

# **WHENUAPAI AIRBASE – IMPACTS OF CLOSURE ON CIVIL DEFENCE EMERGENCY MANAGEMENT IN THE AUCKLAND REGION**

## **INTRODUCTION**

The New Zealand Defence Force has made a decision to relocate military operations away from Whenuapai Airbase, and to dispose of the Airbase asset. It is now considering options for disposal and future use of the Airbase.

Whenuapai Airbase is a significant Airport asset in the region. It currently provides airport facilities for about 18,000 air movements a year. Up until 1958, Whenuapai was Auckland's principal Airport, and commercial operations continued until 1966. As well as providing a home for military operations, the base, through its runway capability, other facilities and personnel, has played a role in Civil Defence Emergency Management Planning over a number of years.

The Coordinating Executive Group of the Auckland Region Civil Defence Emergency Management Group has been approached by consultants carrying out an evaluation of future use options for Whenuapai Airbase on behalf of New Zealand Defence Force. The Coordinating Executive Group (hereafter CEG) has been asked to provide comment in respect of the impacts any removal of runway and airport capability at Whenuapai might have on the Auckland Region from a Civil Defence Emergency Management perspective. CEG has established a project team to conduct an evaluation of the impacts and provide guidance on whether there are Civil Defence Emergency Management reasons for an airport and runway capability to be retained. This is the report of the project team.

## **TERMS OF REFERENCE**

The purpose of the investigation is to identify any Civil Defence Emergency Management drivers for the retention of runway and airport capability at Whenuapai Airbase, and to evaluate the criticality of these drivers.

The project team has approached this task through:

- Reviewing existing regional planning material.
- Assessing the need for and role of the airport and runway capability in emergency event situations.
- Assessing the airport and runway capability existing within the Auckland Region, and the susceptibility of the various individual components of that capability to closure or other factors during emergency event situations.
- An assessment of the criticality of the Whenuapai Airbase in terms of Civil Defence Emergency Management response within the framework listed above.

The project team has been asked to provide guidance and recommendations in relation to the need to retain the airport and runway capability of Whenuapai Airbase from a Civil Defence Emergency Management perspective.

For the avoidance of doubt, the following issues are specifically excluded from this investigation:

- The commercial viability for a second airport in Auckland.
- The lack of competition in the Auckland commercial airport market.
- Whether a commercial airport would increase any adverse environmental effects over and above the existing airport capability at Whenuapai.

- Associated commercial or other use issues relating to other land at the airbase.

A number of professionals from within the CDEM sector in Auckland raised issues relating to the capability provided by the current military operation at the airbase. These issues included the ability to use the base facilities as a command/operations centre, the ability to use buildings on the base as a health or other emergency facility, and the usefulness of having military personnel and equipment in the region for use in CDEM emergencies. As the retention of the airbase as a military base is not one of the options being considered by New Zealand Defence Force, these issues are not explored within this exercise. However, it is noted that the retention of Whenuapai as an airport in some form would enable a military air capability to be maintained, along with the associated CDEM benefits.

## **METHODOLOGY**

The information for this report was gathered from a variety of sources. The facts and figures in the attached table were sourced from the Aeronautical Information Publication of New Zealand website, and from representatives of the airports themselves. All other information was gathered from the airports own supporting documentation and websites. A list of references is included at the end of this report.

The hazards information was sourced from the Auckland Engineering Lifelines Stage One Report and the Auckland Engineering Lifelines Project Final Report, the CDEMG Draft plan, and was verified by the Hazards Management Team at the Auckland Regional Council.

A table, which outlines all the information gathered on the four airports, is attached as Annex 1.

## **ANALYSIS**

### **The Role of Air Capability in an Emergency Event**

While, the role of air capability in an emergency event is varied and dependent on the situation, overseas experience has shown that this capability can be critical in response efforts. Seldom does an area affected by an emergency event have sufficient resources in terms of personnel and equipment to deal with the response and recovery efforts itself. September 11 demonstrated the criticality of air capability through the need to airlift in to New York emergency equipment and personnel.

Air capability requirements can come in a number of forms. There may be a requirement to provide a runway and parking space for large military aircraft carrying overseas support, supplies or equipment. These planes are limited as to what types of runway they can land upon due to their sheer size and weight. Overseas these types of planes have been used to ferry Urban Search and Rescue teams and supplies of essential equipment into affected areas. In New Zealand the RNZAF's C-130 Hercules is regularly used to fly aid to stricken south pacific countries.

There may also be a requirement for injured or evacuated persons to be flown out of the area. Here again the RNZAF C-130 has been used for this task in the south pacific region.

As well as these obvious capability needs there will also be a variety of flights that may need to be undertaken within the region, for example aerial surveillance and ferrying of emergency supplies. Historically aircraft have been used for the following local purposes in emergencies:

#### Fixed wing aircraft

- Coastal and off shore searching
- Visual coverage of large areas
- Air dropping of equipment (such as life rafts)
- Aerial guidance in co-ordination of surface craft to targets
- Transportation of supplies and equipment into affected areas

#### Helicopters

- Rescue of persons, some in particularly remote or hazardous areas
- Searching of coastal areas or areas where fixed wing aircraft may not be able to operate safely
- Carrying of personnel or equipment to strategic locations.

Having access to airport and runway facilities is essential for enabling this air capability to operate effectively.

### **Analysis of Air Capability in the Auckland Region**

Currently within the Auckland region there are four airports, Auckland International Airport Limited (AIAL), Whenuapai, Ardmore and Dairy Flat.

#### *AIAL*

Currently AIAL is the primary airport for the Auckland region handling 145,000 aircraft movements a year. The airport has one main runway and one secondary runway, both of which are the longest in the region. An additional runway is planned for the near future which will increase the landing area available at the airport.

The airport has the length of runway and apron parking area to handle both an increased number of flights due to an emergency situation, and large fully laden military aircraft. One of the largest the airport could handle is the Antonov An124, which requires a 3000m runway for landing. The plans to increase the capacity of the airport in the near future will increase the amount of flights the airport will be able to support in a 24-hour period. By diverting non-essential traffic to an airport such as Whenuapai (which is still in the Auckland region) or to other airports around the North Island AIAL could deal with the increased demands of an emergency situation with only some disruption.

#### *Whenuapai*

Whenuapai has four runways, the main runway which is bitumen, and three others (two of which are grassed). The airport currently regularly supports military aircraft up to the size of a C-130 Hercules. The airport can also support larger aircraft (such as the C5A Galaxy and the C-141 Starlifter) but not at full take off weight, although this would be rectified with the proposed extension of the runway. Provided these larger aircraft were not required to be fully laden, they could be landed at Whenuapai in an emergency situation. Currently the airport is not set up for commercial flights and has limited ground manoeuvring and apron parking for larger aircraft. However, in an emergency situation Whenuapai could support a range of military and commercial aircraft with planning.

#### *Ardmore*

Ardmore is the third largest airport in the region and has three runways, the smaller two being grass. The airport is capable of supporting planes up to the size of a C-130 Hercules. The airport does not have the capacity to handle larger fully laden military aircraft such as the C5A Galaxy and the C-141 Starlifter, both of which can be supported by AIAL and

Whenuapai. Much of the day to day flying from Ardmore is smaller aircraft and the airport does not have a 24-hour tower facility.

#### *Dairy Flat (North Shore Aerodrome)*

Dairy Flat is the smallest of the regions airports and has two short runways. This airport would not be suitable for any large aircraft but could still support smaller aircraft and helicopters in an emergency.

### **Susceptibility to Hazards**

Each of the regions airports is susceptible to varying hazards dependant upon its location. The below sets out the major hazards the region is susceptible to and how these would impact on each of the airports.

#### **Earthquake**

The region could be impacted by either a local earthquake or one that has its epicentre outside the regional boundaries. The Auckland Engineering Lifelines Project report sets out a local earthquake scenario that has a return period of 2,000 years. The scenario is that of a magnitude 6 earthquake, 10km in depth with an epicentre 20km east of central Auckland. AIAL is built on poorly consolidated sediments that are prone to liquefaction. Liquefaction occurs in saturated cohesionless soils, in response to repeated ground shaking generated during earthquakes. The results of this ground shaking are that the strength of the soil is reduced to near zero and bearing capacity failure, mass soil movement and subsidence can occur. The results of this occurring at AIAL would likely be spalling at pavement joints, settlement of runway pavement and possible temporary closure of the airport for repairs. The displacement of the runway would make the airport unusable by larger planes but it could still be used by small aircraft and helicopters. The liquefaction susceptibility of the soils underlying AIAL is 30-90% and liquefaction would occur under the Lifelines scenario above.

Whenuapai airport is mainly built overlying soils that are unlikely to liquefy in the Lifelines scenario earthquake. This airport is stated in the Lifelines report as being the least vulnerable to an earthquake of all the regions airports. However, the airport still has an earthquake risk and could be damaged by a local or distant earthquake of significant magnitude.

Ardmore airport is built upon Holocene age saturated fine sediments and may experience significantly higher ground shaking amplification due to these weaker soils. The airport is also located within close proximity to the North Wairoa Fault which has been active in the last 0.5 million years and may show evidence of more recent activity.

Dairy Flat is located on firmer soils and bedrock and is unlikely to experience liquefaction in the Lifelines scenario earthquake.

#### **Volcanic Eruption**

Air transportation is vulnerable to moderate to large eruptions of ash. Historically in New Zealand and around the world airports have been closed by <1mm of ash fall, and large airspace volumes have been closed to avoid ash clouds which can cause failure of aircraft engines in flight.

Even minor ash falls on airports will render them inoperative and can damage aircraft and facilities. The removal and disposal of ash can be a time consuming and costly affair and the larger the ash deposit the longer the removal process will take.

Ash fall in Auckland could be generated by a local eruption from the Auckland Volcanic Field or a distant eruption from the Taupo Volcanic Zone. All the airports in the region have the

potential to be affected by an eruption from either source. Ash fall would be dependant on wind direction at the time of eruption, however it is relevant to note that the wind direction in Auckland is predominantly west and southwest. Under a west / southwest wind direction much of the ash would fall to the east / northeast of the region. A recent example of ash fall impact came during the 1995/96 eruptions of Mt Ruapehu when AIAL was closed due to volcanic ash. It is interesting to note that during the same event Whenuapai remained open and fully operational.

A local eruption from the Auckland Volcanic Field (AVF) could also directly impact on AIAL as it sits within the known boundaries of the AVF. This impact could range from minor damage to facilities and structures at the airport to loss of the airport completely. The other three airports within the region (Whenuapai, Ardmore and Dairy Flat) are all outside the boundaries of the AVF and would likely not be directly impacted by an eruption. They could however suffer from indirect affects such as ash fall, although the predominant wind would likely mitigate against this.

### **Tsunami**

Tsunami are long period gravity waves generated by sudden displacement of the water surface. This displacement is generally due to submarine earthquakes, volcanic eruption or submarine landslides. Both teletsunami and local tsunami could affect the Auckland region. A teletsunami is a tsunami that travels more than 1,000km from source before impacting upon an area. Teletsunami that could affect Auckland would be generated from areas around the Pacific such as Chile and Alaska. Local tsunamis have a much shorter warning time and in Auckland two potential source mechanisms have been identified. The first is seismic tsunamis associated with active faults in the region and the second, volcanic tsunamis associated with an eruption from the Auckland Volcanic Field.

Of all the airports in the region AIAL is most at risk of being impacted by a tsunami, either generated overseas or locally, due to its low-lying nature. Any impact will be determined by wave height however, as anything below 4 metres in height is unlikely to have any major consequence.

Whenuapai is located at about 20 metres above sea level so is unlikely to be affected by a tsunami in the Waitemata Harbour unless the wave runup heights are 20 metres and above. The scenario used in the Auckland Engineering Lifelines Project report has maximum tsunami height about mean seal level in the Waitemata Harbour of 3.4 metres.

Both Ardmore and Dairy Flat are located inland and at significant elevations to have a nil risk of being impacted by tsunami.

### **Storm surge/Flooding**

Storm surge is produced by a combination of two processes, adjustment of mean water level caused by changes in atmospheric pressure, and movement of water over the continental shelf due to stress exerted by wind. The hazards associated with storm surge are:

- Flooding of the low lying coastal land,
- Increased penetration of storm waves, and
- Increased shoreline erosion.

Flooding is a regular occurrence in New Zealand and also on a smaller scale in the Auckland region. Rivers and streams in the near vicinity will have a large impact on the flooding risk of the airports.

AIAL is susceptible to storm surge and coastal flooding due to its low lying nature and vicinity to the Manukau Harbour. A scenario presented in the Auckland Engineering Lifelines Project

Report has storm surge and storm waves causing perimeter flooding of the airport. The report notes that the runway will not be flooded but there may be some loss of friction.

Whenuapai airport has a low risk of being flooded by a rising stream or river and the airport is at an elevation that would not be affected by storm surge. It has in the past however experienced surface flooding that pooled at the end of its sloping runway causing flooding of the local area.

Ardmore airport is located in a swampy area which may influence the flooding of the local area. The airport is located too far inland to be affected by storm surge.

Dairy Flat is also elevated and will not be affected by storm surge. Localised flooding may affect the airports as there are a number of streams in the area.

### **Loss of key lifeline utilities**

Auckland is highly dependant on key lifelines such as power, water, transport and communications for everyday business. Lifeline utility failure can be caused both by natural hazards or by human induced events such as terrorism and vandalism. The consequences of lifelines utility failure are variable and will depend on which utility has failed.

### **Support Infrastructure**

Key in support infrastructure for airports in emergency events are the roading and access infrastructure that enable the movement of traffic and supplies to and from the airports. An earthquake affecting the region would have the most impact on the roading network. Many key roads in the region might not be available after an earthquake and others could have reduced capacity. Bridges and their abutments are generally the most vulnerable points and in the region and many of the bridges would be rendered unusable. This would increase traffic flow on any small local roads not badly affected potentially resulting in gridlock as local roads are not designed for high traffic volumes. Other hazards would have varying effects on the roading network that supports the regions airports. Low lying approaches to the airports could be affected by both storm surge, flooding and tsunami. A local eruption from the Auckland Volcanic Field could affect the local roading network supporting AIAL but is unlikely to physically damage the local networks supporting the other three airports. Volcanic ash could impact on any of the regions roads causing congestion, multiple accidents and large numbers of broken down vehicles.

Both AIAL and Whenuapai can be accessed from throughout the region by two major arterial routes. In the event of roading access being denied to either airport by road failure or lengthy closure, the ability to still be able to move emergency supplies from or to one or the other could be critical for emergency relief purposes.

### **Cost and Resource Redundancy**

It would be easy from an emergency management perspective to call for the retention of the airport capability of Whenuapai without regard to the cost of retention. However, that would be unlikely to achieve a desired outcome.

The project team recognises that the retention and expansion of airport capability at Whenuapai would come at a cost. It also recognises that neither the Crown nor the CDEM sector have the financial resources to retain the airport solely for CDEM purposes.

For these reasons the project team has recognised that the only way airport capability at Whenuapai can be retained for CDEM purposes, is if the airport is retained and operated at

no (or minimal) ongoing cost to the Crown, and if the New Zealand Defence Force and realise the capital value of the asset. If this can be achieved, it will enhance CDEM capability.

## FINDINGS

- 1. Airport Capability can have a significant role in responding to emergency events and is vital in planning response to emergency events.**

Overseas experience (including September 11) has shown the essential role that airport capability can play in delivering emergency personnel, relief aid and equipment in response to emergency events. The availability of this airport capability is considered to be very significant in both response, and in planning for response for major emergency events.

- 2. Auckland International Airport Limited (AIAL) is recognised as the primary airport for the region in terms of airport capability, both with its existing capacity, and taking into account proposed expansion; however emergency event response could impact on normal operations.**

The project team recognises that Auckland International Airport is the principal airport in the region and is well placed to serve that purpose for many years to come. Both currently, and with its proposed expansion, it has the capacity to cater to emergency event response requirements. However, scenarios can be envisaged where the normal operations of the Airport might be impacted by activities in support of response and recovery efforts for an emergency event. AIAL is essentially a commercial airport and the majority of air movements are aligned to this purpose. In the event of a major emergency in Auckland or elsewhere in the country where Auckland is providing support, such additional air traffic would put an additional strain on the airports' resources. Should the support required involve the arrival of international rescue teams and relief agencies plus their equipment, this could disrupt normal operations.

- 3. AIAL could cope with all requirements provided it was unaffected by the emergency, however the airport is the most susceptible to emergency event hazards of all the airports in the region.**

As stated above Auckland International Airport has the capacity to cater to emergency event response requirements. However, existing research shows that it is potentially more susceptible than Whenuapai to a range of natural hazards, and would also be a likely target for human caused emergency events. Retaining a back-up capability where one already exists makes good sense if this can be done at minimal cost to emergency management agencies and the Crown.

- 4. Of the other airports in the Auckland region, Whenuapai is by far superior in provision of airport capability, both for normal use and during an emergency.**

Whenuapai is the only credible alternative to Auckland International Airport within the Auckland region in terms of a back up or overflow facility. Dairy Flat is too small and can not cater for the types of aircraft likely to be used in emergency event responses. Ardmore can cater for Hercules aircraft, but has a shorter runway than Whenuapai, and the runway strength is not as highly rated as Whenuapai. This impacts on its ability to cater to fully loaded aircraft of the types to be used in emergency event responses. Both Dairy Flat and Ardmore also have extremely limited cargo handling capabilities compared to Whenuapai and AIAL.

With the likelihood of Whenuapai being expanded if it were to be operated commercially, Whenuapai is likely to be able to be in a position to deal with larger

aircraft than at present. This would enable it to cater for almost all aircraft likely to be used in an emergency event response.

**5. Whenuapai could take a large proportion of air traffic for an emergency event leaving AIAL perform its normal function relatively unimpeded.**

Based on the above, Whenuapai currently, and in any expanded form, would be likely to be able to host almost all emergency operation requirements, leaving Auckland International free to perform its normal functions.

Auckland International Airport's proposed expansion will increase its capacity meaning this diversion function may not be as necessary. However in the current situation, it would be desirable to have Whenuapai available for emergency operations.

**6. While the use of Whenuapai is not critical for emergency event purposes if AIAL is in full operation, it could be desirable, and would become critical should AIAL's airport capability, or the capability of infrastructure linking to the airport, be impaired by an emergency event.**

The research on Lifelines shows that AIAL is vulnerable to several hazards which might cause emergency events. If operations at AIAL were impeded by the effect of an emergency event, the use of Whenuapai could be critical. If it can be retained with minimal cost to the Crown and other emergency management agencies, it would seem short-sighted to allow the opportunity to escape. It would seem unlikely that replication of the facilities at Whenuapai could occur in Auckland, given existing and project growth and the current fiscal and regulatory environments.

In addition to airport capability being impaired, another risk is that of damage to, or impaired operation of transport networks servicing AIAL. The attraction of having both Whenuapai and AIAL available for emergency purposes is that they are served by two completely different parts of the roading network, providing another risk mitigation strategy against the risk of network damage or impairment.

### **Key Finding**

**The retention of Airport Capability at Whenuapai is strongly desirable from a Civil Defence Emergency Management perspective in order to:**

- i) enable diversion of a large proportion of emergency event traffic from Auckland International Airport to allow normal functioning of the airport**
- ii) provide an alternative to Auckland International Airport should it become affected by an emergency event**