two of the benchmark airports are located on the mainland – Wick and Campbeltown, but again remain remote from the main business/population centres in the lowlands area.
- For comparison, runway lengths and 2011 total passengers at these benchmark airports are shown below. Skye's current runway is smaller than other benchmark airports, being comparable to Barra. Typically, the benchmark airports have a runway length of 1,400m to 1,800m.
- The number of passengers at the benchmark airports range from 7,767 (Tiree) through to 152,013 (Kirkwall) – the more remote islands (Stornoway, Sumburgh and Kirkwall) having a greater volume of traffic.

Overview of benchmark airports (Source: Eurocontrol AIP, CAA)

Airport Name	IATA Code	Maximum Runway length (m)	2011 Total Passengers
Barra	BRR	846	12,582
Benbecula	BEB	1,836	47,330
Campbeltown	CAL	1,750	9,160
Islay	ILY	1,545	25,812
Kirkwall	KOI	1,428	152,013
Stornoway	SYY	2,315	140,141
Sumburgh	LSI	1,426	145,148
Tiree	TRE	1,472	7,767
Wick	WIC	1,825	24,839
Skye	**SKL**	**753**	**-**

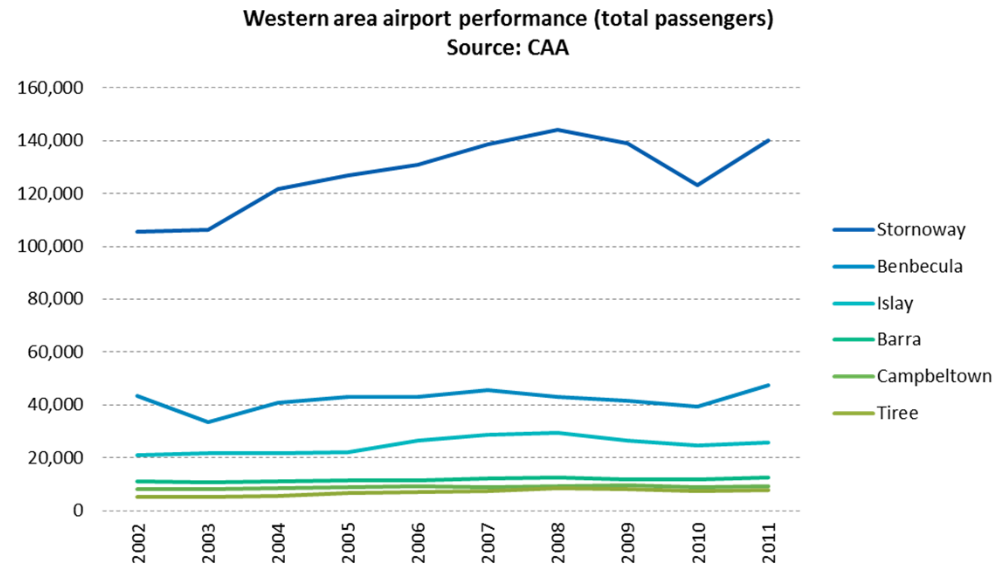


2. Study Background

2.3 Benchmarking review of other air service routes

Benchmark Airport Performance – Western airport total passengers

- Once the effects of the Volcanic Ash disruption in 2010 are taken into account, passenger traffic at the western area airports within the benchmark group has shown a steady performance over the last 10 years, with all showing flat, or slightly positive, growth.
- Stornoway, the most remote of the western isles, has the largest volume of total passengers and the strongest growth, with traffic up from 105,000 passengers in 2002 to 140,000 in 2011 and a CAGR of 3.2%.
- In comparison, other western area airports have seen much lower growth (both in percentage and absolute terms). Both Benbecula and Islay have added 4,000-5,000 passengers over the last 10 years, with CAGRs of 0.9% and 2.4% respectively.
- The smaller airports (Barra, Campbeltown and Tiree) have seen lower absolute growth in passenger traffic (1,000-2,500 over the ten-year period), but all have remained below 15,000 passengers in total over the period.



Western area airport performance - 2002 to 2011 (Source: CAA)

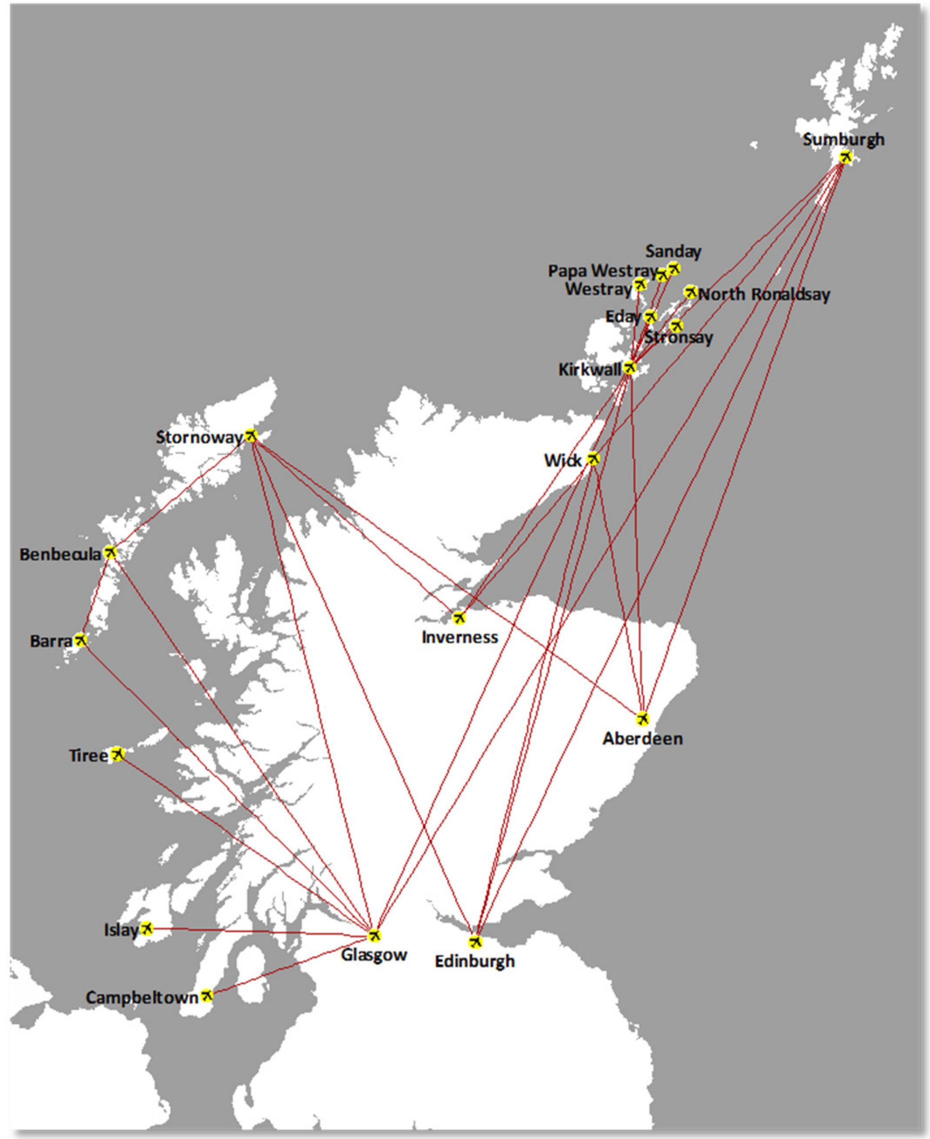
Airport	Change in passengers (2002-2011)	2002-2011 CAGR
Stornoway	34,770	3.2%
Benbecula	3,854	0.9%
Islay	4,979	2.4%
Barra	1,501	1.4%
Campbeltown	1,018	1.3%
Tiree	2,465	4.3%

2. Study Background

2.3 Benchmarking review of other air service routes

Benchmark Airport Network – All Services

- An overview of the 2012 published route network from the benchmark airport group is shown on the right.
- In general, those airports serving the remote western areas are linked to Glasgow while those to the north are linked to Edinburgh, Inverness and Aberdeen.
- In addition to the mainland services, the western isles are inter-connected (Stornoway-Benbecula-Barra), while the northern isles have a range of intra-islands services, mainly between Kirkwall and the outlying Orkney islands.
- Only Stornoway in the western group of airports has services to mainland airports beyond Glasgow International (Glasgow Prestwick having no services at all to the HIAL group), being linked to Edinburgh, Inverness and Aberdeen.
- This indicates that Glasgow International is the preferred airport for operations from the western areas of Scotland and air services to/from Skye could follow this pattern.

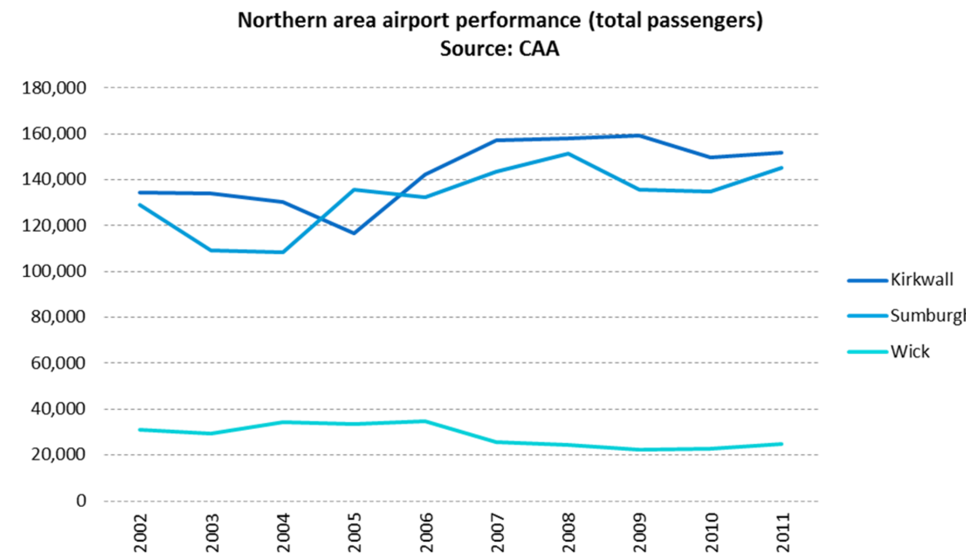


2. Study Background

2.3 Benchmarking review of other air service routes

Benchmark Airport Performance – Northern airport total passengers

- Kirkwall and Sumburgh handle similar passenger volumes (152,000 and 145,000 respectively in 2011) and have similar performance profiles over the period, adding 16,000-17,000 passengers and with CAGRs of just over 1%.
- Wick, however, remains significantly smaller than the remote island airports, handling just over 20,000 passengers in 2011. Of all the airports within the benchmark group, Wick is the only one to have seen traffic drop over the last 10 years, down 2.4% on average.
- Total passenger numbers at Wick fell between 2007 and 2008 when services to Kirkwall Airport were dropped.



Northern area airport performance - 2002 to 2011 (Source: CAA)

Airport	Change in passengers (2002-2011)	2002-2011 CAGR
Kirkwall	17,372	1.4%
Sumburgh	15,919	1.3%
Wick	-6,145	-2.4%

2.3 Benchmarking review of other air service routes

Benchmark Airport Performance – Mainland routes

- When considering services to mainland airports only, all benchmark airports have seen growth in passenger traffic (CAGRs of between 1.3% and 7.4%) – much stronger than total airport performance.
- Despite Wick's traffic falling overall, mainland service passenger numbers have grown by 11,500 since 2002, indicating that the drop in overall traffic was due to a reduction in services to island airports.
- While there have been some dips in mainland passengers (such as Kirkwall in 2005 and Stornoway in 2010), traffic has quickly rebounded to pre-dip levels.
- The performance of peers indicates that air services from Skye are likely to grow at a steady rate, with some of the smaller airports (such as Tiree, Campbeltown and Barra) adding an average of 200 passengers per annum.

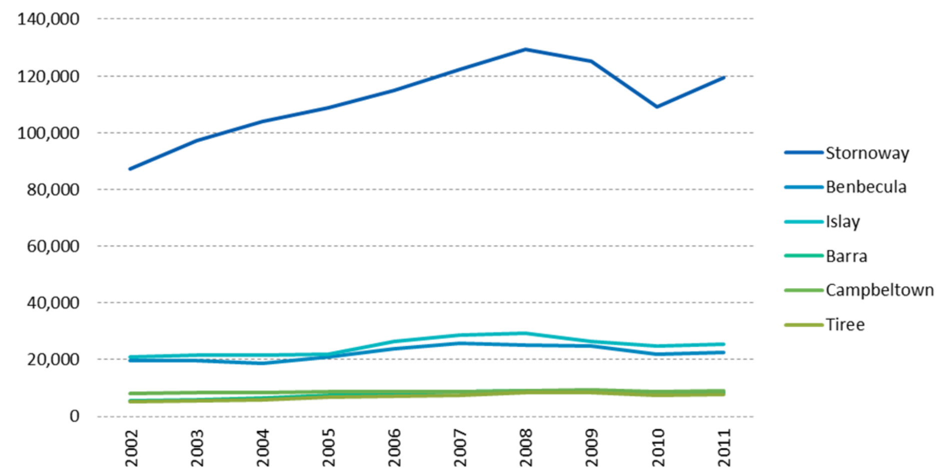
Western area airport performance (Mainland services) - 2002 to 2011 (Source: CAA)

Airport	Change in passengers (2002-2011)	2002-2011 CAGR
Stornoway	32,172	3.6%
Benbecula	2,972	1.6%
Islay	4,621	2.3%
Barra	2,859	4.7%
Campbeltown	1,018	1.3%
Tiree	2,465	4.3%

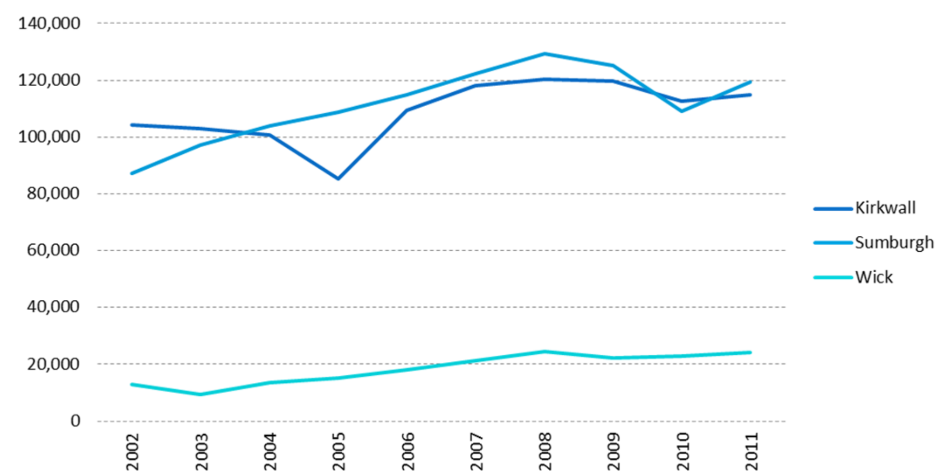
Northern area airport performance (Mainland Services) - 2002 to 2011 (Source: CAA)

Airport	Change in passengers (2002-2011)	2002-2011 CAGR
Kirkwall	10,838	1.1%
Sumburgh	32,172	3.6%
Wick	11,524	7.4%

Western area airport performance (passengers to mainland airports)
Source: CAA



Northern area airport performance (passengers to mainland airports)
Source: CAA

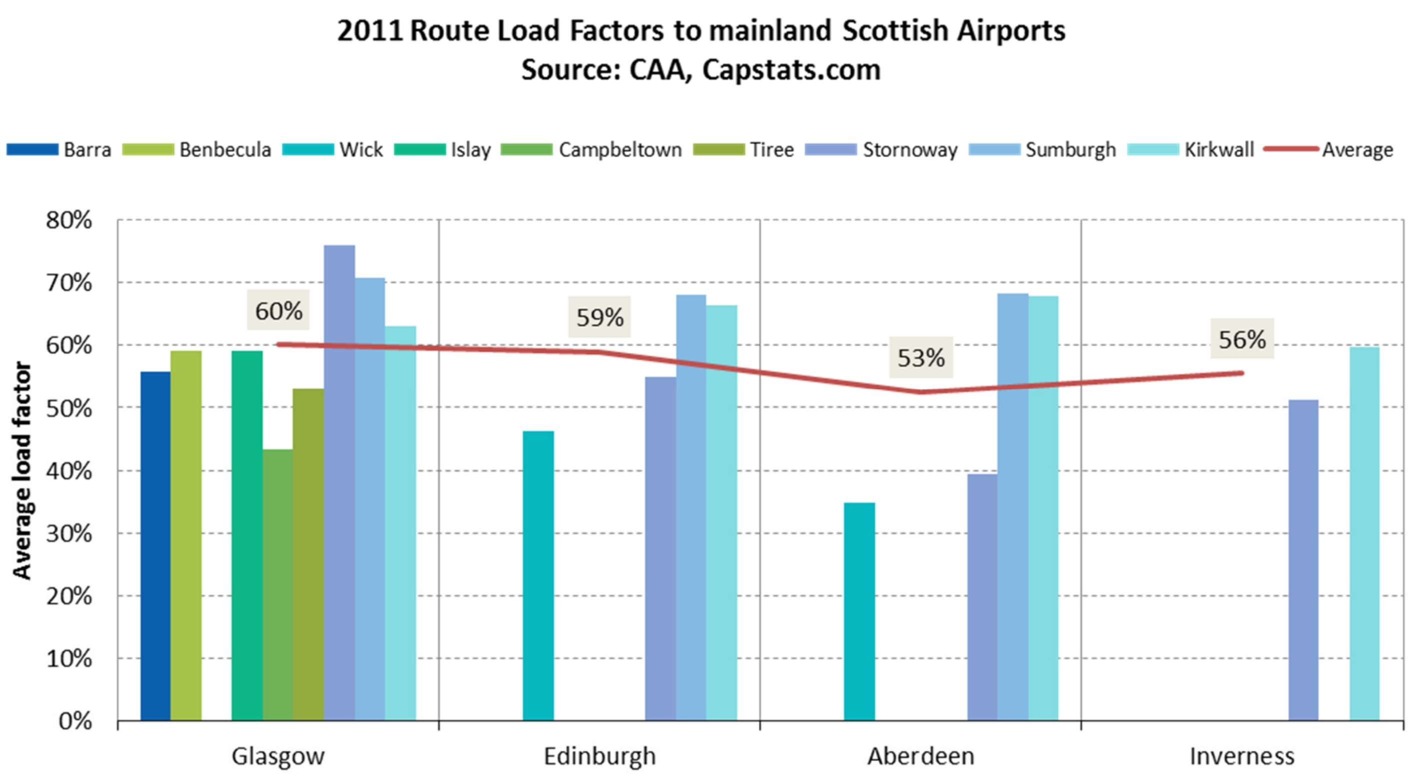


2. Study Background

2.3 Benchmarking review of other air service routes

Benchmark Airport Performance – HIAL route load factors to mainland Scottish airports

- The chart below summarises the load factors on HIAL services to mainland Scottish airports for 2011. On average, services to Glasgow achieved the highest average load factor of 60%, ranging from 43% (Campbeltown) to 76% (Stornoway).
- Services to Edinburgh had a similar average load factor (59%), and again had a similar range of route load factors from 46% (Wick) to 68% (Sumburgh).
- Services to Aberdeen and Inverness had lower load factors (53% and 56% respectively), indicating that in general, there is greater demand from HIAL airports to the two largest cities in Scotland – Glasgow and Edinburgh.



2. Study Background

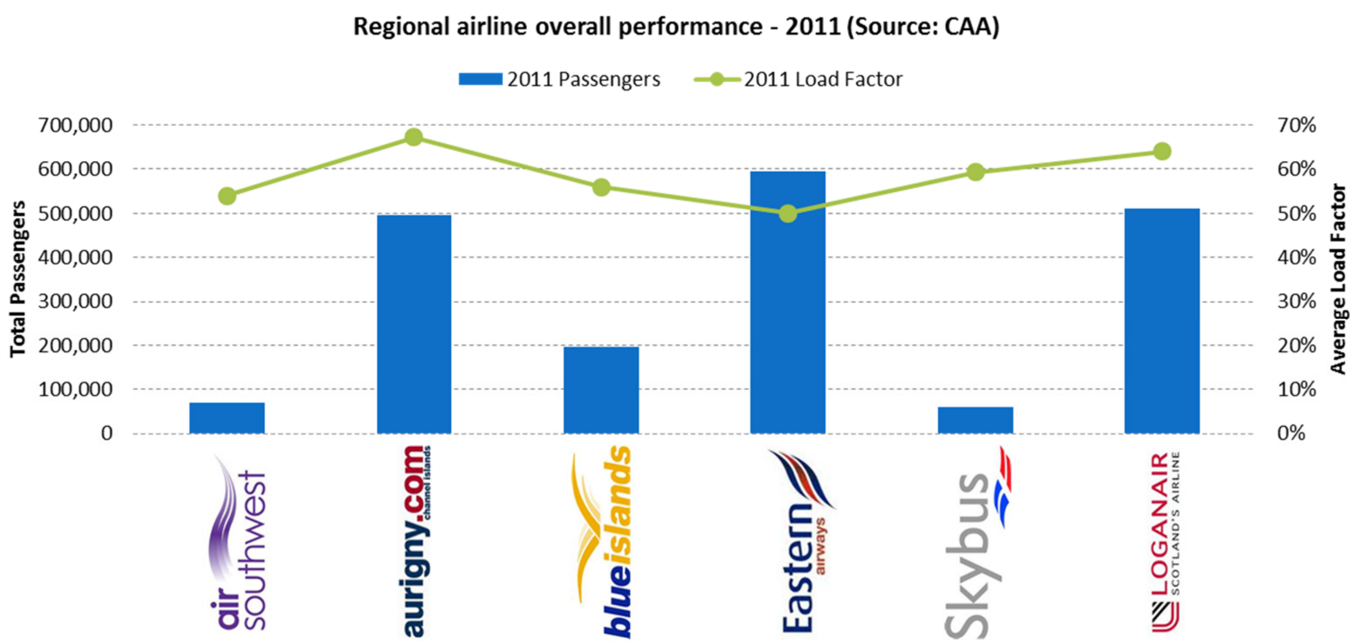
2.3 Benchmarking review of other air service routes

Regional airline performance

- An overview of the performance of the main British regional airlines during 2011 (handling under 1m passengers per annum) is provided below. Of these airlines, Loganair and Eastern Airways are the only ones to operate to/from Scottish airports, with the former being the most dominant, especially for services to/from HIAL airports.

- Loganair's average load factor during 2011 was 64% - one of the highest from the regional airline group – and handled just over 500,000 passengers. While Eastern Airways handled the most passengers (almost 600,000) its load factor was lower at just over 50%.

- Other regional airlines operated with load factors of between 54% and 67%. It should be noted that operations with Air Southwest, purchased by Eastern Airways in late 2010, were eventually halted in late 2011.



3. Airfield Infrastructure

3. Airfield Infrastructure

3.1 Context

- An important part of this study is to explore the infrastructure needed to support new air passenger services at Broadford airstrip and assess the likely investment needed to gain a permit to operate the aerodrome for commercial services.

- The main issues that the study has considered with respect to the infrastructure needs are:
  - The runway length that might be feasible given the local environment and the aircraft types which can viably operate from runways of these lengths;
  - The issues associated with navigational aids that might be provided which would help enhance the reliability of operations to the airport in periods of low visibility;
  - The resulting airfield classification (e.g. Visual Approach or Instrument Approach) that the airfield needs to be designed for;
  - The additional facilities that might be needed.

- The work has been based on a number of previous studies that have investigated a wide range of potential runway and development options. This study draws heavily from this work and particularly the 'Ashaig Airstrip, Broadford Runway Development Options Study' completed by Mott MacDonald in November 2006. It has not been the intention to duplicate the work in this study, but where appropriate the findings, such as CAPEX costs, have been updated.

Instrument Systems

- One of the important conclusions of the previous studies was that navigational instrument approach aids would be needed to allow reliable operations in poor visibility conditions. Cancellation or diversion of services results in significant costs to airlines, and service reliability influences passenger decisions to fly as opposed to using other available modes of travel. It was felt that these factors would both reduce the underlying passenger demand and reduce the attractiveness of the airstrip for airlines due to these additional operational costs.

- The previous studies therefore investigated a range of runway options which incorporated ILS systems and airfield arrangements suitable for precision instrument approaches.

- In the period since the previous reports were complete, GNSS (Global Navigation Satellite Systems) technologies have advanced considerably and flight procedures for GNSS instrument approaches are now in operation at many USA airports and an increasing number across Europe and the UK.

- GNSS systems are aircraft cockpit based systems which essentially eliminates the need for ground based navigational aids and consequently have a number of cost saving advantages.

3. Airfield Infrastructure

3.1 Context

Instrumented Approach Operations

- However, whether an airstrip is permitted to operate with instrument assisted approaches or only for visual approaches is not only an issue of having the appropriate equipment installed and pilots having adequate training to use it.

- On instrument approaches navigation systems are used to guide aircraft through the early stages of approach to a point where the pilot can see the runway and land the aircraft or choose to abort the attempt. Approved instrument approach procedures are followed which define the routing and minimum height/altitude ('minima') which the pilot should not drop below until visual contact is made with the runway.

- The lower the minima is, the fewer occasions there are likely to be when the pilot has to abort the landing attempt due to the visibility being too poor once the decision height is reached. Clearly, this is beneficial for maintaining reliable service.

- Instrument approach runways are classified (Cat I, II, III) based on the decisions minima with increasingly onerous airfield design requirements imposed as the Cat level increases (and decision height minima reduces).

- The reason for this is principally that as the point at which the pilot transfers from instrument to visual navigation gets lower, the time available for the pilot to visually assess the aerodrome environment is reduced.

- The CAA publish in their document, CAP168, the requirements for airfields. This specifies significant differences between Visual Approach and Instrument Approach runway as well as differences between categories of Instrument runways.

- In terms of the physical and spatial layout of the airfield, the most significant differences are the increased zones either side of the runway which must be free of obstructions and designed to minimise damage to aircraft which stray off the runway. Also, additional safety areas at each end of the runway are required as are enhanced approach lighting systems.

- Specifically for example, CAP168 requires the runway strip (an area cleared of obstructions and graded to support an aircraft) to extend 75m either side of the runway centreline for a Code 2 instrumented runway compared to 40m either side of a Code 2 non-instrumented runway.

- Also, Runway End Safety Areas (RESAs) of 90m beyond each end of the runway are required for Code 2 instrumented runways but none are needed for Code 2 non-instrumented runways. RESAs are intended to minimise risks to aircraft and their occupants when an aeroplane overruns or undershoots a runway.

- **GNSS Instrument Approaches**
- The requirements of CAP168 were developed on the basis of conventional instrument systems such as ILS and VHF omni directional range (VOR). GNSS systems require significantly different processes and procedures to be followed and place different demands on pilots.

3. Airfield Infrastructure

3.1 Context

- The UK is in the early stages of adopting and approving GNSS approach procedures and this is also promoting a discussion within the industry on the CAP168 airfield requirements with respect to GNSS approaches.
- We understand that HIAL (Highland and Islands Airports Ltd) are currently undertaking work to prepare and gain approval for GNSS approach procedure for runways at Campbeltown, Barra and Benbecula airports. In the case of Barra, proposed flight procedures have a minima of approximately 350ft . According to CAP168 this would categorise the runway as a Cat I Instrument Approach. However, a risk based approach has been used to argue that full airfield enhancements for this category are not needed.
- This procedure is currently with the CAA for considerations but HIAL do not anticipate receiving direction on their submission before early to mid 2013. The results of this work could set an important precedent for similar processes at other airports but it is not possible to predict what the outcome will be with any certainty.
- This is particularly important for the study for Skye as the previous studies found that developing infrastructure for full compliance with the requirements for Instrumented runways was overwhelmingly expensive and unaffordable.
- However, given the uncertainty of the outcome of the HIAL work, the approach taken for this study has been to investigate the minimum cost development options for both Visual Approach and Instrument Approach categories of runway but replacing the ILS systems with the assumption that aircraft will be equipped with GNSS navigational aids.
- If the outcome of the HIAL work is favourable, specific studies would then be needed to develop GNSS procedures for Broadford aerodrome based on the existing terrain environment and proposed infrastructure. A clear understanding could then be gained of the benefits to service reliability and hence attractiveness for airlines to operate scheduled services.

3. Airfield Infrastructure

3.2 Runway Options

- Within this study four runway options have been included which have been based on the runway development options prepared by Mott MacDonald in their 2006 study. The options included concentrate on the 'lower initial cost' Mott MacDonald development options.

- Due to the uncertainty around future approaches taken by the CAA on airfield infrastructure requirements for GNSS approaches, this study includes options for both Visual Approach and Precision Approach category runway. This issue is discussed in more detail in the previous section.

- The runway options considered are:
  - Option A : Existing Airstrip 773m Code 1C Visual Approach
  - Option B : 900m Code 2C Visual Approach
  - Option C: 1035m Code 2C Precision Approach
  - Option D: 950m Code 2C Precision Approach

- The Code description for each runway above refers to the runway classification in CAP168. Code 1 runways are where the greater of the TODA[1] or ASDA[2] are less than 800m. A Code 2 runway is where these dimensions are between 800m and 1199m. The letter in the Code reference is primarily a reflection on the maximum wing span of the intended aircraft. A Code C runway is for aircraft with wingspan width less than 36m.

Option	Descriptor	Comments
Option A	771m Code 1C Visual Approach	Complies with CAP168 requirements for visual runway only
Option B	900m Code 2C Visual Approach	Complies with CAP168 requirements for visual runway only
Option C	1035m Code 2C Precision Approach	Complies with CAP168 requirements for instrument runway but with minimum mandatory RESA's
Option D	950m Code 1C Visual Approach	Complies with CAP168 requirements for instrument runway with recommended length RESA's

- The measured length in the runway descriptor refers to the length of paved area. The various declared runway distances (TODA/ASDA) in some cases differ from this and are described with the options on the following pages.

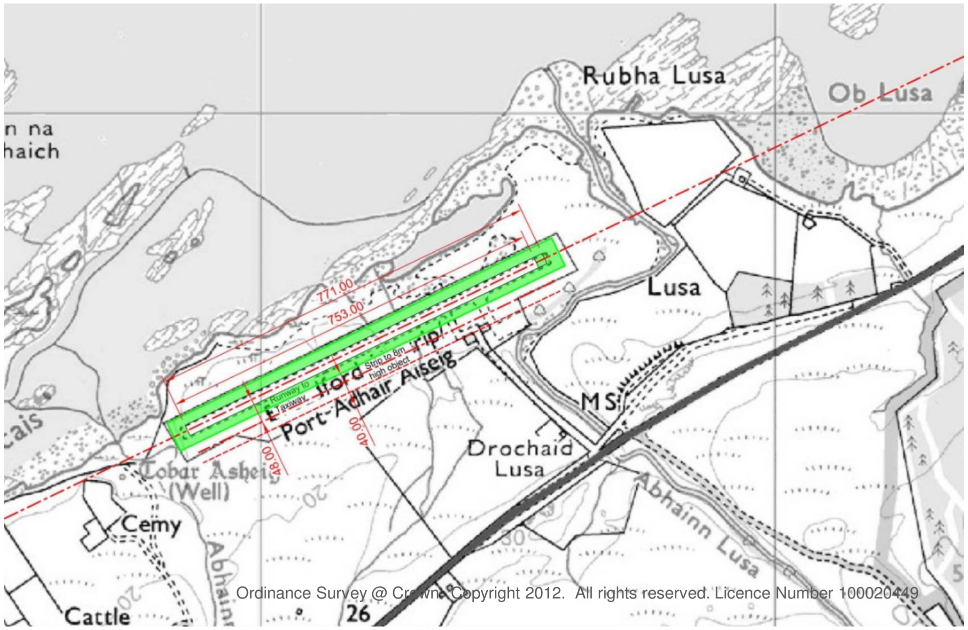
- In this study we have reviewed the option details provided in the Mott MacDonald report and updated areas such as the cost estimates. The options are summarised in the following sections and outlined in more detail in the Mott MacDonald report.

[1] TODA is the declared Take Off Distance Available
[2] ASDA is the Accelerate and Stop Distance Available

3. Airfield Infrastructure

Runway Option A

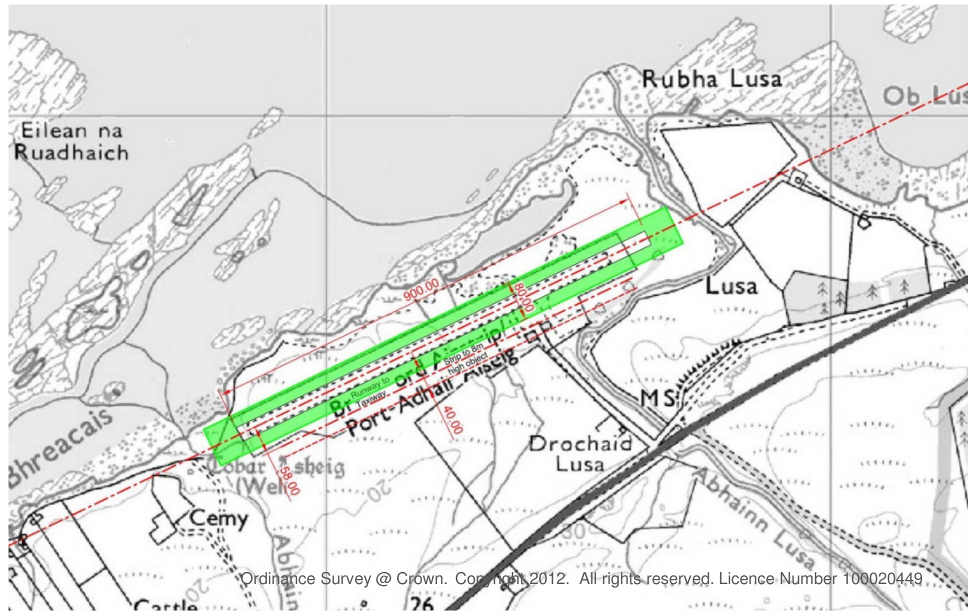
- Option A is the existing airstrip with a 771m x 23m paved runway suitable for visual approaches by Code C aircraft.
- The declared distances are:
  - Rwy 07 TORA: 771m LDA 771m
  - Rwy 24 TORA: 771m LDA 753m
- The green shaded area surrounding the runway represents the runway strip which for a Code 1 Visual Approach runway is 60m wide. This area is graded at the same level as the runway and free from obstructions. It is designed to limit damage to aircraft running off the runway or flying over it during landing or takeoff manoeuvres.
- No RESA's (runway end safety areas) are provided as these are not mandatory for non-instrument runways.
- Much of the existing apron would not be available for use due to the transition slope clearance requirements which requires clear zones to be maintained along the length of the runway. A new apron area has therefore assumed to be needed.
- A limited amount of landscape clearance is also likely to be required to clear the transition slope obstacle clearance zones.
- No significant earthworks are likely to be needed except for the construction of a new terminal and apron.
- A brief visual inspection of the runway indicates that some re-surfacing is likely to be needed in the near future, but this would need to be confirmed by a more detailed survey.



- *Option A includes the minimum level of infrastructure likely to required to licence the airstrip for scheduled services.*
- *The outcome of HIAL's submission to the CAA for GNSS approach procedures for Barra, Campbeltown and Benbecula will give an indication of CAA's view on setting minimum decision heights for airstrips with Visual Approach category infrastructure. This, along with discussions with potential airlines, should inform whether it would be beneficial to develop GMSS procedures for this option.*

Runway Option B

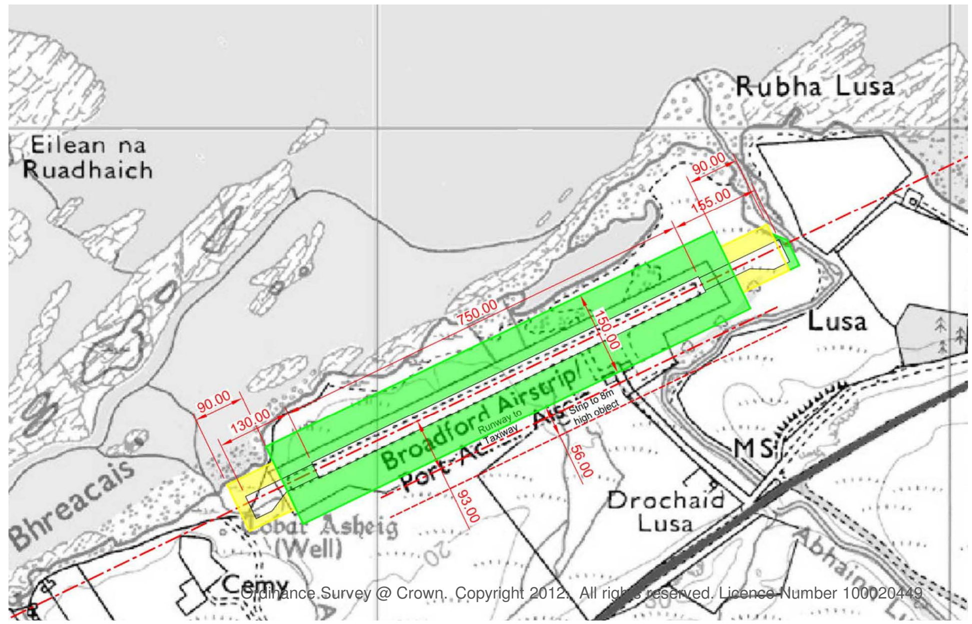
- Option B is a lengthening and widening of the existing airstrip to 900m x 30m with infrastructure based on non-instrument requirements for a Code 2 runway as described in CAP168.
- The declared distances are:
  - Rwy 07 TORA: 900m LDA 900m
  - Rwy 24 TORA: 900m LDA 900m
- The lengthened runway results in it being categorised as a Code 2 runway which requires both a widening of the paved runway from 23m to 30m and of the runway strip (green shaded area surrounding the runway) to 80m.
- The lengthening and widening works will require re-grading of the terrain along the length of the runway and fill to the east end where the land contours drop and culverting over the Abbhainn Ashik.
- Obstacle clearance requirements will again mean that the existing apron will not be available for parking aircraft so a new apron has been assumed.
- In addition to widening of the runway paved area, re-surfacing of the existing runway is assumed.



- *Option B is the longest Visual Approach runway that can be accommodated without encroachment into the graveyard at Tobar Ashik to the east or the Abhainn Lusa watercourse to the west .*
- *The outcome of HIAL's submission to the CAA for GNSS approach procedures for Barra, Campbeltown and Benbecula will give an indication of CAA's view on setting minimum decision heights for airstrips with Visual category infrastructure. This, along with discussions with potential airlines, should inform whether it would be beneficial to seek approval for GNSS procedures for this option.*

Runway Option C

- Option C is the maximum length precision approach runway that can be accommodated between the graveyard site at Tobar Ashik and the Abhainn Lusa watercourse.
- As an instrumented Code 2 runway CAP168 requires RESA's at each end which reduces the available length for landing to the central 750m of the paved area. The Take Off Distance Available has been maximised by incorporating starter strips into the RESA's, which results in the overall paved length being 1035m.
- The declared distances are:
  - Rwy 07 TORA: 880m LDA 750m
  - Rwy 24 TORA: 905m LDA 750m
- The runway strip for a Code 2 instrument runway is considerably wider than for Visual Approach runways at 150m compared to 80m for Option B.
- RESA's of 90m x 90m have been accommodated which is the minimum size required for this category of runway. However, this is smaller than the 120m recommended in CAP168.
- The wider runway strip will mean that there is significantly more earthworks and vegetation clearance needed for this option compared to the two non-instrument options.
- The existing runway sections are assumed to be re-surfaced.



- *Option C is the shortest Instrument Approach runway that can be accommodated without encroachment into the graveyard at Tobar Ashik to the west or the Abhainn Lusa watercourse to the east.*
- *The runway had the minimum mandatory RESA's required for this category of runway but falls short of the recommended length. Discussions will be needed with the CAA to confirm if these RESA lengths are considered acceptable based on the type of traffic anticipated*

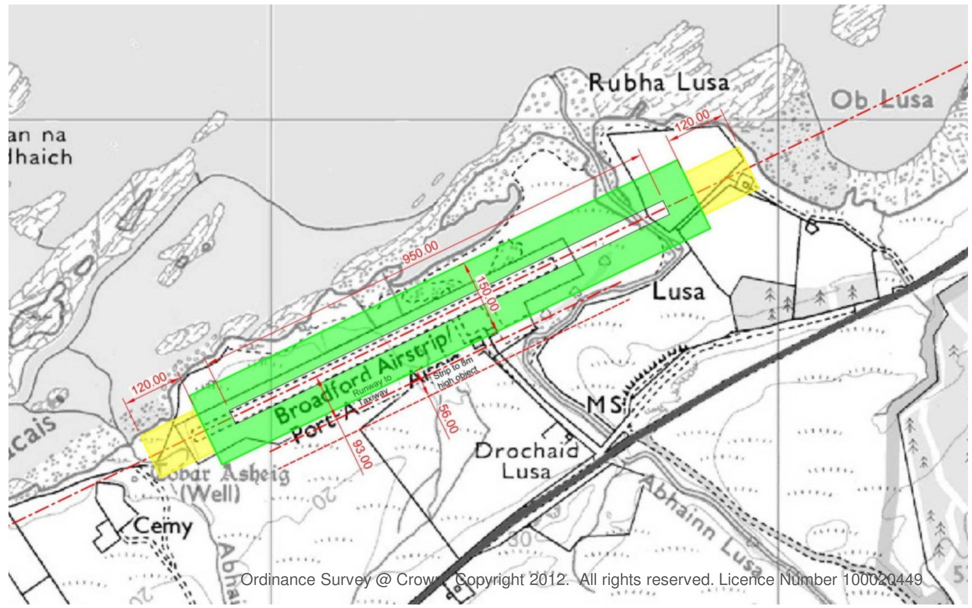
3. Airfield Infrastructure

Runway Option D

- Option D is an instrumented Code 2 runway with the full recommended 120m RESA's at each end and a 950m paved runway length.

- The declared distances are:
  - Rwy 07 TORA: 950m LDA 950m
  - Rwy 24 TORA: 950m LDA 950m

- The longer RESA's make it impractical for a Code 2 runway to be accommodated between the graveyard site and the Abhainn Lusa watercourse. The eastern end therefore extends over the top of the culverted stream.
- In this option, starter strips are not included so the TORA and LDA are both the same length.
- The runway strip is similar to Option C at 150m and extends 60m beyond the paved runway. The RESA's extends beyond the end of the runway strip.
- The existing runway sections are assumed to be re-surfaced.



- *Option D utilises all the available land from the graveyard at Tobar Ashik to the east to the beach at Ob Lusa Bay to the west to provide an Instrumented Code 2 runway with TORA and ASDA lengths of 950m.*
- This option is likely to have the greatest environmental impact on the coastal SSSI.

3.3 Aircraft Payload

- Using aircraft manufacturers' data, an analysis of the capability to operate different aircraft on each of the four runway options has been undertaken.
- An assessment has been made of whether the different aircraft types can carry their maximum payloads on each runway option, or if it is possible with a payload restriction.
- The table on the following page gives details of this analysis, with the figures relating to the percentage of payload that can be carried by each aircraft on each route. In each case the lower of the landing and take-off payload restrictions should be taken as the restriction that would apply to the aircraft flying the return route.
- The results of this analysis are inputs into the traffic forecast analysis and associated operating cost analysis.

Option	Aircraft which can operate to EDI and GLA without payload restrictions	Aircraft which can operate to EDI and GLA with restrictions not less 75% to 99% of maximum payload
Option A	Islander BN-2B-20 Islander BN-2B-26 Trislander BN-2A MkIII	Bombardier DHC-6 300 Bombardier DHC-6 400
Option B	As option A plus: Dornier 228-212	As Option A plus: Bombardier DHC-8 100ER Bombardier DHC-8 101 Bombardier DHC-8 102 Bombardier DHC-8 103 Bombardier DHC-8 201 Bombardier DHC-8 201ER Bombardier DHC-8 202 Bombardier DHC-8 202ER
Option C	As option A plus: Dornier 228-212	As Option A
Option D	As option A plus: Dornier 228-212	As Option A plus: Bombardier DHC-8 100ER Bombardier DHC-8 101 Bombardier DHC-8 102 Bombardier DHC-8 103 Bombardier DHC-8 201 Bombardier DHC-8 201ER Bombardier DHC-8 202 Bombardier DHC-8 202ER

Bombardier DHC-6 - Twin Otter
Bombardier DHC-8 - Dash 8

3. Airfield Infrastructure

Aircraft Payload

Aerodrome IATA Code	SKL	
Aerodrome Elevation	10	m
Airfield Ref Temp	13	°C
Runway Slope	0	%
All Conditions	WET	

				Option A - Existing Code 1C 753m Visual Approach Runway ASDA/TODA - 771m LDA - 753m			Option B - Code 2C 900m Visual Approach Runway ASDA/TODA - 900m LDA - 900m			Option C - Code 2C 1035m Precision Approach Runway ASDA/TODA - 950m LDA - 750m			Option D - Code 2C 950m Precision Approach Runway ASDA/TODA - 950m LDA - 950m		
				Max takeoff Payload %		Max landing Payload %	Max takeoff Payload %		Max landing Payload %	Max takeoff Payload %		Max landing Payload %	Max takeoff Payload %		Max landing Payload %
Manufacturer	Aircraft Designation	Engine Number	Engine Type	EDI	GLA		EDI	GLA		EDI	GLA		EDI	GLA	
Bombardier	DHC-6-300	2	PT6A-27	95%	96%	84%	95%	96%	100%	95%	96%	84%	95%	96%	100%
Bombardier	DHC-6-400	2	PT6A-34	92%	93%	100%	95%	96%	100%	95%	96%	100%	95%	96%	100%
Bombardier	DHC-8-100ER	2	PW121	68%	69%	N/A	92%	92%	75%	100%	100%	N/A	100%	100%	83%
Bombardier	DHC-8-101	2	PW120A	68%	69%	N/A	92%	92%	75%	100%	100%	N/A	100%	100%	83%
Bombardier	DHC-8-102	2	PW120A	68%	69%	N/A	92%	92%	75%	100%	100%	N/A	100%	100%	83%
Bombardier	DHC-8-103	2	PW121	68%	69%	N/A	92%	92%	75%	100%	100%	N/A	100%	100%	83%
Bombardier	DHC-8-201	2	PW123C	67%	67%	N/A	87%	88%	97%	94%	95%	N/A	94%	95%	100%
Bombardier	DHC-8-201ER	2	PW123C	65%	66%	N/A	86%	87%	97%	94%	94%	N/A	94%	94%	100%
Bombardier	DHC-8-202	2	PW123D	63%	64%	N/A	85%	86%	97%	94%	94%	N/A	94%	94%	100%
Bombardier	DHC-8-202ER	2	PW123D	61%	62%	N/A	84%	85%	97%	93%	93%	N/A	93%	93%	100%
Bombardier	DHC-8-300ER	2	PW123E	N/A	N/A	N/A	62%	63%	N/A	69%	69%	N/A	69%	69%	N/A
Bombardier	DHC-8-301	2	PW123	N/A	N/A	N/A	77%	77%	N/A	84%	85%	N/A	84%	85%	N/A
Bombardier	DHC-8-311	2	PW123	N/A	N/A	N/A	77%	77%	N/A	84%	85%	N/A	84%	85%	N/A
Bombardier	DHC-8-314	2	PW123B	N/A	N/A	N/A	69%	70%	N/A	75%	76%	N/A	75%	76%	N/A
Bombardier	DHC-8-315	2	PW123E	N/A	N/A	N/A	64%	65%	N/A	70%	71%	N/A	70%	71%	N/A
ATR	ATR 42-500	2	PW127E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Saab	340A	2	CT7-5A2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Saab	340B	2	CT7-9B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dornier	228-212	2	TPE331-5A	N/A	N/A	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Dornier	328-110	2	PW119B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Britten-Norman	BN-2B-20 Islander	2	IO-540	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Britten-Norman	BN-2B-26 Islander	2	O-540	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Britten-Norman	BN-2A Mk III Trislander	3	O-540	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Fairchild	Metro 23	2	TPE331-12UHR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beechcraft	1900C	2	PT6A-65B	N/A	N/A	N/A	N/A	N/A	100%	N/A	N/A	N/A	N/A	N/A	100%
Beechcraft	1900D	2	PT6A-67D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	100%
BAe	Jetstream 31	2	TPE331-10UG	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BAe	Jetstream 32	2	TPE331-12B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BAe	Jetstream 32EP	2	TPE331-12B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BAe	Jetstream 41	2	TPE331-14GR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- The analysis considers the requirements of aircraft under wet conditions (which is more onerous than dry).
- The take-off and landing length requirements are calculated separately. The allowable payload is the lowest of the calculated percentages.
- For departing aircraft, it is assumed that only enough fuel is carried for the safe trip with a contingency to either of Glasgow and Edinburgh Airports.
- Arriving aircraft are assumed to carry sufficient fuel for the return journey so refuelling at Broadford is not necessary.
- N/A indicates where the allowable payload is below the range covered in the data available from the manufacturers and hence the aircraft is not able to use a runway of the length considered.

3.4 CAPEX

Option A

- The minimum capital investment needed to the existing airfield to accommodate 19-seater aircraft is estimated to be approximately £2.3m to 2.8m.
- This includes the construction of :
  - 720sqm terminal building fitted out to a basic standard of functionality and quality
  - 2000sqm of new apron and taxiway to accommodate two Twin Otter aircraft
  - 100 space car park
  - Minor upgrades to access road junction
  - A single Cat 3a standard RFFS vehicle with garaging facility, storage and basic non-residential staff facilities
- The runway condition is assumed to require only minor patch repairs to surface before remarking
- Minimum allowances of £20-30k have been included for upgrades to each of the existing runway lighting systems and instruments and equipment (radio, meteorological equipment etc)
- A small allowance has been included for upgrading the boundary fence to prevent stray animals entering the airfield. It is assumed that a full security fencing to protect the airfield from unauthorised persons entering is not required but this will need to be discussed with the DfT.
- No hangar has been included. If airlines are to base aircraft overnight at the airfield then they may require this to be provided.
- This estimate is considered to represent the minimum level of investment that might be required subject to successful discussions with the CAA, DfT, the potential airline operators and Fire Authorities. If these third parties do not accept the compromises needed to minimise the initial investment, it may be that up to £2m additional Capex is needed.

Option A – cost estimated in 2012 prices	
Earthworks, drainage and vegetation removal	£5-6k
Runway and existing apron refurbishment	£70-80k
New apron and taxiway (including mixing plant)	£300-360k
Runway extension and widening	-
Culverts and structures	-
Runway, apron and approach lighting and marking	£60-80k
Upgrade to radio, signage, meteorological equipment and windsock	£20-30k
New terminal building	£770-940k
Car parking and road junction upgrade	£160-190k
Rescue and Fire Fighting Service Facilities	£90-100k
Boundary fence upgrade	£20-30k
Hanger	**-**
Preliminaries @ 18%	£270-330k
Sub-total	**£1,765-2,156k**
Contingencies @ 20%	£350-430k
Professional Fees @10%	£180-210k
Total	**£2,300-2,800k**

3. Airfield Infrastructure

3.4 CAPEX

Option A continued.

- If the existing airfield is developed initially to accommodate only the 9-seater Islander aircraft, it would be possible to reduce the size of some of the facilities needed. This could reduce the initial Capex needed to approximately £1.6m to 2.1m.
- This would include the construction of :
  - 400sqm terminal building fitted out to a basic standard of functionality and quality
  - 1500sqm of new apron and taxiway to accommodate two Islander aircraft
  - 50 space car park
- Other assumptions are similar to those described on the previous page.

3. Airfield Infrastructure

Option B

- The minimum capital investment needed for Option B to accommodate 19-seater aircraft is estimated to be approximately £6.2 to 7.6m.
- The provisions for a new terminal building, apron, car parking, and road access is the same as for Option A
- The major additional costs include:
  - Earthworks for widening and lengthening the runway strip and increasing the obstacle clearances associated with the wider runway
  - A full resurfacing of the existing runway to be compatible with the new build extensions to the length and width of the runway
  - A culvert structure needed for the west end extension of the runway
  - New runway edge lighting for the widened runway
- As for Option A, a minimum allowances of £20-30k has been included for upgrades to instruments and equipment (radio, meteorological equipment etc)
- A small allowance has been included for upgrading the boundary fence to prevent stray animals entering the airfield. It is assumed that a full security fencing to protect the airfield from unauthorised persons entering is not required but this will need to be discussed with the DfT.
- No hangar has been included. If airlines are to base aircraft overnight at the airfield then they may require this to be provided.
- This estimate is considered to represent the minimum level of investment that might be required subject to successful discussions with the CAA, DfT, the potential airline operators and Fire Authorities. If these third parties do not accept the compromises needed to minimise the initial investment, it may be that up to £2m additional Capex is needed.

Option B – cost estimated in 2012 prices	
Earthworks, drainage and vegetation removal	£1,400-1,700k
Runway and existing apron refurbishment	£500-660k
New apron and taxiway (including mixing plant)	£330-410k
Runway extension and widening	£500-620k
Culverts and structures	£60-80k
Runway, apron and approach lighting and marking	£200-240k
Upgrade to radio, signage, meteorological equipment and windsock	£20-30k
New terminal building	£770-940k
Car parking and road junction upgrade	£160-190k
Rescue and Fire Fighting Service Facilities	£90-110
Boundary fence upgrade	£20-30k
Hanger	-
Preliminaries @ 18%	£730-890k
Sub-total	**£4,780-5,850k**
Contingencies @ 20%	£950-1,170k
Professional Fees @10%	£480-580k
Total	**£6,200-7,600k**

3. Airfield Infrastructure

Option C

- The capital investment needed for Option C to accommodate 19-seater aircraft is estimated to be approximately £9.7m to £11.7m.
- The provisions for a new terminal building, apron, car parking, and road access is the same as for Option A
- The major additional costs include:
  - Earthworks for widening and lengthening the runway strip and increasing the obstacle clearances associated with the wider runway
  - A full resurfacing of the existing runway to be compatible with the new build extensions to the length and width of the runway
  - A culvert structure needed for the west end extension of the runway
  - New runway edge lighting for the widened runway
  - 5-bar approach lighting for Instrument Category runways (on the eastern approach only as the cemetery is assumed to prevent similar systems being located to the west).
- As for Option A, a minimum allowance of £20-30k has been included for upgrades to instruments and equipment (radio, meteorological equipment etc).
- A 3m high chain link perimeter fence to DfT standards has been included.
- A hangar to accommodate a single Twin Otter sized aircraft is included.
- Upgraded RFFS facilities is provided which includes a sea rescue RIB, associated garaging and enhanced staff facilities.
- ILS equipment is not included in the estimate, it is assumed that GNSS systems would be installed in-aircraft to provide approach assistance.

Option C – cost estimated in 2012 prices	
Earthworks, drainage and vegetation removal	£2,100-2,500k
Runway and existing apron refurbishment	£490-590k
New apron and taxiway (including mixing plant)	£450-550k
Runway extension and widening	£770-940k
Culverts and structures	£70-90k
Runway, apron and approach lighting and marking	£650-790k
Upgrade to radio, signage, meteorological equipment and windsock	£20-30k
New terminal building	£770-940k
Car parking and road junction upgrade	£160-190k
Rescue and Fire Fighting Service Facilities	£270-330k
Boundary fence upgrade	£320-390k
Hangar	£290-330k
Preliminaries @ 18%	£1,120-1,370k
Sub-total	**£7,460-9,040k**
Contingencies @ 20%	£1,470-1,800k
Professional Fees @10%	£740-900k
Total	**£9,700-11,700k**

3. Airfield Infrastructure

Option D

- The capital investment needed for Option D to accommodate 19-seater aircraft is estimated to be approximately £12.5m to £15.3m.
- This option has the same facilities as Option C, but has additional earthworks and pavement costs to achieve a full recommended length RESA.
- Additional cost is also included for a culvert over the Abhainn Lusa watercourse.

Option D – cost estimated in 2012 prices	
Earthworks, drainage and vegetation removal	£3,800-4,600k
Runway and existing apron refurbishment	£490-590k
New apron and taxiway (including mixing plant)	£520-640k
Runway extension and widening	£500-620k
Culverts and structures	£480-580k
Runway, apron and approach lighting and marking	£650-790k
Upgrade to radio, signage, meteorological equipment and windsock	£20-30k
New terminal building	£770-940k
Car parking and road junction upgrade	£160-190k
Rescue and Fire Fighting Service Facilities	£90-110k
Boundary fence upgrade	£360-440k
Hangar	£270-330k
Preliminaries @ 18%	£1,490-1,820k
Sub-total	**£9,600-11,680k**
Contingencies @ 20%	£1,950-2,380k
Professional Fees @10%	£970-1,190k
Total	**£12,500-15,300k**

3. Airfield Infrastructure

3.5 Operating and Maintenance Costs

- Order of magnitude O&M costs have been estimated for each of the options based on high level benchmarking and rule-of-thumb rates from comparable airports.
- Average annual maintenance costs are based on 2.5% or the asset replacement cost and is deemed to include cleaning, on-going minor repairs and decoration, consumables and airfield maintenance. Replacement costs of equipment, and renovation and upgrades of the airfield and terminal facility are not included.
- Staff related costs cover the airport management, security and fire fighting teams. Baggage handling and aircraft ground servicing is not included and assumed to be airline cost. Cleaning and estate maintenance staff costs are included in the maintenance costs.
- Staff related costs are based on:
  - 3 FTE airport management staff
  - 6 FTE fire fighting staff
  - 5 FTE security staff
  - An overhead of 60-90% to cover insurances, direct employment cost and other assigned central office overhead costs.
- These staffing levels are considered to be a reasonable minimum based on providing cover only during morning and afternoon operating periods. It may be possible that some cost reductions could be achieved if roles are shared with other Local Authority or Fire Service activities.
- Power and utilities are based on benchmark rates for similar facilities. Options C and D include costs associated with enhanced approach lighting, RFFS and hangar facilities.
- It is difficult to make direct comparisons with the operating costs at other airports as the assignment of central office overheads and arrangements for part time operations for staff differ between airports.

Annual Costs £s In 2012 prices	Maintenance Costs	Staff Related Costs	Power & Utilities	Total Annual Costs
Option A	£110-130k	£420-500k	£20-25k	£550-660k
Option B	£220-260k	£420-500k	£20-25k	£660-790k
Option C	£310-370k	£420-500k	£25-30k	£760-910k
Option D	£400-480k	£420-500k	£25-30k	£850-1,010k

- Notwithstanding this, in annual financial statements prepared by Highlands and Islands Airports Ltd for the periods between 2006 and 2010, the operating costs for Barra Airport were recorded as being between £650-700k per annum.
- Barra Airport is of a similar size to Option A but has some significant differences, particularly the fact that aircraft land on the beach. However, the operating costs are of a similar order-of-magnitude as estimated for Option A.

4. Traffic Forecasts

4. Traffic Forecasts

4.1 Forecast background and methodology

Demand Drivers

- As with all air services, there are several main drivers behind demand for air travel at a macro-economic level. These include:
  - The population catchment size of the airport/service (with a larger population generally leading to greater traffic volumes);
  - The wealth of a region (with more wealthy regions generally leading to greater demand due to a higher level of disposable income to spend on air travel);
  - The alternative options for travel (with greater modal competition generally leading to fewer air passengers);
  - The cost of air services (and modal competitors), with cheaper air fares (especially in comparison to modal competitors) leading to greater stimulation in travel demand;
  - Modal competitor travel times (with longer journeys by other modes generally making air travel a more attractive option, especially for business travel), and;
  - Medical travel demands, while not necessarily a demand driver from Skye, are considered within the model to account for increased demand from other HIAL airports.
- All these factors are relevant for air traffic demand within the Highlands of Scotland, particularly issues surrounding (the lack of) alternate transport modes and journey times (the two not necessarily being mutually exclusive).
- As always, the benefits to a person's journey from flying often need to be weighed against the dis-benefits of (usually higher) cost, less freedom in terms of locality of end airport and actual origin/destination, additional stress of flying (such as security checks and potential delays/cancellations) and so on.

Forecast methodology overview

- As Skye has not had air services for a significant period of time (and over that time, substantial changes have occurred within the aviation industry), the forecast methodology that would normally be employed (in terms of assessing specific route performance from Skye and looking at traffic leakage to competitor airports) is not really appropriate.
- As a result, a bespoke benchmarking model has been constructed for the project, taking HIAL airport service performance, against the key demand drivers discussed left, as a starting point for assessing overall potential demand from Skye.
- This model assumes that, in general, the population on Skye does not act in any different way to the population in other Highland areas (taking into account the availability of other modes of transport and the remoteness of the region) when assessing their options for transport to/from the area. For example, if a resident from elsewhere in the Highlands were presented with the same travel options as someone on Skye, both residents would act in a similar way.
- Other research conducted by RDC Aviation into the travel habits of residents of different regions of the UK compared to others confirms this – essentially, members of the public act in the same way when deciding when, where and how they chose to travel.
- A macro-economic, multivariate model, based on the performance of air services from other benchmark airports and the demographics of these regions has been built. The same data has then been determined for Skye to give a benchmarked demand forecast for air services to/from Skye.

4. Traffic Forecasts

4.1 Forecast background and methodology

Forecast methodology overview – data sources

- The data collected to represent the demand drivers listed on the prior page are as follows:

  - **Population.** The most recent population data identified has been sourced form the Scottish Index of Multiple Deprivation (SIMD) on a Super Output Area (SOA) level. For island airports, the SOAs on that island have been chosen as being representative of the total island population. For mainland airports (Wick, Campbeltown and Skye), a review of drive-times from the airports has been undertaken, with SOAs which fall within these drive times being used as the population of the airport's catchment.

  - **Regional Wealth.** Again, data from the SIMD has been used to give a metric of economic wealth of each airport region. Typically, regional GVA would be used, but no data has been identified on a small island level. Therefore, the number of people within each SOA being classified as 'Income Deprived' has been used as a proxy for economic wealth (or deprivation).

  - **Alternate options for travel and demand on these modes.** To assess the total travel demand from each region, a review has been undertaken of traffic on alternate modes of transport. Passengers on ferry services to/from other Highland islands has been sourced from Transport for Scotland. In addition, traffic count data for vehicles passing over the A87 Skye Bridge have been sourced from Transport for Scotland to give some indication as to current travel demand to/from the Island. In addition, an average of the SIMD 'Geographical Access' index score has been taken as a proxy for how remote a region/island is.

Forecast methodology overview – data sources

- **The cost of air transport, and cost and time of other modes of transport to/from Glasgow and Edinburgh.** The benchmarking analysis, along with the online survey conducted over the last few months, has identified that Glasgow and Edinburgh would be the most likely options for air services to/from Skye. Therefore, travel costs on current air services from benchmark airports to/from Glasgow and Edinburgh (sourced from loganiar.com) have been used. In addition, the drive and ferry costs from each region to Glasgow and Edinburgh have been used (sourced from Google Maps and Calmac/NorthLink websites) as a guide of alternate travel costs.

- **Outbound passengers.** To assess the origin of demand on current HIAL airport services (i.e. whether it is inbound to or outbound from the island/airport), an analysis has been undertaken on CAA Survey Data of Scottish Airports. This analysis looked at the stated home district of passengers on HIAL services from Glasgow and Edinburgh to give an overall percentage of demand which originates at the HIAL end.

- **Medical Traffic.** Accurate data on passengers travelling for medical purposes on a route-by-route basis are unknown. However, previous research projects and studies have determined certain route-specific medical passengers, while others have measured approximate percentages too. The most appropriate route-level values for medical traffic have been included to account for the lack of this demand being within Skye traffic.

- **Air passengers (dependent variable).** To correlate these factors against actual demand, 2011 passenger data from the HIAL benchmark airports has been sourced from the CAA. However, as a mainland service is most likely from Skye, only mainland passengers have been included (i.e. excluding passengers on intra-island routes).

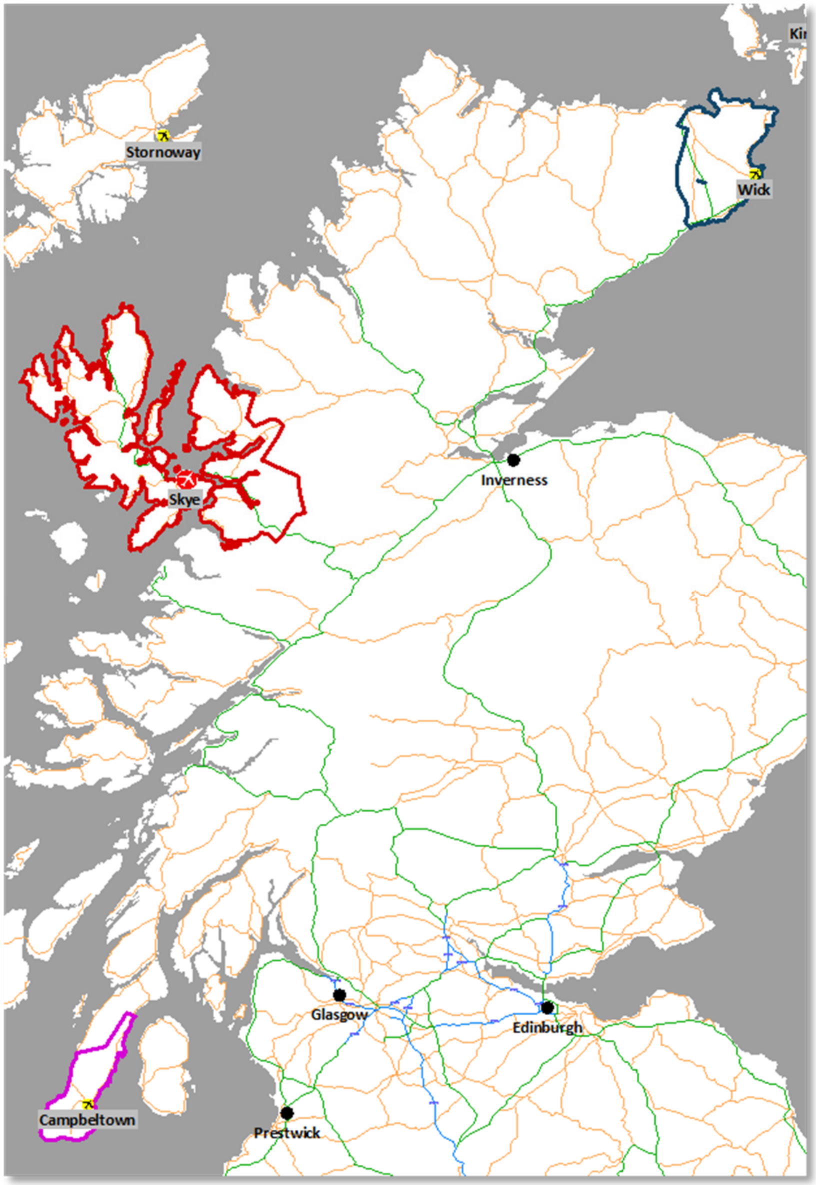
4. Traffic Forecasts

4.1 Forecast background – Population

- Population catchments for each benchmark airport (and Skye) are shown below. For the island airports, the island's total population has been used.
- For airports with connections to the mainland (Wick, Campbeltown and Skye), a drive-time analysis has been undertaken, identifying the general area each airport serves. These catchments have then been restricted according to either competitor airports (in terms of Wick vs Inverness) or where driving to the airport would be counter-intuitive (e.g. residents in Argyll and Bute driving down to Campbeltown to catch a flight back north to Glasgow).
- Skye's catchment population sits within the middle of the two extremes of low population
- The approximate drive-time areas used for mainland airports is shown right.

Airport Catchment Populations
(Source: SIMD, 2011 Mid year estimates)

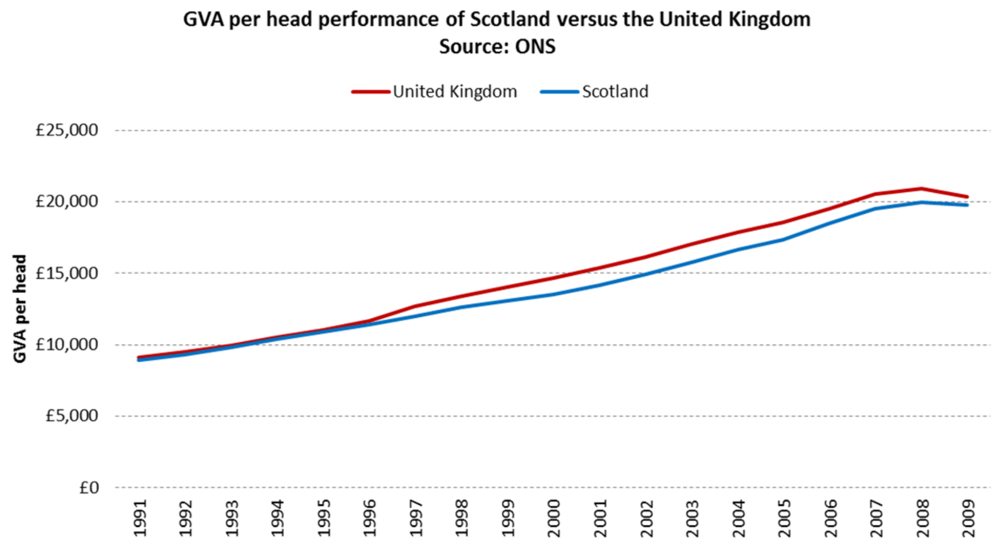
Airport	Population
Benbecula	2,706
Barra	3,979
Campbeltown	9,952
Islay	4,604
Kirkwall	20,160
Sumburgh	22,500
Stornoway	20,395
Tiree	2,048
Wick	25,160
Skye	14,664



4. Traffic Forecasts

4.1 Forecast background – Regional Wealth

- Over the last 20 years, the GVA per head of Scotland has performed strongly, being just under that of the UK as a whole (in 2009, Scotland's value stood at £19,755 per capita).
- GVA per head values are available down to a NUTS3 level, but this is insufficient to highlight the economic wealth of specific Highland airports rf regions. Therefore, a different approach has been taken to highlight an airport's economic wealth.
- The Scottish Index of Multiple Deprivation dataset breaks Scotland down into over 6,000 Super Output Areas (SOA) with specific analysis provided for each area such as population, the ranking of deprivation for each SOA against others, and the number of income deprived people within each area. It is this latter value which has been taken as a proxy for economic wealth for each airport's catchment.
- Each airport's catchment SOA's have been identified and the number of income deprived people has been totalled. This is then converted into a percentage of the total catchment population.
- The table to the bottom right shows the percent of people within each airport's catchment as being income deprived. In general, the greater the level of income deprivation, the less money people will have to spend on air fares, especially for discretionary travel, and should in theory result in less demand for air services.
- Skye's catchment has a lower level of income deprivation than the surrounding areas and therefore, other things being equal, should have a greater demand for air travel.



Airport Catchment Income Deprivation (Source: SIMD, 2011 Mid year estimates)

Airport	% Population Income Deprived
Benbecula	13%
Barra	11%
Campbeltown	16%
Islay	11%
Kirkwall	10%
Sumburgh	8%
Stornoway	15%
Tiree	11%
Wick	22%
Skye	6%

4. Traffic Forecasts

4.1 Forecast background – Cost Elasticities

- As part of this study, an overview is provided of studies which have been conducted into price elasticities to provide some context over the potential impact on demand from increasing, or decreasing fares. Typically, price elasticities come into effect when they represent a change against an existing fare, with an elasticity of -1.5 resulting in a suppression of demand of 1.5% if fares increased by 1% (for example).

- This section looks at two key studies which have looked at cost elasticities in detail:
  - North American studies undertaken on behalf of the Canadian Government by Gillen et al in 2003.
  - A wide-ranging global study carried out for IATA by Intervistas in 2007.

- In addition, a summary of elasticities from two more local studies isprovided:
  - UK focused investigations of the elasticity issue reported by the CAA in 2005.
  - Detailed work on the subject underpinning the UK Department for Transport's latest national passenger forecasts published in 2011.

- Each of these independent studies combines its own literature review with econometric analysis of trends in income, fares and passenger numbers, and therefore between them enable a comprehensive overview of the issue. Gillen and Intervistas provide international empirical evidence; the CAA and DfT's work focuses on the UK aviation market.

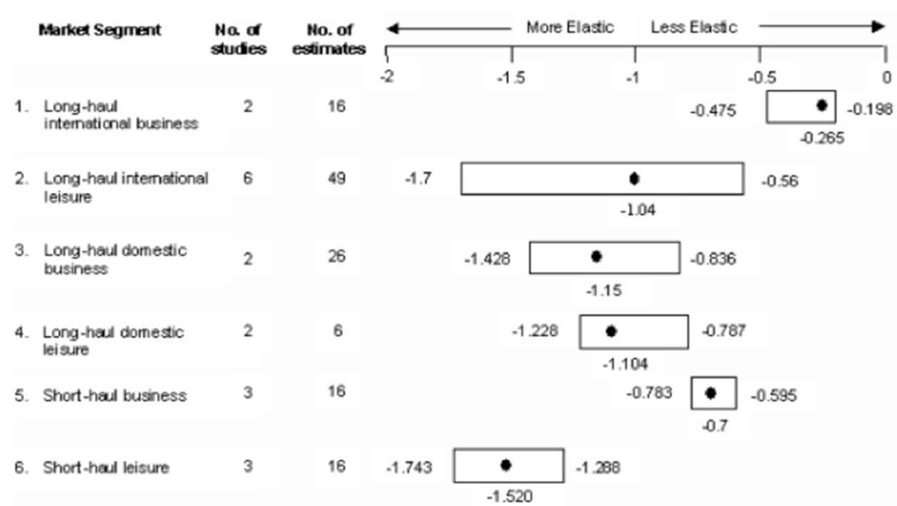
4. Traffic Forecasts

4.1 Forecast background – Cost Elasticities

Canadian Studies: Gillen et al – 2003 (Gillen, D.W., W.G. Morrison and C. Stewart for Department of Finance, Government of Canada: Air travel demand elasticities - concepts, issues and management; 2003)

- The comprehensive review of existing studies undertaken by Gillen et al for the Canadian Department of Finance in 2003 provides a seminal comparative evaluation of the elasticity of air travel available from the academic literature. They collected 254 *own-price elasticity* estimates from 21 empirical studies and 132 *income elasticity* estimates from 14 studies. From this data they identified six distinct markets that studies of the demand for air travel should distinguish between:
    - Business and leisure travel
    - Long-haul and short-haul travel
    - International and North American long-haul travel
- Accordingly, to examine the sensitivity of the demand for air travel to its price, separate estimates of the own-price elasticity of demand were gathered for each of these six markets.
- Gillen et al then went on to postulate that since the availability of alternative modes of transportation that are reasonably close substitutes for air transport diminishes with distance travelled, it can be expected that the demand for air transport will be less elastic for longer flights than for shorter flights. Further, the report hypothesises that international travel tends to be spread over more time than domestic travel, so that the airfare is a smaller proportion of overall trip costs, which makes international travel less sensitive to changes in ticket prices. And finally, they anticipate that leisure travellers are more likely to postpone trips to specific locations in response to higher fares, or to shop around for those locations offering more affordable fares. Consequently, they expect that the demand for air transport for leisure reasons will be more elastic than business travel.

- Gillen et al produced a summary of their meta-review of various cost elasticities according to sector type and journey purpose (summarised below). It is clear there is no single elasticity value that is representative of air travel demand; rather there are several distinct markets and consequently several different elasticities should be used when exploring the impact on the overall market from changes to the aviation environment.
- Furthermore, even within a single market segment the study suggests there is a range around this elasticity value that should be considered in forecasting the impact of fare changes. The aggregate elasticities for the market segment reflect the combined effect of demand relationships in each component market. Each market will typically exhibit different elasticities than that considered at the aggregate market level. All markets demonstrate some unique idiosyncrasies at the granular, route-by-route level.



4. Traffic Forecasts

4.1 Forecast background – Cost Elasticities

Intervistas Study 2007 (Intervistas for IATA: Air Travel Demand Elasticities: Dec 2007)

- This important report was commissioned by IATA and published in 2007. It is widely regarded, both internationally and by different sections of the industry, as a core source document on fare elasticities in the passenger aviation market. The study undertook an extensive meta-review of previous research on airfare elasticities (23 papers over the preceding 25 years – including Gillen et al's 2003 work), and combined this with econometric analysis .

- The aim of the research was to provide elasticity estimates to enable policy issues relating to liberalisation, airport charges, taxation and emissions schemes to be examined from a more robust and evidence-based perspective. The literature review and econometric analysis demonstrated that airfare elasticities vary depending on a number of factors such as geography, distance and level of aggregation.

- There is a significant demand response to changes in air fares, with increased air fares leading to lower passenger demand. The uniformity and consistency of this result indicates strongly that any policy action that results in higher fares (e.g. taxes, increased landing fees) will result in a decline in demand. But the scale of this decline in demand will depend on a number of factors:
  - Business/leisure mix - business travellers are less sensitive to fare changes (less elastic) than leisure travellers because they generally have less flexibility to postpone or cancel their travel than leisure travellers
  - Short-haul vs. long-haul route structure - fare elasticities on short-haul routes are generally higher than on long-haul routes, reflecting the opportunity for inter-modal substitution on short-haul routes (e.g. travellers can switch to rail or car in response to air fare increases)

- Some studies also reviewed by Intervistas supported the idea that the demand elasticity faced by individual air carriers is higher than that faced by the whole market. For example, Oum, Zhang and Zhang (1993) estimated airline network elasticities in the U.S. and found values ranging from -1.24 to -2.34, while studies estimating market or route elasticities ranged from -0.6 to -1.8. In contrast, Alperovich and Machnes (1994) and Njegovan (2006) used national-level measures of air travel in Israel and the UK respectively and produced even lower elasticity values (-0.27 and -0.7, respectively).

- A summary of the potential range of elasticities identified in the Intervistas study is provided in the table below:

	Route/Market Level		National Level		Pan-National Level	
	Short-haul	Long-haul	Short-haul	Long-haul	Short-haul	Long-haul
Intra North America	-1.54	-1.40	-0.88	-0.80	-0.66	-0.60
Intra Europe	-1.96*	-1.96	-1.23	-1.12	-0.92	-0.84
Intra Asia	-1.46	-1.33	-0.84	-0.76	-0.63	-0.57
Intra Sub-Sahara Africa	-0.92	-0.84	-0.53	-0.48	-0.40	-0.36
Intra South America	-1.93	-1.75	-1.10	-1.00	-0.83	-0.75
Trans Atlantic (North America – Europe)	-1.85	-1.68	-1.06	-0.96	-0.79	-0.72
Trans Pacific (North America – Asia)	-0.92	-0.84	-0.53	-0.48	-0.40	-0.36
Europe-Asia	-1.39	-1.26	-0.79	-0.72	-0.59	-0.54

*The short-haul adjustor has not been applied to the Intra Europe short-haul elasticity in order to maintain elasticities below 2.0

4. Traffic Forecasts

4.1 Forecast background – Cost Elasticities

CAA Elasticities Study 2005

- The CAA found the literature on UK aviation demand elasticities relatively sparse; certainly more so that Gillen at al had found in North America. In the forecasting work underpinning the last Air Transport White Paper , DfT found that leisure traffic was *price elastic* (elasticity value of around -1.3), but business traffic was price inelastic (elasticity value of around -0.5).

- The CAA also highlighted two other academic studies of demand for air travel in the UK:
  - Graham (2000), who estimated the income elasticity for UK leisure travel to be about +2, but found no significant relationship between demand and air fares.
  - Dargay and Hanly (2001), who used pooled time-series/cross-section data that covered the years 1989 to 1998. They estimated a price elasticity of about -0.6. They also found exchange rate (local currency per pound) and relative prices (RPIUK/RPIFOREIGN) to be more influential than air fares with elasticity estimates of +1 and -0.8, respectively.

Elasticities in DfT's 2011 Air Passenger Forecasts

- The table below provides a summary of the estimated long run elasticities (for both income and price) of air passenger demand that were used by the DfT in 2011:

		Elasticity of demand with respect to	
Sector	Share of Passenger demand 2008	Income	Air Fares
UK Business	8%	1.2	-0.2
UK Leisure	45%	1.4	-0.7
Foreign Business	7%	1.0	-0.2
Foreign Leisure	14%	1.0	-0.6
International to International Interliners	10%	0.5	-0.7
Domestic	15%	1.7	-0.5
Overall	100%	1.3	-0.6

Notes:

Income variable depends on sector

Price and income elasticities are point estimates.

Results are elasticity of terminal passengers to income or fares

- Again, differing elasticities have been utilised for different traffic types, highlighting the fact that different journey purposes and destinations have a different traffic profile.

Elasticity Summary

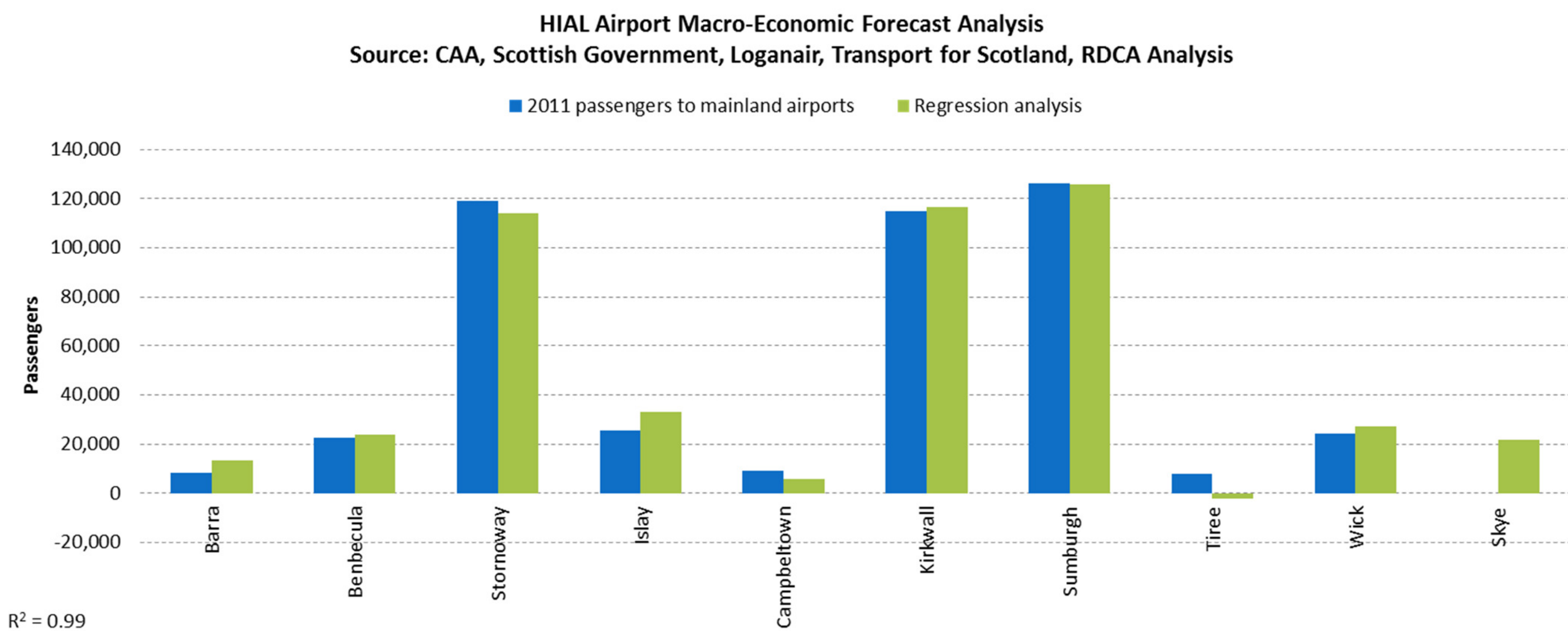
- The studies show a range of cost elasticities according to journey type. DfT values, while the most appropriate, seem significantly lower than other studies and indeed against the CAA's values of -0.5 and -1.3 for business and leisure respectively. The CAA figures match much more closely with those from the Gillen et al study for short-haul services (-0.7 and -1.5 median values).
- Therefore, taking average values of the CAA and Gillen et al studies would be the most robust, giving elasticities of **-0.6 and -1.4 for business and leisure traffic** respectively.
- These elasticities are built into the long-term forecast and are only applicable when considering fare variations from one period to the next.

4.2 Forecast outputs and sensitivities

Forecast methodology overview – macroeconomic analysis

- When undertaking a multi-variate regression analysis on the independent variables discussed on the prior page, there is a very strong correlation against total mainland passengers being carried, with an R^2 value of 0.99. The average variance of the regression analysis against actual outturn is ±6%, giving a reasonable error margin.

- When the independent variables for Skye are input into the model, the regression analysis shows an overall unconstrained demand of **21,574 passengers**.

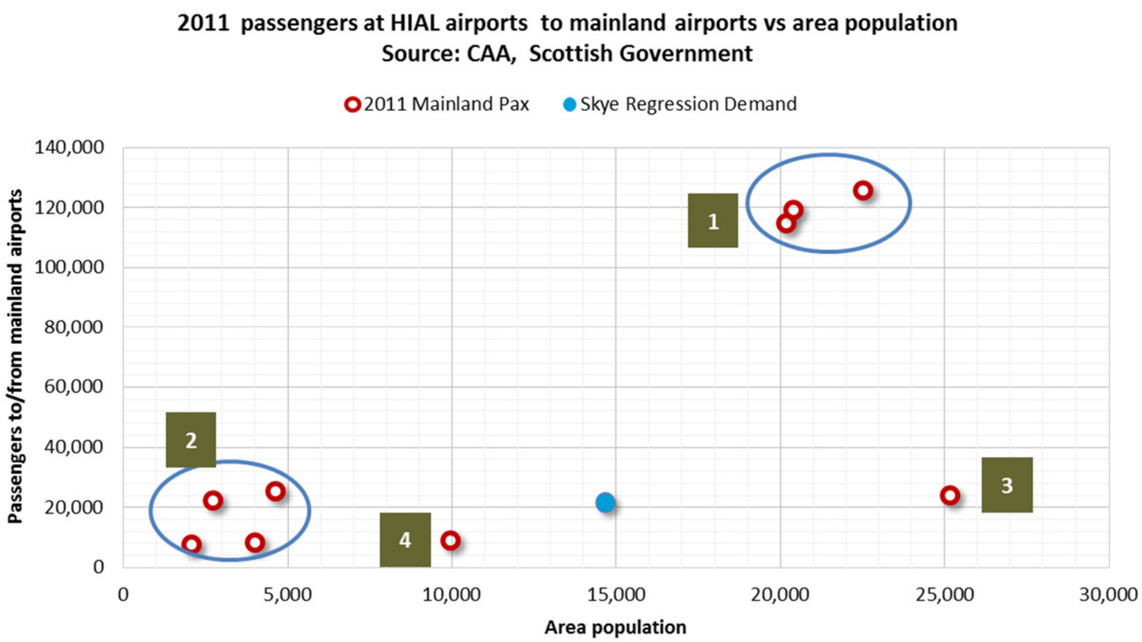


4.2 Forecast outputs

Skye unconstrained demand forecast – comparison against other airports

- Comparing the regression forecast for unconstrained air service demand from Skye against mainland passengers at other airports (and each airport's population), the unconstrained demand fits well in comparison to the mainland demand for airports at the lower end of the population scale.

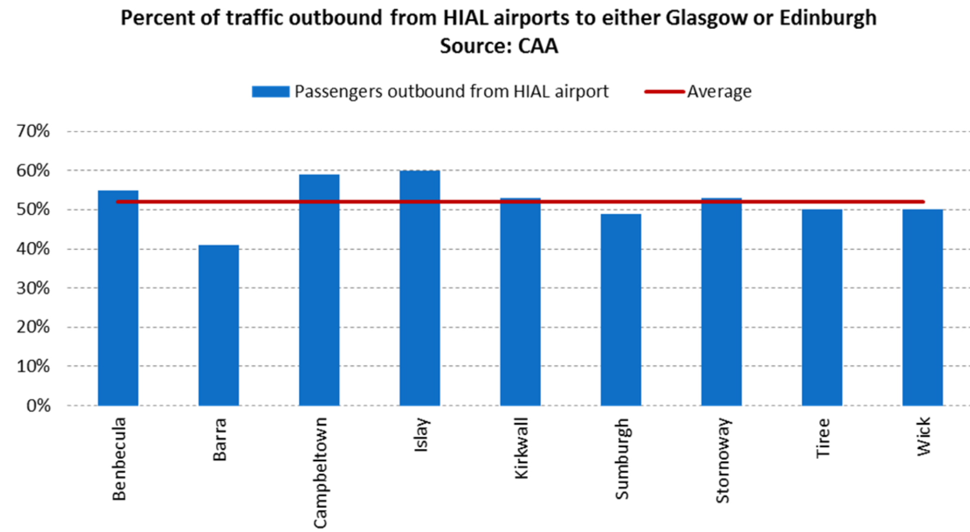
- Four groups/airports have been highlighted:
  - Group 1: Stornoway, Kirkwall and Sumburgh. These airports serve the most remote island regions from within the benchmark group and residents therefore could be expected to have a significantly higher propensity to fly.
  - Group 2: Tiree, Barra, Benbecula and Islay. These airports are the most comparable to Skye in terms of westerly location in the Highlands.
  - Airport 3: Wick. Wick faces competition from Inverness Airport (the only airport to really have a competitor within the benchmark group). Therefore, traffic could be expected to be lower as a result.
  - Airport 4: Campbeltown. Campbeltown has the shortest drive time and cost to Glasgow airport (being around 3.5 hours). This drive time is typically the point at which driving becomes a competitor against air travel once check-in, security process and journey time at the destination end, are taken into account. Therefore again we could expect Campbeltown to sit lower in terms of demand vs population.

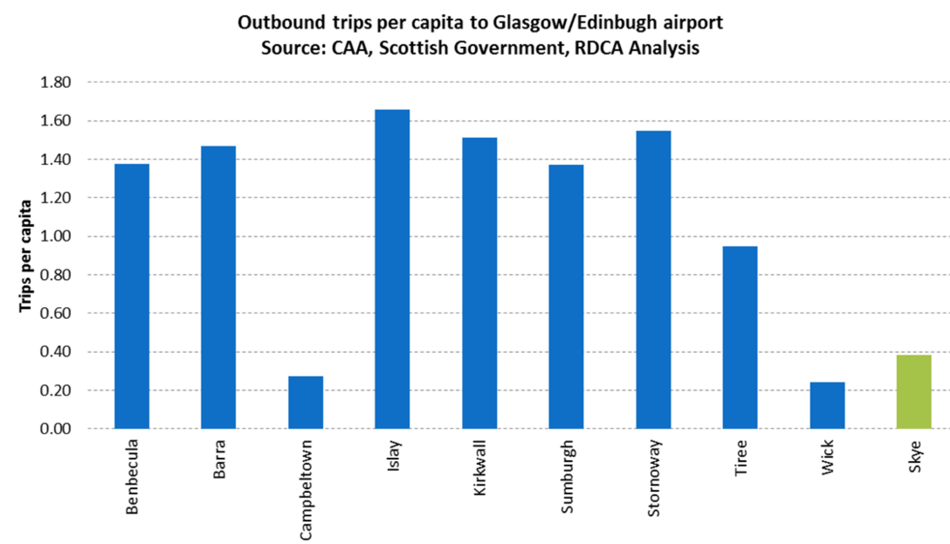


4.2 Forecast outputs and sensitivities

Skye unconstrained demand forecast – propensity to fly (PTF) comparisons

- The percentage of outbound traffic from the benchmark airports group varies according to airport and route. 2009 CAA Survey Data from Edinburgh and Glasgow (the most recent data available for these Scottish airports) has been reviewed to identify the home address location of passengers on each HIAL route.
- Mainland airports (Wick and Campbeltown) have between 50% and 59% of traffic outbound from the regions to Edinburgh/Glasgow, while the HIAL group as a whole has an average of 52% outbound. Only Barra varies from the average significantly (with only 41% of traffic outbound to Glasgow).
- Taking the average of 52% as the potential outbound traffic from Skye, this implies that, of the 21,574 passengers forecast, just over 11,000 would be Skye residents, giving approximately 0.38 trips per capita (with two passengers representing one trip and based on the catchment population of 14,664).
- Compared to the benchmark group, the number of outbound trips per capita from Skye is higher than the other mainland HIAL airports (Wick and Campbeltown). As discussed, Wick and Campbeltown could be expected to have a lower PTF due to competition from Inverness and shorter drive times respectively.
- The island airports have a substantially higher PTF, which would be expected due to the reliance these communities place on air services due to limited alternate travel options.





4.3 Commercial analysis of service

Potential Aircraft Types

- As part of the infrastructure review, a range of turbo-prop aircraft were reviewed as to their operational capability at Skye (across the three potential infrastructure development options). The initial starting position was all commonly (and currently) used turbo-prop aircraft used by airlines in Europe. However, of these aircraft types, some have not been in production for some time and therefore are likely to be phased out of operation. In addition, some aircraft within this list have poor safety records and would therefore not be considered for operation.

- After an initial review of the airlines which operate the aircraft types, 20 aircraft variants were analysed in detail to assess their performance for using Skye. The main aircraft types and manufacturers considered are:
  - Bombardier
    - DHC6-300/400 (Twin Otter)
    - DHC8-300
  - ATR
    - ATR42-500
  - Saab
    - 340
  - Dornier
    - Do228
    - Do328
  - Britten-Norman
    - BN-2B Islander
    - BN-2A Trislander
  - Beechcraft
    - 1900
  - BAe
    - Jetstream 31/32
    - Jetstream 41

Potential Aircraft Types

- The typical internal configuration of these aircraft types ranges from 9 seats to 50 seats and mainly operating with 2 engines (the exception being the Trislander with 3). Maximum Take Off Weights (MTOWs) of the aircraft range from 2.99 tonnes through to 19.5 tonnes (for the DHC8-300).

- The runway options (including location, runway lengths, typical air temperature etc.) have then been assessed against these aircraft variants to see if a) they could actually operate from Skye given the operating environment and b) if so, what payload restrictions (if any) they would be subject to due to landing or take off distances available.

- Through this process of identification and elimination of typical aircraft which could operate from Skye, the following have been identified as being the most probable aircraft which could be used commercially to operate to/from Skye without major payload restrictions of significant improvements having to be made to the airfield:
  - DHC6-300/400 (Twin Otter)
  - Dornier Do228-212
  - Britten-Norman BN-2B-26 Islander
  - Britten-Norman BN-2A Mk III Trislander

- There are no known aircraft planned for production which would revolutionise the sub-50 seat aircraft market. The most recent development has been the re-introduction of the DHC6-400 – a new version of the Twin Otter, which started production in 2010. The aircraft has the same seat capacity as the older DHC6-300, and has similar landing and take-off runway length requirements. Being a newer aircraft, ownership costs will be higher than the DHC6-300.

4. Traffic Forecasts

4.3 Commercial analysis of service

Typical aircraft capacity and frequency of operation

- The starting point for assessing the potential constraints of aircraft/runway option is to assess the unconstrained demand forecast against the annual operational capacity.
- The online survey indicated that if a service was operated less than twice daily, people's use of the service may start to drop. The most common reasons given for a change in usage for a less than double daily service were the inability to complete a day's return for their journey and also the restriction that a single-daily service could place on the number, and range, of connections possible at the end airport.
- In addition, at least 75% of respondents stated they would be likely or very likely to use services on each day of the week. While midweek stated demand was lower than Friday/Monday services, there was still an obvious preference for services to be operated throughout the week.
- As with other HIAL services though, a reduced operation on weekends has been considered, at least initially while the service is immature. Therefore, in terms of overall operational capacity, a double daily weekday service and single daily weekend service with the previously discussed aircraft types has been considered.
- Of the four main aircraft types, all have a typical configuration of 19 seats, with the exception of the Islander, with just 9 seats. This gives an annual capacity of between 11,000 and 23,700 seats (assuming 52 weeks of operation) with 1,250 movements over the course of a year.

Aircraft types, typical configuration and annual capacity

Aircraft	Typical Seat Configuration	Annual Capacity
DHC-6-300 (Twin Otter)	19	23,712
Do228-212	19	23,712
BN-2B-26 Islander	9	11,232
BN-2A Mk III Trislander	19	23,712

4.3 Commercial analysis of service

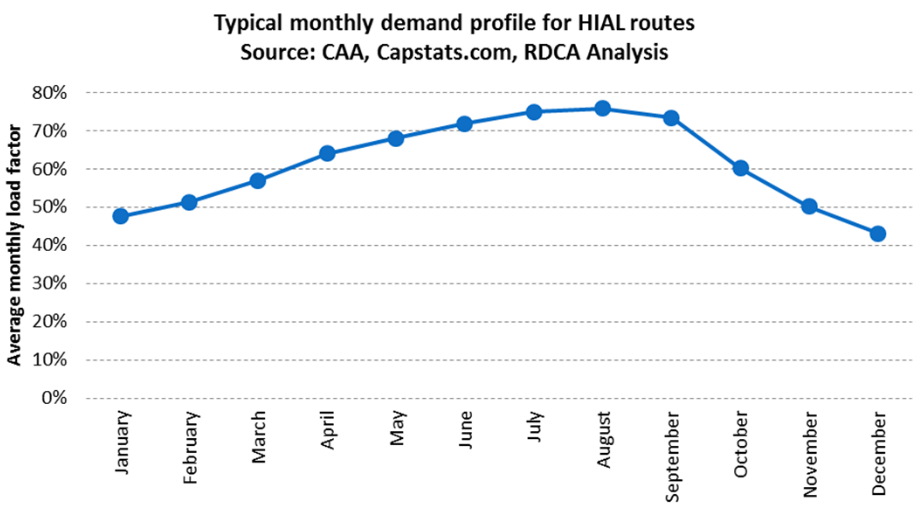
Typical aircraft capacity, frequency of operation and payload constraints

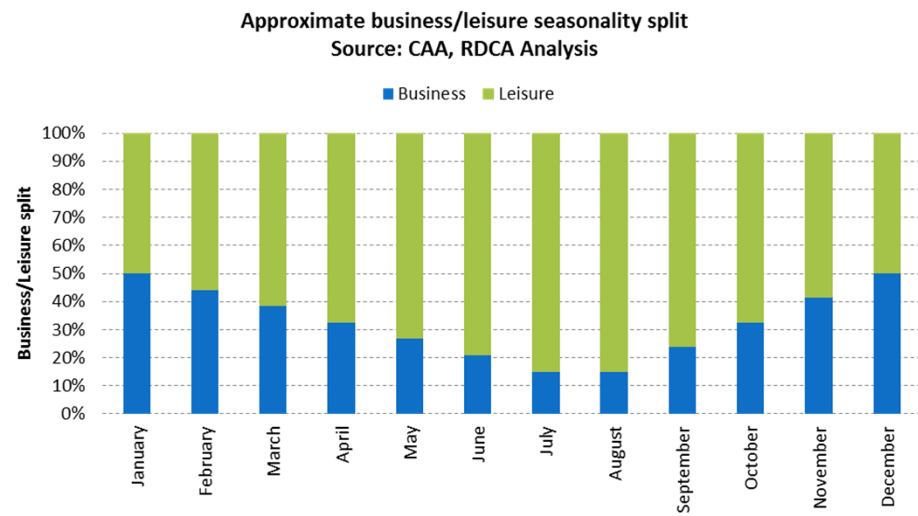
- Given the unconstrained demand for over 21,500 passengers, a 12x weekly service with any of the 19 seat aircraft could accommodate the total forecast passengers. However, the Islander would have insufficient capacity to enable the full demand to be theoretically handled and therefore would constrain the passenger forecast before taking in to account any payload restrictions.

- If the theoretical unconstrained demand were to be realised, load factors on the remaining 19 seat aircraft would be 91% over the course of a year. However, while the benchmark demand forecast shows a high correlation, there will inevitably be specific factors which will reduce the overall demand, such as the actual timing of flights being unsuitable for some passengers, or revenue management of fares resulting in more price-sensitive passengers being put off from flying. The unconstrained demand forecast does, however, show there should be demand for air services and gives an indication as to likely service frequency (as discussed, 12x weekly initially).

- A more detailed bottom-up forecast for the base year has therefore been constructed, based on a 12x weekly service with a 19-seater aircraft. The potential capacity from tis operation has been reviewed on a monthly basis. Demand for services will inevitably vary throughout the year, with summer services typically being busier than winter services (due to such factors as an increase in tourism in summer months).

- Based on the average monthly load factors from benchmark HIAL routes, the likely monthly load factor and business/leisure profiles for the proposed Skye Air Service are shown below:



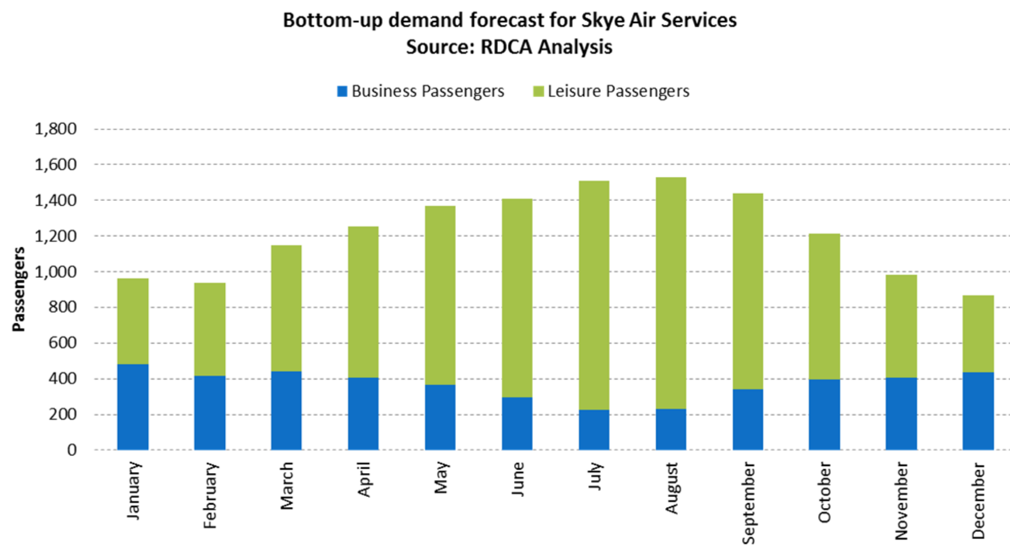


4. Traffic Forecasts

4.3 Commercial analysis of service

Bottom-up forecast by month and passenger type

- Based on these monthly profiles and an assumed schedule offering 12x weekly rotations, the overall monthly passenger demand if shown top right.
- In total, this bottom-up forecast gives **14,630.** While this is lower than the unconstrained benchmark demand forecast, it looks reasonable in the context of other passengers on mainland HIAL services.
- This demand gives an annual average load factor of 62%, which again looks reasonable in the context of the average load factors seem on benchmark routes.
- As discussed, demand in summer months is likely to be greater than in winter months. The typical business/leisure profile by month shows a relatively consistent business demand throughout the year, except during summer months when business traffic falls slightly. Again, this seems reasonable – fewer business trips would be expected during the main holiday season.



4. Traffic Forecasts

4.3 Commercial analysis of service

Annual demand, movements, and airport revenue

- Based on an average load factor of 62%, the following annual revenues would be generated from aeronautical charges (based on those currently levied at HIAL airports) and commercial incomes (based on HIAL average revenue per passenger for 2011/12, reduced slightly to account for a more limited offering at Skye Airport).

- For the 19-seater aircraft, services could generate over £150,000 revenue for the airport per annum. However, if services were operated on the smaller Islander aircraft, revenues would be significantly less due to a lighter MTOW and being able to carry fewer passengers.

Potential airport income (based on 62% load factors and 12x weekly services)

Annual Airport Income

Aircraft	DHC-6-300 (Twin Otter)	Do228-212	BN-2B-26 Islander	BN-2A Mk III Trislander
Typical MTOW (kg)	5,670	6,600	2,990	4,500
Sectors per annum	1,250	1,250	1,250	1,250
Annual Capacity	23,750	23,750	11,250	23,750
Typical annual passengers @ 62% Load Factor	14,630	14,630	6,975	14,630
Airport Fees and Charges (based on HIAL 2012 F&Cs)				
Landing charge (per 1,000kg MTOW)	£10.68	£10.68	£10.68	£10.68
Passenger Service Charge per departing passenger	£15.67	£15.67	£15.67	£15.67
PRM Charge per departing passenger	£0.35	£0.35	£0.35	£0.35
Total aeronautical revenue (assuming no rebates or discounts)	*£155,034*	*£161,241*	*£75,828*	*£147,224*

- In addition to any aeronautical revenues from passenger services, there may be some scope to receive revenue from GA/private flights, which assuming they're brought within the HIAL charging structure, are currently charged a flat rate of £19.00 per landing (subject to various terms and conditions). Other comparable HIAL airports (Barra, Benbecula and Campbeltown) have limited GA/Private movements (between 35 and 115 departures per annum), generating between £650 and £2,200 approximately in revenue per annum.

- It is not expected that any significant commercial revenues would be generated, if any.

4.3 Commercial analysis of service

Per-sector cost assessment of services from Skye to Glasgow or Edinburgh

- Given the strong preference for services to Glasgow International or Edinburgh Airport from the online survey, operational costs to these airports have been assessed based on the previous 4 aircraft types.
- Per sector operating costs from Skye to Glasgow/Edinburgh have been determined through RDC Aviation's proprietary software *routepro.net.* Developed over the last 12 years, *routepro.net* is a detailed airline-aircraft operating economics tool, enabling detailed route profitability/operating costs analysis to be conducted.
- The software is being constantly updated with the latest costs, covering items such as lease rates, insurance, variable passenger elements (such as catering and GDS distribution), handling rates and aircraft-engine specific fuel burn (and therefore determining fuel costs). In addition, the most current airport charges are sourced, enabling specific weight and passenger based costs to be determined.
- For the purposes of this assessment, the following has been assumed to determine per-sector costs:
  - The aircraft used for the service utilised for 1,500 hours per annum (for comparison, each Loganair aircraft was utilised for an average of 1,416 hours in 2011, Source: CAA, JP Fleets)
  - A higher contingency cost (10%) has been used than normal to account for a greater risk of weather disruption and higher overheads due to the remote location of the area;
  - Airport charges for operating from Skye have been based on other HIAL airport charges and services to Glasgow are subject to a weight-based rebate of 65% due to operations being intra-Scotland;
  - Current (December 2012) fuel prices of £1.85 per US Gallon have been used, with an USD-GBP exchange rate of £1=$1.61

Per-sector cost assessment of services from Skye to Glasgow or Edinburgh

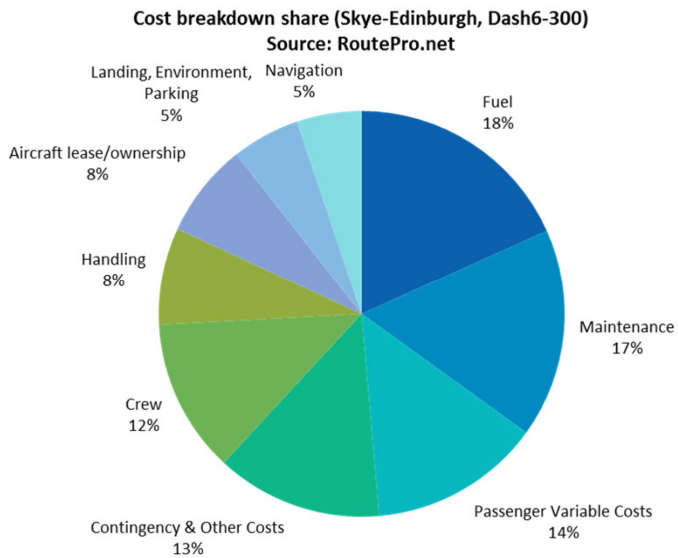
- Within the cost structure of *routepro.net*, items such as route marketing, airline management costs and other overheads are included in a general 'overheads' section. This is based on published annual accounts by airlines, where these miscellaneous cost items are included.
- Therefore, the *routepro.net* output costs, with the exception of airport charges, cover all aspects of an airline's operating costs, being calibrated on an annual basis to ensure the most current data is used.
- Aircraft lease costs are sourced from ACAS and are specific to the typical age of the aircraft used in an airline's fleet. For example, an older Twin Otter DHC6-300 aircraft used by UK regional airlines are older, and therefore cheaper to lease, than newer built aircraft of the same type.
- For the purposes of this analysis, typically aged aircraft have been selected based on those leased/owned by UK regional airlines, but if younger (or older) aircraft were used to operate the Skye service, the operating costs would be impacted accordingly.
- The aircraft's utilisation time has been allocated specifically to this service. While there could be options to utilise the aircraft in-between morning and evening rotations (thereby increasing the utilisation and decreasing the allocation of fixed costs on a per-block hour basis), this has not been considered in this analysis. Therefore, there may be an upside of reduced operating costs allocated to the Skye service if the aircraft were used at other times during the day.
- For comparison, however, Loganair's average aircraft utilisation in 2011 was 1,416 hours. A 12x weekly Skye service would result in approximately 1,500 hours of 1,500 hours of flying time and therefore seems a reasonable time allocation in the context of the main operator at HIAL airports.

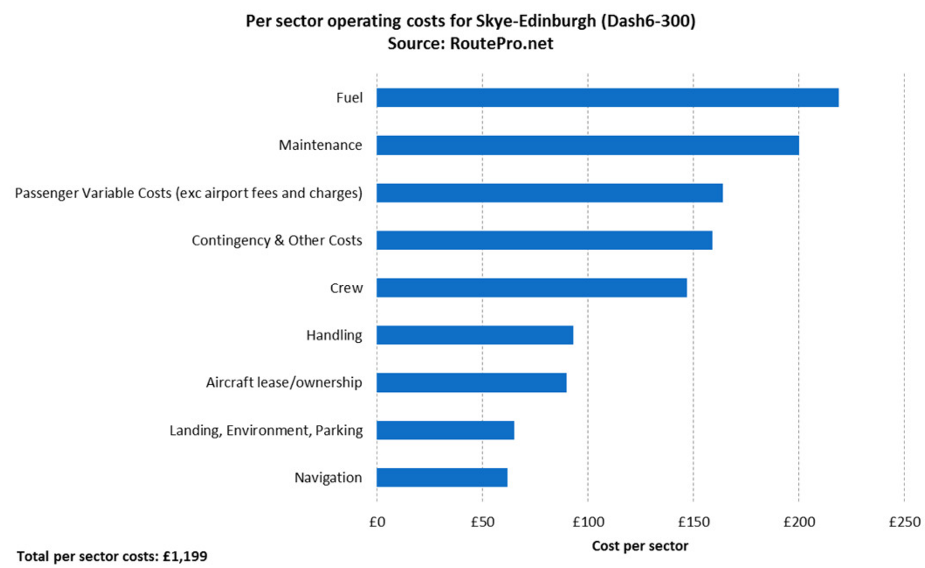
4.3 Commercial analysis of service

Per-sector cost assessment of services from Skye to Glasgow or Edinburgh

- An example breakdown of per sector operating costs is shown below for Skye-Edinburgh, being operated on a Dash-6-300 (Twin Otter). Similarly structured output has been analysed for the other combinations of routes and aircraft types.

- Overall, each sector is estimated to cost £1,199 (excluding passenger-variable airport charges). The largest element of operating costs is fuel (accounting for around 18% of the total sector costs and highlights a potential area of risk due to the volatility of fuel costs).





4.3 Commercial analysis of service

Average fare calculation

- Based on the *routepro.net* output for each route and aircraft combination, the following per-sector costs are shown in the table below.

- Average one-way airport charges for each airport are included, taking into account any discounts such as those offered at Glasgow on weight-related charges due to the flight being Intra-Scotland.

- The required break-even one-way fare (plus 10% profit margin) ranges from £109 to £174 for Glasgow and £121 to £200 for Edinburgh (higher Edinburgh fares due to longer travel distance). As mentioned, the 10% profit margin would be in addition to any company overheads, marketing costs etc. It should also be noted that flights from airports in the Highlands and Islands are exempt from Air Passenger Duty and therefore this eases the pressure slightly on gross fare costs. It is assumed that services from Skye are also subject to this exemption (HMRC Note 550 Air Passenger Duty is explicit in the airports which are exempt from the charge – Skye is not included, but clear fits within the grouping mentioned).

- The break-even fare level would vary according the actual carried load. A greater number of passengers per flight would result in fixed operating costs being allocated to a greater number of people, therefore resulting in a lower cost per passenger (and vice versa).

Approximate gross fare required, at 62% average load factor, to deliver 10% profit margin to airline - Skye to Glasgow

Aircraft	Per sector cost	Breakeven seat cost (@ 62% load factor)	Airport charges (average one-way)	Gross fare (with 10% profit margin)
DHC-6-300 (Twin Otter)	£1,080	£90.00	£11.45	**£110.45**
Do228-212	£1,777	£148.08	£11.45	**£174.34**
BN-2B-26 Islander	£696	£116.00	£11.45	**£139.05**
BN-2A Mk III Trislander	£1,066	£88.83	£11.45	**£109.17**

Approximate gross fare required, at 62% average load factor, to deliver 10% profit margin to airline - Skye to Edinburgh

Aircraft	Per sector cost	Breakeven seat cost (@ 62% load factor)	Airport charges (average one-way)	Gross fare (with 10% profit margin)
DHC-6-300 (Twin Otter)	£1,199	£99.92	£11.73	**£121.64**
Do228-212	£2,058	£171.50	£11.73	**£200.38**
BN-2B-26 Islander	£781	£130.17	£11.73	**£154.91**
BN-2A Mk III Trislander	£1,202	£100.17	£11.73	**£121.91**

4. Traffic Forecasts

4.3 Commercial analysis of service

Per-sector cost assessment with different aircraft utilisation assumptions

- The table on the prior page summarises required fares with an assumption of a dedicated aircraft and crew to this service, giving approximately 1,500 hours aircraft utilisation per annum.
- There are other possibilities for the service operating without the aircraft being solely dedicated to the service. The most likely options are a) utilisation of the aircraft in between morning and evening rotations (increasing the utilisation by approximately 50%) and b) dropping the Skye service down to a single daily service and tying it in to another HIAL service (which would increase the aircraft's utilisation but may impact demand and therefore average fare required by the airline).
- The main cost saving associated with greater aircraft utilisation is a change in the allocation of fixed costs (primarily aircraft ownership costs) over a greater number of hours. However, given the age of the aircraft which would typically be operated on this type of route, lease rates would be low and therefore savings from diluting the cost per hour would be minimal. With contingency and other costs being calculated on a percentage basis, there is again minor savings resulting.
- The one area where additional savings could be made would be around crew costs, but this would be dependent on the actual operating schedule of the service (and if additional crew sets would be required to operate the service), the local labour contracts in place (which may impact the number of hours worked), where the aircraft is based (which again would impact crew requirements for standby cover etc). Therefore, the potential saving on crew costs are dependent on factors which are undeterminable at this stage of the analysis.

Change in per sector average cost due to increased aircraft utilisation (Skye-Glasgow DHC 6-300 Twin Otter)

Cost Element	2,250 hours	1,500 hour
Fuel	£202	£202
Crew	£128	£128
Maintenance	£175	£175
Ownership	£52	£78
Passenger	£159	£159
Landing, Environment, Parking	£65	£65
Handling	£88	£88
Navigation	£56	£56
Contingency & Other Costs	£127	£129
Total	*£1,052*	*£1,080*
Difference	***-2.6%***	

- Other aspects of operating costs (such as fuel, maintenance, handling etc) are based on external factors which would not typically be impacted by increased aircraft utilisation and therefore remain the same.
- A similar magnitude of cost savings would be seen for other aircraft and this level of cost saving would lead to drop in average fare of between £2-£5 per passenger.
- Even if significant crew cost savings (e.g. 50%) were made through more efficient shift patterns for example, the fare savings would still be less than 10% (-8.5% in the example above), equating to £10-£18 saving depending on aircraft type and destination.

4.3 Commercial analysis of service

Per-sector cost assessment with New Variant DHC-6-400 (Twin Otter)

- Production of the DHC-6-300 Twin Otter variant ended in 1988. Following the end of the production, Viking Air purchased the tooling equipment, making spares for the aircraft since and eventually purchased the type certificates to put the aircraft into production again. The first new Twin Otter variant (DHC-6-400) was delivered in 2010.
- With the youngest DHC-6-300 aircraft now approaching 25 years old, it is likely that within the next 5 to 10 years, services reliant on this aircraft variant will need replacing with the new variant DHC-6-400.
- The current list price for a new variant Twin Otter is $7m[1]. Based on a typical methodology[2] for determining lease rates, this would equate to an annual lease rate of around $30,000 per month.
- Depending on age, lease rates for the current DHC-6-300 range from $5,000 to $6,500 per month[3]
- Depending on aircraft utilisation rates (as before), this higher lease rate would add around £110 (at the lower utilisation rate) to around £170 (at an increased aircraft utilisation rate).
- Based on an average load factor of 62%, this would add £10.00 to £15.00 onto the average break-even fare required (with a 10% profit margin level) depending on aircraft utilisation.

Per sector costs (net of Fees and charges and profit margin) for old and new variant Twin Otters

Variant	2,250 hours	1,500 hours
DHC-6-300	£1,052	£1,080
DHC-6-400	£1,166	£1,249
Change	***11%***	***16%***

Average fare (plus 10% profit margin) for different utilisation rates and aircraft variants to Glasgow Airport

Variant	2,250 hours	1,500 hours
DHC-6-300	£107.88	£110.45
DHC-6-400	£118.33	£125.94
Difference	***£10.45***	***£15.49***
Change	***10%***	***14%***

(1) – Inferred from http://www.vikingair.com/content.aspx?id=6731, 15th Feb 2012
(2) - Modeling Aircraft Loans and Leases, PK Air, a GECAS subsidiary, March 2010
(3) - AVAC – The Aircraft Value Analysis Company, June 2012

4.3 Commercial analysis of service

Per-sector cost assessment with different aircraft utilisation assumptions

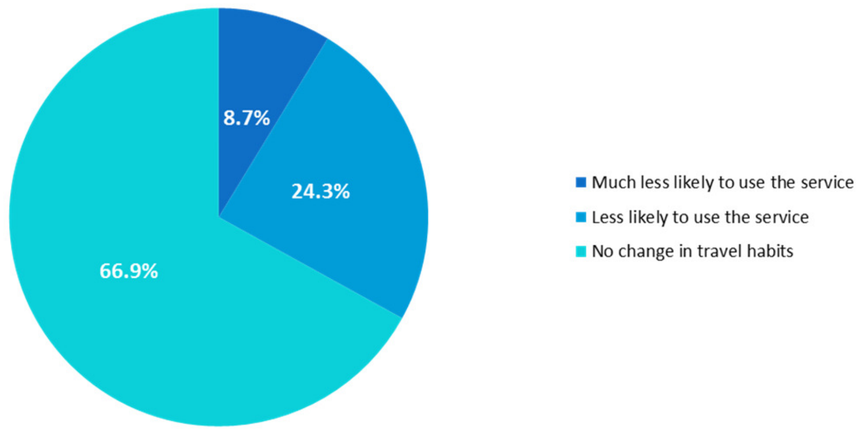
- If the service were operated on a single daily operation as opposed to double daily (with the service being shared with another HIAL service), the assumption would be again an overall increase in aircraft utilisation (e.g. taking the average Loganair aircraft utilisation rate from 1,400 hours to around 2,100 hours including a midday rotation from Skye). Therefore, the cost savings identified on the prior page would apply.

- However, if services from Skye were operated on a daily frequency, there may be associated impacts on how frequently people would use the service, resulting in a drop in demand and, with the majority of operating costs being fixed, an increase in average fare. The Skye Air Service Survey found that around one-third of respondents would be 'less' or 'much less' likely to use a single daily versus double daily service.

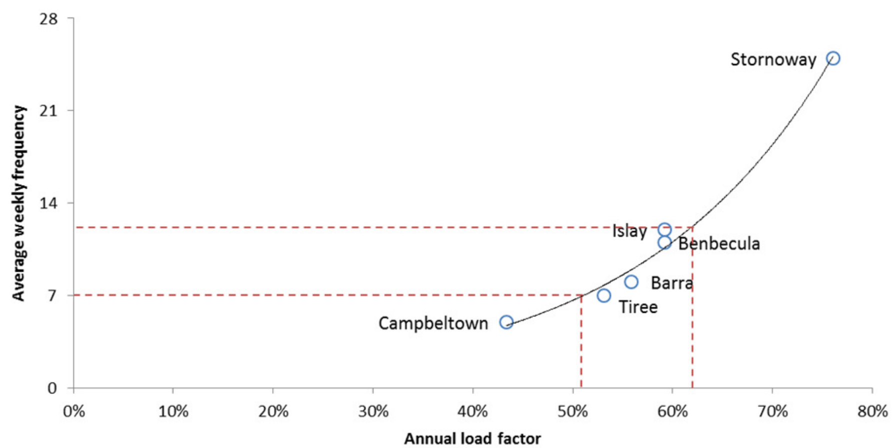
- This is supported when looking at benchmark services. While there will of course be many factors which impact demand, an overall trend emerges where average service load factors are lower for services with reduced operational frequency.

- The best-fit curve for load factor versus frequency shows that the base case frequency of a 12x weekly service benchmarks well with a 62% load factor. However, following the curve down, a 7x weekly service would benchmark with a 51% annual average load factor, giving some indication of the potential drop in demand if the service fell to single daily.

How likely would you be to use a less frequent, single-daily service compared to a double daily service?
Source: Sky Air Service Survey



Average weekly frequency versus annual load factor - services to/from Glasgow
Source: CAA, Capstats.com



4.3 Commercial analysis of service

Willingness to pay

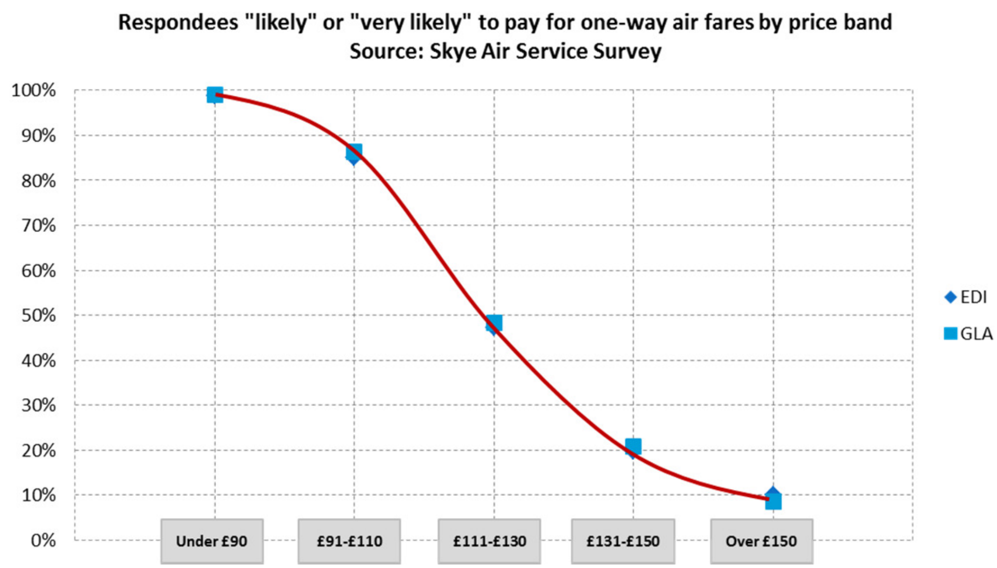
- In the online survey conducted, respondees were asked "*how likely would you be to use an air service to/from Skye at the following one-way fares?*". Based on those passengers who stated they would use air services to Glasgow or Edinburgh (regardless of how often they would use the service), the chart below summarises percentage of respondents who would be likely or very likely to use air services from Skye at the appropriate fare bracket. Note that, in general, people's willingness to pay for Edinburgh and Glasgow services are approximately the same.

- If fares were priced 'Under £90', 99% of respondents would be likely or very likely to use the air service. Likewise, if priced between £91 and £110, around 85% of passengers would again be likely or very likely to use the air service. However, beyond this point, interest in using the air service at high prices drops off rapidly, with less than 50% likely or very likely to use the service if priced between £111 and £130.

- This indicates that in order to keep passengers using a service, one-way air fares should be within the range of £90-£110 – any higher and demand may start to drop off. In taking the middle ground of £100 for a gross one-way fare, this gives a suitable indication of what people are willing to pay.

- The change in willingness to pay in various price brackets ties in with the wider elasticity studies previously discussed, with elasticity values ranging from -0.53 to -1.98. Taking the mid-point fare of each bracket, and the change in people's willingness to pay for each bracket, the following elasticities are gained:

	£91 to £110	£111 to £130	£131 to £150	Over £150
% change in fare from lower bracket	25%	20%	17%	14%
% change in demand	-13%	-38%	-28%	-12%
Elasticity	-1.98	-0.53	-0.61	-1.15



- Leisure travellers typically pay lower fares than business travellers and therefore the elasticity at the lower fare end (-1.98) could be representative of leisure travellers. Within the middle fare brackets, the higher-spending business traveller may be more willing to accept higher fares due to the time-saving benefits offered by flying, hence lower elasticities. At the far end of the fare scale, the price will be reaching a point where even business travellers will be put off, resulting in a downswing in elasticity again.

- It should be noted that willingness to pay statements are not necessarily a true indicator of what fare will be achieved. If services are not aligned with people's expectations, they may pay less in reality, or indeed if faced with a 5-6 hour drive, may pay more than they originally indicated they would. Therefore, this is used as guide of potential rather than an absolute figure.

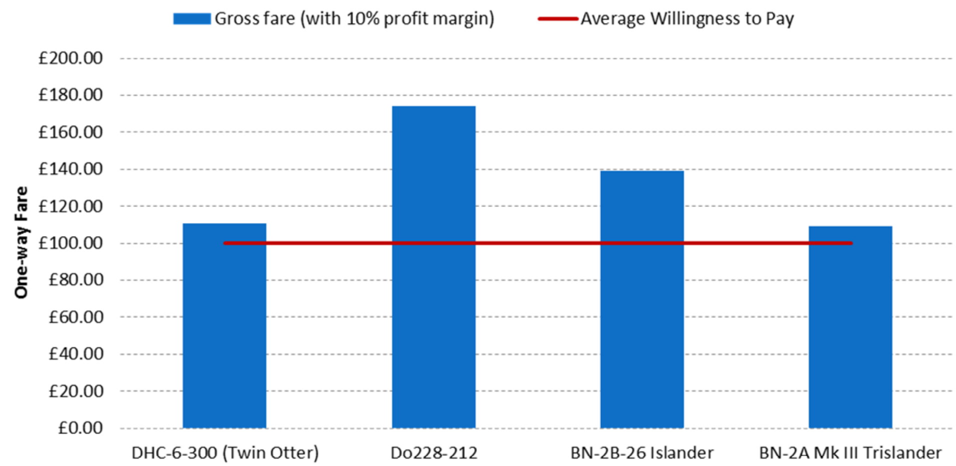
4. Traffic Forecasts

4.3 Commercial analysis of service

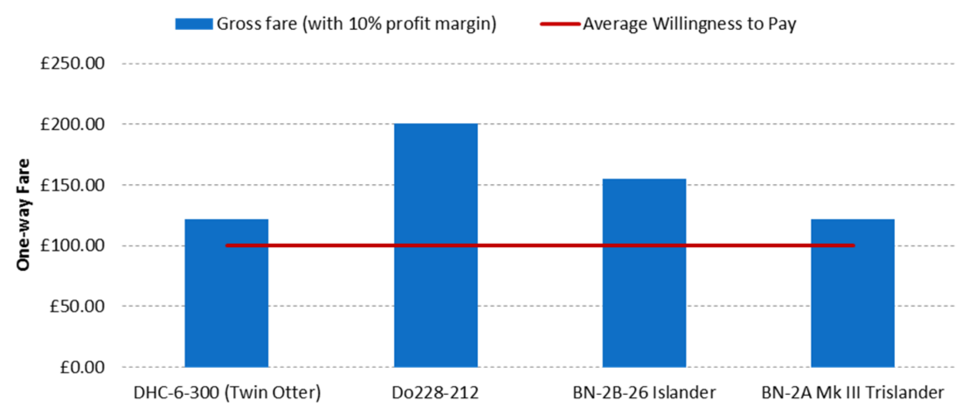
Willingness to pay versus required gross fare

- Combining the analysis on gross fares which could be potentially required by an airline to deliver a 10% profit margin at a 62% load factor, along with the survey responses for willingness to pay, the charts to the right show how these compare.
- For Glasgow (top right hand chart), the gross fare for the DHC-6-300 and the BN-2A Trislander are above the level that people are willing to pay (by approximately 9%). Required fares of the Dornier Do228 and the BN-2B Islander are much higher than the stated willingness to pay and therefore indicate that these aircraft types are unlikely to be commercially sustainable.
- The DHC-6-300 and the BN-2A Trislander required fares for Edinburgh are higher than the willingness to pay (by approximately 20%) and again, the fares for the Dornier Do228 and the BN-2B Islander are substantially higher then the willingness to pay level (by 100% and 55% respectively).
- Compared against fares which people are willing to pay, the DHC-6-300 (Twin Otter) and BN-2A Trislander appear to offer the best chance of being commercially sustainable to either Glasgow or Edinburgh.
- As stated, people's willingness to pay will be determined by various other factors. In addition, variations to fare levels will inevitably occur (such as higher fuel prices, different lease rates, demand being lower than forecast and indeed differences in how airlines account for operating costs, especially in relation to PSO type services).
- This analysis, however, indicates that services from Skye to Glasgow and Edinburgh are on the cusp of being self-sustaining for some aircraft types for the airline operator. However, the analysis on gross fares does not account for the opex/capex costs associated with the Skye airport infrastructure. Some of this may, in part, be covered by the airport charges imposed at Skye, but it is assumed that these cost are largely met by the Scottish Government.

Potential average fare versus willingness to pay (Glasgow)
Source: RoutePro.net, Skye Air Service Survey



Potential average fare versus willingness to pay (Edinburgh)
Source: RoutePro.net, Skye Air Service Survey



4.3 Commercial analysis of service

Potential impact of Air Discount Scheme

- The Air Discount Scheme (ADS) provides a 40% discount on air fares for eligible routes and for eligible residents (including those resident in Colonsay, Orkney, Shetland, the Western Isles, Islay, Jura, Caithness and North West Sutherland).
- The ADS does not extend to business-related travel, which would cause a material breach of the terms and conditions of the scheme. In addition, NHS related traffic is also excluded and, therefore, only outbound leisure traffic would be able to claim any form of fare saving through the scheme.
- Therefore, based on the profile of traffic by purpose (in terms of inbound/outbound and business/leisure splits), approximately 4,300 passengers would be eligible to reduce their net fares (i.e. excluding any airport charges/APD if applicable) by 40%.
- A report into the impact of the ADS (*Review of the Air Discount Scheme, Halcrow, 2008*) found that of those people eligible for the ADS, 87% were members. The remaining 13% who were eligible but not members reported they were unlikely to travel anyway (due to issues with mobility), were unaware of the scheme or unaware of the application process.
- It is assumed that a similar picture would emerge in Skye/Lochalsh region and that despite offering cost savings, only 87% of eligible passengers are actually members of the scheme.
- It is also assumed that Skye/Lochalsh residents would actually be made eligible for the ADS (currently it is restricted to specifically residents of those areas mentioned in the first paragraph) and that the service does not receive a PSO (again, those services which are directly subsidised are not eligible).

Potential impact of Air Discount Scheme

- With a leisure cost elasticity of -1.4, a 40% reduction in fare would theoretically lead to an increase in demand of 56% and result in the following:

Assessment of potential impact of ADS on overall demand

	Value	Comments
Base case forecast	14,630	
Base case outbound leisure demand (eligible for ADS)	4,326	Based on leisure and outbound profiles
Eligible members who are actually users of the ADS	87%	Based on Halcrow study into other ADS routes
Base case outbound demand which takes advantage of ADS discount	3,764	
Stimulation impact from lower fares	56%	
Additional demand stimulated from lower fares	2,108	
New outbound leisure demand	*5,872*	
Base case 'other' passengers (ineligible for ADS)	*10,866*	Inbound leisure, business passengers and outbound leisure not taking
ADS stimulated base case demand	**16,738**	
Overall stimulation effect of ADS	14%	

- Overall, if ADS discounts of 40% were applicable to services from Skye, the overall impact would be a 14% growth in traffic on the base case forecast.
- In comparison, the 2008 Halcrow study found that, in the year after the ADS was implemented, passenger numbers on eligible routes grew 12%, supporting the potential growth in demand for Skye if ADS discounts were offered.

4. Traffic Forecasts

4.3 Commercial analysis of service

Annual airline operating costs

- When aggregated over the course of a year, airline operating costs would vary between £957,000 (Skye-Glasgow operated on an Islander) through to almost £3,000,000 (Skye-Edinburgh on a Dornier 228-212).
- The services which look the most commercially viable based on required break-even fare and willingness to pay (Skye-Glasgow on either a Twin Otter or Trislander) would have annual operating costs of just under £1.5m per annum, based on the operating/cost assumptions previously discussed. The costs exclude airport fees and charges, which are assumed to be a direct pass through from airport to customer.
- Whilst there appear to be options under which an operator could break-even or make a small profit, it is highly unlikely that a route between Skye and Edinburgh or Glasgow would be sufficiently attractive for an airline to launch operations on a commercial basis.

Estimate annual airline operating costs (based on 62% load factors and 12x weekly services) - Skye to Glasgow

Aircraft	DHC-6-300 (Twin Otter)	Do228-212	BN-2B-26 Islander	BN-2A Mk III Trislander
Per sector costs (exc Airport fees and charges, inc. profit margin)	£1,188	£1,955	£766	£1,173
Total airline operating costs	***£1,485,000***	***£2,443,375***	***£957,000***	***£1,465,750***

Estimate annual airline operating costs (based on 62% load factors and 12x weekly services) - Skye to Edinburgh

Aircraft	DHC-6-300 (Twin Otter)	Do228-212	BN-2B-26 Islander	BN-2A Mk III Trislander
Per sector costs (exc Airport fees and charges, inc. profit margin)	£1,319	£2,264	£859	£1,322
Total airline operating costs	***£1,648,625***	***£2,829,750***	***£1,073,875***	***£1,652,750***

4.3 Commercial analysis of service

Base case sensitivities – passenger demand

- The unconstrained, macro-economic demand forecast of 21,500 passengers gives a good sense check against the bottom up, month by month forecast of around 14,500 passengers (with an annual load factor of 62%).
- Based on other HIAL services to/from Glasgow Airport, the average annual load factor is 60% with a standard deviation of just under 10%. Similarly, services to/from Edinburgh Airport have an annual average load factor of 59% with a standard deviation of 9%. This gives some boundaries of upper and lower variances from the base case bottom up Skye forecast to consider as demand sensitivities.
- The table to the right summarises the impact these higher and lower average annual load factors would have on the base case demand. At the lower load factor end, around 2,300 fewer passengers per annum would be handled. Likewise, at the higher load factor end, around 2,300 more passengers per annum would be handled.
- A range of demand sensitivities reflects the fact that, despite all due diligence being applied to forecasting methodologies and analysis, the actual operated outcome may be different from the base case. The range presented here gives an idea as to realistic boundaries which could occur if air services were introduced.
- For comparison, the higher load factors (71/72%) on the 19-setear aircraft would be equivalent to those given if demand were stimulated through lower fares due to the ADS being applicable.

Low, base and high annual demand based on potential variance from base case - Glasgow

Aircraft	Annual Capacity	Annual average load factor		
		52% (Low Case)	62% (Base Case)	72% (High Case)
DHC-6-300 (Twin Otter)	23,712	12,330	14,630	17,073
Do228-212	23,712	12,330	14,630	17,073
BN-2B-26 Islander	11,232	5,841	6,964	8,087
BN-2A Mk III Trislander	23,712	12,330	14,630	17,073

Low, base and high annual demand based on potential variance from base case - Edinburgh

Aircraft	Annual Capacity	Annual average load factor		
		53% (Low Case)	62% (Base Case)	71% (High Case)
DHC-6-300 (Twin Otter)	23,712	12,567	14,630	16,836
Do228-212	23,712	12,567	14,630	16,836
BN-2B-26 Islander	11,232	5,953	6,964	7,975
BN-2A Mk III Trislander	23,712	12,567	14,630	16,836

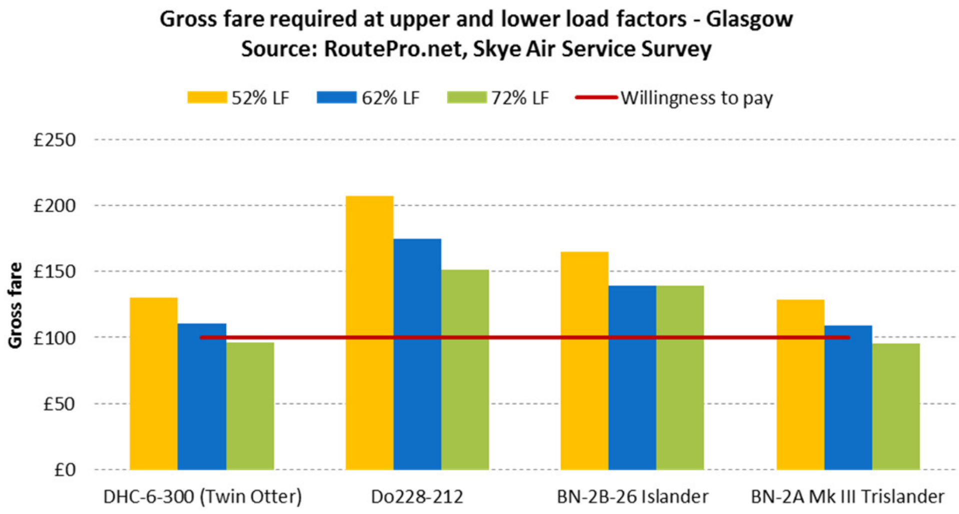
- For comparison, the demand given at the higher end of the range (for the 19-seater aircraft at least) would be comparable to the demand from ADS stimulated demand previously discussed (16,738 passengers per annum).
- The lower end demand could be representative of several factors, such as higher fuel/fare costs supressing demand or fewer people using the service (due to operational times being unsuitable for example).
- In context, the boundaries seem reasonable, especially against the background of performance on other HIAL services.

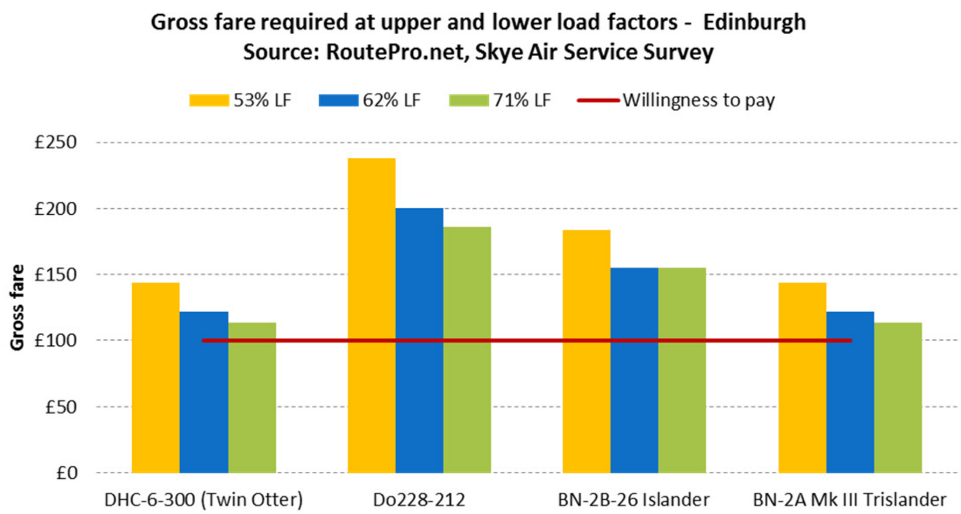
4.3 Commercial analysis of service

Base case sensitivities – average fare required

- At the respective upper and lower load factor limits (rounded to the nearest whole number of passengers per sector), the fares required to provide 10% profit margin to the airline are shown in comparison to the base case 62% annual average load factor.

- For services to/from Glasgow, an increase in load factor would bring the required fare down to the level that people stated they were willing to pay, though only just. For services to/from Edinburgh, even a 9% increase in average load factor would still result in the fare level higher than that which people would be willing to pay.





4. Traffic Forecasts

4.3 Commercial analysis of service

Potential required subsidy/support

- The base case demand of 14,630 passengers per annum, with the stated willingness to pay indicates that regardless of aircraft type and destination, indicates there will be a shortfall in in fare revenue compared to operating costs. The low case demand would give required fare levels far above the willingness to pay threshold and therefore a large subsidy would be required to make the service feasible.
- If the service was deemed commercially sustainable by an airline without the need for a PSO, but the service was eligible for the ADS, there would be a cost associated with providing the discount to eligible residents.
- Therefore, there are two scenarios with three varying levels of cost: low and base demand which would require PSO type subsidy of the route (required fares above willingness to pay threshold and where ADS would be not eligible) and ADS eligible costs (where PSOs would not be required, but costs would be associated with providing the fare discount) which would be representative of the high case sensitivity.
- The levels of potential subsidy in the three scenarios mentioned above are shown to the right for year one of operation. In all cases, ADS costs are lower than PSO costs (which seems sensible, given that under the ADS scenario, services would be commercially viable for the operator). ADS costs are the same for both Glasgow and Edinburgh, assuming that both services had a similar demand profile of inbound/outbound and business/leisure and that the fare levels were achievable.
- For PSO subsidisation, costs would vary from around £170,000 to over £1.3m for services to/from Glasgow and from £350,000 to over £1.7m for Edinburgh (reflecting the higher operating costs of flying further and also highlighting the level of variation in operating costs by aircraft type).

Range of potential subsidy costs in year one - services to Glasgow

Aircraft Type	Low demand (PSO Subsidy)	Base demand (PSO Subsidy)	High demand (ADS related costs)
DHC-6-300 (Twin Otter)	£393,179	£189,514	£71,504
Do228-212	£1,351,554	£1,147,889	£71,504
BN-2B-26 Islander	£439,779	£340,338	£34,033
BN-2A Mk III Trislander	£373,929	£170,264	£71,504

Range of potential subsidy costs in year one - services to Edinburgh

Aircraft Type	Low demand (PSO Subsidy)	Base demand (PSO Subsidy)	High demand (ADS related costs)
DHC-6-300 (Twin Otter)	£556,804	£353,139	£71,504
Do228-212	£1,737,929	£1,534,264	£71,504
BN-2B-26 Islander	£556,654	£457,213	£34,033
BN-2A Mk III Trislander	£560,929	£357,264	£71,504

4.3 Commercial analysis of service

Connection options at Glasgow and Edinburgh

- The survey responses indicated that preferred outbound times from Skye would be between 06:00 and 10:00, with 08:00 to 10:00 being most commonly preferred. Inbound flight times were most commonly preferred for 18:00 to 20:00.
- In terms of connections at Glasgow and Edinburgh, the main outbound services to major EU/global destinations depart these airports between 08:20 and 10:00 and therefore any feeder service which wished to connect with these services would need to arrive at between 07:00-07:30 to allow suitable time to catch the connection. Therefore, flights would need to depart Skye at around 06:00.
- However, this would be unlikely to be achieved, especially as the aircraft is likely to be based at the mainland airport (Glasgow or Edinburgh). This is primarily due to the provision of spare aircraft (in case of technical fault) and hangar space (which is not available at Skye).
- Glasgow services typically depart other HIAL airports at between 09:40 and 12:00 and Edinburgh services typically departing the HIAL airport at 07:35 to 08:40. Of all HIAL services, only Kirkwall and Sumburgh have aircraft based away from the mainland airport. Services to Glasgow are all operated on aircraft based at Glasgow overnight.
- Therefore, despite the benefits of catching early morning connections from Glasgow or Edinburgh, it seems unlikely that this would be feasible and therefore connections to other UK, EU and Global destinations would be in early afternoon, assuming Skye services operating on a similar timing as other HIAL services.

Preferred flight times to/from Skye
Source: Skye Air Service Survey

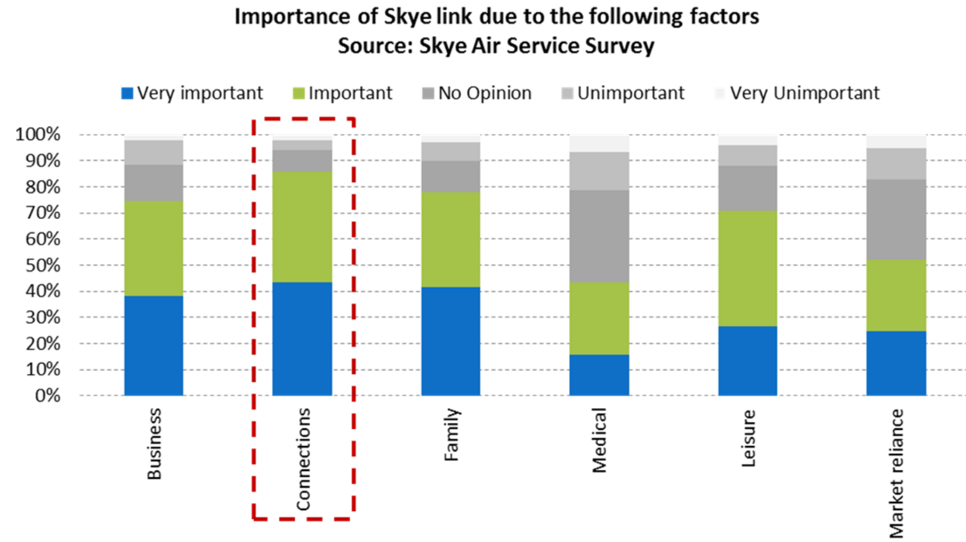
Typical weekday operating times to Glasgow Airport
Source: Flybe.com

From	Departure Time	Arrival Time	Base?
Barra	11:55	13:05	Glasgow
Benbecula	11:20	12:25	Glasgow
Islay	09:40	10:20	Glasgow
Campbeltown	10:00	10:40	Glasgow
Stornoway	08:30	09:30	Glasgow
Sumburgh	12:00	13:30	Glasgow
Tiree	12:30	13:25	Glasgow

Typical weekday operating times to Edinburgh Airport
Source: Flybe.com

From	Departure Time	Arrival Time	Base?
Kirkwall	07:35	08:55	Kirkwall
Stornoway	08:40	10:30	Edinburgh
Sumburgh	07:40	09:05	Sumburgh
Wick	12:30	13:30	Edinburgh

4.3 Commercial analysis of service



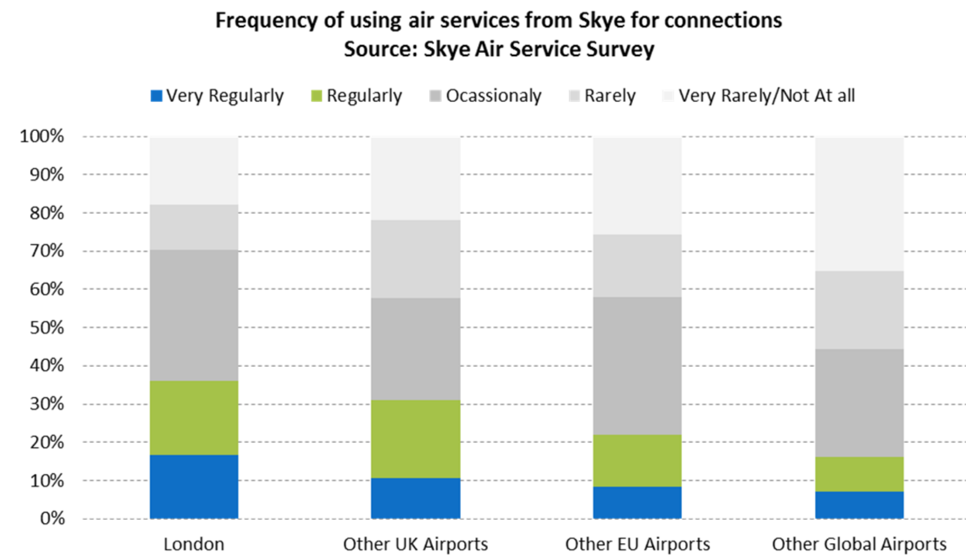
Connection options at Glasgow and Edinburgh

- Despite the difficulties in managing the operation to enable morning connections to be made at either Glasgow or Edinburgh, the importance of connections was cited by respondees to the online survey, with 85% stating that connections were important or very important in peoples' decisions when deciding whether or not to use an air service.

- However, this sentiment was not necessarily backed up with evidence that people would regularly use the air service for connections. When asked *"How regularly would you use air services from Skye to enable you to catch connecting flights to the following destinations outside Scotland?"*, only 35% said they would very regularly or regularly use Skye air services for connections to London, 30% to other UK airports, 20% to other EU airport and 15% to other global destinations.

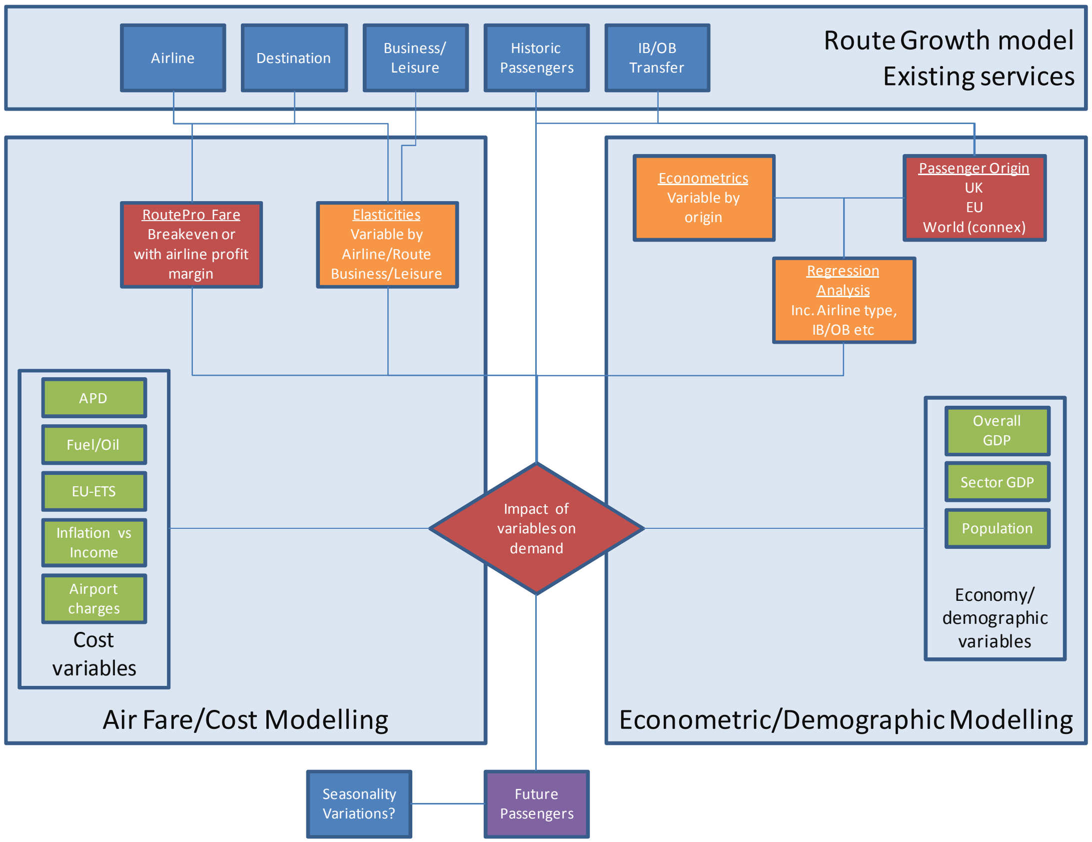
- The statement of connections being very important may be more related to the perception of making Skye less remote and offering connectivity possibilities, rather than being a vital part of demand.

- That said, it is likely that some people would connect onto other services, but may not be the largest factor in determining the timing of services.



4.3 Long term forecasts

- In order to assess the longer-term potential and benefits of investing in air services to/from Skye, and to assess the potential impact on demand from varying operating costs (such as varying fuel prices), a long-term forecast model has been constructed. The flow diagram below summarises the general approach undertaken as part of the forecast. The top and right hand side sections summarise the demand forecasting, with long-term growth multipliers coming from benchmarked historic performance of other HIAL services. The left hand side of the flowchart summarises the initial RoutePro.net fare calculation which, when combined with cost elasticities on a business and leisure perspective (as discussed in section 2) and assumptions on how operating costs (and therefore fares) could change over the forecast period, enable demand to be assessed against future air fares.



4.3 Long term forecasts

Data sources and inputs

- The base case bottom up forecast (of around 14,500 passengers per annum on a 12x weekly service with a Twin-Otter style aircraft) has been used as a base year, along with the breakeven fare for the Glasgow service (which seems more appropriate to use given the profile of services from the Western Isles and that these fares are closest to those which people are willing to pay).
- Future operating costs (such as lease rates, maintenance costs etc) have been based on the typical age of a Twin-Otter style aircraft used in the UK at present and how these will change in future years as the aircraft ages. Some operating cost elements (such as insurance) are assumed to increase in line with inflation (UK CPI – Source: HSBCIB).
- Future oil/fuel prices have been sourced from the US Energy Information Administration from their 'Reference Case' forecast which forecasts a 1.7% CAGR growth in real terms over the next 30 years.
- Airport charges at both Skye (which are based on the current HIAL charges structure) and Glasgow Airport are assumed to increase in line with inflation.
- EU-ETS charges have been sourced from Point Carbon, a Thomas Reuters company. The EU-ETS charge is levied per tonne of CO_2, per sector emissions being calculated from the typical engines used on a Twin Otter style aircraft.

Data sources and inputs

- Business/leisure splits have been based on the bottom-up analysis by month, giving a split of approximately 30%/70% over the course of the year. This is not assumed to change over time.
- Business users are assumed to pay slightly high fares than leisure users, based on fare research undertaken by RDC Aviation. This is reasonable – business users are likely to book closer to the time of departure and due to airline revenue management practices, this would lead to them paying a higher fare as a result.
- Business/leisure price elasticities of -0.6 and -1.4 respectively have been used to assess the suppression/stimulation in demand resulting from fare variances. These have been sourced from various studies into price elasticities as discussed in section 2.
- In terms of macro-economic growth, the performance of a comparable HIAL services to Glasgow against historic GDP has been used to give a GDP (income) multiplier.
- GDP forecasts have been sourced from IHS Global Insights. GDP forecasts are only available on a UK level and are not broken down to a regional level. However, as discussed towards the start of this section, Scotland's economy (measured in GVA per head) has generally followed that of the UK as a whole and therefore UK GDP can be used as a reasonable proxy.
- Combining the GDP multiplier with the GDP forecast provides growth factors which, when assessed with the cost/fare modelling, provides a combined perspective of long-term growth potential.

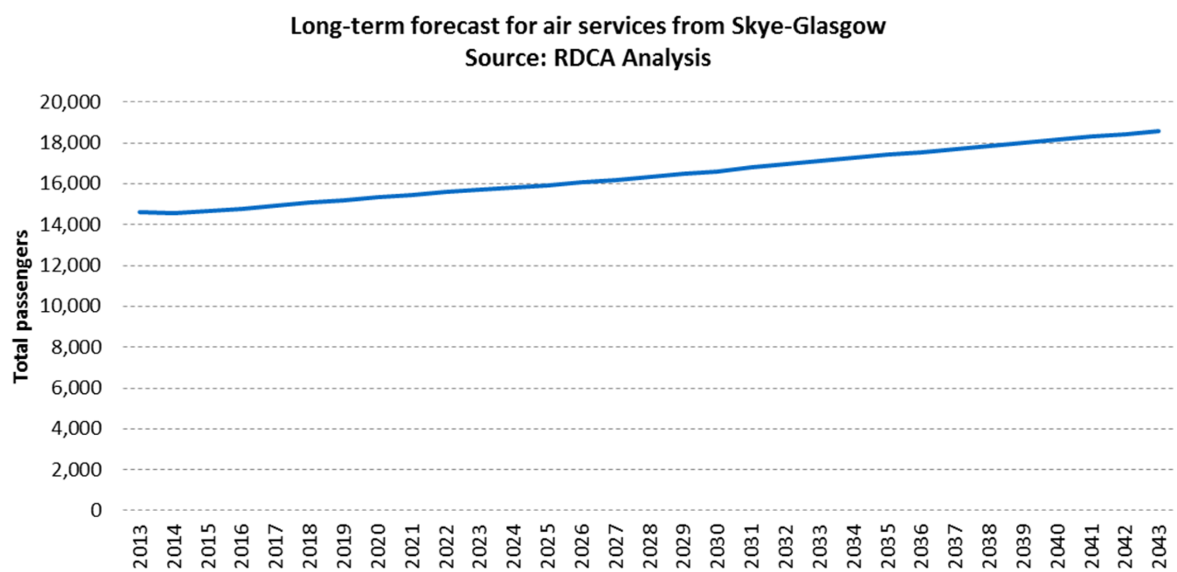
4.3 Long term forecasts – Base Case

Forecast outputs

- The long-term forecast has been extended through to 2043 to give a 30-year indication of potential demand change in the long-run. Over the long-term period. It has been assumed that the aircraft type used remains the same. New aircraft types could potentially be used on this type of service, but more detailed research would be required to assess a more likely entry point for new aircraft for airlines which could potentially operate such a service from Skye.

- Over the long-term period, taking fare variations and general GDP-driven growth into account, demand is forecast to grow from 14,500 passengers in 2013 (as the base year) to 18,500 by 2043. This would give an annual average growth of around 140 passengers, which is comparable to the average annual growth in passengers on other Western Isle-Mainland services discussed in section 2 (with Tiree, Campbeltown and Barra adding an average of 200 passengers per annum).

- If this future demand had a similar monthly profile, summer demand would result in load factors starting to exceed 90-95%. This would likely be managed through the addition of additional frequencies, increasing to 14x weekly and perhaps more in peak summer periods.



4.4 Wider economic benefits – Base Case

High level gross economic benefits

- A high-level analysis has been undertaken to assess the gross economic benefits of the proposed service, both initially and over a 30-year forecast period. This analysis includes the following:
  - Time-saving benefits of passengers flying instead of driving
  - Gross inbound spend of passengers using a Skye air service
  - Gross GVA impacts from inbound spend and employment supported by this spend; and
  - Direct, indirect and induced employment in Skye as result of the air service.

- In order to assess the benefits, the following assumptions have been used:

  - Business/leisure: as discussed, the business/leisure splits have been based on CAA survey data of journey purpose by month for comparable routes, giving approximately 30% of annual demand travelling for business purposes (against the benchmark average of 32%).

  - Inbound/outbound: the inbound split (i.e. people living outside of the Skye/Lochalsh region using the service) has been based again on CAA survey data by month for comparable services. It is assumed however that Skye will attract a higher percentage of inbound passengers during summer months (due to the region's attractiveness as a leisure destination) which results in an annual average inbound percentage of 58% (compared to the benchmark average of 48%).

High level gross economic benefits (cont…)

- Stimulated/diverted: On the whole, it is assumed that the majority of traffic using the proposed air service would be diverted from using other modes of transport. However, based on peoples' current travel habits (as stated through the online survey), there is likely to be an increase in the frequency of use of the Skye air service versus current modes of transport, as well as the service making Skye more accessible for potential inbound visitors. Based on the increase in trip demand from the online survey, approximately 28% of demand is expected to be stimulated (i.e. new trips – see following page).

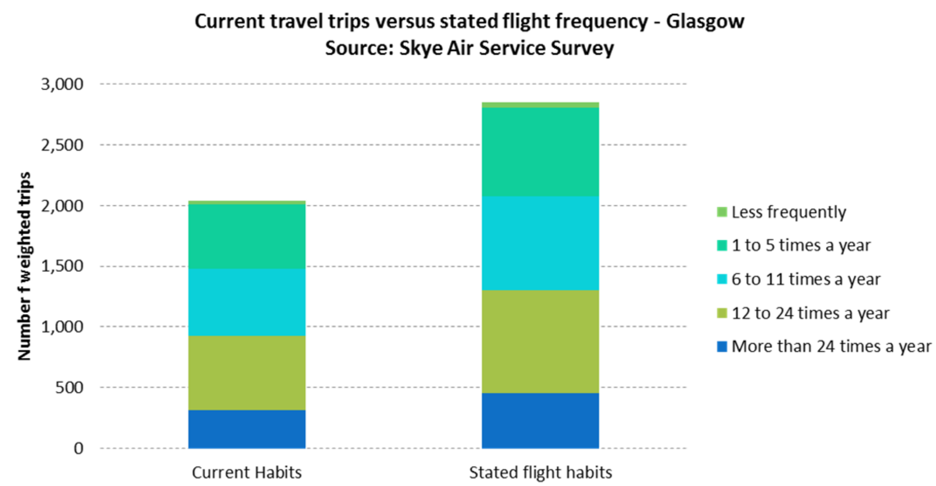
Profile of passengers on the Skye air service

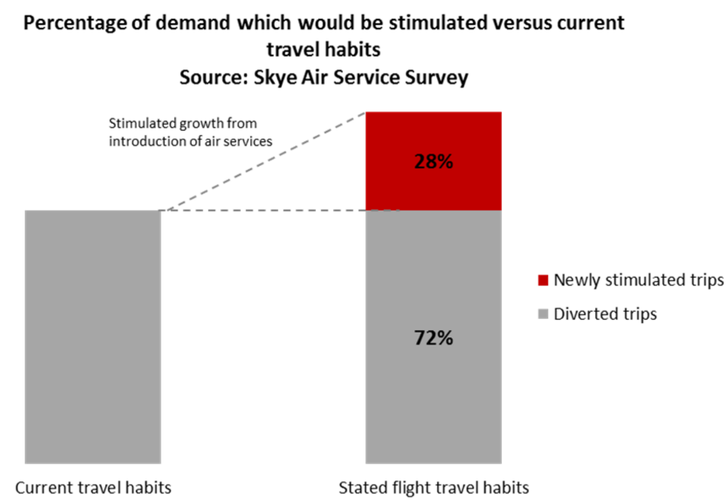
Designation	Percentage	Absolute (year 1)
Business	30%	4,438
Leisure	70%	10,192
Inbound to Skye	58%	8,421
Outbound from Skye	42%	6,209
Stimulated	28%	4,065
Diverted	72%	10,565

4.4 Wider economic benefits – Base Case

Review of potential stimulation from air services

- Within the Skye Air Service Survey, respondees were asked how many trips they make in a typical year (*regardless of mode of transport)* between Skye and main areas in Scotland and the UK (with Glasgow and Edinburgh being distinct options).
- Respondees were also asked how many return *flights* people would make in a typical year if air services were introduced from Skye to main Scottish airports.
- Based on stated responses of how often respondees currently travel to/from Skye and Glasgow compared to how often they would fly between Skye and Glasgow (weighted by the number of trips per annum made currently versus flying – e.g. if one person stated they travelled to Glasgow 6 to 11 times a year, their response was taken to count for 9 actual trips per annum – the mid-point of the bands), the introduction of air services would see an additional 39% annual trips compared to current.
- This growth in trips being made would be classed as additional (i.e. stimulated) trips which aren't currently taking place. When accounting for this additional growth within the increased total number of trips, the additional stimulated trips account for 28% of passengers.
- For comparison, a study conducted into the impacts of increasing capacity on the Campbeltown-Glasgow service (*Campbeltown Weekend Air Services Market Assessment, Reference Consultants, 2012)* forecast an 11% stimulation from adding 2 additional rotations to an existing service. A new air service would be expected to increase the level more so, so in context of stimulation on Campbeltown-Glasgow service, 28% seems reasonable.





4. Traffic Forecasts

4.4 Wider economic benefits – Base Case

Time savings

- Taking check-in, drive and city centre access times into account, flying between Glasgow and Skye would take save 2 hours and 20 mins compared with the equivalent drive:

Time comparison between driving and flying - Broadford to Glasgow City Centre

Journey sector	Driving	Flying	Comments
Broadford to Glasgow City Centre	**4 hours 45 mins**	**2 hours 15 mins**	**Drive time with 30 minute break after 2 hours**
Flight time saving	**2 hours 20 mins**		
Flight journey breakdown			
Check-in/wait prior to departure	-	45 mins	
Flight time	-	60 mins	Typical sector time to Glasgow Airport
Travel to city centre	-	30 mins	8 mile taxi journey, plus 10 mins from aircraft to taxi

Source: Google Maps, Glasgow Airport, RoutePro.net

- Due to the different values attached to time by business and leisure users, the value of the saving will vary by journey purpose. Values of time (per hour) for business and leisure users have been sourced from DfT webTAG documentation (Unit 3.5.6). For business, it is assumed that business time cost relates to that for car drivers and all leisure time cost relates to non-working time for 'other' (i.e. non-commuting) purposes.

- For those passengers which are stimulated (as opposed to diverted from other modes of transport), 50% of the full value was applied. This reflects the convention of the "rule of half" which is widely used in transport appraisal.

- In total, business time savings would equate to approximately £305,000 and leisure savings of £118,000 in year one of the service. Over a thirty year period, these savings equate to just under £11.5m in real terms, discounted to 2012.

Time saving benefits - Skye to Glasgow

	Business	Leisure	Comments
Value of Time (per hour)	£33.75	£5.71	2012 prices
Benefits in year one	£305,240	£118,621	
Present value through to 2043	£8,387,993	£3,091,141	Discounted to 2012 prices at 3.5% discount rate
Net Present Value	**£11,479,134**		

Source: webTAG, RDCA

4. Traffic Forecasts

4.4 Wider economic benefits – Base Case

Net inbound spend

- Net inbound expenditure in the Skye/Lochalsh region has been determined at this stage, based on typical expenditure by both business and leisure visitors.

- For the purposes of this assessment, it is assumed that all passengers which use the air service would be from Great Britain. There would of course be the potential for other international visitors to utilise the service, but this could be largely dependent on the timing of flights and promotion of the service/region to international visitors. In any case, international visitor spend would likely be higher than that of domestic visitors and therefore the below output could be considered a conservative assessment of benefits.

- On average, business visitors to Scotland spend an average of £292 per trip, while leisure travellers spend an average of £235 per trip.

Spend per trip by purpose in Scotland

	Business	Leisure
Total spend (£m)	£640	£2,089
Total trips (m)	2.186	8.908
Average spend per trip (£)	£293	£235

Source: Visit Scotland

- Based on the split of inbound business and leisure passengers expected to use the service, and the percentage of passengers which would be stimulated to use the service, the potential stimulated inbound pend in Skye is summarised below. Over the long-term period, benefits are expected to total £6.3m in real terms, discounted to 2012. While business visitors may spend more per head, the greater volume of leisure trips results in higher benefits accruing to this purpose and shows some of the potential inbound tourism benefits of the service.

Stimulated inbound visitor spend in Skye/Lochalsh region

	Business	Leisure	Comments
Spend per tip	£293	£235	
Benefits in year one	£103,621	£190,701	
Present value through to 2043	£2,206,438	£4,061,044	Discounted to 2012 prices at 3.5% discount rate
Net Present Value	**£6,267,482**		

Source: Visit Scotland, RDCA

- Based on the postcodes of respondees to the Skye Air Service Survey and their current versus stated travel habits, **approximately 34% of the inbound stimulated demand would be from outside of Scotland** (the remaining being inbound to Skye but still resident in Scotland). This implies that approximately £2m of the NPV spend in Skye would be **additional to Scotland**, rather than simply being displaced from else where in country.

4. Traffic Forecasts

4.4 Wider economic benefits – Base Case

Direct, indirect and induced employment from the air service

- It is estimated that 13 FTE's would be required to operate and maintain airfield operations at Broadford; 3 FTE management, 5 FTE fire fighter and 5 FTE security staff. Employment multipliers related to "Air Transport" have been sourced from the Scottish Government to assess the direct, indirect and induced impact on employment as a result of these.
- In addition to the direct employment on site, there would be support services/functions related to operations, supply chain activities related to the on going maintenance of the airfield and so on. In addition, the increase in employment in the area would have further impacts on spend in the region, resulting in further induced employment. Overall, 25 FTE's would be created as a result of this service (table right).
- There would also be additional employment benefits at a Scottish level from flight crew, maintenance, pilots etc.

Employment related to air services in Skye

Employment Type	FTEs
Direct	13
Indirect	7
Induced	5
Total	**25**

Stimulated employment and GVA supported through visitor spend

- There are two benefits resulting from increased tourism spend – spend which is net additional to Scotland as a whole and spend which is net addition to the Skye/Lochalsh region. As discussed on the previous page, approximately 34% of visitors would be net at a Scottish level. These additional benefits at a Scottish level have been split out of the net benefits to Skye/Lochalsh as a whole and applicable national or region GVA and employment multipliers have been used accordingly.
- Overall, 5 jobs would be net to the Skye/Lochalsh region as a result of the service, based on local tourism and employment data and over £140,000 in GVA. At a Scottish level, 3 FTEs would be created, with approximately £85,000 GVA associated.

Net GVA and employment supported through visitor spend - Additional to Skye Region

	Business	Leisure	Comments
Benefits in year one	£103,621	£190,701	
GVA	£50,774	£93,444	Based on Tourism figures for Highlands region (implied GVA multilpier of 0.49)
Employment (FTE)	2	3	Based on direct employment multilpiers for Highlands region

Source: Scottish Government, RDCA

Net GVA and employment supported through visitor spend - Additional to Scotland

	Business	Leisure	Comments
Benefits in year one	£35,231	£64,838	
GVA	£30,299	£55,761	Based on Multilpier for 'Hotels, catering and pubs' at a Scottish level
Employment (FTE)	1	2	Direct, indirect and induced

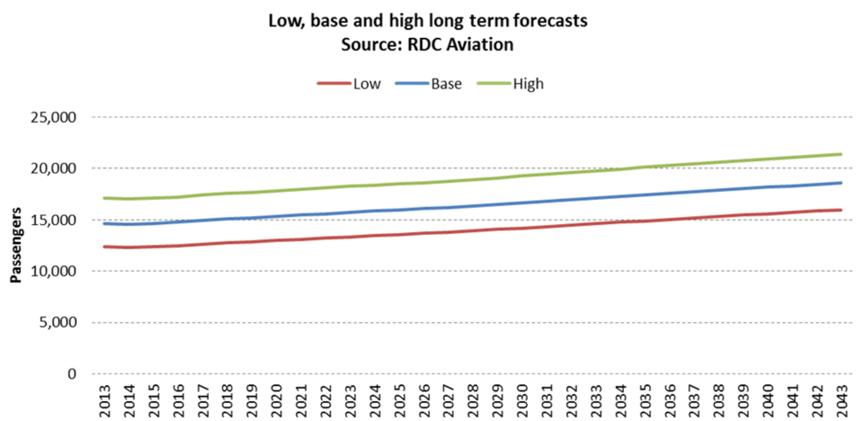
Source: Scottish Government, RDCA

4.4 Wider economic benefits – Low and High Case forecasts

Forecast outputs

- As discussed, there are boundaries within which the base case forecast could sit within year one which, if continued, would result in low and high case long term forecasts and economic benefits.

- All other factors being equal (e.g. keeping assumptions regarding operating costs, GDP, inflation etc the same), the chart below summarises the low and high case sensitivities over the long term, compared to the base case forecast. Over the next 30 years, demand would vary by approximately ±2,500 passengers per annum compared to the base case.



Long term forecast comparisons - Low, base and high

Scenario	2013	2018	2023	2028	2033	2038	2043
Low	12,330	12,757	13,327	13,905	14,605	15,304	15,969
Base	14,630	15,084	15,703	16,331	17,103	17,866	18,578
High	17,073	17,556	18,227	18,909	19,757	20,588	21,348

Comparison of economic benefits according to scenario

- The economic benefits discussed in detail in the preceding section were calculated on the base case forecast.

- By utilising the same methodology, but for the low and high case forecasts, the following range of economic benefits would be gained according to scenario. It should be noted that these assume similar splits in traffic profile, visitor expenditure etc.

- Benefits are, or course, highest in the 'high case' forecast given the higher passenger volume resulting in increased time saving benefits and greater inbound spend.

Comparison of economic benefits in each forecast scenario

	Low Case	Base Case	High Case
Year one passenger traffic	12,330	14,630	17,073
Time savings (NPV)	£9,767,598	£11,479,134	£13,297,054
Stimulated visitor spend in Skye (NPV)	£5,328,169	£6,267,482	£7,265,200
Stimulated visitor spend additional to Scotland (NPV)	*£1,811,578*	*£2,130,944*	*£2,470,168*
Year one Skye/Localsh GVA benefits from visitor spend	£121,545	£144,218	£168,300
Skye/Locahalsh net FTE's generated from visitor spend	4	5	6

4.4 Wider economic costs – Carbon Costs, Base Case

Carbon emissions from air service

- Carbon dioxide (CO_2) is always generated during the combustion of fossil fuels (coal, gas, oil) and the amount of carbon dioxide emitted is a direct function of fuel consumption: 3.157 kilograms of CO_2 are produced per kilogram of fuel burnt.
- In order to calculate the fuel burn from any particular flight, a range of sources are used to determine fuel burn from landing and take-off cycle and during the actual flight. These sources are typically from aircraft and engine manufacturers and we make adjustments to these based on aircraft age (older aircraft/engines typically being less fuel efficient) and aircraft capacity (greater capacity leading to greater on-board weight and therefore greater fuel burn).
- The sector great circle distance is then calculated and applied to the cruise fuel burn. Adding the LTO fuel burn gives a per sector fuel burn which is then converted to CO_2 emissions.
- Per sector CO_2 emissions for a Twin Otter (300 variant) equal 784kg, giving an annual emission output of 978 tonnes for a 12x weekly service.
- The new variant Twin Otter 400 series would give some benefits due to newer and more efficient engines. These efficiency savings would equate to approximately 5.5% fewer CO_2 emissions – around 920 tonnes emitted for an annual 12x weekly service.
- Note that Radiative Forcing factors are not included in this assessment due to being not applicable to the flight height (and aircraft type) considered in this analysis.

Carbon emissions from air service

- The Department of Energy and Climate Change[1] gives a central value of one tonne of CO_2 emitted as £16 for 2013 (2011 prices) – this value being guided by forecast EU Emissions Trading Scheme (EU-ETS) prices. However, carbon is currently trading at €4.12 per tonne[2] (£3.50) – less than a quarter of the price of the central DECC figure.
- However, taking the central DECC value, the 30 year present value of emissions related to the service equates to £1.1m (and slightly lower for the 400 series Twin Otter). However, if carbon continues to trade at this lower value, the equivalent price of carbon could be as low as £0.25m over the 30 year period.

Cost of CO2 emissions from Skye-Glasgow air service by twin otter variant

	300 series	400 series
Per sector CO2 (t)	0.784	0.741
Annual emissions (t)	978.5	924.7
30 year PV of aircraft emissions (DECC central price)	£1,153,678	£1,090,225
30 year PV of aircraft emissions (current trading price of CO2)	£252,367	£238,487

(1) DECC (2011) *A brief guide to the carbon valuation methodology for UK policy appraisal*

(2) Point Carbon *EU spot carbon permit auction clears at 4.12 eur/t, http://www.pointcarbon.com/news/reutersnews/1.2210868* accessed 7th March 2013

4.4 Wider economic costs – Carbon Costs, Base Case

Emission savings from reduced road trips

- Offsetting emissions from air services are savings made from current modes of transport. A forecast 10,500 passengers being diverted from other modes of transport (primarily car) and the saved CO_2 from these trips must be considered to look at the net change in emissions from the air service.
- Based on other HIAL services from Glasgow Airport, the average party size is 1.21 persons per party (see right). Equating this to average vehicle occupancy for trips currently being made, a total of 8,729 one-way surface trips are being saved from passengers flying versus driving.
- The drive between Skye Airport and Glasgow is 184 miles[1]. With the average car efficiency at 39 miles per gallon[2], each one-way surface trip results in average of 4.72 gallons of fuel burnt. Over the course of a year, the number of diverted trips equates to over 41,000 gallons of fuel savings – equivalent to 473 tonnes of CO_2
- In addition to diverted trips, the emissions from stimulated trips are also considered (following Scottish Enterprise Appraisal Techniques[3]). As with time saving benefits, stimulated CO_2 emission savings from surface journeys are subject to the rule of halves. These stimulated trips have a value of 91 tonnes per annum, giving a total saving of 564 tonnes of CO_2 savings from reduced surface trips being made.
- As discussed, these emissions would have an estimated cost of £664,000 over 30 years (discounted to 2012) at the central DECC price of carbon, or down to £145,000 at currently traded prices.

Average party sizes for select HIAL services from Glasgow (Source: CAA Survey Data 2009)

	Glasgow services to…	Party Size						
		1	2	3	4	5	6	Weighted average
Passengers by party size	Benbecula	13,659	2,130	151	259			1.20
	Barra	3,685	1,399	205				1.34
	Campbeltown	3,477	2,202					1.39
	Stornoway	32,153	4,013	96	400	101	88	1.17
	Total	**52,973**	**9,745**	**452**	**659**	**101**	**88**	**1.21**

Diverted passengers	10,565
Passengers per trip	1.21
Diverted surface jounreys	**8,729**

CO2 emission savings from diverted surface journeys between Skye and Glasgow

Distance (miles)	184
Average vehicle fuel efficiency (mpg)	39.0
Average fuel per journey (gallons)	4.718
One-way trips diverted	8,731
Fuel savings from diverted surface trips (gallons)	41,194
Fuel weight equivalent (tonnes)	150
Equivalent CO2 emissions (tonnes) - Diverted passengers	473.0
Stimulated passenger CO2 savings	91.00
Total CO2 savings from surface journeys (tonnes)	**564.00**
30 year PV of surface emissions (DECC central price)	£664,968
30 year PV of surface emissions (current trading price of CO2)	£145,462

(1) Maps.google.com
(2) http://www.transportdirect.info, accessed 6th March 2013
(3) Appraising the Economic Benefits of New Air Routes: Technical Report, Scottish Enterprise, 2011

4. Traffic Forecasts

4.4 Wider economic costs – Carbon Costs, Net costs and scenarios

Net change in carbon emissions and costs

- Comparing emissions created from flights and offset with the savings from reduced surface trips, the net change in emissions is 360 to 410 tonnes of CO_2 per annum depending on aircraft variant.
- Based on the central DECC carbon cost, this net change in emissions would be equivalent to between £425,000 and £489,000 additional costs, or between £93,000 to £106,000 in additional costs at the current trading price of carbon.

Net change in emissions and 30 year NPV carbon costs

	300 series	400 series
Annual flight emissions created (tonnes)	978.50	924.68
Annual surface emissions saved (tonnes)	563.83	563.83
Net change in annual emissions (tonnes)	414.67	360.85
30 year NPV of change in emissions (DECC central price)	£488,910	£425,458
30 year PV of surface emissions (current trading price of CO2)	£106,949	£93,069

Net change in carbon emissions and costs - scenarios

- In terms of the three demand scenarios considered through this analysis, each would have similar flight emissions (there would be minor variations due to lighter/heavier carrier weight, but would be relatively insignificant). However, there would be noticeable impacts of higher/lower demand in terms of surface emission savings.
- In the low case scenario, lower demand would lead to fewer trips being diverted/stimulated and therefore there would be a greater net change in emissions from the introduction of the flight (and vice versa for the high demand case).
- The various net costs of carbon emissions under the three scenarios are summarised below – the low and high demand cases result in +/- £80,000 NPV costs over the 30 year period at DECC central carbon prices, or +/- £17,000 at current carbon trading prices.

Change in carbon costs for three demand scenarios (twin otter 300 series)

	Low case	Base case	High case
Surface journey savings (tCO2e)	475.19	563.83	657.97
30 year NPV cost of carbon (DECC central)	£565,772	£488,910	£407,279
30 year NPV cost of carbon (current trading price)	£123,763	£106,949	£89,092

5. Development Strategy

5.1 Development Approach

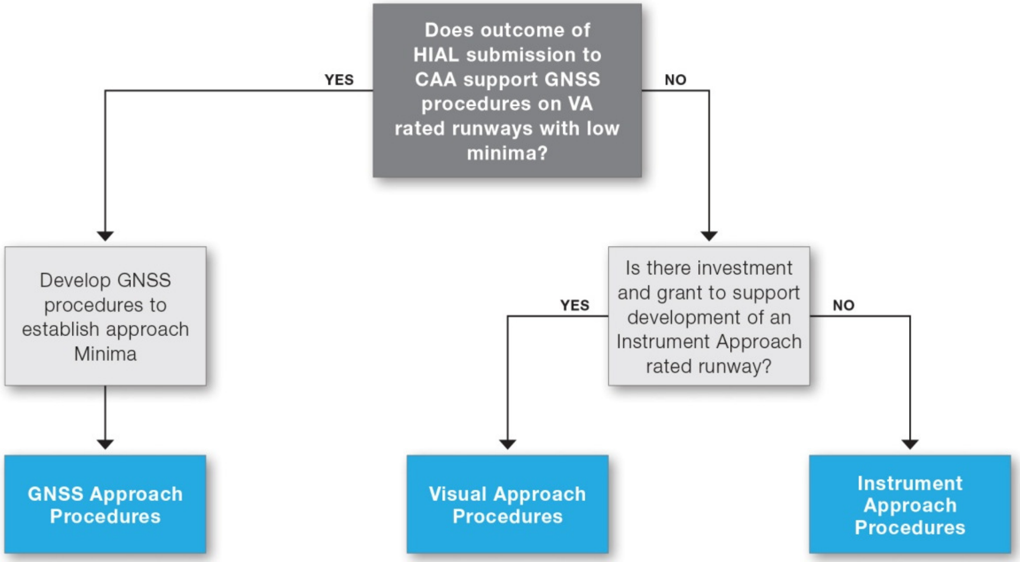
- Successfully re-starting regular scheduled air service from Broadford Airfield will depend on achieving a balance of affordability and attractiveness for airlines and passengers, while meeting the necessary level of safety and security standards required to gain a permit to operate.

- Previous studies have concluded that instrument approach navigation systems are highly desirable in order to minimise the number of occasions when operations are disrupted due to poor visibility weather conditions. Our own informal discussions with a number of airlines has also indicated that although they would consider operating services on a Visual Approach only basis, Instrument Approaches are highly desirable given the climatic conditions on Skye.

- However, the installation of conventional ILS instrument systems along with infrastructure which fully complies with CAP 168 requirements for instrumented runways has proved prohibitively expensive.

- Work currently being carried out by HIAL in conjunction with the CAA on GNSS approach procedures could provide an opportunity to achieve the benefits of instrument assisted approaches but with substantially less onerous airfield development requirements.

- The adjacent diagram outlines the development strategies that might be available at Broadford depending on the outcome of the HIAL/CAA work on GNSS procedures.

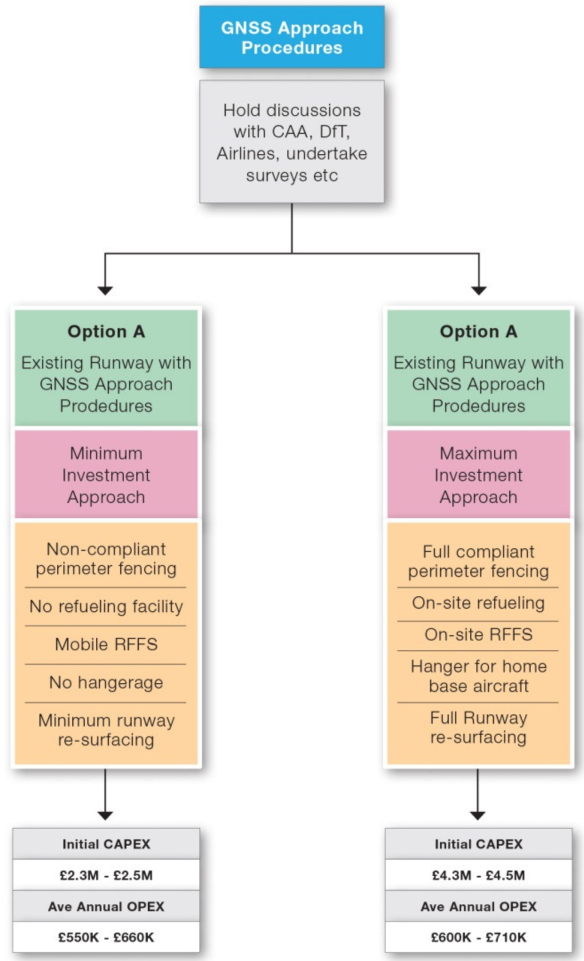


- If the outcome of the HIAL work supports a GNSS approach, the next stage would be to undertake studies to develop GNSS procedures for Broadford based on the existing airstrip infrastructure and surrounding terrain. This would establish a landing minimum decision height which, when assessed against historic cloud-base height records, will give an indication of operational reliability benefits in adverse visibility weather conditions

5. Development Strategy

GNSS Approach Procedures – Option A

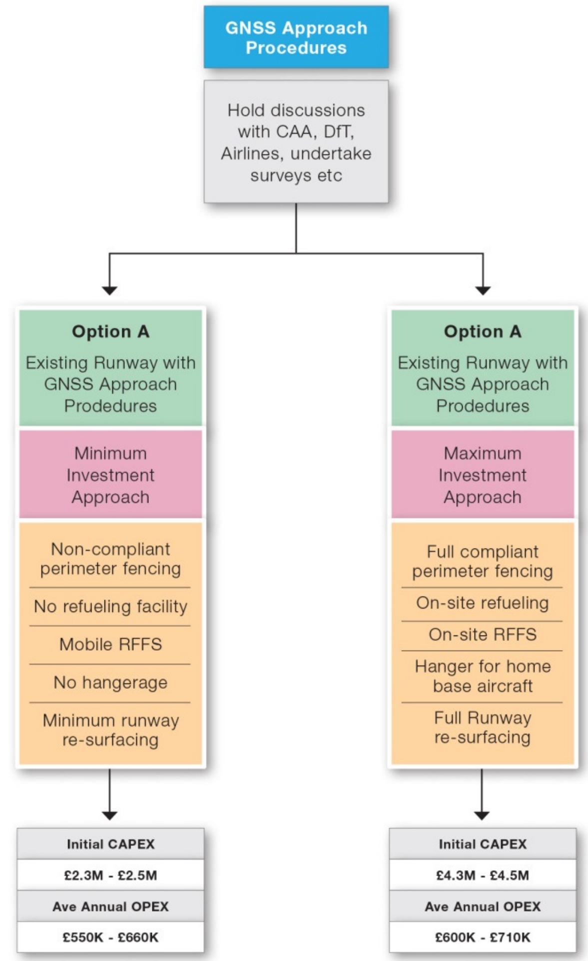
- If GNSS procedures on Visual Approach category runways proves viable then it is likely that Option A in conjunction with GNSS approach procedures would provide the best development strategy to establish reliable scheduled services at lowest overall cost.
- Based on the aircraft types currently available to airlines who are likely to operate at Broadford, there is little benefit of the longer runway of Option B, which also has significant additional cost and additional environmental impacts.
- For Option A, further detailed discussions with the CAA, DfT as well as the potential airline operators will be needed to refine the development proposal and associated CAPEX and OPEX costs.
- In deriving CAPEX estimates for Option A in this study, it has been assumed that agreements can be reached with approval authorities and airlines which will minimise investment requirements given the remote location of the airfield, the anticipated aircraft likely to be used and level of passenger throughput.
- The range of issues that will need to be agreed are outlined below and could add a further £2m of CAPEX and £50k per year of OPEX to Option A:
  - Perimeter fencing assumed to be designed to contain livestock only rather than providing a 3m high security fence to DfT standards.
  - RFFS facilities is appropriate for part-time cover with modest facilities for shared local fire service staff. A RIB or similar rescue boat and associated equipment is assumed not to be needed.
  - The condition of the runway surface with only modest patch repairs is assumed to be acceptable for continued operation in the foreseeable future.
  - Airlines will not be basing aircraft at the airfield and do not require a hangar for secure overnight storage
  - No commercial refuelling facilities are assumed to be provided.



- In addition to the airport costs described above, there would be some modest airline costs for operating GNSS approaches to cover in-cockpit equipment (<£50k) and pilot training.

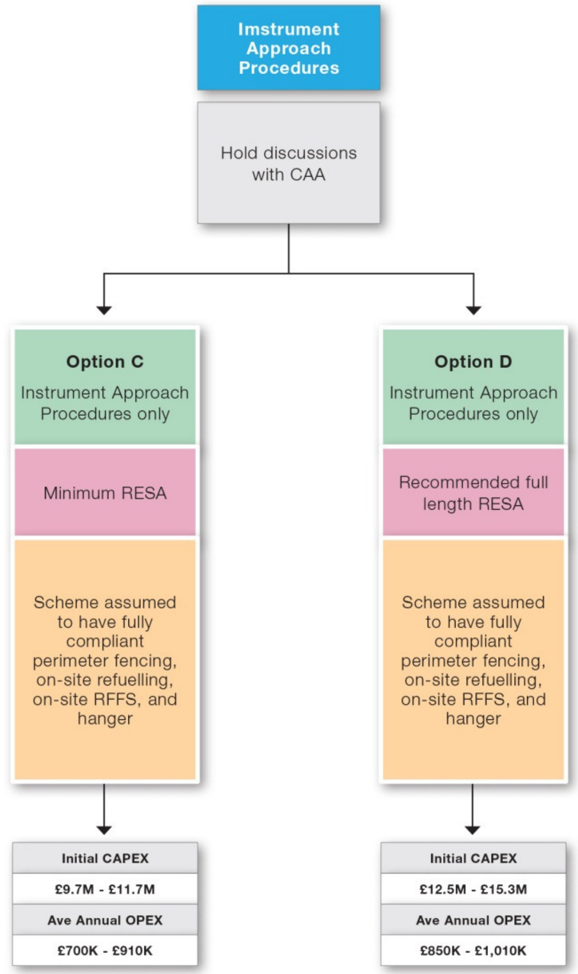
Visual Approach Procedures – Option A

- If emerging opinion from the CAA on GNSS procedures at Visual Approach category runways does not provide benefits to low visibility operational reliability compared to non-instrument approaches, then operating Broadford as a Visual Approach only airstrip may be viable.
- If this is the case, further work will be needed to develop VA procedures and to establish the frequency of low cloud base conditions that would impact VA operations.
- Discussions should also be held with potential airline operators to establish their willingness to consider scheduled services to the non-instrumented airstrip. Our informal discussions with a number of airlines is that they would be willing to consider this.
- Important considerations will be the costs associated with low-visibility related disruptions, arrangements for alternative transport and accommodation for passengers and contractual obligations associated with these disruption events.
- If a non-Instrument category runway approach is taken, then Option A provides the lowest cost development option and can accommodate Twin Otter and Britten-Norman Islander/Trilander aircraft types which would be suitable for operating services to Glasgow and Edinburgh Airports.
- Option B, with the runway extended to 900m , could accommodate Dornier 228-212 aircraft in addition to those above, but the estimated cost of £6.9m compares unfavourably to £2.6m for Option A.
- CAPEX and OPEX costs for Option A are estimated to be the same irrespective of whether GNSS or VA approach procedures are being operated.



Full Instrument Approach – Options C and D

- Options C and D have been retained from previous studies as CAP 168 compliant instrumented category runways.
- In terms of aircraft types accommodated, Option C has a similar capability to Option A with Dornier 228-212 also being accommodated and Option D would also allow some Dash 8 variants (Bombardier DHC-8) to operate with some payload restrictions.
- CAPEX costs for these options are substantially greater than for Option A, estimated at £10.6m and £14.1m respectively, compared to £2.6m. However, these costs do assume some additional facilities such as hangars, refuelling facilities and perimeter security fencing are provided as might be expected in these larger scale developments.
- The key difference between the options is the treatment of RESA's (Runway End Safety Areas). Option C includes RESA's of 90m in length which are mandatory for this category of runway to comply with CAP168. Option D includes 120m RESA's which is the recommended length stated in CAP168.
- The CAA have a general policy requirement for new runway developments to include the recommended 120m RESA's rather than minimum 90m. However, if a Full Instrument Category compliant runway development were to be pursued, it is recommended that discussions are held with the CAA to explore the specific safety benefits of the two runway options given the type of operations proposed at Broadford, and the relative cost and environmental impacts of the two options.



6. Summary

6. Summary

Key Findings

Business Survey

- Over the course of two and a half months, RDC Aviation hosted an online survey to gather opinions on air services to and from Skye. As part of this survey, a total of 919 people responded to the survey (either in part or in whole).
- After cleansing the data for duplicate and very incomplete responses, a total of 684 responses were used to inform the wider analysis. The survey was promoted through a range of media outlets and through social media websites to gain as wide a range of opinions and from as many sectors of society/potential users as possible.
- The survey results have been used to help identify the appropriate fares which people would be willing to pay, confirming that the area considered as Skye's catchment area is realistic (based on the post codes of respondents) and providing context around the requirements and importance of an air service for Skye residents. Some analysis is detailed throughout the report and the survey results are summarised in full in Appendix A.

Forecast outputs

- The current unconstrained demand for air services from Skye to Glasgow/Edinburgh is estimated to be of the order of 21,500 passengers per annum.
- Twin Otters, Trislanders and Dornier 228, each having a seat capacity of around 19 seats, can operate within the 750m length restrictions of the current airstrip, without significant restrictions to payload.
- Runway lengths in excess of 1100-1200m would be required in order to accommodate potentially available aircraft which have a significant increase in seat capacity (30-35 seats). Runways of this length have a more onerous infrastructure requirement, which would have costs likely greater than £15m (based on previous studies) and considerable impact on the adjacent coastline.
- A 12x weekly service for a 19-seat aircraft would have a theoretical capacity of 23,712 seats per annum but would therefore require an unrealistically high load factor to satisfy this unconstrained demand.
- Bottom-up forecasts based on this service pattern predict a throughput of around 14,500 passengers per annum with a more realistic average load factor of 62%.

Infrastructure

- The introduction of instrument navigation approach systems is likely to significantly increase the reliability of operations in periods of low visibility. However, further work on approach procedure minima (the routes and heights an aircraft must fly on approach to landing) and a greater understanding of the local weather conditions is needed to quantify this.
- GNSS (Global Navigation Satellite Systems) could provide significant cost benefits compared to a conventionally designed ILS navigation guidance system and runway infrastructure.
- The runway clearances, strip width and RESA requirements associated with GNSS approach procedures at small aerodromes are being studied by HIAL. If the emerging findings of this work are accepted by the CAA, significant infrastructure upgrades (required in the CAA's document CAP168) might not be needed for GNSS approaches at airstrips such as Broadford.

6. Summary

CAPEX and Operating Costs

- If this is the case, investment of around £2.3-2.8m would be needed to construct additional facilities such as a terminal building, aprons, rescue and fire fighting facilities etc. in order to support a 12x weekly scheduled service by Twin Otter or similar aircraft.
- This estimate assumes that agreement is reached with parties such as the DfT on security fencing, the airline operators on hangars and Fire Authorities on facilities to minimise initial investment needs. If these discussions prove unfavourable, additional investment of up to £2m might be needed.
- If the CAA requires the airstrip to be designed for the full requirements of CAP168 for instrumented runways then the Capex required could be up to £9.7-15.3m depending on if the CAA insist on the full recommended RESA lengths rather than accepting the minimum specified length in CAP168.
- The operation of the existing airstrip without CAP168 upgrade and with minimum facilities (Option A) is estimated to require an average Operating and Maintenance budget of around £550-660k per annum.
- This could be partially offset by an income of around £150,000 per annum from aeronautical revenue.

Commercial Model

- Based on the commercial analysis of airline costs the required break even one-way fare (including10% profit margin) ranges from £110-£175 for Glasgow services and £120-£200 for Edinburgh services, assuming the aircraft is dedicated to this route.
- Fares within the lower end of this range are considered to be at a level that passengers might be willing to pay based on benchmark comparisons and the user survey feedback.
- On this basis, operation of unsubsidised services are likely, at best, to be only marginally viable. It is more likely that assistance, both financially and in terms of marketing and other support, would be needed to attract airlines to establish and maintain regular scheduled air services to Skye.
- Aircraft availability is likely to be an important issue. Operators seek to operate as few different types of aircraft as possible to simplify availability of spares and crew training. There are relatively few operators that have the appropriate equipment for serving Skye Broadford. The potential return (profit) is unlikely to be large enough/attractive enough to warrant obtaining new equipment and therefore the number of potential operators will be limited.
- There is no evidence of substantial willingness to over-pay above the break even fares derived from the airline cost analysis. Therefore there is unlikely to be high potential for 'upside' for airline revenues, limiting the attractiveness for them to invest without a PSO[1] being in place to protect them contractually.
- As it is likely that the airport would require an operating subsidy, there may be an expectation by the airlines that subsidies would also extend to air services.
- Whilst PSO is likely to be the preferred model for operators, it's not the only option. Marketing support or some form of risk share may be acceptable. However, this may not achieve the guaranteed commitment to a fixed period of flying in the same way as a PSO provides.

1. PSO – Public Service Obligation. An arrangement where the cost of providing specific air services are subsidised

6. Summary

Cost Benefit Analysis

- A range of Benefit / Cost ratio scenarios has been tested for Option A, based on the data derived in the report. Option A represents the lowest cost airport option based on the existing runway length. Air services assume a Twin Otter 300 series operating a twice-daily (12 return trips per week) service and a single aircraft dedicated to the route.
- Other options have significantly greater airport costs but do not provide additional passenger or tourism benefits
- The table to the right indicates the base, lower and upper bound estimates of costs and benefits used, expressed as a Net Present Value (NPV) using a 3.5% discount rate to 2012 prices with a 30 year evaluation period .
- CAPEX costs are based on the minimum capital investment Option A as outlined in Section 3.4 with a cost range of £2.3-£2.8m spread over two years. Operational & Maintenance costs are based on those derived in Section 3.5.
- Airline subsidies are based on the range of estimates included in Section 4.3 for Twin Otter series 300 services to Glasgow and cover requirements to support airline operating costs including airport charges.
- Airport revenues are taken at £150k per annum from landing charges and other aeronautical and non-aeronautical revenues as discussed in the same section of the report, and increased each year in proportion to the forecast traffic growth.
- Tourism benefits, also derived in Section 4.3, are based on the estimate of stimulated visitor spend which is additional for Scotland as a whole. This is only a proportion of the stimulated visitor spend within Skye as discussed in the economic appraisal section of the report.

Costs	NPV (Discount rate of 3.5% to 2012 over 30 years)		
	Base	Lower	Upper
Airport CAPEX	(£2.5m)	(£2.3m)	(£2.8m)
Airport OPEX and Maintenance	(£11.2m)	(£10.3m)	(£12.4m)
Airline subsidies (PSO/ADS Costs)	(£3.7m)	(£1.4m)	(£7.6m)
Airport Revenue (Landing charges etc.)	£3.1m	£3.1m	£3.1m
Total	**(£14.3m)**	**(£10.9m)**	**(£19.7m)**

Benefits	NPV (Discount rate of 3.5% to 2012 over 30 years)		
	Base	Lower	Upper
Time savings benefits	£11.5m	£9.8m	£13.3m
Tourism benefits	£2.1m	£1.8m	£2.5m
Total	**£13.6m**	**£11.6m**	**£15.8**

6. Summary

Cost Benefit Analysis

- A range of Benefit / Cost Ratio (BCR) scenarios has been assessed and summarised in the table below. This estimates the BCR using the BASE assumptions to be 0.95 with other scenarios tested falling within a range of 0.75 to 1.13

Scenario	Assumptions	BCR
Base	All costs and benefits based on BASE values in tables on previous page.	0.95
1 - Low CAPEX & O&M	As for Base Scenario but with lower values for CAPEX and O&M cost	1.04
2 - High CAPEX & O&M	As for Base Scenario but with upper values for CAPEX and O&M cost	0.87
3 - Low Economic Benefits	As for Base Scenario but with lower values for time saving and tourism benefits.	0.81
4 - High Economic Benefits	As for Base Scenario but with upper values for time saving and tourism benefits.	1.10
5 – Low Subsidies	As for Base Scenario but with lower values for aircraft subsidies	1.13
6 – Low Subsidies	As for Base Scenario but with upper values for aircraft subsidies	0.75

6. Summary

Cost Benefit Analysis

- The analysis on the previous page is based on dedicated use of a Twin Otter 300 series operating 12 return trips to Glasgow. Higher leasing costs of a new Twin Otter 400 series might increase the airline subsidy required by approximately £200,000 per annum and result in a BCR of around 0.76 if all other assumptions remain the same as the Base Case.
- However, this assumes that the aircraft is dedicated to the Skye-Glasgow service. If the 400 series aircraft were to be shared with other services, the lease rates would be spread over a greater number of services and the BCR for this route improved.

Carbon Cost

- The carbon emissions from operating 12 x weekly return flights to Glasgow is estimated as 975 tonnes per annum based on a Twin Otter 300 series, and 925 tonnes for the 400 series with slightly more efficient engines.
- This is offset by the reduction of around 8731 one-way car journeys (plus stimulated trips) and the consequential saving in emissions of around 565 tonnes, resulting in a net change in emissions of approximately 360 – 410 tonnes.
- Based on the Department of Energy and Climate Change cost of carbon of £16 per tonne for 2013, this net change in emissions would be equivalent to between £425,000 and £489,000 additional NPV costs over a 30 year period. If this is included in the Cost Benefit analysis, for the Base Case the BCR would reduce from 0.95 to 0.92.
- However, the current carbon trading price is £3.50 (March 2013) and on this basis the net 30-year NPV cost would be between £93,000 to £106,000.

6. Summary

Recommended Next Steps

- Commencing scheduled air services from Skye would provide significant benefits to the Island and adjacent region. In order to further explore the feasibility , we recommend the following next steps :
  - A joint working group is formed comprising the Scottish Government, Transport Scotland and HIAL joining Highland Council, HITRANS and HIE, who have led this Initial Feasibility Study.
  - The working group should progress detailed investigations starting with DfT liaison to discuss the feasibility of establishing a PSO service to Skye.
  - When available, the outcome of the work by HIAL on GNSS approaches should be reviewed and implications for Broadford understood.
  - Subject to the outcome of the above, development work on GNSS approach procedures should be undertaken to assess the benefits of providing an instrument approach.
  - Discussions should be led by the working group, and involve airlines, fire authorities and CAA to gain greater certainty on the infrastructure and facilities needed to gain an operating licence for the airfield.
  - Influenced by the outcome of these key actions the detailed business case should be advanced determining the specific capital and revenue costs, and the full economic and social growth and benefits that would be realised. The case should be advanced to a stage to enable decisions on investments to be made.