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OIA-2023-4690

21st July 2023

[REDACTED]
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Dear [REDACTED]

I refer to your email of 6 April 2023 requesting all background reports and studies on the First Principles Review of Defence Estate Footprint, Estate Investment Priorities and Future Naval Base Indicative Business Case. Your request has been considered under the Official Information Act 1982 (OIA).

Apologies for the delay in responding to you. The Indicative Business Case for the future naval base is withheld in full in accordance with section 9(2)(f)(iv) of the OIA to maintain the confidentiality of advice provided by Ministers of the Crown and officials.

The other reports and studies (concerning the Waiouru airfield, a Christchurch military air base, greenfield air base options, a northern military air base, and a southern maritime base) are also withheld in full in accordance with section 9(2)(g)(i) of the OIA to maintain the effective conduct of public affairs through the free and frank expression of opinions. Recognising, however, the public interest in these matters, the executive summaries of these reports and studies are enclosed. Where indicated, information has been withheld in accordance with section 9(2)(g)(i) of the OIA, as described above.

You have the right, under section 28(3) of the OIA, to ask an Ombudsman to review this response to your request. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

Please note that responses to official information requests are proactively released where possible. This response to your request will be published shortly on the NZDF website, with your personal information removed.

Yours sincerely

AJ WOODS

Air Commodore
Chief of Staff HQNZDF

Enclosures:

1. Airfield Site Assessment Waiouru
2. Christchurch Military Air Base Options Study
3. First Principles Review Greenfield Airbase
4. Northern Military Air Base Study Report
5. Southern Maritime Base Viability Study

Executive Summary

Beca Ltd has been commissioned by the New Zealand Defence Force (NZDF) to provide a high-level assessment and considerations on the feasibility of constructing a new airfield, or redeveloping the existing runway, at Waiouru. This assessment has been commissioned as an input into the First Principles Review of the Defence Estate Footprint.

Aeronautical

The obstacle environment at this location is not well suited for the proposed airfield based on a preliminary assessment of the Obstacle Limitation Surfaces. With more detailed analysis and input from approach procedure planners, it may be possible to find a more suitable runway alignment, however it appears likely that significant physical and operational constraints will remain.

The colder climatic conditions in this area will present additional challenges to aircraft operations when compared to other existing or potential sites in more temperate climates. To ensure continuity of operations in all weather conditions would require the investment in snow removal equipment and aircraft de-icing facilities.

There is also an ongoing risk of disruptions to flight operations as a result of volcanic activity. It was noted that major eruptions typically occur approximately every 50 years in this area, the last being in 1995–1996. Ash from volcanic activity is a major hazard to flight operations and even minor eruptions, which occur much more frequently in the area, have in recent years resulted in interruptions to civilian flight operations.

Engineering

While construction at this site will be challenging, there were no engineering issues identified that would preclude an airfield development at this location.

There are however several environmental risks associated with this site, which cannot be fully mitigated by good engineering practice. This includes the potential for liquefaction during an earthquake event and disruption to facilities and operations during a volcanic event.

Planning Considerations

The existing Base, including the airfield, is designated in the Ruapehu District Plan for 'defence purposes'. The existing designation includes the airfield and an area directly to the north and east of the airfield.

s. 9(2)(g)(i)

s. 9(2)(g)(i)

A notice of requirement (NoR) to alter the existing designation (under the Resource Management Act 1991) would need to be lodged with the Ruapehu District Council. Depending on the scope and scale of aerodrome operations proposed, the existing designation (under the nature of work provided for) may not provide for the expansion¹. In this case, the NoR would need to cover both the amended boundary and an amended purpose/ description. This NoR may be publicly notified.

Resource consents may also be required under the Horizons Regional Council One Plan. Expansion of the airfield would likely require construction within the Te Onetapu, which is classified as an Outstanding Natural Landscape (ONL) for its scenic qualities and ecological value. While this area is within the existing defence purposes designation, any required vegetation clearance and land disturbance would need to take into

¹ This would need to be discussed with RDC.

account the potential effects on this area. The preparation of a consenting strategy would be an important input should the proposal progress further.

Given the existing and historical land ownership and the cultural values associated with the Waiouru airbase and the surrounding conservation land, iwi would need to be actively engaged early and would be a key partner in any development.

The Tongariro National Park is located to the north and west of the existing airfield. Tongariro National Park is a UNESCO World Heritage site. This status recognises the park's important Maori cultural and spiritual associations as well as its outstanding volcanic features. While the land within the National Park is some distance from the northern extent of the runway, the potential noise (and amenity) impacts of over-flying this land would need to be considered when determining use of the airfield. The Department of Conservation would be a key stakeholder, that would need to be consulted should the project progress.

Conclusion

While this assessment has not identified a 'fatal flaw' to establishing a new air force base at the location of the existing Waiouru Aerodrome, there are however significant operational constraints and multiple risks that would preclude us from recommending this site for further investigation at this time.

Executive Summary

Introduction

Cabinet has directed the New Zealand Defence Force (the Defence Force) to undertake a First Principles Review of the Defence Estate Footprint [CAB-19-MIN-0171.01 refers]. The First Principles Review will provide the Government with a long-term (50 year) view of the Estate footprint, outlining options for a fit for purpose Estate that provides stability and direction for the Defence Force, and enables delivery against Government and Defence Force strategies and priorities into the future¹.

As an input into the First Principles Review, Beca Ltd has been engaged by the Defence Force to report on the viability of Christchurch International Airport (CIA) as a possible Air Domain Option. This report includes assessment on:

- the existing facilities and requirements at CIA; and
- a potential alternative Military Air Base location at CIA, including a dedicated compound with a proposed second runway at CIA.

The report finds that the relocation of military operations from both Whenuapai and Woodbourne to Christchurch International Airport (CIA) is likely feasible from an Engineering and Statutory Planning perspective. This conclusion has been developed through consideration of whether there is sufficient existing infrastructure, available land area for further infrastructure, favourable ground conditions and existing statutory protections. Given this report has investigated the 'worst case' scenario being the relocation of the entirety of both bases, it is considered that CIA could accommodate partial relocation of either Base as well.

Approach

The approach to this assessment was broken down into the following key activities:

- Desktop review of previous studies and reports relating to Whenuapai and Woodbourne
- Initial desktop assessment and site visit for CIA to provide aeronautical, engineering and planning assessment
- Stakeholder engagement to inform: identification and understanding of existing and potential future CIA strengths and operational constraints
- Undertake assessment of options
- High Level Order of Cost
- Final Reporting

Assessment options

The options have been considered against the following assessment have included:

- Option A – Relocation of capability from Whenuapai only
- Option B – Relocation of capability from Woodbourne only
- Option C – Relocation of capability from both Whenuapai and Woodbourne

The concept plans attached in Appendix A are for Option C only, as the worst-case scenario.

¹ New Zealand Defence Force, Terms of Reference: First Principles Review of the Defence Estate Footprint (11 July 2019)

Christchurch International Airport

Christchurch International Airport (CIA) is an international airport with a 3,288m main runway, 1,741m crosswind runway and a combined international/domestic terminal approximately 77,500m². Over 6 million passengers pass through CIA annually making it the second busiest airport in New Zealand behind Auckland International Airport.

CIA's primary runway (02-20) provides for approximately 90% of the airports flight movements and is suitable for aircraft types up to Code F. The crosswind runway (11-29) provides for the remaining 10% of CIA's flight movements however is only suitable for aircraft types up to Code D due to lack of infrastructure. Both runways do not have curfews and utilise PAPI and approach lighting. However, only the main runway has instrument landing aids (CAT ILS). Currently, CIA has fuel storage for up to 2.5 million litres of Jet A1 fuel, maintenance areas, explosive safety areas and various aprons and aircraft parking areas suitable for Code C through to Code F. Additionally, CIA provides remote parking for large military transport aircraft (C-17 or similar) for United States of America and New Zealand Antarctic operations.

CIA publicly released a new airport Master Plan² in 2017 which provides a roadmap for future airport development to 2040. This Master Plan forecasts growth from 67,000 movements per annum to 111,000 by 2040 and displacement of Antarctic operations due to terminal and apron expansions. Additionally, the Plan identifies the lengthening of both existing runways which will delay the construction of an identified third runway. This third runway is mooted in the Plan as parallel, to the north, of the existing main runway at some indeterminate time post 2040. The Master Plan also states that existing noise contours set an operational limit for the airport

Engineering

CIA is considered to be a 'flat' and within the proposed base location (at the northwest quadrant of the aerodrome site), the ground levels vary up to approximately 2m. There are few, if any, drainage channels in the site. It is understood swales are typically underlain by subsoil pipes discharging to soak pits where a relatively high degree of soakage is generally expected.

Existing aircraft apron areas generally require collection of surface water runoff to contain fuel spill residues and contaminants. This is crucial at CIA as there are significant water supplies drawn from groundwater downstream of the airport and so there is a strong focus from authorities on preventing contamination from stormwater soakage. Groundwater is understood to be relatively deep at around 10-15m below ground level and artesian conditions are not expected.

CIA land consists of predominantly Waimakariri River gravels with a possibility of silt and sand layers. It is understood that the gravel subgrade is relatively dense providing strong founding conditions for buildings and pavements. Buildings for the NZDF development could be expected to require relatively shallow footings, noting however, that footings may need to be sizeable to resist wind uplift loads. Additionally, heavy duty aircraft pavements could be relatively economic to construct due to the strong subgrade and substantial local aggregate source quarries.

Taxiways, aprons, hangars and "landside infrastructure" could be formed by cut/fill earthworks of less than 1m height however a detailed grading plan has not been reviewed or prepared at this stage. It is possible that imported fill will be required to raise building floor levels above the surrounding ground to help with drainage and flood protection along with fire protection from aircraft fuel spill.

² <https://www.christchurchairport.co.nz/about-us/who-we-are/master-plan/>

Christchurch is in a moderate earthquake loading zone however, the CIA runway performed well during the 2010/2011 earthquakes being re-opened on the same day as the earthquakes. Liquefaction is not expected given the deep ground water level and dense gravel soil profiled.

CIA is built in the historic southern (true right) floodplain of the Waimakariri River and current protection consists of primary and secondary stopbank systems. The airport is located on the landward side of the secondary stopbank system, and so receives the maximum possible protection provided by the stopbanks.

Three major Transpower electricity transmission lines travel generally North-South within 2-3 km of the aerodrome and will need to be checked for their interaction with the Obstacle Limitation Surface for any future extension of runways. All of these transmission lines are clear of the proposed Base location as discussed later in this report. The proximity to major electricity infrastructure means there are very little, if no, power constraints at CIA.

Our review of the proposed development area of the Base indicates that it is well suited for development from an engineering perspective with no major risks identified. To summarise:

- Heavy duty aircraft pavements will be relatively economic to construct due to the strong subgrade and low-cost local gravel availability.
- Liquefaction is not expected under loading code earthquake events, given the deep ground water level and dense gravel soil profile reported.
- The airport is located on the landward side of the existing Waimakariri River stopbank system, and so receives the full level of protection provided by the stopbanks.
- Local transmission towers will not be required to be immediately relocated or buried, but may need to be if the future parallel runway is constructed.

Planning Considerations

The opportunities and challenges in relation to statutory planning (Resource Management Act) have been investigated in this report. This investigation has been undertaken on the assumption that operations currently located at the Whenuapai and Woodbourne bases would be moved to CIA in their entirety. This approach is a 'full movement scenario' approach and allows for scalability of the investigation findings. Should all operations from both bases be able to be accommodated at CIA, then partial operations will also be able to be accommodated.

Overall, the report finds that CIA could accommodate extended military operations under the existing statutory planning framework applied to the site, including accommodation for on base staff/training. This extended military operations refers to the full relocation of Whenuapai and Woodbourne base activities to CIA.

The Christchurch International Airport is designated in the Christchurch District Plan for "Airport Purposes" and has an underlying zoning of Special Purposes (Airport) Zone. Both this designation and underlying zoning place an expectation and understanding that aviation related activities do, can and will be undertaken within the CIA. The CIA designation definition of 'Airport Purposes' is understood to differ from other NZDF designated sites where they may have a "Defence Purposes" definition. This "Airport Purposes" definition is considered to be broad and allows for both direct aeronautical activities as well as non-direct aeronautical activities. These non-direct activities may preclude immediate aeronautical activities but shall not preclude the operation of direct aeronautical activities in the long term (i.e. airside expansion). Should this designation be unable to be relied upon, for any reason, the underlying zoning provides for military aviation. Given the nature of the proposal being a military airfield, it is considered that the relocation of Whenuapai and Woodbourne bases to CIA will be largely within the existing designation purpose being an "Airport Purpose". This is because the existing "Airport Purpose" designation is broad, and advice received from CIA confirms

that aeronautical and non-aeronautical activities including short-term accommodation and military activity and training would fall under the remit of this designation.

Notwithstanding this advice, further consideration would need to be given to the scope and scale of accommodation that would be covered by the designation, including the possibility of altering the existing designation or applying for a NoR for another designation to more clearly cover the full range of military activities that occur at a Base, rather than at a civilian airfield.

A desktop assessment of the surrounding roading network finds that the surrounding roads are of a construction and contain sufficient capacity to potentially support a military base. However, further investigations should be undertaken to determine whether any network upgrades would be required (intersections etc).

Existing noise contours take into account commercial operations at CIA but not the existing Antarctic operations. CIA also have a dedicated engine testing bay however NZDF may wish to construct a dedicated facility for military use. Further information on NZDF's anticipated future operational requirements will be required in order to undertake a comprehensive noise assessment.

Overall, the Christchurch International Airport could accommodate extended military use and associated residential accommodation. However, further detailed investigations will be required to work through finer details with CIA.

Operational

Prior to COVID-19 drop in traffic, CIA confirmed that they were operating with remaining capacity during peak periods, with no issues facilitating the current Antarctic/RNZAF flights. s. 9(2)(g)(i)

COVID-19

This report was first issued as a draft on 2 March 2020 and subsequently issued as a final version on 31st March 2020.

During this time the implications of Coronavirus/COVID-19 have become apparent and resulted in governments across the globe implementing country-wide lockdowns and closing international borders to tourism and non-citizens/residents. This has resulted in global demand for air travel declining at an unprecedented rate and subsequently a corresponding dramatic decline in the demand for CIA passenger services. An effect of this is the quoted figures in this report in respect of flight numbers, frequency, aircraft used, and passenger numbers are significantly higher than what is currently occurring 'on the ground' as of 31 March 2020.

Through this dramatic decline in demand, CIA is actively seeking options to create additional demand for its services and existing infrastructure. This situation may provide the NZDF with additional options and greater flexibility in locating operations at CIA.

Analysis Against the FPR Criteria

The following is a summary of the analysis of the options against the FPR criteria.

- Option A - Relocation of capability from Whenuapai only
- Option B - Relocation of capability from Woodbourne only
- Option C - Relocation of capability from both Whenuapai and Woodbourne

Option Analysis Summary Table

	Option A	Option B	Option C
The footprint aligns with known and anticipated Defence Force capability requirements			
The option is able to meet known capability requirements and Defence outputs	✓✓	✓✓✓	✓✓
The option is able to meet anticipated capability requirements and Defence outputs	✓✓	✓✓✓	✓✓
The footprint allows for flexibility in Estate design to incorporate changes in capability over time			
The option enables the Defence Force to expand and contract	✓✓✓	✓✓✓	✓✓✓
The option enables the Defence Force to reconfigure the footprint to incorporate changes in capability over time	✓✓✓	✓✓✓	✓✓✓
The footprint provides tangible benefits and resilience to the Defence Force for the delivery of outputs			
The option provides measurable benefits to the Defence Force resulting from aspects such as climate change, geographical features, terrain and location	✓✓✓	✓✓✓	✓✓✓
The option provides for current and future demands from Government by ensuring the Defence Force's critical assets operate both day-to-day and in times of disruption	✓✓✓	✓✓✓	✓✓✓
The footprint addresses encroachment pressures from third-party competing land uses			
The option meets the pressures from urbanisation	✓✓	✓✓	✓✓
The footprint supports the Government's priorities including value for money and the Government's regional social and economic development goals			
The option provides value for money	✓✓✓	✓✓✓	✓✓✓
The option provides for the Government's regional social and economic development goals	-	-	-

Conclusions of Option Assessment

As shown in the table above, all three options score equally against the criteria pertaining to flexibility in estate design, tangible benefits and resilience, encroachment pressures, value for money and regional development goals. These common scores have been obtained due to the following outcomes of the FPR:

- **With respect to flexibility in estate design**, all three options would not impact on long-term planning of the aerodrome. The available footprint of land between the existing and future parallel runway exceeds the requirement of the development options and allows for changes in capability to be incorporated with relative ease and in a manner consistent with CIAL's long term planning goals.
- **With respect to tangible benefits and resilience**, all three options would deliver a beneficial geographic separation from the existing and proposed North Island Air Base locations as they would reduce the risk of all major Air Bases being impacted by localised natural or man-made disasters. Moreover, no major engineering risks were identified for all options, noting that during the Christchurch earthquakes, there were minimal disruptions to ongoing operations.
- **With respect to encroachment pressures**, there is sufficient existing protection at CIA (through the designation) for airport activities, including controls on noise sensitive activities and flight paths to limit reverse sensitivity effects. Further, the surrounding land is zoned as rural with development actively encouraged away from CIA land. However, in the context of defence activities the designation purpose may need to be updated to include defence purposes/NZDF operations, depending of the scale/scope of the Base proposed. Should NZDF wish to establish a permanent operation base at CIA, further studies would need to be undertaken to redefine the noise contours in relation to the identified sensitive third-party receptors in the surrounding environment.
- **With respect to value for money and regional development goals**, all three options would deliver a similar level of value for money since the relocation in whole or in part to CIA would incur lease costs. However, there is a common benefit for all three options to NZDF in terms of the ability to leverage off existing amenities and infrastructure associated with CIA and Christchurch City. All three options do not meet the government's regional development goals as the relocation would be to another metropolitan city and not in a regional area in line with the Government's regional investment agenda

Aside from the common scoring against the criteria noted above, the only criterion under which there is differentiation in scoring is that of the footprint aligning with known and anticipated Defence Force capability requirements. Despite this, all options would provide benefits to NZDF and are scalable according to the NZDF's present and future needs.

Executive Summary

Cabinet recently directed the Defence Force to undertake a First Principles Review (the "Review") to provide the Government with a long-term view of the future of the Estate footprint.

The Review's consideration of the air domain includes the long-term viability of RNZAF Base Auckland (Whenuapai) and RNZAF Base Woodbourne (Blenheim), and the requirements for an alternative military base in New Zealand, in addition to retaining RNZAF Base Ohakea.

For the Air Domain, the Minister of Defence has directed that the long list of options needs to include a new facility at a greenfield site, potentially north of Auckland, s. 9(2)(g)(i) [REDACTED]

The AECOM team have prepared an initial long list of ten potential sites. Initial consideration of aeronautical and preliminary engineering suitability aspects reduced this to a shortlist of six candidate sites.

s. 9(2)(g)(i) [REDACTED]

Multi Criteria Analysis (MCA)

Through the application of an agreed Multi Criteria Analysis (MCA) process the initial shortlisting of 6 sites have been fully evaluated to establish a preferred Northland Greenfields Base option.

As part of the initial siting long list two sites were identified s. 9(2)(g)(i) one of which progressed through to the shortlisting for full technical evaluation under the MCA process. Due to multiple constraints the s. 9(2)(g)(i) site is now ranked last in sixth place.

The MCA process has uncovered several planning and related constraints on several sites that from an aeronautical aspect would otherwise appear quite suitable, and as such the far northern site in s. 9(2)(g)(i) is now considered extremely constrained by iwi related issues. Similarly, the s. 9(2)(g)(i) sites have significant planning related issues and rate poorly. During the detailed assessment of the Mangakahia site it became clear that issues with the runway alignment and an ox bow in the river and close in terrain made it impossible to achieve the 3,350m runway configuration without major environmental issues (realignment of 500m of the river). Whilst scoring well in other aspects the site is now considered unsuitable due to these issues. Under the current MCA analysis there is no suitable second site for consideration.

The final site rankings and weighted MCA scores by category are as follows:

s. 9(2)(g)(i)

First Principles	24.2%	24.4%	19.3%	21.9%	21.0%	18.6%
Operational Suitability	26.3%	20.6%	22.5%	26.3%	22.5%	18.8%
Planning Risk and Consentability	11.5%	8.5%	4.5%	5.0%	7.0%	12.5%
Engineering Feasibility	14.6%	14.0%	14.9%	14.9%	12.4%	11.7%
Site Accessibility	1.3%	1.3%	0.8%	0.8%	1.3%	1.3%
TOTAL	77.8%	68.7	65.7%	65.0%	64.1%	62.8%
RANK	1	2	3	4	5	6

The s. 9(2)(g)(i) site is currently preferred at this interim stage.

An overview of the proposed s. 9(2)(g)(i) site is presented below.

s. 9(2)(g)(i)

The Baylys site has suitable approach and departure flight tracks and relatively unobstructed inner horizontal surface suitable for low level flight training. The upper airspace flight tracks for approach

and departures from Auckland International airport are generally clear of the airfield. The proposed location is in close proximity to s. 9(2)(g)(i) [redacted]. The runway end areas of the proposed site are potentially located within the projected 1:100 flood plain extents, noting that the runway strip ends do requiring filling to bring them up to match levels with the central runway section and would be a critical criterion for the site earthworks platform design. The main buildings area is generally clear of the flood plan extents. s. 9(2)(g)(i) [redacted] is also stop-banked to provide some flood protection s. 9(2)(g)(i) [redacted]. This may need to be improved for future protection of the site. It must be stressed that further assessment of the site is required, particularly the extent of the 1:100 flood plain and the required earthworks levels need to be investigated in more detail to confirm the s. 9(2)(g)(i) [redacted] site for onward consideration. Recommendations for the next steps to further confirm the suitability of the s. 9(2)(g)(i) [redacted] site are presented at the end of the executive summary.

Currently the other sites are considered to be too constrained for a variety of reasons to be further considered as a viable alternative s. 9(2)(g)(i) [redacted].

Site concept plan for the preferred site to meet demand to 2070

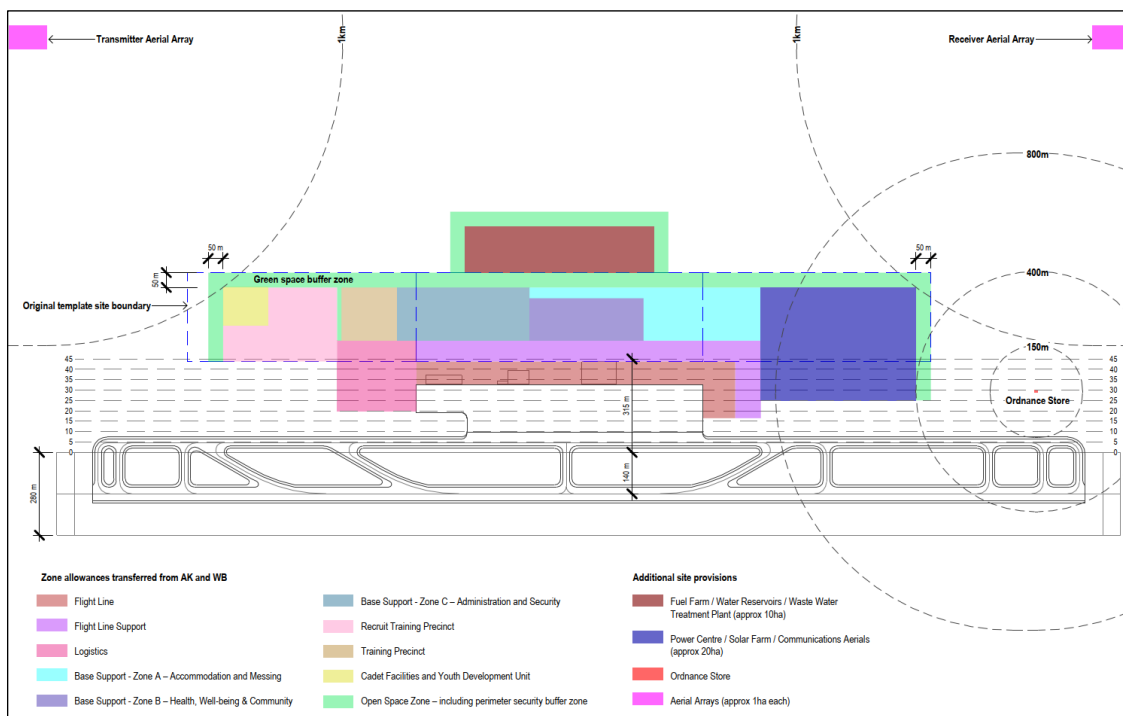
In parallel to the MCA analysis process, our military specialist team in Australia uplifted the conceptual base plan footprint and onward developed this taking into account spatial area allowances for new facilities in line with the emerging Precinct Block Plan requirements.

The base footprint zones have been sized using area allowances developed from the existing allowances at RNZAF Base Auckland and RNZAF Base Woodbourne, to check that the required facility buildings and related spatial areas can be incorporated within the footprint template.

The zoned areas at RNZAF Base Auckland and RNZAF Base Woodbourne were measured (m²), transferred and rearranged onto the greenfield template. Transferred areas were increased by 10% to allow for future growth. The married quarters areas were not measured or transferred onto the new template. It is understood that a solution for the replacement married quarters will be developed off base.

Areas were included to make additional spatial provision for support facilities such as:

- Fuel Farm, Water Reservoir and water treatment plant and a Wastewater Treatment Plant
- Site Power Centre, Solar Panel Farm and Communications Aerials
- Additional Ordnance Store and Aerial Arrays were arranged on the site with exclusion zones. The developed site concept plan is as follows.



Based on the above we recommend that the base plan footprint be increased from the current 150Ha footprint to around 170Ha

Limitations to the slim rectangular shape of the site template:

The slim rectangular shape of the templates pushes the zones of the base into a side by side type arrangements and creates a long travelling distance of approximately 2.5km from one end to the other. A deeper and shorter site shape would allow for a better 'hub' type central site arrangement for a combined mess, medical and physical fitness facilities. If these facilities were able to be placed centrally near the HQ/security facilities then this would provide shorter distances and better amenity for the cadet training zone, the recruit training zone, the trade training, and the logistics zone. Additionally, the accommodation for the permanent live-in and trade training members would be able to be placed closer in travelling distance to their place of work, but still be separated by community facilities.

A deeper site would also provide better utility services design in terms of shorter runs of pipes and cables and networked services with more connections providing better redundancy in the event of a fault in one of the lines. Additionally, there may be potentially less gradient differential requiring less pumping apparatus if lineal lengths were shorter.

Very Rough Order Costs (VROC)

Using the preliminary site earthworks model developed for the short-listed sites and the developed master plan of the base development, AECOM's quantity survey team have developed very rough order budgetary costings for the preferred s. 9(2)(g)(i) site.

The very rough order of cost for the s. 9(2)(g)(i)

Recommendations on Next Steps

We recommend the following next steps should be undertaken to further affirm the viability of the s. 9(2)(g)(i) site;

1. Further investigations into the current 1:100 flood plain modelling be undertaken. The proposed runway earthworks levels will be above the 1:100 flood plain heights based on the current information. We recommend that a site-specific study be undertaken rather than rely on the current generic large area - lower accuracy model available in the local authority system to confirm assumptions.
2. Obtain higher definition LIDAR survey data, ideally to sub 1m level accuracy for the site and rerun runway OLS projections, focusing on the first 5KM "close in" sections to confirm these are fully unobstructed – clear. This data can also be used to update the site earthworks models.
3. A further ground reconnaissance of the site and surrounding areas be undertaken once Covid-19 travel restrictions are lifted.
4. Development of an approach and departure aircraft flight path track and consider options for a visual flight through the area with Defence aircraft flying the approach and departure tracks. This could be undertaken as a general low-level training flight exercise spread out over several days over the wider region and tying into other aircraft flight operations as a drop in and fly through type exercise.
5. Based on the finding and observations made under items 1 through 4, a revised site-specific base footprint be developed specifically for the s. 9(2)(g)(i) site.
6. Further investigations in land ownership both under the immediate site footprint and immediate surrounding areas be undertaken.
7. Currently there is no site-specific metrological data for this site or immediately surrounding area; we recommend the installation of an Automatic Weather Station (AWS) in the general area to provide confirmation of the local wind patterns and related local metrological data.

8. Further to item 7 above, confirmation of Military Standard Operating Procedures (SOP) is required with regards to allowable crosswind components for confirming runway usability figures.
9. Carry out an MCA analysis on the current base Whenuapai site to allow a comparison of the rating scores with the s. 9(2)(g)(i) site to be undertaken.
10. As an option to develop a suitable secondary site, re-evaluate the s. 9(2)(g)(i) regional airport site which could be co funded with the s. 9(2)(g)(i) site. This site had originally been discounted earlier in the study due to the relatively large earthworks volume required (approximately 6 to 7 times the s. 9(2)(g)(i) site earthworks) noting this is a one-time cost, this site may otherwise be viable compared to the other shortlisted alternatives. We recommend consideration of running this site through the full MCA process to compare rankings with the s. 9(2)(g)(i) site.
11. Review local and regional district schemes for potential restrictions on quarrying developments that will be needed to support the construction development off the site.
12. A desktop environmental and planning pre-feasibility assessment of the preferred site is recommended, with assessments by the relevant subject matter experts (including planning, air quality, acoustics, landscape architecture, ecology, archaeology, traffic, hydrology, water quality, stormwater management, hazardous substances).
13. In addition to in-depth feasibility assessments, it is recommended that a consent strategy is prepared for the preferred site(s). The consent strategy enables detailed consideration of the consent risks, timeframes, issues, and notification requirements. The outcome from a consent strategy would recommend the preferred way forward from a planning risk perspective.

Glossary

Abbreviation	Description
AC	Advisory Circulars – issued by the New Zealand Civil Aviation Authority
AGL	Airfield Ground Lighting (or Aeronautical instead of Airfield)
AMA	Air Movements Area
CAA	Civil Aviation Authority
DTM	Digital Terrain Model
ESD	Environmentally Sustainable Development
GA	General Aviation
GIS	Geographic Information System
HF	High Frequency
HQ	Head Quarters
ICAO	International Civil Aviation Organization
IH	Inner Horizontal – part of the runway OLS
IMP	Integrated Master Plan
MCA	Multi Criteria Analysis
NAVAIDS	Navigational Aids – for aircraft flight operations and navigation
NZAA	New Zealand Archaeology Association
NZCAA	New Zealand Civil Aviation Authority
NZDF	New Zealand Defence Force
OLS	Obstacle Limitation Surface (refer AC139-06 and ICAO Annex 14)
RNZAF	Royal New Zealand Air Force
Rx	Receiver – refers to radio receiver equipment
SIDS	Standard Instrument Departure routes (SIDs)
STARS	Standard Arrivals Routes (STARs).
TA	Territorial Authority
TGA	Tauranga Group Alluvium
Tx	Transmitter - refers to radio transmission equipment
VROC	Very Rough Order Costs

Executive Summary

Introduction

Cabinet has directed the New Zealand Defence Force (the Defence Force) to undertake a First Principles Review of the Defence Estate Footprint [CAB-19-MIN-0171.01 refers]. The First Principles Review will provide the Government with a long-term (50 year) view of the Estate footprint, outlining options for a fit for purpose Estate that provides stability and direction for the Defence Force, and enables delivery against Government and Defence Force strategies and priorities into the future¹.

As an input into the First Principles Review, Beca Ltd has been engaged by the Defence Force to consider the future of Base Auckland (Whenuapai) and investigate options for a Military Air Base in the north of New Zealand. This report includes assessment on:

- the long-term viability of Base Auckland, focusing on the external factors that are currently, or have the potential to constrain future Base operations; and
- recommended management responses to strengthen the Defence Force's position if it were to remain at Base Auckland;
- potential alternative Military Air Base location options including a greenfield development north of Auckland or a dedicated compound with access to the proposed second runway at Auckland International Airport.

Approach

The approach to this assessment was broken down into the following key activities:

- Desktop review of previous studies and reports relating to options to retain or close Base Auckland.
- Initial desktop assessment of the strengths, weaknesses, opportunities and threats of Base Auckland (drawing on previous studies, SWOT analyses, and a review of Council and other publicly available documents).
- Stakeholder engagement to inform: identification and understanding of existing and potential future Base Auckland strengths and operating constraints; and alternative military air base options. (Refer to the List of workshops and attendees provided at Appendix B).
- Undertake assessment of options.
- Final reporting.

Assessment of options

As part of the first draft of this Report, two options were considered:

- **AIA option:** Relocating to a dedicated compound (either whole or in part) at Auckland International Airport.
- **Greenfields option:** Greenfield site north of Auckland.

Following a review of the Draft report, it was determined that additional assessment should be undertaken on the option of extending the main runway at Whenuapai, to address potential long-term capability constraints.

¹ New Zealand Defence Force, Terms of Reference: First Principles Review of the Defence Estate Footprint (11 July 2019)

The following now represents a consolidated list of the options considered in the NMAB Study:

- Base Auckland Option 1a – remain at Whenuapai – Do nothing
- Base Auckland Option 1b – remain at Whenuapai and continue to proactively address identified planning/designation issues and increase public engagement.
- Base Auckland Option 1c – Runway extension
- Option 2 – AIA
- Option 3 – Greenfields site

SWOT Analysis

The need for this assessment has been triggered by questions raised over the long-term operational viability of Base Auckland. It has been signalled that Auckland's population growth, pressure for alternative uses of Base land, and operational constraints such as the limited runway length, will place increasing pressure on the range of military operations that can be conducted from Base Auckland in the future.

Alternative options for the location of a Military Air Base have also been proposed from time to time. A large amount of Estate investment is planned at Base Auckland over the coming years. Government and the Defence Force need assurance this investment is in the right place.

As a first step in considering the question of the long-term viability of Base a SWOT analysis was undertaken. A summary of the strengths, weaknesses, opportunities and threats identified for Base Auckland is provided below:

Strengths

Proximity to Auckland, which is important in relation to other Defence Force activities/bases and for the access to the general Auckland market for resources, family employment and the ability to support subsidiary activities was considered a significant strength. The synergy of base Auckland with other Defence Force activities was also seen as a symbiotically important attribute. The long history of Base Auckland in establishing and building relationships with both the local immediate community at Whenuapai and with other components of the wider Auckland community should not be underestimated. However the major strength factor was the existing operational security framework established by the two major designations that provide for the Base in the Auckland Unitary Plan. Although there is room for improvement of this framework (for which suggestions have been made for a concerted plan of action in the conclusion to Chapter 2, it does provide for a high degree of protection for the Base's continued operations and its interactions with the regulatory authority and the community. Whenuapai is a "known entity" whose continued existence can be assured.

Weaknesses

Three key weaknesses were identified: future growth and expansion is thought likely to be significantly constrained, although this has not been tested in any comprehensive or sustained manner; the existence of heritage classifications on a number of structure is likely to constrain future use/re-development options; and, traffic congestion adversely affects Base operations at times. Overall however these weaknesses are worthy of further investigation if a decision is taken that the base will remain. For example, with the identified need for an additional point of access to the Base and the need to consider this within the framework of the Structure Plan, there is an opportunity to look at both expansion options and well as a re-alignment of Brigham's Creek Road.

Opportunities

Two main opportunities were identified: the general improvement of accessibility to the wider transport network, which the pro-active planning for a major urban growth node in the northwest of Auckland will bring

and the opportunity for additional educational/youth engagement activities to be developed on the Base with access to the whole Auckland metropolitan region.

Threats

Three major threats were identified all of which were substantially inter-related. The main threat is effectively residential development or “nimbyism” as recognised by the Minister, which may act as a constant constraint to legitimate Base activities and is likely to see any proposals for expansion of either footprint or activities, resisted strongly by neighbours. This situation has not been assisted by the uncertainty introduced by the two other threats identified; Plan Change 5 and its continuing uncertainty is a cause for concern; the recent Environment Court determination has also introduced further uncertainty, which may be more perceived than real. Overall however, when the threats are considered against the key strength of the existence of a strong statutory licence to operate afforded by the designations, we are of the view that they can be satisfactorily substantially mitigated by a strong statement of intent and a programme of actions to amend the designation provisions.

Analysis Against the FPR Criteria

The options of relocating to AIA or to a Greenfields site were considered against the assessment criteria for the First Principles Review (FPR). The following is a summary of the analysis of the options against the FPR criteria. A comparison has been provided for Base Auckland using the SWOT analysis undertaken².

	Base Auckland (Whenuapai)	Auckland International Airport	Greenfield site north of Auckland
The footprint aligns with known and anticipated Defence Force capability requirements			
The option is able to meet known capability requirements and Defence outputs	✓✓✓	✓	✓✓✓
The option is able to meet anticipated capability requirements and Defence outputs	✓✓	✓	✓✓✓
The footprint allows for flexibility in Estate design to incorporate changes in capability over time			
The option enables the Defence Force to expand and contract	✓✓	✓	✓✓✓
The option enables the Defence Force to reconfigure the footprint to incorporate changes in capability over time	✓	✓	✓✓✓

² An assessment of Option 1c against the FPR criteria was not undertaken as part of the Addendum report in Appendix G. Based on the initial assessment undertaken on Option 1c, it is considered that if the score for the criteria, 'The option is able to meet anticipated capability requirements and Defence outputs' could be revised to '✓✓✓' if Runway option 1 was selected.

The footprint provides tangible benefits and resilience to the Defence Force for the delivery of outputs			
The option provides measurable benefits to the Defence Force resulting from aspects such as climate change, geographical features, terrain and location	✓✓✓	✓✓✓	✓✓✓
The option provides for current and future demands from Government by ensuring the Defence Force's critical assets operate both day-to-day and in times of disruption	✓✓✓	✓✓	✓✓
The footprint addresses encroachment pressures from third-party competing land uses			
The option meets the pressures from urbanisation	✓	✓✓	✓✓/✓✓✓
The footprint supports the Government's priorities including value for money and the Government's regional social and economic development goals			
The option provides value for money	✓✓✓	✓✓/✓✓✓	---
The option provides for the Government's regional social and economic development goals	---	---	✓✓✓

Conclusions of Option Assessment

Whenuapai

The principal conclusions with respect to Base Auckland are as follows:

- The immediate operability of the facility is secure. The question of ability to accommodate future capability beyond 2035 needs further investigation. In part this is caused by the fact there are numerous permutations and combinations of future capability requirements. The continued ability of the base to operate can be improved with a selected programme of actions designed to remedy a range of current uncertainties/omissions in the regulatory framework.
- The SWOT analysis demonstrated the robustness of this conclusion: the five identified Strengths were all substantial, two Opportunities were identified to add utility; of the three Weaknesses identified two could be further investigated with a view to ameliorating their impacts and of the three identified Threats, two could be further actively managed to reduce or ensure they at least did not get worse.

With respect to immediate actions which could be taken/considered to strengthen Base Auckland's continued ability to function to meet the Defence Force's needs the following are recommended:

- The situation with respect to PC 5: Whenuapai Plan Change³ proposed changes to the surrounding planning framework should continue to be pursued.
- The recommended need for a second entry point from the Base masterplan could offer an opportunity to address road network issues with both Auckland Council and Auckland Transport, perhaps including the re-alignment of Brigham Creek Road to permit a runway extension which could address some of the future capability concerns (beyond 2035).
- Resolution of some of the issues with Designation 4311⁴ in the Auckland Unitary Plan and Council's inability to control potential obstacle limitation surface (OLS) intrusions should also be actioned.
- Refinement of the airfield noise overlay (or the addition of a specific engine testing noise overlay) to take into account the outcomes of the recent Environment Court determination would also assist in firming up the regulatory framework.

If Council receives a strong signal that it is Defence Force's intention to remain at Whenuapai for the "foreseeable" future (beyond 25-30 years) then that is likely to influence the manner in which Council progresses PC 5 and the Structure Plan proposals.

a. Option 1c

This Addendum report contained in Appendix G has investigated the feasibility of runway extensions to both the north (21 end) and south (03 end) of the existing runway at Base Auckland. This assessment indicates that a 150m long runway extension to the northeast is possible, but extensions beyond this would be constrained by obstacle limitation surfaces, topography and environmental issues. A runway extension to the southwest appears technically feasible from an aeronautical perspective, when taking into account the obstacle limitation surfaces and existing ground contours.

A longer runway extension to the southwest (Option 1) of 1,200m to achieve 11,000ft, would provide relatively little restriction on delivery of capability given all known types of aircraft currently operating/on order and quite possibly future aircraft within a 20 year timeframe. The shorter runway extension to achieve 9,000ft (Option 2) would provide for existing capability, e.g. P8, however may not provide unrestricted operations for all future aircraft types, e.g. replacement aircraft for the B757-200.

We recommend NZDF give further consideration to the destinations they may be required to operate into in the future and therefore the range required and aircraft options to achieve this. This will have a direct impact on the runway length required.

s. 9(2)(g)(i)

Both options would have a material impact on current sub-regional structure/ growth planning being undertaken by Auckland Council and the New Zealand Transport Agency, in terms of:

- Reducing land available for industrial/commercial development in the area -this area has been identified to support the need for business land in the north-west
- Proposed local and cross-town transport connections

The extent of these impacts would need to be assessed further, e.g. the economic and transport benefits and costs. These growth planning exercises are currently in progress, giving a relatively 'narrow window' of

³ Plan Change 5 to the Auckland Unitary Plan, notified 21 September 2017 - refer to <https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-by-laws/our-plans-strategies/unitary-plan/auckland-unitary-plan-modifications/proposed-plan-changes/Pages/whenuapai-plan-change.aspx>

⁴ The Requiring Authority for Designation 4311 (in the Auckland Unitary Plan), is the Minister of Defence. The designation relates to the Whenuapai Airfield Approach and Departure Path Protection.

opportunity should NZDF, wish to pursue this option in advance of formal Council statutory and investment processes proceeding. We would recommend early engagement with the Council, should a decision be made to proceed further with Option 1c.

The VROC cost estimates indicate that a runway extension at Whenuapai could provide a value for money option to address the need for a northern military airbase to 2035 and well beyond.

Auckland International Airport (AIA)

The AIA option would provide benefits to NZDF in the 'value for money' area, as the airside infrastructure would be owned and maintained by AIAL. In addition, this option would address some of the existing pressures from urbanisation facing Whenuapai, as there are sufficient existing protections at AIA for airport activities, for example noise controls and flight paths to protect the NZDF operations as well as the ongoing management required by these protection measures would be maintained by AIAL.

However, based on current engagement with AIAL, the area available at AIA for aeronautical uses adjacent to the proposed northern runway falls well short of that required to accommodate all the capability (and associated infrastructure and facilities) currently located at Whenuapai Air Base. In addition, AIAL have indicated that the available area would need to be shared with other users.

In addition, to the space constraints, discussions with AIAL indicate that this option would place constraints on RNZAF operations that may not be acceptable. Initial indications are that training, and helicopter operations may not be able to be accommodated at AIAL. In addition, the lack of a northern taxiway may unreasonably constrain operations.

As part of the Project workshops, the 'AIAL Option' was effectively defined as relocating the majority of capability and functions from Base Auckland to AIAL. It was recognised that not all of this infrastructure would be able to be located within one secure compound. Given the feedback from AIAL, this option as currently defined does not appear to be feasible.

Further work needs to be undertaken on whether this option can be re-defined to a level which would be acceptable to RNZAF, e.g. only one Squadron is re-located to AIAL or a portion of capability from each Squadron (training is accommodated at another site) is relocated.

Greenfield Option

The option of a greenfield location north of Auckland for a northern military airbase has been considered. When assessed against the FPR assessment criteria, this option performs well when considering its potential ability to deliver on future known and unknown capability requirements. A location in Northland would also deliver on the Government's regional economic priorities. The design and location of a new air base also has the potential to provide for resilience to the Defence Force for the delivery of outputs.

The success of a greenfield option is dependent on the availability / finding a suitable site. The analysis provided in this report demonstrates that this is likely to be a challenging process as there are a number of criteria that need to be met, particularly with respect to operational suitability. The amount of land area required to establish an airbase (at 300-350ha) is significant and finding a site, which could accommodate one 11,000ft runway in Northland would be difficult.

A greenfield location also has the potential to reduce urban encroachment pressures and third party competing land uses, depending on the location selected. However, the analysis of three example sites indicates that a development of this size, in locations which meet other criteria would be likely to be located within the vicinity of existing and/or proposed residential areas and therefore face some of the same reverse sensitivity issues as Whenuapai experiences.

When considering a generic concept rather than a specific site, this option ranks well on the majority of criteria, with the exception of 'value for money' criteria, given the significant capital cost of development. Consideration could be given to acquiring additional land at Whenuapai (to extend the runway and provide an additional access), which would deliver benefits in the capability area, for a much lower cost.

The establishment of a new Air Base on a greenfield site would require a significant planning/ consenting process and a consistent/sustained policy setting, extending over perhaps a decade. It would be a large complex development, with challenges around the establishment of noise contours and the impact on existing land uses. Given the amount of land acquisition required and the impact on adjacent land uses, this planning/ consenting (designation) process would need to be supported by a robust option evaluation (under the Resource Management Act), which demonstrated the need for both the amount of land required and the work required. This would need to include why other options have not been pursued, which would achieve the objectives of the Defence Force.

Overall Findings

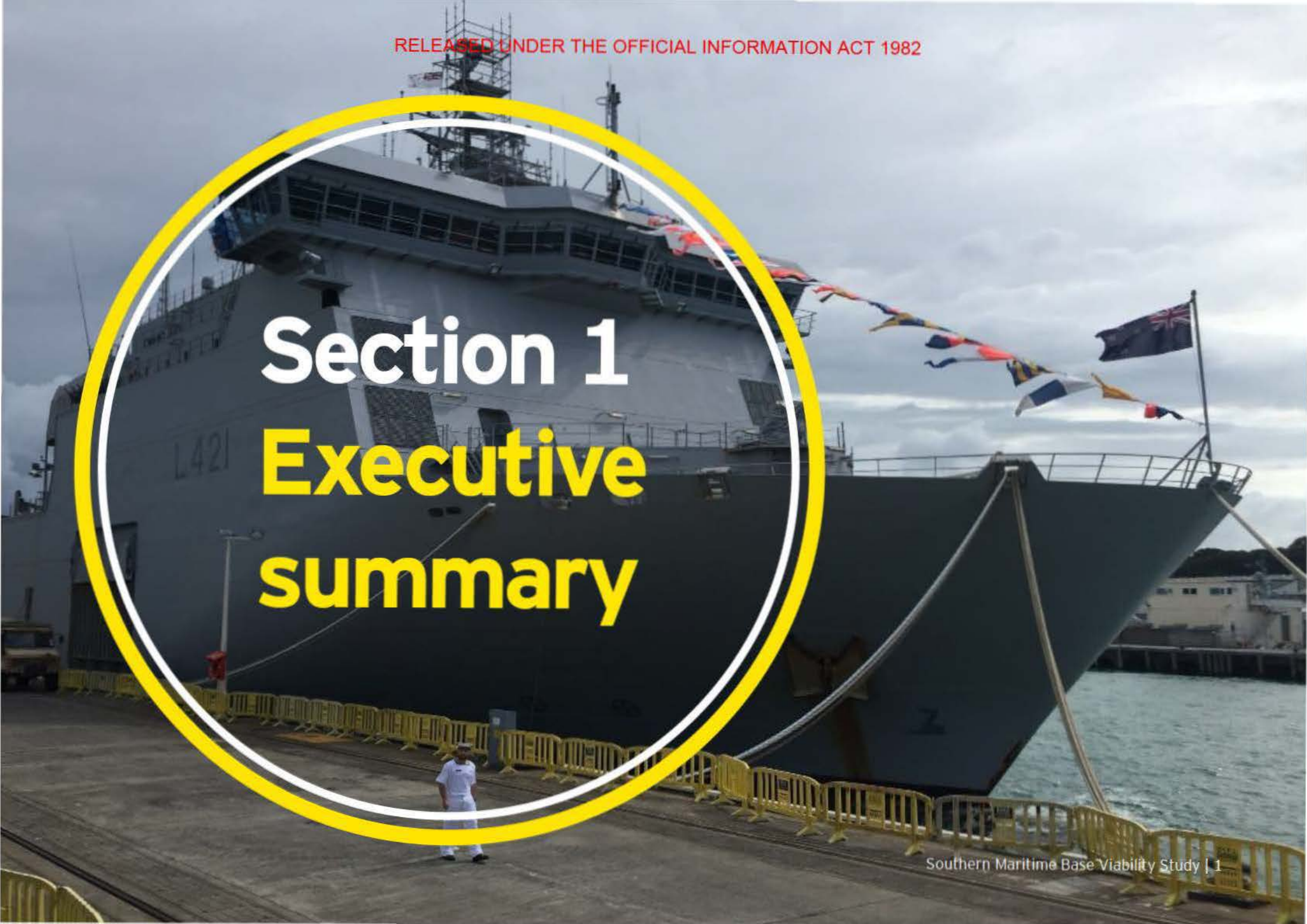
The overall findings of this Study are that there are considered to be limited operational constraints at Base Auckland, which would impact on the delivery of required capability up until 2035. Potential constraints on the ability to deliver the required capability up to 2070, will depend upon the choice of future aircraft and their operational requirements. Should additional runway length be required, a runway extension to the southwest appears technically feasible from an aeronautical perspective. However, it would have a material impact on current sub-regional structure/ growth planning being undertaken by Auckland Council and the New Zealand Transport Agency. Early engagement with Auckland Council would therefore be necessary, should this option be pursued further.

It is acknowledged that the Defence Force are likely to face increasing pressure to place limits on their operations from increased urban development around the Base over the next 20 years. However, it is considered that these impacts can be managed through continued proactive measures to address existing planning/designation issues and increased public engagement.

If a decision was made to relocate from Base Auckland, given the feedback from AIAL, the option of relocating all the existing capability at Base Whenuapai to AIA does not appear to be feasible. The area available at AIA for aeronautical uses adjacent to the proposed northern runway falls well short of that required to accommodate all the capability currently located at Whenuapai Air Base. In addition, AIAL have indicated that the available area would need to be shared with other users.

Given the findings that the medium term capability requirements could be accommodated at Whenuapai, any greenfield option would be addressing longer term capability requirements. The option of relocation to a Greenfields site would require a large capital expenditure and it will be challenging to find a site capable of accommodating an 11,000ft runway. The significant lead time and regulatory complexity required to construct and establishing a new Air Base, is also a consideration.

A location in Northland would deliver on the Government's regional economic development priorities. Further work would be required to determine if the costs of relocating the Air Base would outweigh the benefits. Any benefits would be more likely to be realised through the establishment of a joint Force facility. There may also be the ability to house both the Air Base and other government funded investment proposals in the same location, through a coordinated approach.

A large grey naval ship, likely a Landing Ship, Tank (LST), is docked at a pier. The ship's hull number 'L421' is visible. The ship is surrounded by yellow safety barriers. A person in a white uniform stands on the pier in the foreground. The ship is flying several signal flags and the Australian flag. The sky is overcast.

Section 1

Executive summary

1 Executive summary

The Southern Maritime Base Viability Study ('the Study') was commissioned by the NZDF to inform the First Principles Review on the viability of establishing a Southern Maritime Base ('SMB'). A SMB would supplement maritime operations and deployments for the NZDF, for more efficient projection to the Antarctic and Southern Ocean. A SMB would provide an additional benefit of resilience of fleet location e.g. in the event of civil or national emergency denying use of the main Naval Base. The Study identifies the scope and User Requirements for a SMB and considers a range of options across the South Island only.

1.1 Viability Study

The Royal New Zealand Navy (RNZN) vessels that presently operate in the Antarctic and Southern Ocean conduct a series of deployments during the austral summer (December through to February). Currently, the RNZN vessels utilise an existing commercial port in the South Island, for resupply, personnel exchange, and inspection of bio-fouling and potential repair of ice damage.

Establishment of a permanent SMB will achieve an additional level of resilience by providing a dedicated NZDF secure maritime facility in a separate geographic location to the existing Naval Base. This would potentially limit exposure to a threat and provide redundancy, for example in the event of a natural disaster.

Currently, there are no other permanent NZDF owned New Zealand port facilities outside of the Devonport Naval Base and Kauri Point Armament Depot to support more efficient projection to the Antarctic and Southern Ocean.

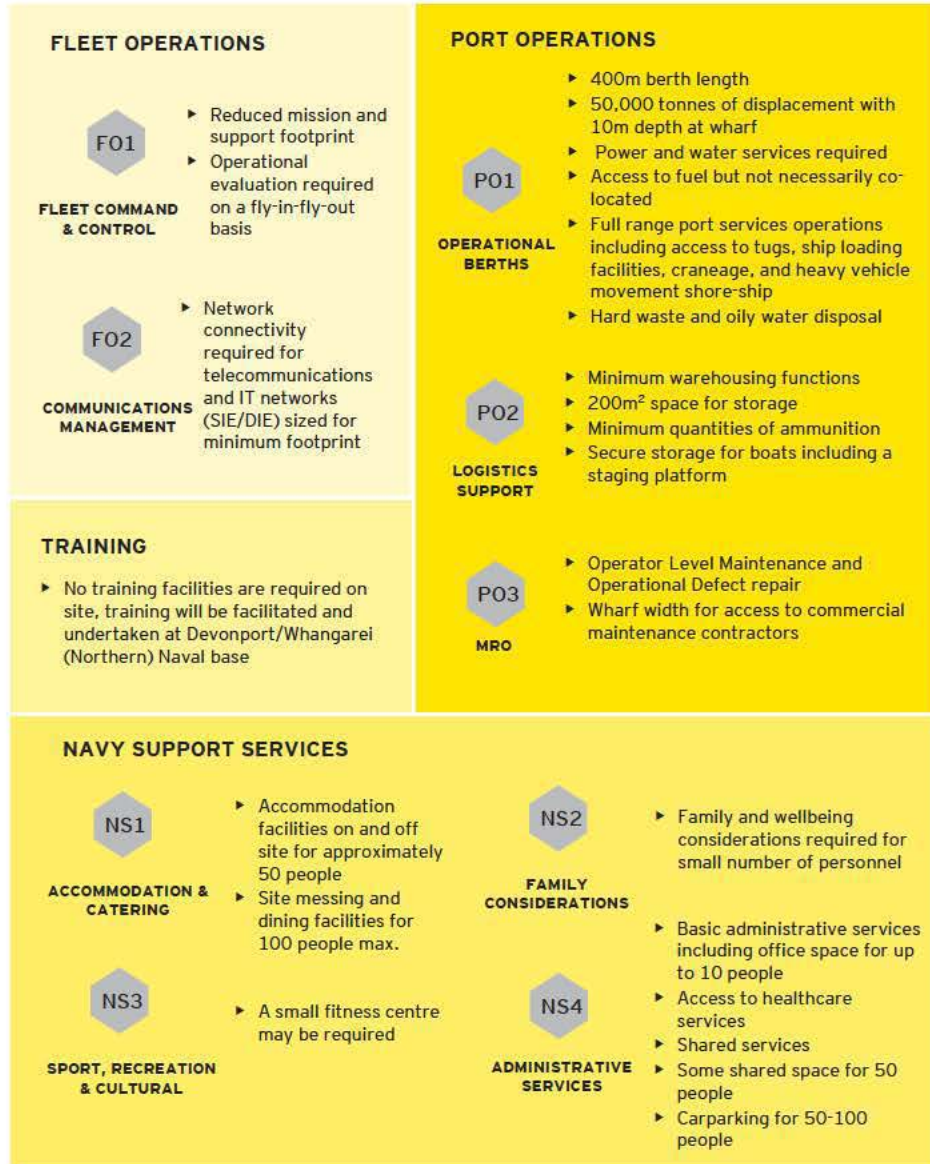
In addition, the outcomes of the Study will optimise the FPR Scenarios and Future Naval Base Indicative Business Case (FNB IBC) Options. Once completed, the recommended option for the Future Naval Base ('FNB') may be assessed with and without the recommended SMB option. We note that a core

original assumption for the 2018 FNB Study was a single location for a Naval Base, however, testing the preferred options of FNB with and without a SMB will provide the FPR with more visibility on how this impacts on the NZDF's maritime operations and resilience over the medium to long term¹.

The User Requirements for the SMB (Figure 1) defined and confirmed with the Reference Group, were critical to identifying what the NZDF requires from a SMB in order to supplement maritime operations and meet deployment needs. The User Requirements were a crucial component in evaluating and identifying the recommended option for a SMB.

¹ Given the original single location premise, should a split base model be pursued by FPR, the concept of operations would need to be reconsidered, and the FNB and SMB may require reexamination as the FNB currently assumes an individual footprint.

Figure 1 Summary of the User Requirements



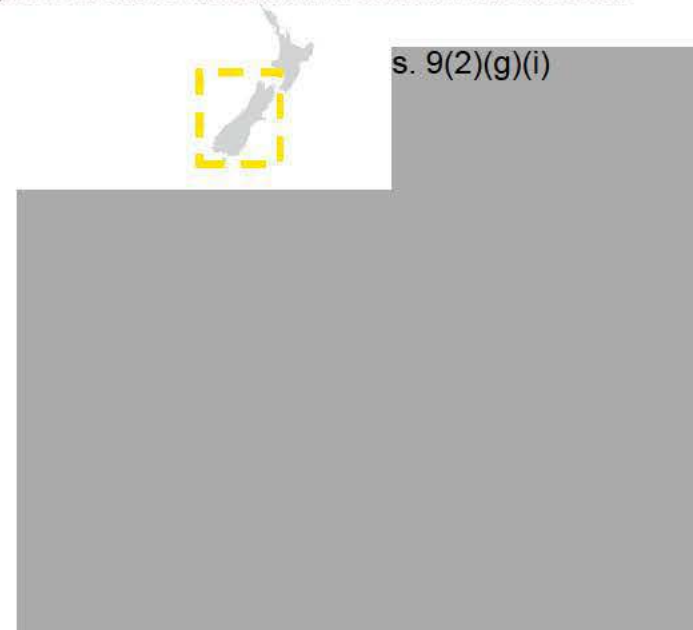
1.2 Locations

Eight locations in the South Island were selected for a SMB, as shown in Figure 2. These were adopted from the South Island options assessed in the 2018 FNB Study, and then reassessed for the purposes of a SMB. A SMB will have reduced requirements in terms of footprint and facilities compared to an entire Naval Base.

It is important to note that only South Island locations have been considered for a Southern Maritime Base for the purposes of this Study given the nature and short timeframes associated with it. If additional time was available, the investigation could have been broader, and may have considered other North Island locations e.g. Wellington and Napier.

A typical layout for a SMB was designed based on the User Requirements. This layout was then applied to the selected South Island locations for illustrative purposes.

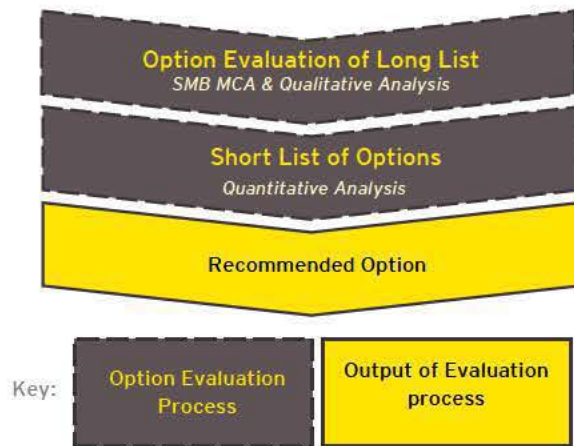
Figure 2 Locations evaluated for a Southern Maritime Base



1.3 Options

The Long List of options was evaluated through a Multi Criteria Analysis ('MCA') process. The MCA criteria was an aggregation of the FPR MCA and the amended 2018 FNB MCA. Figure 3 provides an overview of this process. This was informed by the User Requirements and high-level Qualitative Analysis completed for each location.

Figure 3 Summarised option evaluation process



1.4 Results

The MCA criteria, framework and evaluation were developed and agreed together with the Reference Group at a workshop on 28 February 2020. Therefore, the results of the MCA are reflective of the feedback received from the Reference Group and have not been further tested or refined given the very short timeframes associated with the project.

The MCA was applied to each location resulting in a ranking of the options (Table 1). Note one of the criteria assessed whether a location meets the stated objectives and happens to be binary in nature. Therefore, this was defined as a pass or fail requirement. If an option failed to meet the key

objectives, the option was not progressed for assessment against other remaining criteria, and therefore not carried forward for further analysis. As a result, three options s. 9(2)(g)(i) were eliminated as they failed to meet the fleet accessibility criteria which was defined as a pass or fail requirement.

Table 1 MCA results identifying the Long-List and Short List options

Rank	Option	Weighted score
1	s. 9(2)(g)(i)	3.60
2		3.49
3		3.48
4		3.27
N/A		Fail
N/A		Fail
N/A		Fail

Due to the very short timeframes associated with the Study, the two highest scoring options, s. 9(2)(g)(i) were determined as the Short List of options which were progressed for further analysis. The top two options are the same ranking on both an unweighted and weighted basis. Note this indicates that the outcomes are not overly skewed by the criteria prioritisation.

It is noted that, s. 9(2)(g)(i) scored closely to the Short-Listed options. However, given the nature and short timeframes associated with the Study, a cost for these options was not included.

An estimate of the very rough order costs ('VROC') for the Short List of options was used to determine which option provides the NZDF with best value for money and long-term benefits.

The quantitative analysis below shows the very rough order costs s. 9(2)(g)(i)

Table 2 Summary of the VROC of the Short List options.

Short list	Very rough order CAPEX estimate* (\$m as at June 2020)
s. 9(2)(g)(i)	

*Rounded up to the nearest \$5 million

The VROC capex estimates outlined include a risk allowance of 35%. For a more detailed breakdown of costs and assumptions refer to Section 6.2.1 and Appendix F.

Due to the very short timeframes associated with the Study further quantitative analysis has not been undertaken for other Long List of Options that relatively scored well s. 9(2)(g)(i). However, the relative costs s. 9(2)(g)(i) have been described qualitatively in the Study.

Based on the qualitative and quantitative analysis completed, the preferred option still remains to be s. 9(2)(g)(i) and the second-best option s. 9(2)(g)(i). This takes into account the relative costing s. 9(2)(g)(i) which have been described qualitatively. Therefore, the closely scored options can be viewed for comparative purposes.

In addition, the quantitative assessment has focussed purely on the capital cost implications however, it is expected that some operational cost implications may exist. However, given the high-level nature of the Study, there is no concept of operations at this stage. Therefore, it is difficult to understand the NZDF's operational use of a SMB to accurately determine the operational cost implications.

Any potential operational cost implication identified has been discussed qualitatively for the purposes of the Study below):

- ▶ **Personnel costs:** the SMB will be a NZDF secure maritime facility which will require some staff to be permanently based there on a day to day basis for management and security purposes. This staff cost is considered to be an operational cost implication for the purposes of the Study. However, if the Study is further investigated, consideration will be given to whether a

SMB is capable of being secure without requiring permanent staff to be based there.

- ▶ **Travel costs:** any additional travel to and from the SMB may need to be accounted for as an operational cost implication, this includes the logistics of transporting key personnel, goods and equipment as required.
- ▶ **Maintenance costs:** it is expected that the SMB will have some basic maintenance requirements on a regular basis to remain operational and functional. This is considered to be an operational cost implication.
- ▶ **Port Operating costs.** It is expected that the port operating costs will increase due to duplication of location, e.g. utilities charges, occasional crane hire, warehousing and port services equipment maintenance (forklift, vehicles, lines, fenders, gangways, etc.).
- ▶ **Government Shared Facility:** It is expected that there may be additional operating costs incurred with potential for SMB to be a shared facility with other services or government agencies (e.g. Customs, Police, Antarctica New Zealand, National Institute of Water and Atmospheric Research (NIWA), Fisheries, Coastguard etc.). If this Study is further investigated, this will need to be captured in order to provide a holistic estimation of operating costs of the SMB and where those costs may be borne.

1.5 Sensitivity analysis

Sensitivity analysis was undertaken for some elements of the MCA process. In particular, a sensitivity analysis was undertaken to present a scenario where the 2018 FNB MCA (amended) weightings and scorings were slightly sensitised. The purpose of undertaking this analysis was to understand the impact any change in the option evaluation process may have on the overall Short List of options identified.

The sensitivity analysis consisted of changes in overall weightings, and some individual criteria scoring. The results of the sensitivity analysis are presented in the table below, (Refer to Section 6.3 for further details).

Table 3 Sensitivity Analysis summary results of the weighted rankings. Options that failed in the Original SMB MCA have been omitted from this summary.

Scenario	Description	s. 9(2)(g)(i)			
Original	Original scores as determined in the Workshop on February 28 2020 with the Reference Group	2	1	3	4
Change in weightings without change in scoring					
1-3	Change in weighting - no change in Scoring	2	1	3	4
Change in scores without change in weightings from Original					
4	Change in score for criteria 3	3	1	2	4
5	Change in score for criteria 6	4	1	2	3
6	Change in score for criteria 9	2	1	3	4
7	Change in score for criteria 11	2	1	3	4
8	Change in score for criteria 12	3	1	2	4

Based on the sensitivity analysis performed, slight amendments in the weightings do not alter the ranking of the options. However, a change in the scoring of some individual criteria have an impact on the Long List of option rankings and the Short List of options. It is evident that the results of the option evaluation process are highly sensitive to the identified User Requirements and MCA process.

In addition, whilst any increase or decrease in the weightings and scoring of each criterion on their own may not drive the overall results, a combination of sensitivities would likely do so. Therefore, if additional time was available to undertake the Study, or if further work on a SMB is commissioned, we recommend undertaking a quantitative assessment for other Long List of options s. 9(2)(g)(i)

1.6 Recommendations and next steps

The analysis completed for the Study shows that s. 9(2)(g)(i) best meets the identified User Requirements for a SMB and is more cost effective than s. 9(2)(g)(i)

We recommend the following next steps:

- ▶ **Determine how the recommended SMB option will impact the FNB IBC workstream within the FPR.** It is recommended that the preferred option for the FNB IBC is tested in combination with the recommended SMB option. We note that a core original assumption for the 2018 FNB Study was a single location for a Naval Base however, testing the preferred option of FNB with and without an SMB will provide the FPR with more visibility on how this impacts the NZDF's maritime operations, and resilience over the medium to long term.²
- ▶ **Revalidate User Requirements.**
 - Conduct a more comprehensive User Requirements elicitation to explore the full range of functions to be supported by a SMB, and the potential to collocate other Government maritime functions from the facility. This includes reassessing the, size and South Island locations based on a more comprehensive scenario;
 - Consider whether there are any infrastructure opportunities, (particularly given resilience requirements and other aspects highlighted by the recent Corona Virus Disease ('COVID19') events) and if there are any impacts to the identified User Requirements; and
 - Categorise the User Requirements as 'mandatory' or 'desirable' once they have been revalidated and updated, noting that mandatory user requirements will present pass/fail criteria in the location option assessment.
- ▶ **Revalidate MCA.** Conduct further consideration and refinement of the amended 2018 FNB Study MCA based on the revalidated User

² Given the original single location premise, the FNB IBC may require reconsideration should the FPR recommend a split maritime base as the preferred option.

Requirements and further qualitative assessment, and repeat MCA scoring (if required) to determine if ranking is altered.

- ▶ **Conduct detailed cost estimates.** We recommend further consideration of the Long List of options through an approved business case process. This is important in order to robustly determine the merits of each option for a SMB.
- ▶ **Reference Group engagement.** We recommend additional Reference Group and key NZDF stakeholder engagement is conducted to further explore the operational impact of an SMB, as well as any interdependencies or synergies with other camps and bases.
- ▶ **External Stakeholder engagement.**
 - We recommend stakeholder engagement is conducted with relevant government agencies and entities who will be directly impacted by the establishment of a SMB. This will also provide the NZDF with an indication of how a SMB will be utilised outside the austral summer period. Note, this may present new User Requirements in order to optimise the SMB for all users; and
 - We also recommend specific stakeholder engagement with the National Emergency Management Agency (NEMA), the New Zealand Transport Agency, and the New Zealand Infrastructure Commission to determine any additional opportunities with regards to this investment that would meet the NZDF requirements as well as improve resilience.
- ▶ **Revalidate the purpose of a SMB.** We recommend a comprehensive engagement with the Reference Group to better understand the primary purpose of a SMB. That is, whether it is more efficient projection to the Antarctic and Southern Ocean, or the ability to achieve better resilience. Once the purpose is clarified, there may be a requirement to consider broader location options such as North Island locations.
- ▶ **Consideration of Southern North Island Ports.** We recommend consideration of Southern North Island Ports among the options of a SMB in any further investigation that suggests a split base. Ports such as Wellington, Napier and New Plymouth could be considered.