New Zealand DEFENCE FORCE
Te Ope Kātua O Aotearoa
NAVY NZARMY AIRFORCE

New Zealand MINISTRY OF DEFENCE
Manatū Kaupapa Waonga

Submission to the Minister of Defence

Air New Zealand B767 Request for Proposals

MoD ref: MOD[illegible] NZDF tracking: NZDF tracking # 460/15

Type of submission:	Update note on the B767	**For action by:**	Not applicable

Purpose:	Updates on the Air New Zealand Request for Proposals for the sale of two surplus Boeing B767-300ER Aircraft, the potential costs and operational benefits and risks of the B767, and updates on ongoing examination of ways to reduce the Point of Safe Return risk to Antarctica operations
Cost:	Nil
Current status:	Noting paper
Key risks / Limitations:	Nil

Recommended actions:

It is recommended that you:

- Note that Air New Zealand have issued a Request for Proposals for two B767 aircraft, with a deadline for response on 27 October 2015;
- 9(2)(b)(ii)
- 9(2)(g)(i)
- Note that Defence's preference would be to prioritise investment towards aircraft that can undertake a full range of military missions in addition to passenger carrying;
- Note that Defence continues to examine ways of reducing PSR risk; and
- Advise Defence as to your interest in pursuing the Air New Zealand Request for Proposal.

MINISTER OF DEFENCE
Date:

New Zealand DEFENCE FORCE
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Submission to the Minister of Defence

Air New Zealand B767 Request for Proposals

MoD ref: MOD ref

NZDF tracking:

T.J. KEATING
Lieutenant General
Chief of Defence Force
Date: 22.10.15

HELENE QUILTER
Secretary of Defence
Date: 22.10.15

NZDF contact:		Ph:	A/H:
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Agencies involved:	Not applicable		

New Zealand DEFENCE FORCE
Te Ope Kātua O Aotearoa
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New Zealand MINISTRY OF DEFENCE
Manatū Kaupapa Waonga

October 2015

Minister of Defence

B767 UPDATE

Purpose

1. This note updates you on the surplus Air New Zealand B767 sales process, the performance and suitability of the aircraft, and the opportunities and risks inherent with this possibility. It also updates other Antarctica alternatives.

Executive Summary

2. Air New Zealand has two 1997 model B767-300ER aircraft for sale. Deadline for proposals is currently 27 October.

3. The B767 is a significantly larger aircraft than B757, with a longer range and greater seating capacity. It can fly to Antarctica with no Point of Safe Return (PSR) with well over 100 passengers. It can reach most key Asian destinations non-stop with a full passenger load. It can reach the United States non stop, albeit with a reduced load.

4. B767 is larger than needed for most Defence missions. Its size limits accessibility to some island nations. It does not have a main deck freight door and the ability to have different seating/cargo configurations, which limits its flexibility.

5. Because of the age and high hours of the aircraft, and the likelihood that they will be undertaking missions for which they are not ideally suited, there are significant risks around operating costs and the overall reliability of the aircraft. These risks will increase over time.

6. 9(2)(f)(iv)

7. 9(2)(b)(ii)

8. Air New Zealand is selling the aircraft 'as is where is', with no support, servicing or other operational equipment and material. Whilst this would not impede a current B767 operator, it adds significant cost to Defence. The size of the aircraft also requires additional equipment to that currently in service to load, maintain and operate the aircraft.

9. These factors, which are required to deliver a basic operational capability, add 9(2)(b)(ii) to the cost of the aircraft as offered by Air New Zealand. Over time, significantly more capital would be required to refurbish the aircraft for extended service, modify infrastructure to properly accommodate larger aircraft, and fully exploit the performance potential.

10. Defence continues to examine ways to decrease the Point of Safe Return (PSR) risk for Antarctica operations, including through limited modifications to the B757.

B 767 Availability

11. On 22 September 2015, Air New Zealand issued to selected recipients a Request for Proposals for the sale of two B767-300ER[1] aircraft. The deadline for proposals is 27 October 2015. The aircraft become available to the purchaser in March and July 2016.

12. The aircraft on offer were built in 1997. At the time of delivery, they will each have amassed about 90,000 hours and 16,000 cycles. The sale is on an 'as is, where is' basis and relates to the aircraft and engines only. No parts, tools, specialist servicing equipment, manuals or any other material is included with the sale.

13. On Monday 28 September, a team from Defence met with Air New Zealand to discuss the operational performance and support/logistic requirements for B767. Additional information has been provided on request. Defence has not discussed the likely capital cost of the aircraft with Air New Zealand.

B767 Operational Performance

14. By comparison with the B757, the B767 is a significantly larger and heavier aircraft with a much longer range.

Table 1: Aircraft Comparison

	B757-200	B767-300ER
Maximum take-off weight	115.6 tonnes	187.3 tonnes
Maximum landing weight	95.25 tonnes	145.15 tonnes
Maximum fuel capacity	34.4 tonnes	71.4 tonnes
Maximum passengers	156	234
Maximum range (full passenger load)	3,500 nautical miles	5,500 nautical miles
Length	47.32 metres	54.94 metres
Wingspan	38.05 metres	47.57metres
Height	13.56 metres	15.85 metres
Engines	2x Rolls Royce RB211-534 43,500 pounds thrust each	2x General Electric CF6-802C 60,000 pounds thrust each

[1] This paper uses B767 as a reference to the B767-300ER variant. There are other B767 variants, but generally the ER (Extended Range) variants have a significantly longer range than other variants.

RNZAF B757-200	Air New Zealand B767-300ER
	

Antarctica

15. Nominally, the B767 can fly to Antarctica with no point of safe return. In practical terms, the limiting factor is the permissible landing weight of the aircraft[2]. Allowing for this, it is calculated that the B767 could carry up to 19 tonnes of payload to McMurdo – sufficient for well over 100 personnel and personal kit.

16. 6(b)(i)

17. The B767 has no capacity to operate from gravel runways, so the proposed Terra Nova airfield development would not be accessible.

18. 6(b)(i)

19. Antarctica operations occur in peaks at the beginning and end of the season. Assuming ten return flights United States – New Zealand – Antarctica at the beginning and end of the season. Each round trip takes about 6 days (three for the Antarctica return leg and three for the United States return leg). This would keep at least four crews fully occupied for 6-8 weeks at each end of the season. The service would be vulnerable to weather induced delays for Antarctica legs, and any unplanned maintenance issues would disrupt the overall scheduling.

[2] Like all long haul commercial aircraft, the B767 is designed around the presumption that most of the fuel will be consumed before a landing is required. Operating to the Antarctic with no Point of Safe Return requires that the landing be made with a significant fuel load still remaining.

Other Missions

20. The B767 can fly as far as Singapore, Tokyo or Seoul non stop with a full passenger load. In practical terms, the B767 can reach most global destinations with one stop with a reasonable, albeit not full, load.

21. In current configuration, the Air New Zealand B767s seat up to 234 passengers in a two class layout (24 in Business, 210 in Economy). By comparison, the Air Force B757 has a maximum seating capacity of 156. The B767 cabin and seating is relatively old, and will soon need to be refurbished or replaced, 9(2)(b)(ii)

22. The B767 requires a longer take-off and landing distance, especially at higher weights. It has a higher ground pressure (which means it is confined to stronger runways, taxiways and parking locations), and requires more room to manoeuvre on the ground because of its greater length and wingspan. It also needs ground handling and support equipment that can handle wide-body[3] sized aircraft.

23. Currently, only Auckland and Christchurch can fully handle wide-body aircraft. (Large 'Head of State' aircraft can land at Wellington but are usually fully fuelled and serviced in Auckland). Queenstown airport is too narrow for B767, although future development is planned to widen the runway.

24. B767 operations from Whenuapai and Wellington require weight restrictions which would limit load and/or range. The runway at Ohakea is adequate, but parking and servicing areas off the runway are weight restricted. As noted in the finance section below, the extra work required may be substantial to allow routine operations by significantly larger than current commercial aircraft.

25. In the South Pacific, Apia, Rarotonga, Nadi, Papeete, Tonga, Nauru and Noumea have the runways and equipment to handle the B767. Other airports in the region, such as Niue and Port Vila, may have sufficient runway length but lack the ground support and handling equipment. Others are just too small. There is a good spread of wide-body capable airports across Australia, Asia and further afield.

26. As currently equipped, the Air New Zealand B767s have navigation and other electronic equipment that is suitable and certified for operations in Asia. There may be some current restrictions on their ability to operate in North American and European airspace. As with any old aircraft, systems would have to be made compatible with new international airspace navigation and controlled airspace requirements that are scheduled for introduction over the next five years.

Analysis of current Defence B757 operations

27. 6(a)

[3] 'Wide-body' is a generic term for commercial aircraft with more than one aisle ie larger than B757/Airbus 321.

6(a)

28. Overall, the B757s fly a wide range of missions, of which around half are inside New Zealand. (This does not include an annual average of 46 training flights between the two aircraft, almost all of which are in New Zealand). The fleet flies an average of 49 international missions per year, with an average of one internal and 4.5 international legs flown per mission.

29. Of the international missions, nearly half comprise flights only to Australia and/or the South West Pacific. For these flights, the additional range of the B767 would be of no value. The remainder go further afield, and for these missions, the B767 may make it possible to cut out intervening stops, although often these refuelling stops also allow the pick-up and drop off of passengers and cargo along the way.

30. In terms of capacity, the B757 normally flies in a combination passenger/main deck cargo configuration that takes up to 138 passengers. Less than 5% of all flights utilise the maximum 156 seat layout. The additional seating capacity of B767 would be no real advantage over the current types of mission, since on average only 1-2 rotations/exercise missions per year exceed the B757 capacity and are dealt with by either a second flight or a combination of B757 and C-130 missions. It may be useful in an evacuation scenario, although this would be totally dependent on appropriate runway and ground handling equipment being available.

31. The B757 most often utilises the VIP modules + 126 seat layout for Whole of Government missions. This includes the 'club style' facing seats with the tables between them. The current B767 seating configuration has a conventional passenger layout with all seats facing forward.

B767 operational challenges

32. As designed, the B767 is optimised for high utilisation over long ranges carrying passengers and their baggage. In Air New Zealand service, the aircraft average about 4,750 hours per year with an average flight duration of around 10 hours.

33. This is nine times the amount of hours flown annually by the RNZAF B757s. The flight duration is five times as long. More crucially, the B767s rarely fly short duration flights, whereas in RNZAF service, nearly 60% of the B757's flights are less than one hour duration. This change from airline style flying to the low intensity, variable duration flights with short flight times has greatly added to the maintenance costs of the B757 by comparison to those achieved in airline service.

34. This disparity would be even greater with the B767, as it is optimised for long haul flights. This makes the risk of unexpected maintenance costs on B767 even higher, as it would be operating even further outside its designed pattern of operation.

35. 6(b)(i)

As noted above, this would comprise around 600 additional flight hours. Adding further long distance flights for other Government purposes (ten annual return missions to Europe and ten annual return

missions to Asia in addition to those currently undertaken adds about 700 flight hours) still only adds 1300 hours to the overall total, or 650 per aircraft. This is still well below airline intensity, and insufficient to lift the aircraft beyond the threshold of a low utilisation maintenance regime.

36. The RNZAF B757 has a main deck cargo door and floor strengthened for freight or combination freight/passenger carriage. These modifications have been very successful in increasing the utility and flexibility for both passenger and freight carriage across a wide range of missions. The B767 does not have either main deck freight door, or modifications to allow combinations of passengers and freight on the main deck.

37. Filling the lower cargo holds of an airliner requires specialist handling equipment, unlike the ease of loading and unloading C-130 or other military lifters. The lower deck baggage holds of the B767 are larger than those of the B757, but are equipped to handle specialised LD8 baggage containers, which are unique to the B767 type[4].

38. The B767 lower hold is 170cm high compared to the B757 upper deck at 240cm. This is too low to fit the T-56 engine and/or propellers used by the C-130/P3K-2 aircraft, so it cannot ferry spares in the event of them being required. The height and shape of the main deck of the B757 makes it far more flexible for freight loads, and loading, than the restricted B767 holds.

39. The way in which the B767 cargo hold doors open mean that the holds cannot be loaded using a standard front end loader or other ad hoc loading equipment – specialised aircraft loading equipment must be used[5]. This would not be an impediment to routine Antarctica operations focussed on people movement.

40. The B767 and B757 share a common type rating, so that pilots should be able to transition between the two types. This would ease the introduction into service of the B767, but does not eliminate the need for ongoing training and conversion to type, and the difference in the 'back end' for cabin crew.

Finance

41. The following assumptions have been used to ascertain the costs:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

9(2)(j)

[4] B767 has a narrower fuselage cross section than all other wide-body aircraft. This prevents it from loading the standard LD-2/LD-3 baggage containers in dual rows, which is the usual procedure for wide-bodies. Conversely, the LD-8 is too wide to be utilised by any single aisle aircraft, including B757. These limitations are no problem to airline operations geared to a specific type and route, but limit flexibility for more varied missions. to mix and match containers across aircraft types.

[5] They are also too high from the ground to be loaded manually.

Case A (Two B767 replace the B757)

42. The capital cost for buying 2 aircraft, spares and equipment is in the range 9(2)(b)(ii)
Of this, around would be required in 2015/16 to be able to commence operations with some degree of surety, with the balance in 2016/17 to better equip the Air Force to operate and maintain aircraft of this size effectively over time. This is not currently in the Defence Capital Plan and would thus need to be entirely funded by capital injections or the deferment or cancellation of other projects.

9(2)(f)(iv)

9(2)(f)(iv)

43. The existing cost of the B757 fleet is . Additional annual 9(2)(b)(ii)
crown revenue of would be needed to fund the operating costs. Additional funding of would be needed for the loss on disposal.

44. The Whole of life cost (net present value) is 9(2)(b)(ii)

Case B (One B767 is used alongside the two B757)

45. For Case B, the purchase cost is . In 2015/16 NZDF 9(2)(b)(ii)
would need up to 2016/17. This is due to only one B767 aircraft being upgraded and the spare aircraft providing parts. Again this would require a capital injection, or the deferment or cancellation of other projects, to fund the purchase.

46. The annual operating costs would be . This is 9(2)(b)(ii)
more than the current fleet costs and would need new crown 9(2)(f)(iv)
revenue funding.

Case B Mixed Fleet - Annual expenses	Low	High
Personnel (Squadron only)		
Operating		
Depreciation		
Capital Charge		
Total		

9(2)(b)(ii) + 9(2)(f)(iv)

47. The whole of life cost (net present value) is 9(2)(b)(ii)

48. The projected maximum funding profiles for each option are set out below:

	2015/16	2016/17	2017/18	2018/19	Annually to 2022/23
	$ m				$ m
Crown Revenue					
Capital Injections					
Total					

9(2)(i)
9(2)(f)(iv)

	2015/16	2016/17	2017/18	2018/19	Annually to 2022/23
	$ m				$ m
Crown Revenue					
Capital Injections					
Total					

9(2)(i)
9(2)(f)(iv)

49. The cost of a substantial increase to operating hours has not been analysed, as there are considerable implications to a significant change in operational tempo. Fixed costs, such as depreciation, would be similar, but personnel and operating costs would rise in approximate proportion to the increased hours flown.

Exclusions

50. More substantial upgrades to bases to better suit them to larger aircraft, such as runways, taxiways, and hard-standing areas, are also not included. These are subject to a very wide risk margin as the extent of upgrading needed is not known (as the lower impact of C-17 did not require investigation into this). Substrate work and runway extensions to cope with ongoing operations by higher weight commercial style aircraft would cost at least tens of millions.

51. No allowance is made for a simulator. The cost of using offshore simulators has been included in the operating costs.

9(2)(b)(ii)

52. There would a possibility of upgrading the Air New Zealand simulator, but the cost or technical practicality of bringing it to a fully compliant standard for comprehensive training is not known. However, depending on the proposed life of type for B767 (including the possible replacement with younger B767s over time), the cost/benefit of an effective simulator would need further investigation.

53. No allowance has been made to install a main deck freight door and optimise the floor for a combination freight/passenger configuration, as was done with the B757. Based on experience, a major conversion of this nature could cost well over 9(2)(j) for the two aircraft. Similarly, no allowance has been made for the strategic aero-medical capability that is inherent in the B757. This would be difficult to effectively provide without a large door and combination layout that allowed the easy removal of seats and handling of patients and medical equipment.

54. No allowance has been made for any aids to self deployment, such as integral air-stairs. The underfloor hold characteristics noted earlier effectively preclude ad-hoc cargo handling, whilst the height of integral air-stairs means they are effectively unusable in anything other than perfectly still weather conditions.

55. 9(2)(g)(i) 9(2)(f)(iv)

Antarctica Alternatives

56. Defence continue to consider ways of reducing the Point of Safe Return risk for Antarctica operations.

B767

57. A short term lease of a B767 on a seasonal basis may be an alternative to procuring used aircraft, with the attendant costs and issues with operating and maintaining them on an ongoing basis over the full range of Defence missions, This would avoid substantial ownership and maintenance costs, and limit the type to the task for which it may be most suited. Antarctica operations are based from Christchurch, which can handle B767 and larger aircraft.

58. Such a proposition would be dependent on the availability of suitable lease stock, whether the aircrew cross rating between B757 and B767 was practical for Antarctica operations, supporting arrangements needed for an aircraft based at Christchurch for up to six months, and liability and indemnity arrangements. Defence has no experience with lease arrangements of this type, and further investigation would be needed.

59. If Government's primary objective is a significant increase in long range passenger carrying capability, it may consider whether Defence should be the provider of choice. A major shift in emphasis for Defence towards essentially line haul passenger transport would either be at the expense of other operational capability, or require additional funding. 9(2)(g)(i)

60. Against this would be the need to consider whether Defence should retain capability for Antarctica operations, especially in conditions that preclude commercial air transport. Antarctica flying relies on experience and knowledge that can only be acquired through practice. Only military aircraft are likely to have the crew training and performance characteristics that would allow both the carriage of outsize loads and the ability to operate in marginal conditions such as darkness, marginal weather conditions, and alternative runways. This could be vital for out of season operations, or medical and other emergency purposes.

61. Other major considerations would be if the availability of alternative providers that are competent to provide the services desired, the operational conditions and limitations that may have to be accepted, and fundamental issues of performance, utility, risk, liability and indemnity that may constrain an independent provider.

B757

62. The Transport Accident Investigation Commission report into the B757 landing in Antarctica made a number of recommendations to further reduce risk, and they have been adopted to the extent that Defence can with existing aircraft. This in itself has reduced risk, and permitted a reduced schedule of flights. As experience builds up, and subject to user satisfaction, these risk reduction measures may permit a flight schedule with existing aircraft that meets all requirements.

63. Equipping the B757 with long range underfloor fuel tanks, utilising developments in this capability since this work was originally scoped, is again being reviewed. The objective would be to shift the Point of Safe Return further towards the 'top of descent', which in practical terms is the point at which the landing process commences. Adding even one hour to the PSR would have avoided the October 2013 landing incident. If this can be achieved without too severe an impact on useful load, it may represent a tangible and worthwhile risk reduction.

64. This is not a simple analysis, since critical factors include the allowable landing weight at destination and in flight weight distribution as well as the overall fuel capacity. Current operational analysis suggests that the loss of underfloor baggage hold space as a consequence of additional tanks would not be a major inconvenience.

65. 6(b)(i)

Whilst it would not be able to carry its full load on these missions, this may provide a useful additional performance increment. It would also potentially reduce the refuelling stops on other long range missions.

66. The cost of modification is estimated at around 9(2)(b)(ii)
(assuming that the modifications made to the RNZAF B757 floors to strengthen them for main deck freight when they were acquired have not directly affected the ability to easily install the tanks). However, if the benefits were adjudged worthwhile, it is the most straightforward option as in utilises current operational and support arrangements.

B737/A320

67. Analysis is also being done as to whether aircraft form the B737/Airbus A320 families, modified with long range tanks, would reduce the risk whilst still offering a worthwhile payload[6]. Advantages may be lower operating costs, and the ability to use

[6] The Australian 'Skytrader' company uses a modified Airbus A319 for Antarctica missions, and it has been chartered occasionally by Antarctica New Zealand. It can only carry about 40 passengers to Antarctica, and the A319 would be too small for many other Defence missions. The A320 (as used by Air New Zealand) and A321 variants are potentially a more useful size.

current servicing and support arrangements, and the fact that both types are common in the region, and can be maintained locally. These types are also designed for short flights and high cycles, unlike the long range B767 and other wide-bodies. This may make them more suited across the range of Defence missions.

Overall, no modification to any narrow-body type looks as though it can eliminate the PSR risk entirely unless they carry very modest loads. They may however be able to reduce the risk by shifting the PSR point further south, in line with the B757 'top of descent' objective above.

C-130J

68. Preliminary investigation has also been done on the new generation C-130J-30 Hercules with optional external fuel tanks. Compared to the C-130H Hercules, the 'J' uses more modern engines and propellers that increase speed, fuel efficiency and thus range which may provide a better PSR than current aircraft.

69. The C-130J-30 is in use with both Australia and the United States, and is compatible with current infrastructure and support equipment. It is likely to be considered for the future Air Transport Fleet, but there would be a possibility of earlier consideration to supplement current aircraft as it is mature and available.

C-17

70. 6(a)

71. As previously advised, the C-17 provides the most effective airlift capability to Antarctica with the least risk (recognising that no flight operations to the region can be entirely risk free). It also provides a full range of other operational capabilities that the RNZAF currently lack. The C-17 is both a more modern design and offers training, operational and support compatibilities with Australia and the United States. 6(a)

Summary

72. 9(2)(g)(i) 9(2)(f)(iv)

73. The additional range of the B767 theoretically allows the B767 to undertake Antarctica missions with no PSR with the caveat that until this capability is proven, unanticipated issues and risks may arise. In this case, the current timetable for the tender precludes a trial flight before a commitment to purchase. This additional range

would also be useful for long haul missions beyond Australia and the South West Pacific region.

74. Against these attributes are the lower flexibility due to the lack of a main deck freight door, the fixed cabin configuration, and the more demanding airport requirements. The additional passenger capacity is of limited use, as it is very rare that a capacity greater than current is required, even for projected Antarctica missions.

75.

9(2)(i)
9(2)(g)(i)

76.

9(2)(i)
9(2)(g)(i)

Recommendations

It is recommended that you:

- Note that Air New Zealand have issued a Request for Proposals for two B767 aircraft, with a deadline for response on 27 October 2015;
- Note that although the B767 has the (as yet untested) capability to fly to Antarctica with no PSR, the age and condition of the B767s on offer poses challenges to both the short and longer term operation of the aircraft;

9(2)(f)(iv)

- Note that Defence continues to examine ways of reducing PSR risk; and
- Advise Defence as to your interest in pursuing the Air New Zealand Request for Proposal.

T.J. KEATING
Lieutenant General
Chief of Defence Force
Date: 22.10.15

HELENE QUILTER
Secretary of Defence
Date: 22.10.15

Pages 13-17 withheld under section 9(2)(b)(ii) of the Act.