Study on Aircraft Suitability to Operate at John A Osborne Airport, Montserrat

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Summary

This study has been carried out using performance assumptions assuming international operating standards in line with ICAO standards and recommended practices, without any derogations, to examine which aircraft types may be suitable for operation at John A Osborne Airport, Montserrat.

Under these performance assumptions, we conclude that:

- The Britten Norman (BN) Islander piston engine models both have capability to operate successfully although the BN2B-26 model is climb limited throughout the study. The bigger wingspan BN2B-20 model has more consistent performance but its capabilities are somewhat compromised by its heavier empty weight.

- The BN2T turbine Islander shows good take-off performance capabilities but is poor when considering wet landing cases with low headwind components.

BN are updating the Islander whilst bringing airframe component production back to the UK and this may result in some empty weigh savings for new build aircraft which could assist payload capability – discussions should be held with BN to identify if suitable weight savings can be made for new aircraft. In addition, BN should be asked whether any improvement is possible in landing performance capability especially for the BN2T model.

- The Tecnam P2012 STOL which at the time of this analysis was at the final stages of certification (now completed) appears to have suitable performance capabilities based upon the data supplied by Tecnam.

- The single engine turboprop types included in this study do not have sufficient performance capability to offer airline service at Montserrat, being significantly limited by their landing performance (it may be feasible for them to land as a private flight and depart as a commercial flight for example for an air ambulance mission).

- The Twin Otter Series 300 and new Series 300G, when analysed under the international standard operating rules specified, do not have enough payload capability to offer economic operations, both being limited on take-off and landing.

The direct operating cost comparison in this study shows that new aircraft may not deliver better economics than used aircraft and similarly, larger aircraft may not have more favourable economics than smaller aircraft – there is no clear cut advantage for any given type economically. Generally, new build aircraft have significantly higher ownership costs but lower maintenance costs whereas equivalent used models have lower ownership costs but incur higher maintenance costs.

Introduction

This performance and operating cost investigation has been commissioned by the Governor's Office of Montserrat to provide an independent assessment of the viability of operating various types of aircraft at the John A Osborne Airport. The data analysis was carried out in Summer 2023.

The specification for the study called for the analysis to use appropriate international operational performance standards, that follow ICAO standards and recommended practises and are in use globally, to define the necessary performance levels to allow assessment of the various aircraft capabilities using manufacturer's Aircraft Flight Manual or Pilot Operating Handbook data. Compliance with OTARs is therefore also achieved.

This study has considered the following aircraft types and models:

Manufacturer / Model	Turbine or Piston	Availability New	Availability Used
Britten Norman			
Islander BN2B-26	Piston	Y	Y
Islander BN2B-20	Piston	Y	Y
Islander BN2T	Turbine	Y	Y
Cessna			
Caravan 208A with Blackhawk engine STC and APE STOL Kit	Turbine	Y	Y
Caravan 208EX with APE STOL Kit	Turbine	Y	Y
Daher			
Kodiak 100	Turbine	Y	Y
Pilatus			
PC12	Turbine	Y	Y
Tecnam			
P2012 STOL	Piston	Y	N
De Havilland Canada			
Twin Otter 300	Turbine	N	Y
Twin Otter 300 G	Turbine	Y	N

Of the above, at the time of finalisation of this report, the Tecnam P2012 STOL has only recently received its type certificate and entered service and so is not yet available in the used market. The De Havilland Canada Twin Otter 300G is a new model that has been launched but has yet to be certificated. Consequently it is only available as new build aircraft. It will be some time before either of these types enter the used market.

A summary of each aircraft type is included which also shows payload capability for benchmark operating conditions. More detailed performance results and payload capability for a broader range of conditions is contained in an Appendix for each aircraft type.

For the operating cost analysis, manufacturer's data has been used where relevant and available and this has been supplemented by additional data obtained from other sources to allow a reasonable comparison between aircraft types to be made.

It should be noted that whilst the operating cost comparison in this study is sufficient to allow the various aircraft types to be assessed against each other, it does not include sufficient cost parameters or assumptions to allow a direct comparison with the operating costs incurred by any specific operator of each type, for example, no indirect operating costs are included, nor are any allowances for costs of any spare aircraft used to support an operation.

Stakeholder meetings

Prior to preparing this report, a visit was made to Montserrat in June 2023. The aim of the visit was to understand and experience the airfield, its environment and current operations. In addition, the opportunity was taken to meet or engage with the following stakeholders:

- Airport Manager
- Operators
    - Fly Montserrat
    - SVG Air
    - Win Air
    - St Barths Commuter
    - St Barths Executive
- Governor's Office
- ASSI
- Montserrat Government Officials

From the meetings with the Government Officials it was clear that there was a strong desire to develop air service to benefit Montserrat and that there was concern that the Twin Otter did not now seem to be capable of consideration especially given its ongoing use at Saba. This study aims at least to explain the current performance situation at Montserrat clearly.

The discussions with the operators provided extremely useful insight into the issues that they face and how they view existing or potential operations at Montserrat, their current fleets and future challenges. This background has been valuable to inform this study.

John A Osborne Airport, Montserrat

John A Osborne Airport was opened in July 2005 and was built to replace the previous airport after eruption of the Soufriere Hills volcano destroyed the capital Plymouth in 1997 and prevented use of the island's original airport which was located relatively close by. Approximately two thirds of the island is vulnerable to volcanic hazard which limited the available locations for the new airport.

It is understood that the largest aircraft envisaged for the new airport was the DHC-6 Twin Otter and that this aircraft was used to confirm runway sizing at the time of design of the new airport.

Figure 1 - View of John A Osborne Airport, Montserrat

As built, the paved surface at John A Osborne Airport was 596 m long within a 600m long runway strip area (the maximum feasible at this location due to the topography of the surrounding land). ICAO Annex 14 requirements and the OTAR 139 requirements based upon them, define a need for a 30m runway strip at each runway end. To meet this requirement, the thresholds for both runway directions were displaced by 28 m so that, in combination with a 2m grass area beyond each end of the paved surface, the 30m requirement was met.

This gave a 540m distance between the runway thresholds.

As there was ample paved area beyond each runway threshold to allow a departing aircraft to turn to line up for take-off, a start of roll point 13m before each runway threshold was established, increasing take-off declared distances[1] by 13m.

It was also possible to declare Clearways for each runway direction with Runway 10 having a Clearway of 70m and Runway 28 gaining a Clearway of 277m.

Figure 2 - View from Runway 10 threshold

[1] Declared distances are the maximum runway dimensions to be used for performance calculations, published in the relevant AIP

Figure 3 - View from Runway 28 threshold

These arrangements resulted in original runway declared distances as shown in the following Table.

Table 1 - Original Declared Distances John A Osborne Airport

RWY designator	TORA[2] (m)	ASDA[3] (m)	TODA[4] (m)	LDA[5] (m)
10	553	553	623	540
28	553	553	830	540

By 2016, a decision had been made to introduce Runway End Safety Areas (RESAs) at the end of each runway which we understand was based upon a UK Government policy to comply with ICAO Recommended Practices as well as Standards. (No RESA was provided at the start of each runway although this was also an ICAO recommendation). The recommended RESA size for a Code 1 non instrument runway is 30m and this was the size provided.

[2] TORA – Takeoff Run Available
[3] ASDA – Accelerate Stop Distance Available
[4] TODA – Takeoff Distance Available
[5] LDA – Landing Distance Available

RESAs by definition lie beyond the end of the runway strip so the dimensions and positioning of the runway strips were amended to a length of 570m to reflect the RESA introduction.

Runway Declared Distances which were impacted by the introduction of the RESAs were also amended by 30m as appropriate resulting in generally shorter current runway distances than when the runway was designed and built - the present values are shown in the following Table.

Table 2 - Current Declared Distances John A Osborne Airport

RWY designator	TORA (m)	ASDA (m)	TODA (m)	LDA (m)
10	523	523	623	510
28	523	523	799	510

The current Declared Distances are used for the performance analyses in this report.

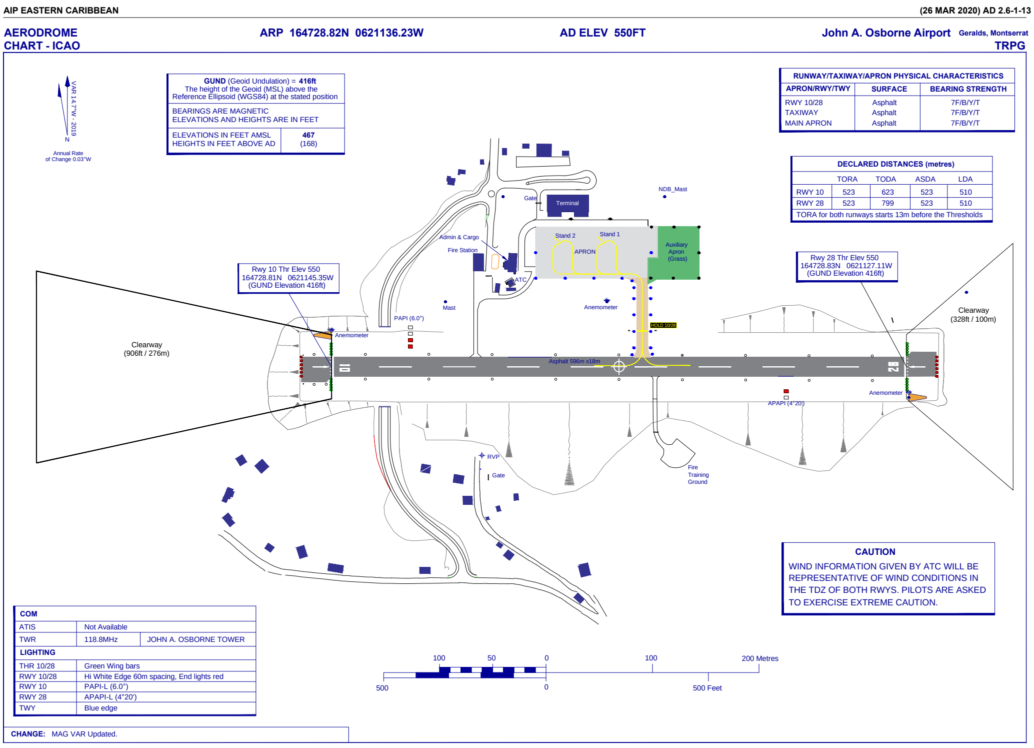

Figure 4 - Current Aerodrome Chart John A Osborne Airport

The following diagram shows the layout of the current declared distances for Runway 10 as an example to aid in understanding how these relate to the actual paved surface.

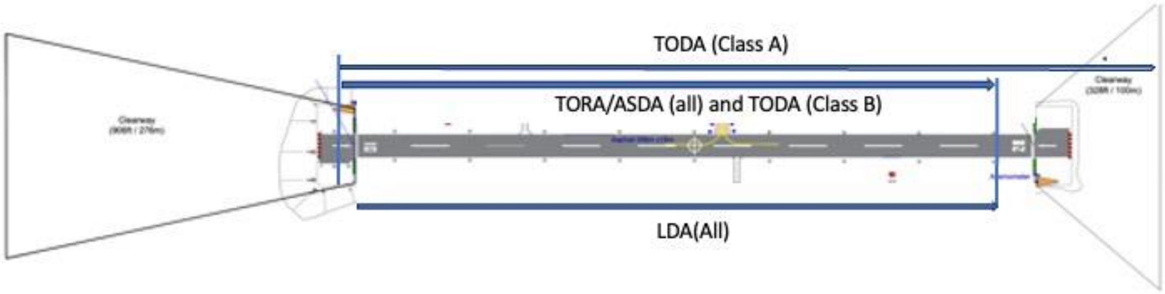

Figure 5 – Example Layout of Declared Distances - Runway 10

Note that this configuration of declared distances and paved surface does not preclude aircraft from manoeuvring on or using the paved surface before or after the declared distances in real operations but the additional lengths do not gain credit in performance calculations.

Performance Class A aircraft make use of the extended TODA but for the smaller Performance Class B aircraft there is no benefit from taking this into account for performance calculations. See the following section for further explanation of these Performance Classes.

Aircraft performance requirements

This study uses aircraft performance requirements aligned with internationally accepted standards that follow from international ICAO standards and recommended practices (ISARPs).

These ICAO level standards and practices are then used by regulatory authorities to define minimum standards for their own regulations. In some cases, where a regulatory authority chooses not to adopt a specific ICAO standard it will file a difference. In addition, for specific operations a regulatory authority may choose to allow a derogation from its own regulations (usually supported by a safety case).

This study does not consider the use of any derogation for any of the considered aircraft types.

Current Performance Class definitions and the requirements in them are widely used by regulatory authorities around the world based upon the ISARPs. Details can be found in EASA Air Ops CAT and OTAR requirements for example. Some authorities such as the FAA, do not use the Performance Class structure and terminology but they do in general have similar underlying performance requirements for an equivalent operating standard.

Two performance classes of aircraft apply to the types considered in this study:

- Performance Class A requirements apply to multi-engine aeroplanes powered by turbo- propeller engines with a maximum approved passenger seating configuration of more than 9 or a maximum take-off weight (MTOW) of more than 5700kg and all multi-engine turbojet powered aeroplanes. The DHC-6 Twin Otter falls into this class by virtue of its seating configuration. (This performance class would also apply to much larger aircraft such as the Airbus 320 and even to the Airbus A380)

- Performance Class B requirements apply to propeller driven aeroplanes with a maximum approved passenger seating configuration of 9 seats or fewer, and a MTOW of 5,700 kg or less. With the exception of the Twin Otter, all the other aircraft in this study fall into Class B (note that whilst the Twin Otter has a MTOW of 5670 kg which would qualify it to be considered as a Class B aeroplane, its seating capacity does not meet the Class B parameters unless configured with 9 seats, so it would not qualify unless a derogation or dispensation was approved).

These performance classes should not be confused with aeroplane approach speed categories which also use letter coding but group aircraft by approach speed ranges to link to approach design and operating minima.

The two Performance Classes tend to reflect the associated requirements in aircraft certification standards with Class A being aligned to Part 25 large aircraft and Class B linking to Part 23 certification of smaller aircraft. However for older aircraft types (such as the Islander and Twin Otter) their certification basis may link to standards that pre-date these requirements (for example, the Twin Otter has been certificated to standards relating to earlier versions of Part 23 for small aircraft but now falls into a performance class that is primarily aimed at large Part 25 aircraft).

Both Performance Classes are valid for commercial operations of each relevant type and so represent a correct basis of comparison (in the absence of any operational derogations or dispensations from the requirements) but it should be recognised that the two sets of requirements do not use the same underlying performance criteria.

For example, all Class B aircraft only have to consider performance data for take-off using unfactored take-off distance data with all engines operating. A safety factor (x1.25) is then applied to show compliance against the declared runway length. Class A aeroplanes are required to consider an engine failure on take-off with accountability for accelerate – stop performance for the rejected take-off case as well as a continued take-off after the engine failure at the decision speed.

Similarly, a Class B multi-engine aircraft is not required to account for an engine failure when establishing its ability to climb to clear obstacles until the point on the all engine take-off flight path where visual reference for the purpose of avoiding obstacles is expected to be lost – this is typically taken to be 200ft (or in some cases 300ft) above the runway elevation. Class A aeroplane performance however takes account of an engine failure throughout the take-off and climb and indeed the whole flight.

Both Class A and Class B require that propeller aircraft are planned to only use 70% of the available landing distance on a dry runway with a further 15% factor in case of a wet runway. This study does not consider the effect of runway conditions worse than wet (known as contaminated runways) nor does it examine the impact of Landing Distance at Time of Arrival calculations which have emerged as an operational regulatory requirement for large aircraft which do not as yet apply to the aircraft types considered in this study

Full details of Performance Class requirements are to be found in easily accessible form in for example the EASA Air Ops CAT Easy Access document or in the OTARs via the ASSI website.

Performance Assumptions

This study uses aircraft performance data sourced from each aircraft manufacturer in the form of either the aircraft flight manual (AFM) or Pilot Operating Handbook (POH) or data provided by the manufacturer to that standard.

The data provides full compliance with internationally accepted standards for each aircraft type with no use of any derogations. It is therefore also compliant with the requirements of OTARs as these follow the international standards defined in ISARPs.

As specified in the study requirements issued by the Governor's Office, representative empty weights are used for each aircraft type and model, a 90 minute fuel load has been assumed to be on board and representative passenger weights have been assumed (based on standard passengers masses defined in the OTARs and an assumed 80:20 male:female passenger mix – note in real operations, actual passenger masses may be used by operators, however this assumption provides a standardised basis for this comparison).

A range of appropriate temperatures and headwind components have been used for the calculation of airfield performance for each type, with the summary section for each aircraft type and model showing results for the most representative temperature and headwind combinations based upon a review of airport climatic records. Full performance results are presented in the appendices.

Dry and wet runway cases are considered as both may be encountered and the airfield data is taken from the AIP entry current in June 2023.

Aircraft Studied

BN Islander (BN2B-26, -20 BN2T)

Figure 6 - BN2B Islander

The Britten Norman Islander first flew in 1965 and has been in continuous production ever since, with over 1300 aircraft built. In recent years production rates have been quite low at around 4 aircraft per year. Britten Norman have recently re-established full component manufacturing capability in the UK and anticipate at least a doubling of production rate if answered by market demand.

The Islander has proved to be extremely capable in short runway environments and now largely operates in these specialised markets.

The type is well known in Montserrat as it provides the current scheduled airlinks connecting the island with Antigua.

The Islander has been modernised to feature modern avionics for newer aircraft and retains the versatility to be reconfigured from passenger role to all cargo or medevac configurations if needed.

Figure 7 - New BN2B flightdeck

For this study we consulted Britten Norman and agreed that three Islander models were relevant for this analysis:

1) BN2B-26 with 260hp Lycoming O-540 piston engines (Avgas fuel)
2) BN2B-20 with 300hp Lycoming IO-540 fuel injected piston engines (Avgas fuel)
3) BN2T with 320hp Rolls Royce 250 turboprop engines (Jet A1 fuel)

The passenger configuration for all these models features up to 9 passenger seats (assuming a single pilot). The compact configuration has no aisle and uses doors on both sides of the fuselage to access the passenger seat rows.

Figure 8 - BN2 Islander cabin

The key performance results for each model for benchmark conditions are shown below with full details in Appendix 1.

BN2B-26 Islander

Runway	10	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	2844	2844	2844	2844	2817	2844
	Limit	Climb	Climb	Climb	Climb	LDA	Climb
	Passengers	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg	7 + 27kg	7 + 54kg
30°C	Limit mass	2790	2790	2790	2790	2740	2790
	Limit	Climb	Climb	Climb	Climb	LDA	Climb
	Passengers + bags	7 + 0kg	7 + 0kg	7 + 0kg	7 + 0kg	6 + 43kg	7 + 0kg

Runway	28	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	2844	2844	2844	2844	2817	2844
	Limit	Climb	Climb	Climb	Climb	LDA	Climb
	Passengers	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg	7 + 27kg	7 + 54kg
30°C	Limit mass	2790	2790	2789	2789	2740	2790
	Limit	Climb	Climb	Climb	Climb	LDA	Climb
	Passengers + bags	7 + 0kg	7 + 0kg	7 + 0kg	7 + 0kg	6 + 43kg	7 + 0kg

The performance results show that the BN2B-26 model of the Islander has a good all round capability for operations at Montserrat.

BN2B-20 Islander

Runway	10	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	2994	2994	2994	2994	2939	2994
	Limit	MTOW	MTOW	MLW	MLW	LDA	MLW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 40kg	7 + 61kg*
30°C	Limit mass	2994	2994	2994	2994	2812	2994
	Limit	MTOW	MTOW	MLW	MLW	LDA	MLW
	Passengers + bags	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	6 + 7kg	7 + 61kg*

*limited by Maximum Zero Fuel Weight

Runway	28	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	2994	2994	2994	2994	2939	2994
	Limit	MTOW	MTOW	MLW	MLW	LDA	MLW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 40kg	7 + 61kg*
30°C	Limit mass	2994	2994	2994	2994	2812	2994
	Limit	MTOW	MTOW	MLW	MLW	LDA	MLW
	Passengers + bags	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	6 + 7kg	7 + 61kg*

*limited by Maximum Zero Fuel Weight

The performance results show that the BN2B-20 model of the Islander also has a good all round performance capability at Montserrat but this could be enhanced if there was any possibility to reduce the aircraft empty weight and increase payload for new build aircraft.

BN2-T Islander

Runway	10	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	3080	3264	3084	3084	2041	2948
	Limit	TODA	MTOW	MLW	MLW	LDA	LDA
	Passengers	9 + 45kg	9 + 145kg*	9 + 50kg	9 + 50kg	N/A	8 + 8kg
30°C	Limit mass	3048	3264	3048	3084	1996	2858
	Limit	TODA	MTOW	LDA	MLW	LDA	LDA
	Passengers	9 + 14kg	9 + 145kg	9 + 14kg	9 + 50kg	N/A	7 + 11kg

*limited by Maximum Zero Fuel Weight

Runway	28	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	3080	3264	3084	3084	2041	2948
	Limit	TODA	MTOW	MLW	MLW	LDA	LDA
	Passengers	9 + 45kg	9 + 145kg*	9 + 50kg	9 + 50kg	N/A	8 + 8kg
30°C	Limit mass	3048	3264	3048	3084	1996	2858
	Limit	TODA	MTOW	LDA	MLW	LDA	LDA
	Passengers	9 + 14kg	9 + 145kg	9 + 14kg	9 + 50kg	N/A	7 + 11kg

*limited by Maximum Zero Fuel Weight

The turbine powered BN2T Islander model has good take-off performance capabilities at Montserrat but suffers from some compromises in landing performance especially for zero head wind component cases.

Cessna Caravan (208 APE STOL Blackhawk, 208EX Grand Caravan APE STOL)

The Cessna Caravan, a product of Textron Aviation, is a well-established aircraft recognized for its adaptability and performance. Since its introduction in 1982, this single-engine turboprop has gained a reputation for its reliability and versatility in various aviation roles.

Figure 9 - Cessna 208EX Grand Caravan

All new build Caravans are powered by a PT6 turboprop, which is well known for its extremely high reliability - a factor which has been crucial in the acceptance of single engine turboprops for commercial service many parts of the world.

New production Caravans feature modern avionics with large display screens but as the aircraft has been in production for such a long period, older used aircraft may be fitted with traditional instrumentation.


Figure 10 - Cessna Caravan new aircraft flightdeck

We have included two models of Cessna Caravan in this study, both of which feature aftermarket STOL performance kits introduced by Supplemental Type Certificates to recognise the challenges posed by the short runway length at Montserrat:

1) Caravan 208 with Blackhawk PT6-42 engine (850shp) and APE STOL kit (Jet A1 fuel)
2) Grand Caravan 208EX (867shp standard engine) with APE STOL kit (Jet A1 fuel)

The Caravan 208 features 3 across seating for 9 passengers and a single pilot with a rear baggage area and cargo pod below the fuselage.

The longer Grand Caravan is also similarly configured but features only 2 across seating in the same fuselage width. Whilst the Grand Caravan could be configured with more seats this would not fit the aircraft Performance Class rules defined in the regulations (and nor would the performance capabilities allow the aircraft to exploit the increased seating capacity for this operation).

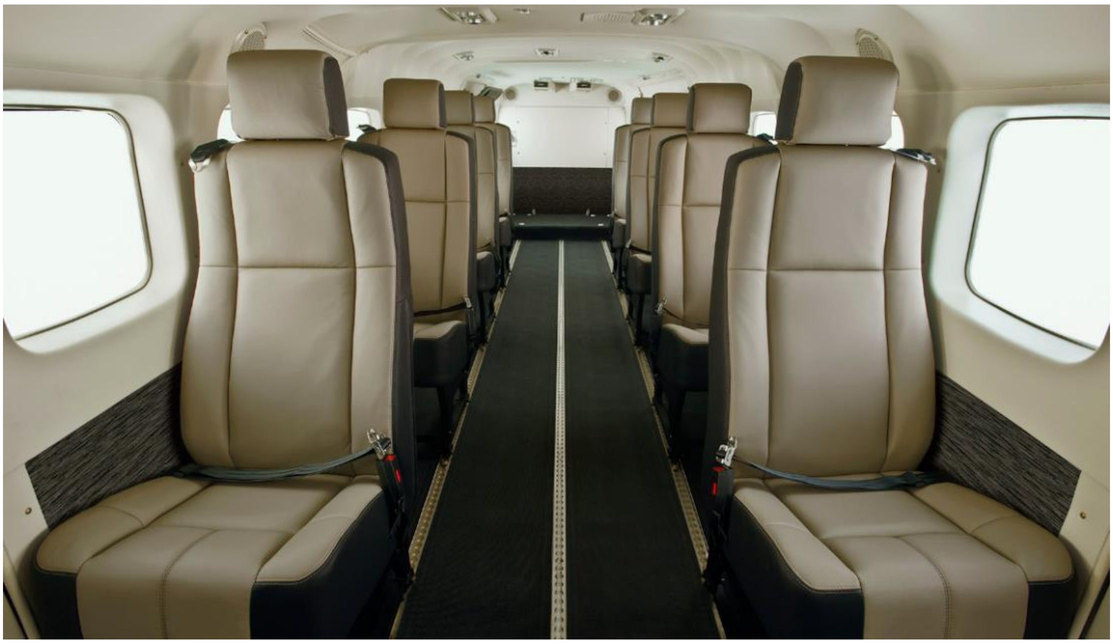

Figure 11 - Cessna 208EX Grand Caravan cabin

All models of the Caravan can be configured to carry cargo or act as a medevac aircraft.

The key performance results for each model for benchmark conditions are shown below with full details in Appendix 2.

Cessna 208 Caravan with Blackhawk and APE STOL STCs

Runway	10	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	3200	3370	N/A	N/A	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers	6 + 89kg	8 + 72kg				
30°C	Limit mass	N/A	3331	N/A	N/A	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers	N/A	8 + 32kg				

Runway	28	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	3200	3370	N/A	N/A	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers	6 + 89kg	8 + 72kg				
30°C	Limit mass	N/A	3331	N/A	N/A	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers		8 + 32kg				

The Cessna Caravan with Blackhawk and APE STC upgrades shows reasonable take-off performance capabilities but is unable to achieve landing weights when considering commercial operation, Performance Class B requirements.

Cessna 208BEX Grand Caravan EX with APE STOL STC

Runway	10	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	N/A	3459	N/A	N/A	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers		6 + 85kg				
30°C	Limit mass	N/A	3403	N/A	N/A	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers		6 + 29kg				

Runway	28	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	N/A	3459	N/A	N/A	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers		6 + 85kg				
30°C	Limit mass	N/A	3403	N/A	N/A	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers		6 + 29kg				

The Cessna 208BEX Grand Caravan with APE STC upgrade shows less good take-off performance capabilities than the smaller and lighter 208 Caravan but is also unable to achieve landing weights when considering commercial operation, Performance Class B requirements.

Daher Kodiak 100

The Daher Kodiak 100 was designed to be a rugged workhorse to serve short runways in demanding environments. Since its introduction in 2007, approaching 400 aircraft have been delivered.

Figure 12 - Daher Kodiak 100

The Kodiak 100 is a single engine turboprop powered by the Pratt & Whitney PT6 engine which underpins this segment of the industry due to its high reliability.

The Kodiak seats up to 9 passengers with a single pilot in a two across cabin with an aisle. Baggage is accommodated in an area at the rear of the cabin and in an external pod below the fuselage.


Figure 13 - Daher Kodiak 100 cabin

The Kodiak has the versatility to be configured for cargo and medevac roles in addition to carrying passengers.

Whilst a larger Kodiak 900 model exists, we have focussed on the Kodiak 100 for this study as it offers the best short field capability.

The aircraft uses modern "glass cockpit avionics" and features worldwide support from Daher. Whilst the Kodiak is not as common in regional airline service as the similar Cessna Caravan, it does operate in passenger roles for many organisations operating in some of the most demanding areas of the world.

The key performance results for benchmark conditions are shown below with full details in the Appendix 3.

Runway	10	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	3012	3123	1993	2305	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers	9 + 121kg	9 + 232kg	N/A	2 + 69kg		
30°C	Limit mass	2933	3038	1960	2266	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers	9 + 43kg	9 + 147kg	N/A	2 + 30kg		

Runway	28	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	3012	3123	1993	2305	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers	9 + 121kg	9 + 232kg	N/A	2 + 69kg		
30°C	Limit mass	2933	3038	1960	2266	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers	9 + 43kg	9 + 147kg	N/A	2 + 30kg		

The Daher Kodiak 100 shows good take-off performance capabilities but is unable to achieve viable or in some cases any landing weights when considering commercial operation, Performance Class B requirements.

Pilatus PC-12

The Pilatus PC12 has established itself as an extremely capable pressurised aircraft since its introduction in 1991. Over 2,000 aircraft have now been delivered worldwide.

Figure 14 - Pilatus PC12 / 47E

As a single engine turboprop, the PC12 uses the highly reliable PT6 engine as its powerplant to provide the necessary high levels of reliability to allow commercial services.

Unlike the other aircraft in this study, the PC12 has a pressurised cabin (although on the likely mission to link Monsterrat to Antigua this is unlikely to be exploited. The aircraft can seat upto 9 passengers in a two across commuter configuration.

Figure 15 - PC12 commuter cabin

The PC12 is also well known as a medevac aircraft and there are a few of the type configured to carry cargo.

The PC12 is an extremely popular aircraft especially in the corporate or private aircraft and there are several operators around the world using it as a regional airliner.

The key performance results for benchmark conditions are shown below with full details in the Appendix 4.

Runway	10	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	3400	3522	N/A	N/A	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers	2 + 0kg	3 + 28kg				
30°C	Limit mass	3353	3469	N/A	N/A	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers	1 + 46kg	2 + 69kg				

Runway		Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	3400	3522	N/A	N/A	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers	2 + 0kg	3 + 28kg				
30°C	Limit mass	3353	3469	N/A	N/A	N/A	N/A
	Limit	TODA	TODA	LDA	LDA	LDA	LDA
	Passengers	1 + 46kg	2 + 69kg				

The Pilatus PC12 shows poor take-off performance capabilities and is unable to achieve landing weights when considering commercial operation, Performance Class B requirements. The type may be suitable for outbound air ambulance operations where any arrival could be made empty as a private, non commercial flight.

Tecnam P2012 STOL

The Tecnam P2012 was developed to meet the need for a modern twin piston engined small commuterliner, in particular for Cape Air from the USA. Tecnam are the largest small aircraft manufacturer in Europe and have achieved sales of the original P2012 in a number of markets around the world.

Figure 16 - Tecnam P2012 STOL

Tecnam also discovered that there was demand for a version of the P2012 that could match or come close to matching the performance capabilities of the BN Islander. In response, they have developed the P2012 STOL model by extending the original aircraft's wing area and introducing new Continental piston engines of increased power, which use Avgas fuel.

The P2012 STOL is in the final stages of certification so the data included in this study is to a standard that would feature in a POH/AFM but is preliminary and was provided by the manufacturer.

The P2012 STOL seats 9 passengers and would generally operate with a single pilot. It features a modern interior with 2 abreast seating with a centre aisle. Luggage is at the rear of the cabin and in a nose bay. The aircraft can also be configured for medevac or cargo operations and Tecnam now also offer a large single piece rear door to assist access to the cabin.

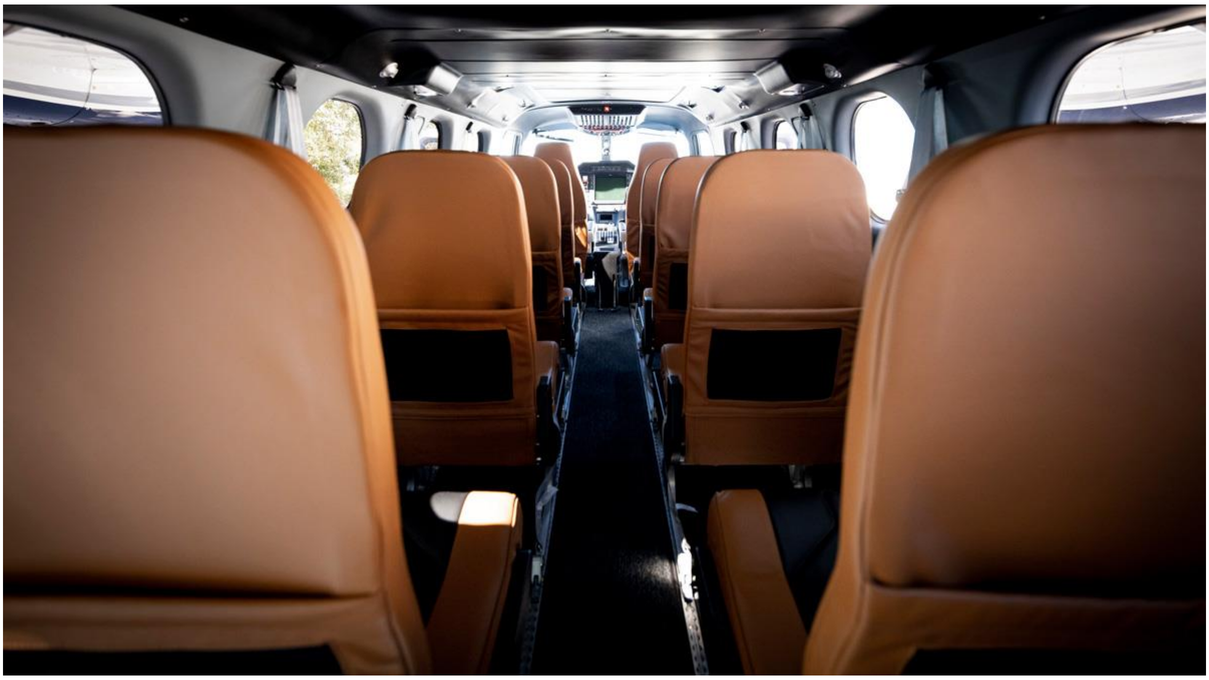
Figure 17 = Tecnam P2012 cabin

The P2012STOL features a full "glass" cockpit avionics suite and Tecnam have focussed their design on ensuring that the aircraft has simple systems and low maintenance costs.


Figure 18 - Tecnam P2012 flighdeck

As a new aircraft model, just entering service, only new build aircraft will be available for some years as the used market will take time to develop.

The key performance results for benchmark conditions are shown below with full details in the Appendix 5.

Runway	10	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	3578	3651	3563	3630	3303	3460
	Limit	TODA	TODA	LDA	MLW	LDA	LDA
	Passengers	9 + 32kg	9 + 104kg	9 + 17kg	9 + 84kg	6 + 37kg	8 + 7kg
30°C	Limit mass	3550	3623	3544	3630	3289	3440
	Limit	TODA	TODA	LDA	MLW	LDA	LDA
	Passengers	9 + 4kg	9 + 77kg	8 + 91kg	9 + 84kg	6 + 23kg	7 + 81kg

Runway	28	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	3578	3651	3563	3630	3303	3460
	Limit	TODA	TODA	LDA	MLW	LDA	LDA
	Passengers	9 + 32kg	9 + 104kg	9 + 17kg	9 + 84kg	6 + 37kg	8 + 7kg
30°C	Limit mass	3550	3623	3544	3630	3289	3440
	Limit	TODA	TODA	LDA	MLW	LDA	LDA
	Passengers	9 + 4kg	9 + 77kg	8 + 91kg	9 + 84kg	6 + 23kg	7 + 81kg

The Tecnam P2012 STOL shows good overall performance although it does have some small restrictions on wet runway landing weights when considering low headwind component conditions.

De Havilland Canada DHC-6 Twin Otter (Series 300 and Series 300G)

The Twin Otter first flew in 1965 and since then approaching 1000 have been built. The Twin Otter is powered by two PT6 turboprop engines that run on Jet A1 fuel. The aircraft was in continuous production from 1985 until 1988 with the final model at that time being the Series 300 that had been introduced in 1969.

Figure 19 - DHC Twin Otter Series 300

In 2007 Viking Aircraft of Canada announced that they were putting the Twin Otter back into production in an updated model, the Series 400. This featured a new Honeywell “glass” cockpit with modern avionics and some updates to structure and vendors. With around 140 of the new Series 400 produced, Viking paused production during the COVID pandemic. In 2023 after the creation of a new De Havilland Canada joining Viking with the turboprop division of Bombardier (which Viking’s parent company bought), a new Twin Otter model was launched, known as the Series 300G.

The Series 300G combines the updated airframe of the Series 400 with the original engine model from the Series 300 along with some system simplifications and the introduction of latest technology Garmin avionics which feature much lower maintenance costs than the Honeywell equipment in the Series 400. The result is a lower weight and more economic aircraft.

It is likely that the majority of future new Twin Otter sales will be for the Series 300G and as it is a lighter aircraft than the Series 400 it is also a more appropriate choice for the needs of Montserrat. Consequently, in this study we have analysed the previous Series 300 and the new 300G which have identical performance, differing only in their respective empty weights with the new 300G benefiting from lighter avionics and interior.

The Twin Otter is extremely well known around the world, not least in the Caribbean as a dependable, high performance aircraft. It can seat up to 19 passengers in a 3 abreast cabin configuration, but needs two pilots. The aircraft has the ability to be configured for cargo and medevac operations.

Figure 20 - Twin Otter Series 300G new cabin

By design, the Twin Otter was a relatively light aircraft with a MTOW of just 5670kg which originally placed it firmly in the small aircraft Part 23 certification category despite it having a 19 seat capability. Later certification standards slightly amended the certification standard used for the aircraft but its performance standards remained aligned to smaller aircraft. More recently, operational performance regulations (rather than certification standards) have been introduced that see the Twin Otter classified to use large airliner performance assumptions (the Twin Otter is now a Performance Class A aircraft – see earlier section) which can often challenge operations to small runways designed prior to the advent of this more stringent requirements (and this has seen historic Twin Otter operations in various locations, including the UK, receive derogations to allow continued use of prior performance standards to allow continued operation at airfields where runways could not be further developed).

It is important to recognise that whilst the performance levels demanded by operational regulations may vary and require different POH/AFM supplements to support compliance, the physical aircraft is no different regardless of the operational regulations applied.

In addition, over time there have been additional performance standards available from the manufacturer such as STOL data and Reduced Ground Roll supplements all based around the same basic aircraft, although these do not comply with the current international standards for the relevant aircraft performance class and can only be used if a local regulator allows a derogation.

DHC Twin Otter Series 300

The operational performance regulations stipulated for the Twin Otter for this study by the client are Performance Class A levels, which feature in for example EASA Air Ops CAT regulations and OTARs and are equivalent to FAR Pt 121 requirements. To comply with them and their underlying performance criteria, a POH/AFM supplement is published by Viking/DHC, known as Supplement 37. This supplement replaces virtually all the performance data section of the standard POH/AFM. This performance standard has therefore been used for this study.

Runway	10	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	N/A	4445	N/A	N/A	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers		5 + 51kg				
30°C	Limit mass	N/A	4218	N/A	N/A	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers		3 + 10kg				

Runway	28	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	N/A	4445	N/A	N/A	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers		5 + 51kg				
30°C	Limit mass	N/A	4218	N/A	N/A	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers		3 + 10kg				

It can be seen that for landing, the Supplement 37 performance standard is very penalising – this is caused by a cut off of the landing weight curve due to a limit on the minimum landing speed under the applicable certification rules. Take-off performance is also compromised by in the main accelerate stop limitations

Consequently, for interest, performance was also calculated using the SFAR23 performance standard contained in the basic POH/AFM which does not fully meet Class A performance requirements. These results are presented in the following tables

Runway	10	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	N/A	4173	N/A	4445	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers		2 + 57kg		5 + 51kg		
30°C	Limit mass	N/A	N/A	N/A	4309	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers				4 + 8kg		

Runway	28	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	N/A	4173	N/A	4445	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers		2 + 57kg		5 + 51kg		
30°C	Limit mass	N/A	N/A	N/A	4309	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers				4 + 8kg		

Under the basic POH/AFM standard the Take-off weights calculated are below those for the Supplement 37 standard. For both performance standards, the ASDA is the limiting parameter.

The basic POH/AFM does give somewhat improved landing weights overall for the dry runway case, but both performance standards do not give a landing weight for our benchmark dry runway still air cases and the basic POH/AFM only gives landing weights for a wet runway when a 20kt headwind is considered (see detailed performance in Appendix 6).

DHC Twin Otter Series 300G

The new build Series 300G version of the Twin Otter retains the airfield performance of the original Series 300, so achieved take-off and landing weights match the older model. However, DHC indicate that the new Series 300G will have a lower empty weight than the original model due to the use of modern avionics and a new interior. This will slightly improve the payload capability.

As for the Series 300, the operational performance regulations stipulated for the Twin Otter for this study by the client are Performance Class A levels, which feature in for example EASA Air Ops CAT regulations and OTARs and are equivalent to FAR Pt 121 requirements. To comply with them and their underlying performance criteria, a POH/AFM supplement is published by Viking/DHC, known as Supplement 37. This supplement replaces virtually all the performance data section of the standard POH/AFM. This performance standard has therefore been used for this study.

Runway	10	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	N/A	4445	N/A	N/A	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers		7 + 5 kg				
30°C	Limit mass	N/A	4218	N/A	N/A	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers		4 + 57kg				

Runway	28	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	N/A	4445	N/A	N/A	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers		7 + 5 kg				
30°C	Limit mass	N/A	4218	N/A	N/A	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers		4 + 57kg				

Again, it can be seen that for landing, the Supplement 37 performance standard is very penalising – this is caused by a cut off of the landing weight curve due to a limit on the minimum landing speed under the applicable certification rules. Take-off performance is also compromised by, in the main, accelerate stop limitations

Consequently, for interest, performance was again also calculated using the SFAR23 performance standard contained in the basic POH/AFM which does not fully meet Performance Class A requirements. These results are presented in the following tables

Runway	10	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	N/A	4173	N/A	4445	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers		4 + 11kg		7 + 5kg		
30°C	Limit mass	N/A	N/A	N/A	4309	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers				5 +55kg		

Runway	28	Takeoff		Landing – Dry		Landing – Wet	
Temperature	Wind	0	10	0	10	0	10
25°C	Limit mass	N/A	4173	N/A	4445	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers		4 + 11kg		7 + 5kg		
30°C	Limit mass	N/A	N/A	N/A	4309	N/A	N/A
	Limit	ASDA	ASDA	LDA	LDA	LDA	LDA
	Passengers				5 + 55kg		

As before, under the basic POH/AFM standard the Take-off weights calculated are below those for the Supplement 37 standard. For both performance standards, the ASDA is the limiting parameter.

The basic POH/AFM does give somewhat improved landing weights overall for the dry runway case, but again, both performance standards do not give a landing weight for our benchmark dry runway still air cases and the basic POH/AFM only gives landing weights for a wet runway when a 20kt headwind is considered (see detailed performance in Appendix 6).

New Technologies

There is a large amount of activity currently looking at new powerplant technologies and fuels to help aviation improve its climate performance. This is leading to many new projects that could be potentially interesting for airlift at Montserrat in the future.

However, it is difficult to be certain which of these projects will prove successful and establish themselves adequately to be candidates for an essential air service such as that required at Montserrat. It would not be wise to be an early user of any of the new technologies for such an essential airlink unless suitable more proven back-up remained in place.

For these new projects, it is difficult to gain accurate data regarding how they would perform if they reach production.

Cranfield Aerospace Solutions are developing a Hydrogen powered conversion for the Islander, however initial indications are that this will result in a heavier aircraft which will reduce passenger payload and external fuel tanks may also impact important climb performance needed for the Montserrat operation.

Figure 21 - Impression of CAeS hydrogen powered BN Islander

Electra are developing a 9 seat very short take-off and landing electric hybrid aircraft that may well prove to have airfield performance suitable for the Montserrat operation as they are targeting a sub 100m runway requirement. Electra have progressed to the stage of flying a small proof of concept aircraft.

Figure 22 - Electra eSTOL impression

Other companies developing conventional take-off and landing aircraft such as Aura and VoltAero in France do not appear to be aiming their aircraft at the shorter runway performance needed for many Caribbean operations.

Indeed, many of the new technology power systems and fuels appear to result in heavier overall empty weights of the aircraft which would typically then indicate a more challenging scenario for achieving a workable useful payload.

Elsewhere, companies such as Joby, Archer, Eve and Vertical are developing small capacity electric vertical take off aircraft but these are small capacity and therefore potentially a poor match to the island’s needs – it is also not yet clear how battery ultimate life and economics will impact their real operating costs and how soon final certification and market entry will be achieved.

Figure 23 - Joby 4 passenger eVTOL demonstrator

There are also projects to develop or restart production of seaplanes. These all seem someway from reaching a realistic programme and there would also be the question of whether suitable operating locations could be found in addition to the question of whether sea state capability could be suitable for the local conditions.

Figure 24 - AAI Albatross 2.0 seaplane project

Similarly, Regent are developing an electric powered "sea glider" that flies at low altitude above water that is aimed at linking coastal locations (it cannot practically fly over land), which is gaining interest around the world but has yet to progress beyond a subscale proof of concept model. They foresee models with 12 passenger initially and eventually larger capacity versions with 50 or more passenger capacity. The sea glider is treated as a ship not an aircraft and Regent claim very low costs of operation. However, it would require specific development of waterside terminals.

Figure 25 - Regent Viceroy 12 seat sea glider impression

Finally, Hybrid Air Vehicles in the UK have been gaining interest in their Airlander 10 airship project for inter island travel, so far mainly in Europe. The airship flies relatively slowly and so flight times may also be more impacted by enroute winds but it does offer the potential for much higher capacity with up to 100 passengers possible. Whilst initial prototypes have flown, so far use cases remain hypothetical.

Figure 26 - HAV Airlander 10 airship impression

It would be prudent to maintain a low key monitoring of these future options in case any develop and mature but this could easily be a 10 year horizon in reality.

Similarly, the future of synthetic or sustainable fuels should be tracked as they will likely also become a main fuel for aviation – however, these are highly likely to support turbine aircraft operations via JetA1 replacement rather than being available for piston engine use.

Direct Operating Costs

Hourly direct operating costs have been analysed for each aircraft type to establish a broad comparison. Acquisition costs for new and used aircraft have also been considered for some examples to illustrate the impact of a high capital cost of a new aircraft vs the lower capital cost of a used equivalent (for the used aircraft, increased maintenance costs due to age were included).

For the hourly cost comparison, the total direct cost per hour has been converted into a cost per installed seat to allow comparison between the different aircraft sizes. Given the performance limitations shown in the study for various types, this is a somewhat academic exercise but it does serve to highlight that the larger Twin Otter does not necessarily offer lower costs per installed seat than some of the 9 seat competitors.

The detailed assumptions and results are contained in Appendix 7.

The DOC per flight hour comparison is shown in Figure 27 and the DOC per flight hour per installed seat comparison is shown in Figure 28

As noted earlier in the document, whilst the direct operating costs are suitable for a general comparison, they do not model the true operating economics of any individual airline, in particular the local operators. The analysis does not include any indirect operating costs or overheads which can be significant and also the maintenance cost data used (supplied by manufacturers or from published sources) does not truly reflect some of the realities of an operation such as the need to employ engineers to cover the operating day and week rather than the typical manufacturer assumption of a number of manhours per flight hour.

Consequently, the analysis cannot be read directly across to a specific operator nor can it be used to infer profitability or fare levels needed to achieve a successful operation – it can however be used to compare the various aircraft on a relative basis. This, in combination with the performance analysis serves to highlight which aircraft models are likely to be feasible for airlift at Montserrat.

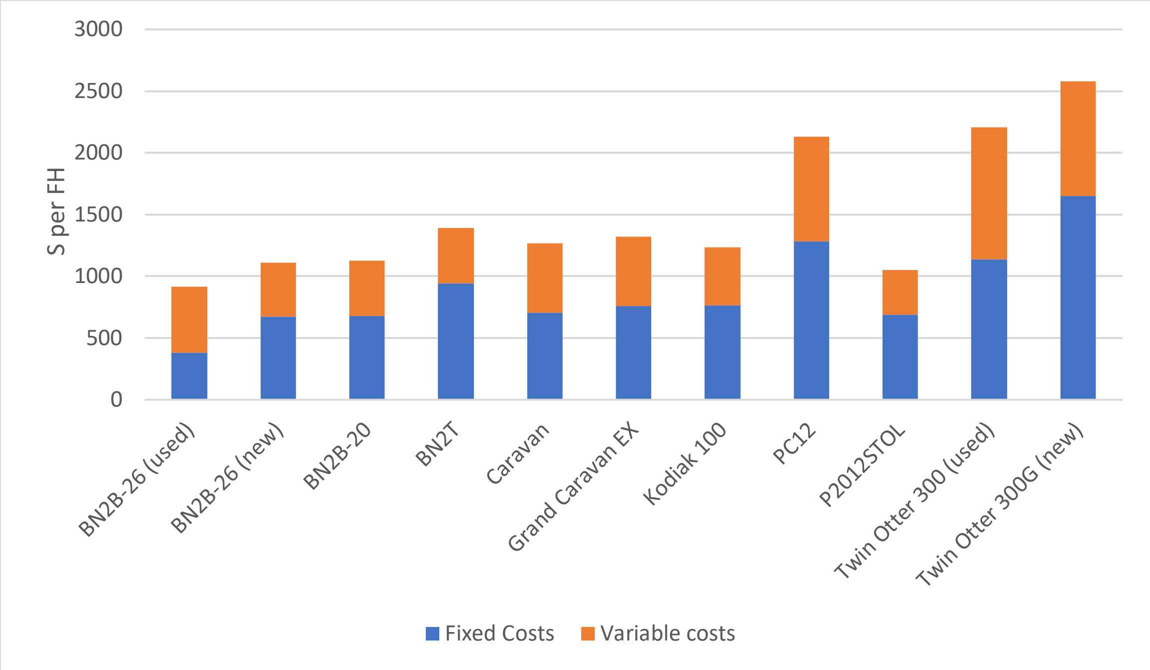

Figure 27 - Direct Operating Cost per Flight Hour Comparison

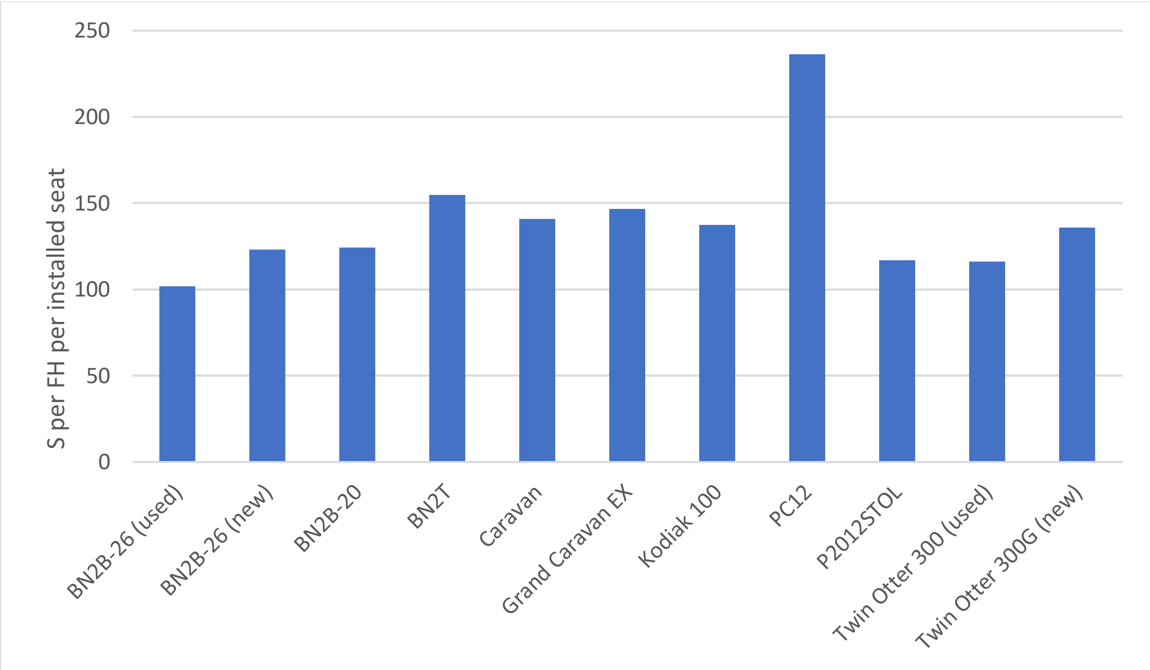

Figure 28 - Direct Operating Cost per Flight Hour per Installed Seat Comparison

Overall, the PC12 does not appear to be a cost competitive aircraft given its business aircraft origins and high price for its seat capacity.

It can be seen that new aircraft can have a higher overall direct operating cost than used aircraft particularly where utilisation levels are modest.

Further comments on operating economics

This study has not examined the traffic patterns and revenue sources linked to the air service for Montserrat.

It is clear that the goal is to increase traffic to stimulate economic development. The increased passenger numbers could be accommodated by an increase in frequency of the small aircraft in the study. The larger Twin Otter cannot be considered if international performance requirements are applied as shown earlier in the document. Even so, it does not necessarily offer more attractive operating economics than smaller capacity options.

Examination of the current scheduled shows plenty of potential to increase the small aircraft frequency within the operating day especially given the short flight times involved. However it is not clear whether this is a sensible path – for example, if connecting traffic is a key factor in demand growth then a larger aircraft deployed at the current schedule might be a better solution (aside from the issues of performance limitations) if there are important connecting flights where a short transfer time is preferred.

In addition, consideration of where the aircraft used to serve the route are based would also be important, especially if new aircraft are considered – it could be challenging to generate sufficient utilisation effectively using a Montserrat based aircraft to bear the fixed costs in comparison to using an Antigua based aircraft that could also easily service other routes from Antigua across its operating day to more effectively spread the fixed costs across more revenue earning flights.

Once the aircraft type question has been settled then a more detailed study of deployment options could be made.

Appendix 1 – Britten Norman Islander Data and Performance

BN2B-26 - 260hp O540 piston engines

Basic Data

MTOW	2994 kg
MLW	2994 kg
MZFW	2857 kg
BEW	1946 kg
Wingspan	14.9 m
Length	10.9 m

Performance
Reference: Data provided by BN derived from AFM FM/40 and with reference to BN SL94 ref Performance Class B requirements.

Runway 10 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	2889	2889	2889	2889	2889
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	8 + 6kg	8 + 6kg	8 + 6kg	8 + 6kg	8 + 6kg
25°C	RTOW	2844	2844	2844	2844	2844
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg
30°C	RTOW	2790	2790	2790	2790	2790
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 0kg	7 + 0kg	7 + 0kg	7 + 0kg	7 + 0kg
35°C	RTOW	2740	2740	2740	2740	2740
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	6 + 43kg	6 + 43kg	6 + 43kg	6 + 43kg	6 + 43kg

Runway 28 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	2889	2889	2889	2889	2889
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	8 + 6kg	8 + 6kg	8 + 6kg	8 + 6kg	8 + 6kg
25°C	RTOW	2844	2844	2844	2844	2844
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg
30°C	RTOW	2790	2790	2790	2790	2790
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 0kg	7 + 0kg	7 + 0kg	7 + 0kg	7 + 0kg
35°C	RTOW	2740	2740	2740	2740	2740
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	6 + 43kg	6 + 43kg	6 + 43kg	6 + 43kg	6 + 43kg

Runway 10 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
25°C	RLW	2889	2889	2889	2889	2889
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	8 + 6kg	8 + 6kg	8 + 6kg	8 + 6kg	8 + 6kg
25°C	RLW	2844	2844	2844	2844	2844
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg
30°C	RLW	2790	2790	2790	2790	2790
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 0kg	7 + 0kg	7 + 0kg	7 + 0kg	7 + 0kg
35°C	RLW	2740	2740	2740	2740	2740
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	6 + 43kg	6 + 43kg	6 + 43kg	6 + 43kg	6 + 43kg

Runway 28 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	2889	2889	2889	2889	2889
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	8 + 6kg	8 + 6kg	8 + 6kg	8 + 6kg	8 + 6kg
25°C	RLW	2844	2844	2844	2844	2844
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg
30°C	RLW	2790	2790	2790	2790	2790
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 0kg	7 + 0kg	7 + 0kg	7 + 0kg	7 + 0kg
35°C	RLW	2740	2740	2740	2740	2740
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	6 + 43kg	6 + 43kg	6 + 43kg	6 + 43kg	6 + 43kg

Runway 10 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	2889	2889	2889	2889	2889
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	8 + 6kg	8 + 6kg	8 + 6kg	8 + 6kg	8 + 6kg
25°C	RLW	2844	2844	2844	2844	2844
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg
30°C	RLW	2740	2790	2790	2790	2790
	Limit	LDA	Climb	Climb	Climb	Climb
	Passengers	6 + 43kg	7 + 0kg	7 + 0kg	7 + 0kg	7 + 0kg
35°C	RLW	2722	2740	2740	2740	2740
	Limit	LDA	Climb	Climb	Climb	Climb
	Passengers	6 + 25kg	6 + 43kg	6 + 43kg	6 + 43kg	6 + 43kg

Runway 28 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	2889	2889	2889	2889	2889
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	8 + 6kg	8 + 6kg	8 + 6kg	8 + 6kg	8 + 6kg
25°C	RLW	2844	2844	2844	2844	2844
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg	7 + 54kg
30°C	RLW	2740	2790	2790	2790	2790
	Limit	LDA	Climb	Climb	Climb	Climb
	Passengers	6 + 43kg	7 + 0kg	7 + 0kg	7 + 0kg	7 + 0kg
35°C	RLW	2722	2740	2740	2740	2740
	Limit	LDA	Climb	Climb	Climb	Climb
	Passengers	6 + 25kg	6 + 43kg	6 + 43kg	6 + 43kg	6 + 43kg

BN2B-20 - 300hp IO540 piston engines

Basic Data

MTOW	2994 kg
MLW	2994 kg
MZFW	2857 kg
BEW	2055 kg
Wingspan	14.9 m
Length	10.9 m

Performance
Reference: Data provided by BN derived from AFM FM/41 and with reference to BN SL94 ref Performance Class B requirements.

Runway 10 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	2994	2994	2994	2994	2994
	Limit	MTOW	MTOW	MTOW	MTOW	MTOW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
25°C	RTOW	2994	2994	2994	2994	2994
	Limit	MTOW	MTOW	MTOW	MTOW	MTOW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
30°C	RTOW	2994	2994	2994	2994	2994
	Limit	MTOW	MTOW	MTOW	MTOW	MTOW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
35°C	RTOW	2948	2948	2948	2948	2948
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 50kg	7 + 50kg	7 + 50kg	7 + 50kg	7 + 50kg

*limited by Maximum Zero Fuel Weight

Runway 28 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	2994	2994	2994	2994	2994
	Limit	MTOW	MTOW	MTOW	MTOW	MTOW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
25°C	RTOW	2994	2994	2994	2994	2994
	Limit	MTOW	MTOW	MTOW	MTOW	MTOW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
30°C	RTOW	2994	2994	2994	2994	2994
	Limit	MTOW	MTOW	MTOW	MTOW	MTOW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
35°C	RTOW	2948	2948	2948	2948	2948
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 50kg	7 + 50kg	7 + 50kg	7 + 50kg	7 + 50kg

*limited by Maximum Zero Fuel Weight

Runway 10 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
25°C	RLW	2994	2994	2994	2994	2994
	Limit	MLW	MLW	MLW	MLW	MLW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
25°C	RLW	2994	2994	2994	2994	2994
	Limit	MLW	MLW	MLW	MLW	MLW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
30°C	RLW	2994	2994	2994	2994	2994
	Limit	MLW	MLW	MLW	MLW	MLW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
35°C	RLW	2948	2948	2948	2948	2948
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 50kg	7 + 50kg	7 + 50kg	7 + 50kg	7 + 50kg

*limited by Maximum Zero Fuel Weight

Runway 28 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	2994	2994	2994	2994	2994
	Limit	MLW	MLW	MLW	MLW	MLW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
25°C	RLW	2994	2994	2994	2994	2994
	Limit	MLW	MLW	MLW	MLW	MLW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
30°C	RLW	2994	2994	2994	2994	2994
	Limit	MLW	MLW	MLW	MLW	MLW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
35°C	RLW	2948	2948	2948	2948	2948
	Limit	Climb	Climb	Climb	Climb	Climb
	Passengers	7 + 50kg	7 + 50kg	7 + 50kg	7 + 50kg	7 + 50kg

*limited by Maximum Zero Fuel Weight

Runway 10 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	2971	2994	2994	2994	2994
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
25°C	RLW	2939	2994	2994	2994	2994
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	7 + 39kg	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
30°C	RLW	2812	2994	2994	2994	2994
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	6 + 7kg	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
35°C	RLW	2676	2948	2948	2948	2948
	Limit	LDA	Climb	Climb	Climb	Climb
	Passengers	4 + 58kg	7 + 50kg	7 + 50kg	7 + 50kg	7 + 50kg

*limited by Maximum Zero Fuel Weight

Runway 28 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	2971	2994	2994	2994	2994
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
25°C	RLW	2939	2994	2994	2994	2994
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	7 + 39kg	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
30°C	RLW	2812	2994	2994	2994	2994
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	6 + 7kg	7 + 61kg*	7 + 61kg*	7 + 61kg*	7 + 61kg*
35°C	RLW	2676	2948	2948	2948	2948
	Limit	LDA	Climb	Climb	Climb	Climb
	Passengers	4 + 58kg	7 + 50kg	7 + 50kg	7 + 50kg	7 + 50kg

*limited by Maximum Zero Fuel Weight

BN2T – 320shp Rolls Royce 250 turboprop engines

Basic Data

MTOW	3266 kg
MLW	3084 kg
MZFW	2994 kg
BEW	1919 kg
Wingspan	14.9 m
Length	10.9 m

Performance

Reference: Data provided by BN derived from AFM FM/100 and with reference to BN SL94 ref Performance Class B requirements.

Runway 10 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	3107	3243	3266	3266	3266
	Limit	TODA	TODA	MTOW	MTOW	MTOW
	Passengers	9 + 73kg	9 + 146kg*	9 + 146kg*	9 + 146kg*	9 + 146kg*
25°C	RTOW	3080	3211	3266	3266	3266
	Limit	TODA	TODA	MTOW	MTOW	MTOW
	Passengers	9 + 46kg	9 + 146kg*	9 + 146kg*	9 + 146kg*	9 + 146kg*
30°C	RTOW	3048	3175	3266	3266	3266
	Limit	TODA	TODA	MTOW	MTOW	MTOW
	Passengers	9 + 14kg	9 + 141kg	9 + 146kg*	9 + 146kg*	9 + 146kg*
35°C	RTOW	3016	3139	3266	3266	3266
	Limit	TODA	Climb	MTOW	MTOW	MTOW
	Passengers	8 + 76kg	9 + 105kg	9 + 146kg*	9 + 146kg*	9 + 146kg*

*limited by Maximum Zero Fuel Weight

Runway 28 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	3107	3243	3266	3266	3266
	Limit	TODA	TODA	MTOW	MTOW	MTOW
	Passengers	9 + 73kg	9 + 146kg*	9 + 146kg*	9 + 146kg*	9 + 146kg*
25°C	RTOW	3080	3211	3266	3266	3266
	Limit	TODA	TODA	MTOW	MTOW	MTOW
	Passengers	9 + 46kg	9 + 146kg*	9 + 146kg*	9 + 146kg*	9 + 146kg*
30°C	RTOW	3048	3175	3266	3266	3266
	Limit	TODA	TODA	MTOW	MTOW	MTOW
	Passengers	9 + 14kg	9 + 141kg	9 + 146kg*	9 + 146kg*	9 + 146kg*
35°C	RTOW	3016	3139	3266	3266	3266
	Limit	TODA	Climb	MTOW	MTOW	MTOW
	Passengers	8 + 76kg	9 + 105kg	9 + 146kg*	9 + 146kg*	9 + 146kg*

*limited by Maximum Zero Fuel Weight

Runway 10 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
25°C	RLW	3084	3084	3084	3084	3084
	Limit	MLW	MLW	MLW	MLW	MLW
	Passengers	9 + 50kg	9 + 50kg	9 + 50kg	9 + 50kg	9 + 50kg
25°C	RLW	3084	3084	3084	3084	3084
	Limit	MLW	MLW	MLW	MLW	MLW
	Passengers	9 + 50kg	9 + 50kg	9 + 50kg	9 + 50kg	9 + 50kg
30°C	RLW	3048	3084	3084	3084	3084
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	9 + 14kg	9 + 50kg	9 + 50kg	9 + 50kg	9 + 50kg
35°C	RLW	2944	3084	3084	3084	3084
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	8 + 3kg	9 + 50kg	9 + 50kg	9 + 50kg	9 + 50kg

Runway 28 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	3084	3084	3084	3084	3084
	Limit	MLW	MLW	MLW	MLW	MLW
	Passengers	9 + 50kg	9 + 50kg	9 + 50kg	9 + 50kg	9 + 50kg
25°C	RLW	3084	3084	3084	3084	3084
	Limit	MLW	MLW	MLW	MLW	MLW
	Passengers	9 + 50kg	9 + 50kg	9 + 50kg	9 + 50kg	9 + 50kg
30°C	RLW	3048	3084	3084	3084	3084
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	9 + 14kg	9 + 50kg	9 + 50kg	9 + 50kg	9 + 50kg
35°C	RLW	2944	3084	3084	3084	3084
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	8 + 3kg	9 + 50kg	9 + 50kg	9 + 50kg	9 + 50kg

Runway 10 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	2268	2563	3084	3084	3084
	Limit	LDA	LDA	MLW	MLW	MLW
	Passengers	0 + 76kg	3 + 90kg	9 + 50kg	9 + 50kg	9 + 50kg
25°C	RLW	2041	2449	2948	3084	3084
	Limit	LDA	LDA	LDA	MLW	MLW
	Passengers	-	2 + 70kg	8 + 8kg	9 + 50kg	9 + 50kg
30°C	RLW	1996	2359	2858	3084	3084
	Limit	LDA	LDA	LDA	MLW	MLW
	Passengers	-	1 + 73kg	7 + 11kg	9 + 50kg	9 + 50kg
35°C	RLW	1905	2291	2767	3084	3084
	Limit	LDA	LDA	LDA	MLW	MLW
	Passengers	-	1 + 5kg	6 + 14kg	9 + 50kg	9 + 50kg

Runway 28 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	2268	2563	3084	3084	3084
	Limit	LDA	LDA	MLW	MLW	MLW
	Passengers	0 + 76kg	3 + 90kg	9 + 50kg	9 + 50kg	9 + 50kg
25°C	RLW	2041	2449	2948	3084	3084
	Limit	LDA	LDA	LDA	MLW	MLW
	Passengers	-	2 + 70kg	8 + 8kg	9 + 50kg	9 + 50kg
30°C	RLW	1996	2359	2858	3084	3084
	Limit	LDA	LDA	LDA	MLW	MLW
	Passengers	-	1 + 73kg	7 + 11kg	9 + 50kg	9 + 50kg
35°C	RLW	1905	2291	2767	3084	3084
	Limit	LDA	LDA	LDA	MLW	MLW
	Passengers	-	1 + 5kg	6 + 14kg	9 + 50kg	9 + 50kg

Appendix 2 – Cessna Caravan Data and Performance

Cessna 208 Caravan with Blackhawk and APE STOL STCs

Basic Data

MTOW	3793 kg
MLW	3793 kg
BEW	2191 kg
Wingspan	15.9 m
Length	11.6 m

Performance
Reference POH 208PHBUS-03 and Blackhawk POH Supplement AFMS 201201-2

Runway 10 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	3234	3318	3408	3470	3541
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	7 + 29kg	8 + 19kg	9 + 16kg	9 + 77kg	9 + 149kg
25°C	RTOW	3200	3282	3370	3454	3536
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	6 + 89kg	7 + 77kg	8 + 72kg	9 + 62kg	9 + 144kg
30°C	RTOW	N/A	3244	3331	3422	3499
	Limit	TODA	TODA	TODA	TODA	MTOW
	Passengers	-	7 + 39kg	8 +32kg	9 + 30kg	9 + 107kg
35°C	RTOW	N/A	3188	3254	3330	3412
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	-	6 + 77kg	7 + 49kg	8 + 31kg	9 + 20kg

Runway 28 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	3234	3318	3408	3470	3541
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	7 + 29kg	8 + 19kg	9 + 16kg	9 + 77kg	9 + 149kg
25°C	RTOW	3200	3282	3370	3454	3536
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	6 + 89kg	7 + 77kg	8 + 72kg	9 + 62kg	9 + 144kg
30°C	RTOW	N/A	3244	3331	3422	3499
	Limit	TODA	TODA	TODA	TODA	MTOW
	Passengers	-	7 + 39kg	8 + 32kg	9 + 30kg	9 + 107kg
35°C	RTOW	N/A	3188	3254	3330	3412
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	-	6 + 77kg	7 + 49kg	8 + 31kg	9 + 20kg

Runway 10 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 10 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Cessna 208BEX Grand Caravan EX with APE STOL STC

Basic Data

MTOW	4110 kg
MLW	4082 kg
BEW	2495 kg
Wingspan	15.9 m
Length	12.7 m

Performance
Reference POH 208BPHBUS-02 and APE POH Supplement AFMS-C208-76 208B

Runway 10 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	3234	3428	3518	3612	3718
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	5 + 67kg	6 + 54kg	7 + 50kg	8 + 51kg	9 + 63kg
25°C	RTOW	N/A	3373	3459	3553	3653
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	-	6 + 0kg	6 + 85kg	7 + 85kg	8 + 91kg
30°C	RTOW	N/A	3322	3403	3495	3592
	Limit	TODA	TODA	TODA	TODA	MTOW
	Passengers	-	5 + 41kg	6 + 29kg	7 + 27kg	8 + 30kg
35°C	RTOW	N/A	N/A	3318	3403	3502
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	-	-	5 + 37kg	6 + 29kg	7 + 34kg

Runway 28 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	3234	3428	3518	3612	3718
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	5 + 67kg	6 + 54kg	7 + 50kg	8 + 51kg	9 + 63kg
25°C	RTOW	N/A	3373	3459	3553	3653
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	-	6 + 0kg	6 + 85kg	7 + 85kg	8 + 91kg
30°C	RTOW	N/A	3322	3403	3495	3592
	Limit	TODA	TODA	TODA	TODA	MTOW
	Passengers	-	5 + 41kg	6 + 29kg	7 + 27kg	8 + 30kg
35°C	RTOW	N/A	N/A	3318	3403	3502
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	-	-	5 + 37kg	6 + 29kg	7 + 34kg

Runway 10 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 10 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Appendix 3 – Daher Kodiak 100 Data and Performance

Basic Data

MTOW	3291 kg
MLW	3035 kg
MZFW	3207 kg
BEW	1758 kg
Wingspan	13.7m
Length	10.3 m

Performance
Reference: Daher Kodiak AIM AM901.201 POH

Runway 10 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	3104	3162	3225	3291	3291
	Limit	TODA	TODA	TODA	MTOW	MTOW
	Passengers	9 + 214kg	9 + 272kg	9 + 334kg	9 + 400kg	9 + 400kg
25°C	RTOW	3012	3065	3123	3187	3257
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	9 + 121kg	9 + 175kg	9 + 233kg	9 + 297kg	9 + 366kg
30°C	RTOW	2933	2983	3038	3098	3163
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	9 + 43kg	9 + 92kg	9 + 147kg	9 + 207kg	9 + 273kg
35°C	RTOW	2844	2890	2941	2996	3058
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	8 + 47	9 + 0kg	9 + 50kg	9 + 106kg	9 + 167kg

Runway 28 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	3104	3162	3225	3291	3291
	Limit	TODA	TODA	TODA	MTOW	MTOW
	Passengers	9 + 214kg	9 + 272kg	9 + 334kg	9 + 400kg	9 + 400kg
25°C	RTOW	3012	3065	3123	3187	3257
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	9 + 121kg	9 + 175kg	9 + 233kg	9 + 297kg	9 + 366kg
30°C	RTOW	2933	2983	3038	3098	3163
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	9 + 43kg	9 + 92kg	9 + 147kg	9 + 207kg	9 + 273kg
35°C	RTOW	2844	2890	2941	2996	3058
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	8 + 47kg	9 + 0kg	9 + 50kg	9 + 106kg	9 + 167kg

Runway 10 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	2033	2187	2347	2514	2696
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	1 + 45kg	3 + 18kg	4 + 91kg	6 + 86kg
25°C	RLW	1994	2145	2305	2468	2646
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	1 + 3kg	2 + 69kg	4 + 46kg	6 + 36kg
30°C	RLW	1960	2107	2266	2427	2601
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	0 + 59kg	2 + 30kg	4 + 4kg	5 + 84kg
35°C	RLW	1925	2069	2224	2384	2555
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	0 + 20kg	1 + 82kg	3 + 55kg	5 + 38kg

Runway 28 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	2033	2187	2347	2514	2696
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	1 + 45kg	3 + 18kg	4 + 91kg	6 + 86kg
25°C	RLW	1994	2145	2305	2468	2646
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	1 + 3kg	2 + 69kg	4 + 46kg	6 + 36kg
30°C	RLW	1960	2107	2266	2427	2601
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	0 + 59kg	2 + 30kg	4 + 4kg	5 + 84kg
35°C	RLW	1925	2069	2224	2384	2555
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	0 + 20kg	1 + 82kg	3 + 55kg	5 + 38kg

Runway 10 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	1919	2087
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	0 + 39kg
25°C	RLW	N/A	N/A	N/A	1882	2048
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	1850	2012
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	1818	1975
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	1919	2087
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	0 + 39kg
25°C	RLW	N/A	N/A	N/A	1882	2048
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	1850	2012
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	1818	1975
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Appendix 4 - Pilatus PC12 Data and Performance

Basic Data

MTOW	4740 kg
MLW	4500 kg
MZFW	4100 kg
BEW	2845 kg
Wingspan	16.3m
Length	14.4 m

Performance
Reference Pilatus PC12 AIM based upon POH 02406

Runway 10 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	3451	3511	3573	3638	3705
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	2 + 50kg	3 + 17kg	3 + 79kg	4 + 50kg	5 + 24kg
25°C	RTOW	3400	3460	3522	3586	3686
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	2 + 0kg	2 + 59kg	3 + 28kg	3 + 92kg	4 + 66kg
30°C	RTOW	3353	3410	3469	3530	3594
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	1 + 46kg	2 + 10kg	2 + 69kg	3 + 36kg	4 + 6kg
35°C	RTOW	3311	3365	3421	3480	3540
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	1 + 4kg	1 + 58kg	2 + 21kg	2 + 80kg	3 + 46kg

Runway 28 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	3451	3511	3573	3638	3705
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	2 + 50kg	3 + 17kg	3 + 79kg	4 + 50kg	5 + 24kg
25°C	RTOW	3400	3460	3522	3586	3686
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	2 + 0kg	2 + 59kg	3 + 28kg	3 + 92kg	4 + 66kg
30°C	RTOW	3353	3410	3469	3530	3594
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	1 + 46kg	2 + 10kg	2 + 69kg	3 + 36kg	4 + 6kg
35°C	RTOW	3311	3365	3421	3480	3540
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	1 + 4kg	1 + 58kg	2 + 21kg	2 + 80kg	3 + 46kg

Runway 10 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 10 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	1850	2012
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	1818	1975
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	1850	2012
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	1818	1975
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Appendix 5 - Tecnam P2012 STOL Data and Performance

Basic Data

MTOW	3680 kg
MLW	3630 kg
BEW	2416 kg
Wingspan	16.6m
Length	11.8 m

Performance

Reference Performance data provided by Tecnam to same standard being used for POH at certification (Data provided prior to completion of certification)

Runway 10 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	3607	3641	3679	3680	3680
	Limit	TODA	TODA	TODA	MTOW	MTOW
	Passengers	9 + 41kg	9 + 75kg	9 + 113kg	9 + 114kg	9 + 114kg
25°C	RTOW	3578	3615	3651	3680	3680
	Limit	TODA	TODA	TODA	MTOW	MTOW
	Passengers	9 + 12kg	9 + 49kg	9 + 85kg	9 + 114kg	9 + 114kg
30°C	RTOW	3550	3588	3623	3661	3680
	Limit	TODA	TODA	TODA	TODA	MTOW
	Passengers	8 + 77kg	9 + 22kg	9 + 57kg	9 + 95kg	9 + 114kg
35°C	RTOW	3523	3563	3597	3635	3676
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	8 + 50kg	8 + 90kg	9 + 31kg	9 + 69kg	9 + 110kg

Runway 28 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	3607	3641	3679	3680	3680
	Limit	TODA	TODA	TODA	MTOW	MTOW
	Passengers	9 + 41kg	9 + 75kg	9 + 113kg	9 + 114kg	9 + 114kg
25°C	RTOW	3578	3615	3651	3680	3680
	Limit	TODA	TODA	TODA	MTOW	MTOW
	Passengers	9 + 12kg	9 + 49kg	9 + 85kg	9 + 114kg	9 + 114kg
30°C	RTOW	3550	3588	3623	3661	3680
	Limit	TODA	TODA	TODA	TODA	MTOW
	Passengers	8 + 77kg	9 + 22kg	9 + 57kg	9 + 95kg	9 + 114kg
35°C	RTOW	3523	3563	3597	3635	3676
	Limit	TODA	TODA	TODA	TODA	TODA
	Passengers	8 + 50kg	8 + 90kg	9 + 31kg	9 + 69kg	9 + 110kg

Runway 10 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	3581	3630	3630	3630	3630
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	9 + 15kg	9 + 64kg	9 + 64kg	9 + 64kg	9 + 64kg
25°C	RLW	3563	3630	3630	3630	3630
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	8 + 90kg	9 + 64kg	9 + 64kg	9 + 64kg	9 + 64kg
30°C	RLW	3544	3615	3630	3630	3630
	Limit	LDA	LDA	MLW	MLW	MLW
	Passengers	8 + 71kg	9 + 49kg	9 + 64kg	9 + 64kg	9 + 64kg
35°C	RLW	3529	3607	3630	3630	3630
	Limit	LDA	LDA	MLW	MLW	MLW
	Passengers	8 + 56kg	9 + 40kg	9 + 64kg	9 + 64kg	9 + 64kg

Runway 28 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	3581	3630	3630	3630	3630
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	9 + 15kg	9 + 64kg	9 + 64kg	9 + 64kg	9 + 64kg
25°C	RLW	3563	3630	3630	3630	3630
	Limit	LDA	MLW	MLW	MLW	MLW
	Passengers	8 + 90kg	9 + 64kg	9 + 64kg	9 + 64kg	9 + 64kg
30°C	RLW	3544	3615	3630	3630	3630
	Limit	LDA	LDA	MLW	MLW	MLW
	Passengers	8 + 71kg	9 + 49kg	9 + 64kg	9 + 64kg	9 + 64kg
35°C	RLW	3529	3607	3630	3630	3630
	Limit	LDA	LDA	MLW	MLW	MLW
	Passengers	8 + 56kg	9 + 40kg	9 + 64kg	9 + 64kg	9 + 64kg

Runway 10 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	3320	3396	3479	3558	3630
	Limit	LDA	LDA	LDA	LDA	MTOW
	Passengers	6 + 34kg	7 + 17kg	8 + 6kg	8 + 85kg	9 + 64kg
25°C	RLW	3303	3379	3460	3540	3616
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	6 + 17kg	7 + 0kg	7 + 81kg	8 + 67kg	9 + 50kg
30°C	RLW	3289	3361	3440	3522	3601
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	6 + 3kg	6 + 75kg	7 + 61kg	8 + 49kg	9 + 35kg
35°C	RLW	3258	3335	3419	3508	3586
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	5 + 66kg	6 + 49kg	7 + 40kg	8 + 35kg	9 + 20kg

Runway 28 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	3320	3396	3479	3558	3630
	Limit	LDA	LDA	LDA	LDA	MTOW
	Passengers	6 + 34kg	7 + 17kg	8 + 6kg	8 + 85kg	9 + 64kg
25°C	RLW	3303	3379	3460	3540	3616
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	6 + 17kg	7 + 0kg	7 + 81kg	8 + 67kg	9 + 50kg
30°C	RLW	3289	3361	3440	3522	3601
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	6 + 3kg	6 + 75kg	7 + 61kg	8 + 49kg	9 + 35kg
35°C	RLW	3258	3335	3419	3508	3586
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	5 + 66kg	6 + 49kg	7 + 40kg	8 + 35kg	9 + 20kg

Appendix 6 - De Havilland Canada DHC-6 Twin Otter Data and Performance

Twin Otter Series 300

Basic Data

MTOW	5670 kg
MLW	5579 kg
BEW	3329 kg
Wingspan	19.8 m
Length	15.8 m

Performance – Supplement 37
Reference AFM PSM 1-63-1A and AFM Supplement 37

Runway 10 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	N/A	4309	4672	4944	5034
	Limit	ASDA	ASDA	ASDA	OBST	OBST
	Passengers	-	4 + 8kg	8 + 0kg	10 + 86kg	11 + 84kg
25°C	RTOW	N/A	4218	4445	4831	4990
	Limit	ASDA	ASDA	ASDA	ASDA	OBST
	Passengers	-	2 + 12kg	5 + 51kg	9 + 65kg	11 + 38kg
30°C	RTOW	N/A	N/A	4218	4627	4944
	Limit	ASDA	ASDA	ASDA	ASDA	OBST
	Passengers	-	-	3 + 10kg	7 + 47kg	10 + 86kg
35°C	RTOW	N/A	N/A	N/A	4173	4763
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	-	2 + 57kg	8 + 90kg

Runway 28 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	N/A	4309	4672	4990	5189
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	4 + 8kg	8 + 0kg	11 + 38kg	13 + 52kg
25°C	RTOW	N/A	4218	4445	4831	5080
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	2 + 12kg	5 + 51kg	9 + 65kg	12 + 36kg
30°C	RTOW	N/A	N/A	4218	4627	4990
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	3 + 10kg	7 + 47kg	11 + 38kg
35°C	RTOW	N/A	N/A	N/A	4173	4763
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	-	2 + 57kg	8 + 90kg

Runway 10 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	4990
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	11 + 38kg
25°C	RLW	N/A	N/A	N/A	N/A	4899
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	10 + 41kg
30°C	RLW	N/A	N/A	N/A	N/A	4853
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	9 + 88kg
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	4990
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	11 + 38kg
25°C	RLW	N/A	N/A	N/A	N/A	4899
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	10 + 41kg
30°C	RLW	N/A	N/A	N/A	N/A	4853
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	9 + 88kg
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 10 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Performance – SFAR23 (Basic POH/AFM)
Reference AFM PSM 1-63-1A

Runway 10 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	N/A	N/A	4423	4808	4990
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	5 + 28kg	9 + 43kg	11 + 38kg
25°C	RTOW	N/A	N/A	4173	4627	4853
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	2 + 57kg	7 + 47kg	9 + 88kg
30°C	RTOW	N/A	N/A	N/A	4354	4581
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	-	4 + 53kg	7 + 1kg
35°C	RTOW	N/A	N/A	N/A	N/A	4218
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	-	-	3 + 10kg

Runway 28 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	N/A	N/A	4423	4808	4990
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	5 + 28kg	9 + 43kg	11 + 38kg
25°C	RTOW	N/A	N/A	4173	4627	4853
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	2 + 57kg	7 + 47kg	9 + 88kg
30°C	RTOW	N/A	N/A	N/A	4354	4581
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	-	4 + 53kg	7 + 1kg
35°C	RTOW	N/A	N/A	N/A	N/A	4218
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	-	-	3 + 10kg

Runway 10 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	4150	4513	4626	4990
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	2 + 34kg	6 + 26kg	7 + 47kg	11 + 38kg
25°C	RLW	N/A	N/A	4445	4536	4876
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	5 + 51kg	6 + 49kg	10 + 18kg
30°C	RLW	N/A	N/A	4309	4491	4785
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	4 + 8kg	6 + 3kg	9 + 20kg
35°C	RLW	N/A	N/A	4173	4332	4717
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	2 + 57kg	4 + 30kg	8 + 45kg

Runway 28 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	4150	4513	4626	4990
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	2 + 34kg	6 + 26kg	7 + 47kg	11 + 38kg
25°C	RLW	N/A	N/A	4445	4536	4876
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	5 + 51kg	6 + 49kg	10 + 18kg
30°C	RLW	N/A	N/A	4309	4491	4785
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	4 + 8kg	6 + 3kg	9 + 20kg
35°C	RLW	N/A	N/A	4173	4332	4717
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	2 + 57kg	4 + 30kg	8 + 45kg

Runway 10 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	4309
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	4 + 8kg
25°C	RLW	N/A	N/A	N/A	N/A	4173
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	2 + 57kg
30°C	RLW	N/A	N/A	N/A	N/A	4082
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	1 + 59kg
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	4309
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	4 + 8kg
25°C	RLW	N/A	N/A	N/A	N/A	4173
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	2 + 57kg
30°C	RLW	N/A	N/A	N/A	N/A	4082
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	1 + 59kg
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Twin Otter Series 300 G

Basic Data

MTOW	5670 kg
MLW	5579 kg
BEW	3189 kg
Wingspan	19.8 m
Length	15.8 m

Performance – Supplement 37
Reference AFM PSM 1-63-1A and AFM Supplement 37

Runway 10 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	N/A	4309	4672	4944	5034
	Limit	ASDA	ASDA	ASDA	OBST	OBST
	Passengers	-	5 + 55kg	9 + 47kg	12 + 40kg	13 + 38kg
25°C	RTOW	N/A	4218	4445	4831	4990
	Limit	ASDA	ASDA	ASDA	ASDA	OBST
	Passengers	-	3 + 59 kg	7 + 5kg	11 + 19kg	12 + 85kg
30°C	RTOW	N/A	N/A	4218	4627	4944
	Limit	ASDA	ASDA	ASDA	ASDA	OBST
	Passengers	-	-	4 + 57kg	9 + 1kg	12 + 40kg
35°C	RTOW	N/A	N/A	N/A	4173	4763
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	-	4 + 11kg	10 + 44kg

Runway 28 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	N/A	4309	4672	4990	5189
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	5 + 55kg	9 + 47kg	12 + 85kg	15 + 6kg
25°C	RTOW	N/A	4218	4445	4831	5080
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	3 + 59kg	7 + 5kg	11 + 19kg	13 + 83kg
30°C	RTOW	N/A	N/A	4218	4627	4990
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	4 + 57kg	9 + 1kg	12 + 85kg
35°C	RTOW	N/A	N/A	N/A	4173	4763
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	-	4 + 11kg	10 + 44kg

Runway 10 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	4990
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	12 + 85kg
25°C	RLW	N/A	N/A	N/A	N/A	4899
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	11 + 88kg
30°C	RLW	N/A	N/A	N/A	N/A	4853
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	11 + 42kg
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	4990
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	12 + 85kg
25°C	RLW	N/A	N/A	N/A	N/A	4899
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	11 + 88kg
30°C	RLW	N/A	N/A	N/A	N/A	4853
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	11 + 42kg
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 10 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
25°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
30°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Performance – SFAR23 (Basic POH/AFM)
Reference AFM PSM 1-63-1A

Runway 10 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	N/A	N/A	4423	4808	4990
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	6 + 75kg	10 + 90kg	12 + 85kg
25°C	RTOW	N/A	N/A	4173	4627	4853
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	4 + 11kg	9 + 1kg	11 + 42kg
30°C	RTOW	N/A	N/A	N/A	4354	4581
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	-	6 + 7kg	8 + 48kg
35°C	RTOW	N/A	N/A	N/A	N/A	4218
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	-	-	4 + 57kg

Runway 28 Take Off						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RTOW	N/A	N/A	4423	4808	4990
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	6 + 75kg	10 + 90kg	12 + 85kg
25°C	RTOW	N/A	N/A	4173	4627	4853
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	4 + 11kg	9 + 1kg	11 + 42kg
30°C	RTOW	N/A	N/A	N/A	4354	4581
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	-	6 + 7kg	8 + 48kg
35°C	RTOW	N/A	N/A	N/A	N/A	4218
	Limit	ASDA	ASDA	ASDA	ASDA	ASDA
	Passengers	-	-	-	-	4 + 57kg

Runway 10 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	4150	4513	4626	4990
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	3 + 81kg	7 + 73kg	9 + 1kg	12 + 85kg
25°C	RLW	N/A	N/A	4445	4536	4876
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	7 + 5kg	8 + 3kg	11 + 65kg
30°C	RLW	N/A	N/A	4309	4491	4785
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	5 + 55kg	7 + 50kg	10 + 67kg
35°C	RLW	N/A	N/A	4173	4332	4717
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	4 + 11kg	5 + 77kg	9 + 92kg

Runway 28 Landing Dry						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	4150	4513	4626	4990
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	3 + 81kg	7 + 73kg	9 + 1kg	12 + 85kg
25°C	RLW	N/A	N/A	4445	4536	4876
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	7 + 5kg	8 + 3kg	11 + 65kg
30°C	RLW	N/A	N/A	4309	4491	4785
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	5 + 55kg	7 + 50kg	10 + 67kg
35°C	RLW	N/A	N/A	4173	4332	4717
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	4 + 11kg	5 + 77kg	9 + 92kg

Runway 10 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	4309
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	5 + 55kg
25°C	RLW	N/A	N/A	N/A	N/A	4173
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	4 + 11kg
30°C	RLW	N/A	N/A	N/A	N/A	4082
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	3 + 13kg
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Runway 28 Landing Wet						
Temperature	Wind (kt)	0	5	10	15	20
20°C	RLW	N/A	N/A	N/A	N/A	4309
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	5 + 55kg
25°C	RLW	N/A	N/A	N/A	N/A	4173
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	4 + 11kg
30°C	RLW	N/A	N/A	N/A	N/A	4082
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	3 + 13kg
35°C	RLW	N/A	N/A	N/A	N/A	N/A
	Limit	LDA	LDA	LDA	LDA	LDA
	Passengers	-	-	-	-	-

Appendix 7 - Direct Operating Costs

Aircraft type	BN Islander				Cessna Caravan		Daher Kodiak	Pilatus	Tecnam	Twin Otter	
	BN2B-26 (used)	BN2B-26 (new)	BN2B-20	BN2T	Caravan	Grand Caravan EX	100	PC12	P2012STOL	300 (used)	300G (new)
Seats	9	9	9	9	9	9	9	9	9	19	19
MTOW	2994	2994	2994	3266	3793	4110	3291	4740	3680	5670	5670
Price $	500000	2415071	2449061	3977711	2610000	2900000	2953653	6028000	2500000	3000000	7450000
Ownership factor %/mth)	1.5	1	1	1	1	1	1	1	1	1.5	1
Ownership per month	7500	24151	24491	39777	26100	29000	29537	60280	25000	45000	74500
Insurance											
Hull %	1	1	1	1	1	1	1	0.8	1	1	0.8
Liability fixed	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Liability per seat	300	300	300	300	300	300	300	300	300	300	300
Insurance total $	17700	36851	37191	52477	38800	41700	42237	60924	37700	45700	75300
Crew Salary $											
Capt	44400	44400	44400	44400	44400	44400	44400	44400	44400	66600	66600
FO	0	0	0	0	0	0	0	0	0	35520	35520
Number	4	4	4	4	4	4	4	4	4	4	4
Crew Total	177600	177600	177600	177600	177600	177600	177600	177600	177600	266400	266400
Utilisation FH	750	750	750	750	750	750	750	750	750	750	750
Fuel Burn kg per hr	68	68	68	124	181	181	136	187	52	287	287
Fuel Cost per kg $	4.27	4.27	4.27	1.97	1.97	1.97	1.97	1.97	4.27	1.97	1.97
Maintenance Cost per hr											
Labour mh/fh	1.5	1	1	0.9	0.48	0.48	0.5	0.95	0.64	1.5	0.88
Labour rate - $	65	65	65	65	65	65	65	65	65	65	65
Labour cost - $	97.5	65	65	58.5	31.2	31.2	32.5	61.75	41.6	97.5	57.2
Airframe Materials - $	100	39.1	39.1	39.9	55.2	55.2	38	246	16.87	148	69
Engine cost - $	41	35.95	41.68	101.05	113.85	113.85	126	164.3	77.66	245	231
Propeller cost - $	6.5	5.6	5.6	6.4	6	6	5	5	6.94	12	10
Maintenance Cost per hr - $	245	145.65	151.38	205.85	206.25	206.25	201.5	477.05	143.07	502.5	367.2
Costs per Hour - $											
Fixed											
Ownership	120.00	386.41	391.85	636.43	417.60	464.00	472.58	964.48	400.00	720.00	1192.00
Insurance	23.60	49.13	49.59	69.97	51.73	55.60	56.32	81.23	50.27	60.93	100.40

Crew	236.80	236.80	236.80	236.80	236.80	236.80	236.80	236.80	236.80	355.20	355.20
Fixed Cost per Hour total	380.40	672.35	678.24	943.20	706.13	756.40	765.70	1282.51	687.07	1136.13	1647.60
Variable											
Fuel	290.36	290.36	290.36	244.28	356.57	356.57	267.92	368.39	222.04	565.39	565.39
Maintenance	245.00	145.65	151.38	205.85	206.25	206.25	201.50	477.05	143.07	502.50	367.20
Total Variable	535.36	436.01	441.74	450.13	562.82	562.82	469.42	845.44	365.11	1067.89	932.59
Total DOC per Hr	915.76	1108.36	1119.98	1393.33	1268.95	1319.22	1235.12	2127.95	1052.18	2204.02	2580.19
Total DOC per hr per installed seat	101.75	123.15	124.44	154.81	140.99	146.58	137.24	236.44	116.91	116.00	135.80
Costs per 15min sector (allowance for landing and handling added) - $											
Fixed											
Ownership	30.00	96.60	97.96	159.11	104.40	116.00	118.15	241.12	100.00	180.00	298.00
Insurance	5.90	12.28	12.40	17.49	12.93	13.90	14.08	20.31	12.57	15.23	25.10
Crew	59.20	59.20	59.20	59.20	59.20	59.20	59.20	59.20	59.20	88.80	88.80
Fixed Cost per Hour total	95.10	168.09	169.56	235.80	176.53	189.10	191.42	320.63	171.77	284.03	411.90
Variable											
Fuel	72.59	72.59	72.59	61.07	89.14	89.14	66.98	92.10	55.51	141.35	141.35
Maintenance	61.25	36.41	37.85	51.46	51.56	51.56	50.38	119.26	35.77	125.63	91.80
Landing	30.00	30.00	30.00	40.00	40.00	50.00	40.00	50.00	40.00	60.00	60.00
Handling	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	100.00	100.00
Total Variable	213.84	189.00	190.44	202.53	230.71	240.71	207.36	311.36	181.28	426.97	393.15
Total DOC per sector	308.94	357.09	359.99	438.33	407.24	429.81	398.78	631.99	353.04	711.01	805.05