WELLINGTON INTERNATIONAL AIRPORT

ALTERNATIVE SITES

Master Plan 2035

Deliverable D5 Report

20 August 2013

AIRBIZ

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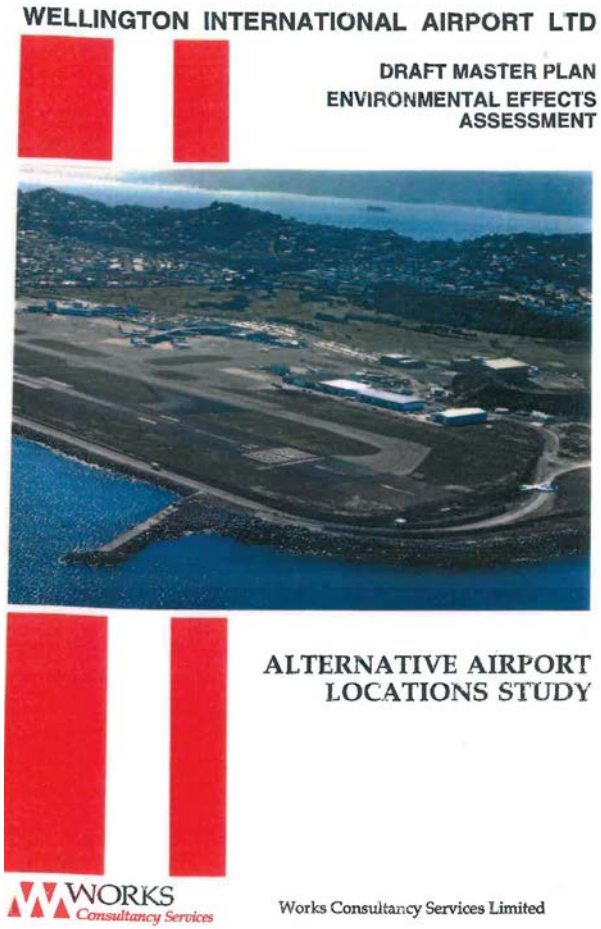
01. INTRODUCTION



Wellington International Airport Limited (WIAL) is preparing a new Master Plan for the airport, to a horizon of 2035. WIAL has engaged Airbiz as the principal planning consultant to carry out the major aspects for the Master Plan and Airbiz has, in turn, engaged Beca and TDG to assist in areas of specialist disciplines.

A comprehensive assessment has previously been undertaken of potential for alternative airport sites within the Wellington region. The Works Consultancy Services 1992 Alternative Airport Locations Study (the "1992 Study") encompassed the establishment of selection criteria for feasible airport sites, a search for such sites within the Wellington region, and an economic evaluation of candidate locations. Seven sites were identified following review of the region's topography to find the best candidates. The conclusions of the Study supported retention of Wellington Airport (the "Airport") at its current location.

The 1992 Study has been reconsidered for the purposes of this Master Plan process in terms of any new factors or changing circumstances that might suggest another location that could be seriously considered and to determine whether any additional information or assessment is required.

This report forms Deliverable *D5 Alternative Sites* - it focuses on the 1992 Study and provides the considerations and results of the review by the consultant team.

02. REVIEW OF PREVIOUS STUDY

1. THE SITES

The sites evaluated in the 1992 Study are listed as follows:

- → Wellington International Airport (WIA)
- → Ohariu
- → Horokiwi
- → Mana Island (a)
- → Mana Island (b)
- → Paraparaumu
- → Te Horo
- → Wairarapa
- → Pencarrow

A map of the sites is provided in Figure 1.

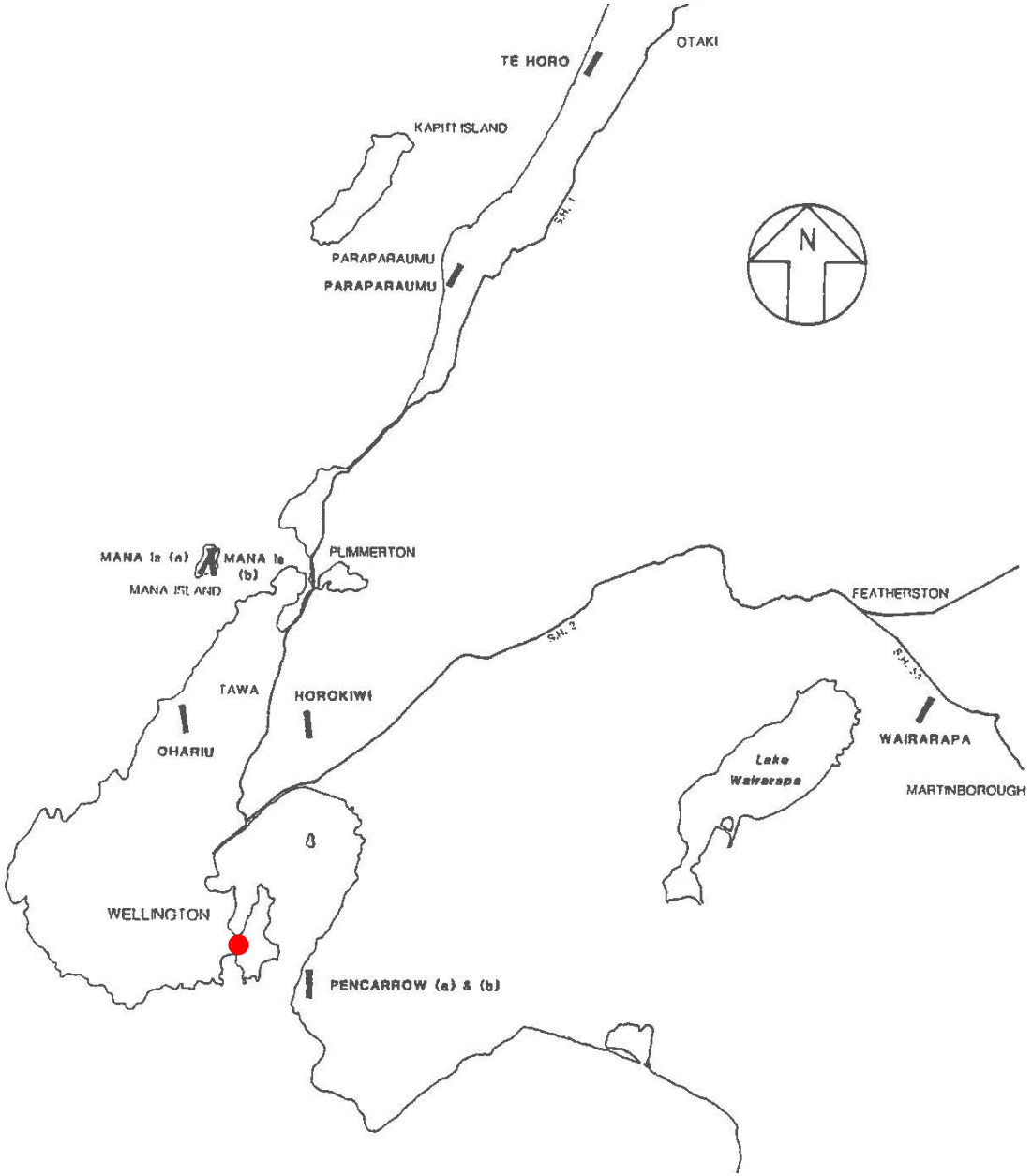


Figure 1 Alternative Sites from Works Consultancy Report (1992)

2. KEY INPUTS/ISSUES

Matters raised in this section are those that were considered in the 1992 Study. Inputs and issues discussed remain valid today although airfield configuration would need to be addressed in regards to the most recent regulatory requirements, namely the need for Runway-End Safety Areas which would increase the overall length of the airfield.

GENERAL

A summary and brief discussion on the key Study inputs considered for each site is provided as follows:

A. Airport size

→ An equivalent size domestic/international airport would be required to that planned in the 1991 WIA Master Plan.

→ The Study sought to accommodate a domestic/international airport (termed a Level 3 Airport in the 1991 WIA Master Plan). The design aircraft as provided in that Master Plan was a Code E aircraft which included B747, B777, A330 and A340 aircraft types;

→ The size of the Study airport was based on the 1991 WIA Master Plan comprising a 3,000m runway length which resulted in a site area allowance of 100 hectares for the runway area and an allowance of 50 hectares for the terminal and airport facilities. A total site area of 200 hectares was included in the costs associated with each site;

→ The 1992 Study reflected a suitable design aircraft (Code E), a suitable runway length of 3,000m for short and long haul destinations and with suitable provision for terminal and associated airport facilities, the size of the airport in the Study was therefore well considered. This is further addressed below in the section titled 'AIRFIELD CONFIGURATION'

B. Obstacle Limitation Surfaces (OLS).

→ The 1992 Study considered the OLS impacts and the associated flight paths including the approach and take-off surfaces for a Code 4E airport. It did not however consider the airspace procedures associated with a typical instrument approach. An explanation is provided in the following section titled 'AIRSPACE CONSIDERATIONS'.

C. Key operational requirements, namely wind, turbulence, cloud base, etc.

→ The meteorological conditions evaluated as part of the Study in comparison to today's environment are practically unchanged. Therefore meteorological conditions were well considered in the Study and they would provide the same outcome if conducted in today's environment.

D. Key site issues including site acquisition, earthworks, land costs and access;

→ The 1992 Study evaluated the viability of acquiring each site, the earthworks associated with the development of a Level 3 airport (equivalent to an ICAO Code 4E airport), the land costs and requirements for access to each site.

→ Key environmental and social issues which might affect the ability to obtain statutory approvals such as aircraft noise and disruption caused by construction of the new site.

→ The Study utilised the aircraft noise footprint from the 1991 WIA Master Plan (using the 55 & 65dBA LDN contours) and developed a typical noise boundary envelope of 1,000m in width and 10,000m in length. This envelope was overlaid over each site to gain an appreciation on the number of properties affected at each site and the general impact of aircraft noise across each and the impact caused by disruption during construction of a new airport. An assessment of the environmental and social issues is provided in the following section titled 'ENVIRONMENT, ECONOMIC AND SOCIAL IMPACTS'.

All the above inputs provided a fair and substantial investigation of the key requirements to be considered when assessing the suitability of a new airport site.

As mentioned however, the Study did not assess airspace implications for each site. Accordingly, an assessment has now been carried out, described in the following section titled 'AIRSPACE CONSIDERATIONS'.

3. AIRFIELD CONFIGURATION

As the basis for evaluating construction costs at the alternative sites, the 1992 Study considered an airport footprint and airfield geometry that is generally consistent with what would be considered if this exercise were undertaken today. However the evaluation, if conducted today, would consider an increased runway length to allow for regulatory requirements and best practices such as those associated with Runway End Safety Areas (RESAs) and land allowances beyond the ends of runways for Runway Protection Zones (RPZs).

An increased runway length at the existing airport site and proposed sites such as Pencarrow would come at a cost premium due to the terrain (at Pencarrow) and at the existing site due to the necessity to extend into the Coastal Marine Area. However, given the scale of construction cost differentials exhibited in the 1992 Study between the current and candidate sites, it is not considered that a new cost premium would change the outcome of the comparative site evaluation.

4. AIRSPACE CONSIDERATIONS

The dimensions of airspace circling areas are a function of runway length and the performance category of operating aircraft. Faster flying aircraft require more manoeuvring room and thus larger circling areas are defined. There are five (5) alpha performance categories defined to capture the characteristics of like type performing aircraft. They are:

Aircraft Performance Category: Approach Speed Range:

→ Cat A Speeds up to 90 Knots (i.e. Cessna 172)
→ Cat B 91 Knots to 120 Knots (i.e. Twin Otter)
→ Cat C 121 Knots to 140 Knots (i.e. ATR72, B737, A320)
→ Cat D 141 Knots to 165 Knots (i.e. B767, A330, B777, B747)
→ Cat E 166 Knots to 210 Knots (i.e. A380)

The dimensions of the circling and missed approach areas and the safe flying altitudes established as part of the approach and departure procedures will vary depending on the category of aircraft and the obstacle environment.

The airspace surrounding an airport is identified as Prescribed Airspace and is defined as airspace where, in the interests of the safety, efficiency or regularity of current or future operations of the airport the airspace is protected. Prescribed Airspace is made up of the Obstacle Limitation Surfaces (OLS) and the Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) surfaces.

The OLS is a number of imaginary reference surfaces in airspace which determine when an object may become an obstacle to aircraft manoeuvring in the vicinity of an Airport or during landing or take-off. Requirements for Obstacle Limitation Surfaces are defined in Chapter 4 of NZCAA's advisory circular AC39-6 and Chapter 4 of ICAO Annex 14 Volume 1. In some circumstances the OLS can be infringed however it is desirable to avoid all penetrations.

The PANS-OPS surfaces are a second set of imaginary surfaces determined by aircraft flight operations under instrument conditions that form an envelope over the existing obstacle environment. These surfaces are established by the instrument procedure designer to ensure that an aircraft will have a specified minimum clearance above any accountable obstacle in situations where the pilot is relying entirely on the information derived from cockpit instruments and may have no external visual reference to the ground, to obstacles or to other aircraft. As a result, PANS-OPS surfaces cannot be infringed in any circumstances.

The objective of the prescribed airspace is to ensure that the airport is not adversely affected by the building of

structures or other activities in the area used by aircraft arriving or departing from the proposed site.

In review of the 1992 Study, and based on a Category D aircraft i.e. B747, A330, B777 type as this was the aircraft type adopted for each site, the area of terrain potentially affecting PANS-OPS is separate to that considered for the OLS as it will be based on the safe altitudes adopted for the approach and departure procedures. This will include the circling and missed approach areas as developed by the procedure designer and this is based on the obstacle environment at each site.

The 1992 study considered the OLS but not the PANS-OPS surfaces and therefore this could therefore play a significant role in the viability of each site as the PANS-OPS procedures may determine an approach or departure procedure which is not practical for a particular site. This may therefore require further investigation to evaluate each site.

5. ACCESS CONSIDERATIONS

Since 1992, commitments have been made by the New Zealand Transport Agency (NZTA) and Wellington City Council (WCC) for investments into major transport route upgrading based on retention of Wellington Airport at its current location. The Mt Victoria Tunnel to Airport upgrade and Basin Reserve projects have begun with NZTA having made major property purchases to date, and the projects estimated at over $100m.

6. AIRCRAFT NOISE CONSIDERATIONS

Aircraft noise is a significant issue for most airports and the approach used in the Study for the evaluation of aircraft noise involved taking the Wellington Airport aircraft noise contours (1992) and overlaying them at each of the proposed sites as a means of obtaining a preliminary view on noise impacts for each option.

While noise contours will have changed over time in light of the best available information in regards to movement projections, fleet mix, time of operations and other operational considerations, for an initial site assessment this approach, using 1992 data remains an appropriate method, as due to these changes, the 1992 data represents a ‘worst case’ scenario that allows scope for growth in future aircraft movements.

7. OTHER POTENTIAL SITES

No investigation has been undertaken on any other sites as the comprehensiveness of previous investigations is considered satisfactory in terms of: identification of viable topography; distance from Wellington; order of magnitude cost differentials between options.

8. CONCLUSIONS

As identified in Section 2 of this report, a preliminary investigation of the PANS-OPS procedures may be required to further validate the viability of each site, if they were to be seriously reconsidered.

Based on the information provided in the Study and on review in terms of today's environment, of the seven candidate sites, in summary:

In 1992, Paraparaumu provided a site which could be developed at lower cost compared to other sites and which provided some operational advantages in relation to high runway usability and frequency of low cloud base and turbulence. However the site has obstructions in the take-off and approach paths which would require a new runway orientation to overcome the restrictions. Given the site has experienced major urban growth, the level of constraint for this option has significantly increased (i.e. cost, noise, urban form etc.) While road travel between Wellington and Kapiti will become more efficient in the next ten years, with the construction of the Transmission Gully Motorway and the Mackays to Peka Peka portion of the Wellington Road of National Significance (RONS), Paraparaumu is still distant from Wellington, located 50kms from the city centre.

The Te Horo site could have also been developed in 1992 at lower cost compared to others and again provided some operational advantages in relation to high runway usability and frequency of low cloud base and turbulence. However this location is considered to also face an increased level of constraint due to long travel distance and total travel cost, being some 65kms from the Wellington city centre. This will not be fully offset even with forecast travel time and trip reliability improvements following the construction of the Transmission Gully Motorway and the Mackays to Peka Peka Expressway.

Since 1992 understanding has improved as to the site's flooding risks and, strong community aspirations have emerged to retain its rural character. There would also need to be a significant upgrade of the local roading network should this location be pursued.

A Horokiwi option would potentially have merit in terms of location on a range of measures (travel accessibility advantages, visual and noise), however suffers from a high frequency of low cloud / visibility to such an extent as to exclude it from further consideration.

The Mana Island options involve significant cost to build a causeway to connect Mana Island to the mainland. The time to construct the airport on Mana Island would be significantly longer given the causeway would need to be built before the airport. The reliance of such a causeway as the sole access passage for the airport is a disadvantage.

There are also significant environmental, social and cultural issues with Mana Island which would render conversion to airport problematic. It has scientific reserve status and is held as conservation estate. It is a bird habitat, is significant to Ngati Toa and other Iwi and has heritage associations due to its early colonial use (whaling and an early Wellington landing location for passengers from Australia) which would further complicate such a conversion.

Of the remaining locations (Ohariu, Wairarapa, Pencarrow) the various combinations of operational viability constraints (e.g. crosswinds), development and / or high transport travel costs and environmental values remain valid as justification for favouring retaining the Airport at its current location.

Table 1 below provides a simple multi-criteria table prepared to illustrate an updated status of key site selection factors used in the 1992 Study with indicative cost adjustments for construction costs. The criteria are grouped into operational and non-operational factors, and for each of these the principal matters that are considered more likely to be a factor for each site are given. However, it should be noted that the identification of these factors has been made by high level judgement rather than specific analysis.

In terms of potential alternative sites for Wellington Airport (excluding the additional impact that a PANS-OPS assessment would have on each site) the conclusion is therefore that the current location remains appropriate when the identified factors are taken into account.

Airport Location	Principal non-operational factors	Construction Costs		Principal operational factors (primary impediment noted)	Total Discounted Travel Costs relative to WIAL site
		1992 Cost ($M)	2013 Cost ($M) Ref Note 1		
Existing site	Coastal Regional consents. District Consents – noise, land use	133	247	Good on most factors except turbulence	0%
Ohariu	Significant earthworks, access	437	813	Crosswind, Low cloud / visibility	10%
Horokiwi	Noise, community issues and access	411	765	Low cloud / visibility	-12%
Mana Island (a)	DoC Estate, bird sanctuary, Iwi issues	501	932	Crosswind, Low cloud / visibility	19%
Mana Island (b)	DoC Estate, bird sanctuary, Iwi issues	549	549	Low cloud / visibility	19%
Paraparaumu	Urban development and noise	340	633	Superior	48%
Te Horo	Flood, ecological and community issues	339	631	Superior	73%
Wairarapa	Impacts on rural communities and activity	339	631	Not assessed	66%
Pencarrow	Regionally significant landscape, access	534 to 972	993 to 1808	Low cloud / visibility	9-21%

Note 1: Adjusted by Construction Cost Index annual rise per annum of circa 3% (21 years x 3%)

KEY	Statutory approval risk	Development Cost ($M 2013)	Operational factors	Travel Costs
	Straightforward	<250	Excellent	5% to 15% saving
	Low to Moderate risk	250-500	Good	Neutral (plus/minus 5%)
	Moderate risk	500-750	Adequate	Plus 5% to 10%
	Moderate to high risk	750-1B	Marginal	Plus 10% to 20%
	High risk	1B+	Not viable	20% plus

Table 1 Multi Criteria Table

03. DRIVERS FOR RE-CONSIDERATION OF POSSIBLE RELOCATION

1. INTRODUCTION

The useful life of Wellington Airport as a facility operating on its current site will primarily depend on its ability to grow to meet demand.

The key drivers which will influence a future need to consider a possible move to a new airport site or to develop a second major commercial airport for the Wellington region include the following:

→ The capacity of the current single runway;
→ The ability to expand the site to meet demand; and
→ A catastrophic event at the current site rendering remediation impossible.

This section addresses each of these issues in order to understand the triggers to potentially consider relocation. It is observed that the range of issues has not changed significantly from when the 1992 Study was undertaken.

2. CURRENT AIRPORT SITE CAPACITY

The current hourly capacity of runway 16-34 at Wellington Airport is 25 – 40 aircraft movements per hour depending on the runway in use and prevailing weather conditions. The primary reasons for the restrictions on current runway capacity include but are not limited to:

→ Delays to aircraft movements (as reported in the Runway Capacity Study undertaken by Airways in 2007);
→ Restrictions on aircraft exiting the runway quickly;
→ Restrictions on some aircraft when the parallel taxiway is occupied;
→ Wellington terrain i.e. having to wait for a departure to climb to a safe altitude before turning;
→ Sequencing of aircraft types as it affects aircraft separation requirements;
→ Differing arrival and departure sequencing patterns;
→ The mix of aircraft types using the runway, including differing speeds and wake turbulence generations and tolerance;
→ Differing departure procedures for each runway; and
→ Night curfew

The maximum theoretical hourly capacity of a single runway without many or any of these restrictive influences,

may be around 50 movements per hour.

The daily capacity of the runway is determined by the available operational hours. In Wellington the daily capacity is therefore limited by the nightly curfew. Annual capacity is significantly influenced by underlying patterns of seasonality in demand.

A Runway Capacity Study undertaken by Airways in 2007 provided recommended opportunities for improving runway capacity at the Airport. These included:

→ Reducing Runway Occupancy Times (ROT);
→ Amended departures procedures particularly for Runway 16 operations to allow pilots to turn early; and
→ Introducing a passing bay.

These are suggestions based on the current runway configuration. However there are other ways including longer term capital improvements which could have a significant impact on runway capacity. These include:

→ Building a new parallel taxiway that meets the regulatory separation distance to allow holding of one or more aircraft at each end for immediate departures and allowing simultaneous unrestricted operations of aircraft on runway whilst the parallel taxiway is in use;
→ Progressive up-gauging to larger capacity aircraft generally;
→ Increasing load factors on aircraft;
→ Adjusting schedule timing to smooth hourly demand patterns;
→ Influencing demand seasonality to that more activity occurs in low and shoulder seasons; and
→ Harnessing new technology to enable more aircraft movements in poor weather conditions

If such improvements were made to reduce runway restrictions and boost runway capacity, then there is sufficient scope to increase passenger throughput without the need for a second runway/site over the next 30 years or more.

The current Wellington Airport master plan (2030) forecasts 10.5 million annual passengers which represents almost a doubling of the current annual passenger numbers.

Table 2 provides examples of other major single runway airports which have a greater annual passenger throughput than Wellington.

Airport	Annual passengers (million)
Chengdu Shuangliu International Airport	31.6
San Diego International Airport	17.2
Auckland International Airport	14
Wellington International Airport	5.2

Table 2 Single Runway Capacity Examples

Auckland Airport currently handles some 14 million passengers and this will increase to approximately 18-19 million before a new runway is opened. The hourly passenger throughput is founded on their movement area configuration, infrastructure, support facilities, operational procedures etc. and this allows a runway capacity in excess of 40 movements per hour.

The progressive implementation of runway capacity improvements with commensurate expansion of terminal and apron areas provides reassurance that an alternative airport site (as a second airport) would not be justified as the current airport can cater for demand beyond 2035 using a single runway.

This provides further reassurance that an alternative site is not justified in the "lifetime" of the Master Plan 2035 for reasons of capacity constraints.

3. LOSS OF AIRPORT THROUGH CATASTROPHE

Another consideration which could force a move to an alternative site would be in the event of a significant catastrophe (such as earthquake, cyclone, tsunami) in which remediation of the airport on the current site may not be feasible. It is noted that such a catastrophe may also have significant impact on potential alternative sites.

4. TRANSPORT ACCESS

Another primary driver to relocate the airport could be to mitigate access constraints (existing and future) perhaps by relocating the airport to a site within proximity to a motorway/railway corridor.

Currently there are challenges associated with access to the existing airport site, the majority of which are actively being addressed by NZTA and WCC through the Roads of National Significance programme. These relate to safety, reliability, customer experience and quality, which will impact on the Airport's future growth and contingency, including:

→ Existing access is constrained by having only one fit for purpose road route at the northern boundary of the airport. This is in response to significant topographic constraints and due to the runway location.

→ Access also being constrained along the length of the main access route to and from the city centre and motorway links, where there exists a combination of road tunnels, large at-grade intersections, limited bus priority, and complex way-finding. The NZTA has a plan for improving the corridor, but it is important to realise that the route is not only an airport road; it fulfils multiple functions and has competing demands for the same road capacity, with the Airport effectively "at the end of the line".

→ Within the Airport site, there are conflicting and competing demands especially within the parking precinct and terminal forecourt areas. Most airport traffic currently passes through the same entry and exit points, where access reliability, travel choice and priority is dampened

The existing Airport site and this Master Plan process presents opportunities to improve access, demonstrating that the existing site can be relied on to meet future needs to 2035 and beyond.

These include:

→ Providing not only car-based access capacity and parking, though this is important. Recent NZTA and WCC studies provide a basis to inform consideration of options for this.

→ Seizing the opportunity for access growth presented by the balanced promotion and prioritisation of bus and taxi access, perhaps through a mode hierarchy based on need and value, to guide decision making.

→ Collaborating with NZTA and WCC on airport access and ways to deliver measures to improve reliability, choice and quality of access, within a context of growth.

→ Develop a Sustainable Airport Access Strategy (travellers, other customers and staff), to help extract the best value from existing and proposed access infrastructure, again to release capacity for access growth.

→ Improve internal site access to resolve pinch points, to provide better parking, circulation and forecourt offerings, to introduce taxi management systems and to pay careful attention to pedestrians.

These access opportunities are based on the current access context and define the principles to help unlock

growth based on the existing Airport site. They are examined further in subsequent stages of the study.

04. SUMMARY

The previous study completed by Works Consultancy Services Ltd in 1992 addressed the critical aviation issues associated with each candidate site sufficiently to provide a good level of confidence that the current site is the optimal site for the airport. However the potential influence of PANS-OPS procedures (not addressed in the 1992 Study) and an up to date aircraft noise evaluation are aspects of assessment of alternative sites that were not addressed in the 1992 Study (PANS-OPS). At this time, without investigating these in greater detail (further study), it is very unlikely that these factors would swing the preferred site away from the current site.

Of importance also is that upon re-evaluation, most of the alternative sites in the Study are less practicable and viable. Also relevant is that there is significant current public commitment underway with investment in the state highway network in Wellington (the Roads of National Significance Northern Corridor projects) which in large part is in recognition of, and seeking to reinforce, the functionality of Wellington Airport at its current location as a regional 'gateway'.

It is the view of the Consultant team that the airport on its current site has latent aeronautical capacity, capability and surface access capacity for significant growth and improvement to runway capacity and airside and landside facilities to support a much greater passenger throughput, though to and beyond 2035.