Before an Independent Hearing Panel
Appointed by Wellington City Council

In the Matter	of the Resource Management Act 1991
And	
In the Matter	of a Notice of Requirement to designate land for Airport Purposes known as the Main Site NOR.
And	
In the Matter	of a Notice of Requirement to designate land for Airport Purposes known as the East Side Area NOR.

Statement of Evidence of **Michael Paul Vincent** for Wellington International Airport Ltd

Dated: 5 May 2021

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INTRODUCTION

Qualifications and Experience

1. My name is Michael Paul Vincent.

2. I hold a Bachelor of Science (Statistics and Operations Research, 1997) and a Masters of Management Studies (Decision Sciences, 2001), both from Victoria University in Wellington.

3. I have held previous employment at consulting firm Booz Allen Hamilton, and at Greater Wellington Regional Council where I developed forecasting tools to assess future demand within transport systems and helped develop solutions and strategies. In 2010, I took on the role as Airline Development Manager at Wellington Airport. This role includes oversight of passenger forecasting, both short-term for budgeting and pricing determination and longer-term for planning. I also work closely with our airline partners on new market opportunities, which includes the creation of business cases, taking into account the operational and commercial aspects of running an airline. My role at the airport gives me insight to population, economic and industry trends.

Scope of Evidence

4. My evidence will cover the following:

   (a) passenger trends and forecasting used to inform WIAL's 2040 master plan and in turn the NOR's

   (b) the impact of Covid and other issues on the forecasts

   (c) the operational scheduling of airlines

5. In preparing this evidence, I have reviewed the following (in so far as they are relevant to my area of expertise):

   (a) The two NOR and associated Assessment of Environmental Effects (**AEE**) documents;

   (b) All further information provided by WIAL in response to requests issued by Council for each NOR;

(c) The reports and statements of evidence of all the other witnesses giving evidence on behalf of WIAL;

(d) The section 42A report by Mark Ashby and its appendices;

(e) Submissions.

PASSENGER TRENDS

6. Wellington Airport facilitates air services linking New Zealand's capital city with the rest of New Zealand and directly to international destinations in Australia and Fiji. In 2019 the Airport was served by ten airlines providing scheduled services to 20 domestic and six international destinations using a range of aircraft: from Golden Bay Air's 3-seat Piper Archer II; to Singapore Airlines 253-seat A350-900.

7. Looking back 20 years (from the last pre-Covid year in FY2019) there were:

(a) 3.6 million passengers using Wellington Airport in FY1999 (1 April 1998 to 31 March 1999), of which 3.1 million were on domestic services and 436,000 on international services.

(b) By FY2019 passenger throughput had increased to 6.4 million (5.5 million domestic, 930,000 international); an 80% increase over the period or a constant annual growth rate (**CAGR**) of 3.0%, with international growing faster (CAGR 3.9%) than domestic (CAGR 2.9%).

8. It should be noted that this 20-year period includes the 9/11 terrorist attacks in 2001, a sustained peak in jet fuel prices to over US$3 per gallon in 2008, 2011-2013 vs US$1.60 currently, the Global Financial Crisis in 2007-2009, and significant earthquakes affecting Christchurch and Kaikoura/Wellington during the 2010's; illustrating the general robustness of the aviation industry to external events.

9. While passenger numbers have continued to grow, aircraft movements at Wellington Airport have been static as airlines have looked to add capacity through the upgauging of aircraft (flying larger aircraft) which reduces costs on a per seat basis. Smaller/expensive aircraft (e.g. 19-seat B1900D, 133-seat B737-300) have been retired and larger/newer aircraft introduced (68-seat

ATR-600, up to 214-seat A320/A321 Neos) which are more fuel efficient, cheaper to operate and quieter, while still being able to cater to passenger demand.

10. These larger aircraft place more pressure on the airport's infrastructure as they require larger parking areas and more airbridges, as shown in the apron planning work undertaken by Airbiz and discussed in the evidence of Iain Munro.

PASSENGER FORECASTS

11. Passenger demand is driven by changes in population, economic activity/incomes, destination attractiveness, travel costs (eg. airfares), behavioural changes and the impact of one-off events. Growth is constrained by the supply of seats; in other words, demand is capped by the number of seats that are available to use. Typically, airlines will look to add capacity to cater for growth, particularly in a competitive environment where not adding capacity passes the opportunity to the competing airlines. New capacity, particularly on new routes, can also stimulate more demand by reducing travel costs (time and money) and increasing the awareness/attractiveness of a new destination to a market.

12. A robust forecasting methodology looks at the drivers for passenger demand and anticipated airline fleet as well as new route plans to determine a possible range of future scenarios.

13. These scenarios are used to inform future planning processes, such as the Wellington Airport Masterplan 2040 (**MP2040**), outlining what future infrastructure needs may be required.

14. In December 2018, WIAL received long-term forecasts for the period FY18 to FY40 to inform the MP2040 from InterVistas Consulting Inc. (**InterVistas**). InterVistas has extensive global experience within the aviation industry working with airlines and airports alike. The InterVistas methodology used econometric models calibrated using historical data relating to Wellington Airport to forecast future passenger demand. Forecasts were developed for domestic (segmented trunk, regional, other) and international (Australia, China, Japan, other Asia, UK, USA, Pacific Islands and other) markets so that

geographically specific factors (e.g. the rise of incomes in Asia) could be included.

15. Overlayed on the forecasts were short-term schedule and aircraft fleet assumptions (to FY30) based on publicly available information on likely airline expansion plans. Given the uncertainty around these plans in the longer-term (beyond FY30), capacity was assumed to be added at a rate which continues trends of increasing loads on aircraft (up gauging) which in turn had a bearing of predicted aircraft movements. The methodology developed by InterVistas is industry best practice and consistent with approaches used by airports around the world. A copy of the forecast report is **attached** as **Annexure A.**

16. InterVistas provided three views on the future, based on a series of simulations varying input variables (including GDP growth, likelihood of terrorism and pandemic events, fuel prices, population, and destination attractiveness) a conservative, a most-likely (or business as usual (**BAU**)) and an optimistic future scenario. It should be noted that the impacts of climate change were not included in the MP2040 forecasts.

17. Further, InterVistas provided forecasts based on Wellington Airport being able to utilise only the existing runway and with an extended runway. For the purpose of both the Main Site and East Side Area NOR's, the forecast utilised was the current airport runway configuration <u>without</u> the runway extension.

18. The InterVistas MP2040 BAU forecast has passengers at Wellington Airport growing from 6.4 million in FY19 to 10.5 million in FY40, an increase of 64% over the 21-year period (CAGR 2.4%). As has been experienced over the last 20-years, international travel (CAGR 3.3% to 1.9 million) is expected to increase faster than domestic (CAGR 2.2% to 8.6 million) although growth in both is forecast to slow as markets mature. Under these forecasts, Wellington Airport would reach 8 Million passenger per annum in FY28-FY29.

19. As a comparison, the optimistic InterVistas forecast resulted in 12.7 million passengers in FY40 (CAGR 3.3%) and the conservative 8.4 million (CAGR 1.3%).

20. None of the scenarios forecast that passengers would remain at current levels, indicating a future requirement to expand infrastructure with variability around

the timing of implementing this expansion work. A chart showing the MP2040 passenger scenarios is **attached** as **Annexure B**.

21. The MP2040 BAU also shows an increase in future aircraft movements at Wellington Airport, from 84,000 scheduled flights in FY19 to 104,000 in FY40 (+24%). The increase in movements is lower than passengers showing the continued trend of airlines up-gauging to larger aircraft to improve efficiency and reduce airline operating costs. There is an expectation that over time the following will occur:

    (a) Domestic widebody aircraft (such as the B787-9) will be introduced on the WLG-AKL sector during peak times around FY29;

    (b) Airlines will look to up-gauge from A320 (around 170-seats) to A321-sized (214-seats) aircraft over the next 10 years. This has already begun on some domestic routes;

    (c) Air New Zealand will phase out their 50-seat Q300 aircraft replacing with more 68-seat ATR aircraft flying over the next 10 years;

    (d) Regional jets of size 100-120 seats will be introduced after 10-years;

    (e) Small electric aircraft (less than 20 seats) will be introduced within 10 years on cross Cook Strait services;

    (f) Widebody aircraft flying across the Tasman will increase.

22. To put these forecasts into context, in 2019 Airport Council International (**ACI**) global air passenger traffic was forecast to increase from 8.8 billion trips in 2018 to 19.7 billion in 2040, a CAGR of 3.7% (with half the growth seen at Asia-Pacific airports), some 50% higher than the Wellington MP2040 BAU forecast. ACI lists the main increase drivers as growing economies driven by higher standards of living and growing middle class, increases in working age population, heightened industry competition, and improvements in aircraft economics (as older fleets are replaced with lower per seat cost alternatives). In a comparative sense, the Wellington MP2040 BAU growth projections are conservative.

23. In New Zealand, Statistics New Zealand's latest population forecasts (50th percentile) has the population increasing from 5.09 Million in 2020 to 6.06

Million in 2043, a CAGR of 0.8%; however much of the population growth is being driven by an aging population with 65+ year olds (commonly referred to as the "grey nomads") growing by CAGR 2.4%, and it is anticipated that this cohort will generate a significant amount of travel growth in the future.

The Impact of Covid

24. Covid-19 (**C19**) has had an unprecedented impact on global aviation. International Air Transport Association (**IATA**), the industry body for airlines, reported in February 2021 that revenue passenger kms (**RPK**) fell 65.9% in 2020 versus 2019, being "the sharpest traffic decline in aviation history". International demand was down 75.6% while domestic saw less of an impact down 48.8%. ICAO reported in January 2021 that in 2020 airlines would have lost US$370 billion, with airports and air navigation service providers losing a further US$115 billion and US$13 billion respectively: half a trillion dollars in total.

25. While the impact of C19 has been catastrophic across the aviation and wider travel/tourism industry, the effects have been uneven across the globe. Domestic aviation, particularly in countries with a C19 elimination policy (eg. China, New Zealand) have recovered very quickly and in some cases has exceeded levels prior to C19, due mainly to the fact that international travel is restricted. Other countries, which rely heavily on international borders being opened, have suffered from the travel restrictions, particularly aviation markets such as Singapore which is a strong connecting point for international services and has no domestic travel market to rely on.

26. IATA's baseline forecasts from April 2021 have global RPK's recovering to 2019 (pre-C19) levels by 2024 and passengers recovering by 2023, although there is a large range of uncertainty. InterVista's commentary relating to the C19 recovery and long-term trends (see **Annexure C**) contains IATA's latest view of the anticipated recovery from April 2021, indicating that by 2023, global passengers are forecast to recover to 105% of 2019 levels, and will track around 7% below the pre-Covid forecast line through to 2030, representing a 2-year lag on pre-Covid expectations.

27. InterVista's commentary also discusses long term trends in economic growth and other drivers of forecast demand, where they conclude that while there is some uncertainty around the recovery, there is general consensus across the

industry of a recovery to pre-Covid levels by 2023-24 and for growth beyond to continue on broadly the pre-Covid trajectory but with a lag of 2-years globally.

28. Closer to home, the latest advice from the New Zealand Treasury (Dec 2020 half year economic and fiscal update) has real production GDP recovering to pre-C19 levels around October 2022 (see **Annexure D**), and to return to match the pre-C19 forecast (the half-year update from 2019) in 2025/2026.

29. In other words, New Zealand's economic activity, a key driver of air travel, is anticipated to recover to the same pre-C19 growth path in around 4-5 years' time. Treasury also forecasts unemployment to return to pre-C19 levels (4%) in 2025. As part of the half-yearly update, Treasury provides advice on Real GDP forecasts for Australia, China and the United States (countries which comprised around 60% of NZ's pre-C19 visitor market, and just over 50% of resident outbound travel). The forecasts presented by the government show growth rates that cancel out the negative economic impact of C19 over the next 5 years.

30. While there continues to be an amount of uncertainty regarding the timing of recovery, there is a general consensus across the global aviation industry, and government forecasters, of a recovery to pre-C19 levels within 3-4 years (2024-2025), with economic activity in New Zealand recovering faster.

31. In the case of Wellington Airport, passenger numbers have recovered more quickly than most, due to the high proportion of domestic travellers (around 85% of airport passengers were on domestic services pre-C19) and a domestic-led recovery. **Annexure E** shows a month-by-month comparison (FY21 vs FY20) of domestic passengers at Wellington Airport. Overall domestic passengers reached 3.0 million in FY21 versus 5.2 million in the prior year (a 43% reduction).

32. The chart in **Annexure E** also shows that domestic traffic has recovered from -99% of the prior year in April 2020 to -20% (capacity -11%) in December 2020/January 2021 (noting February 2021 was impacted by an Auckland lockdown), and March 2021 was well ahead of the prior March year 2020 (which was partially C19-affected).

33. Wellington Airport has a relatively high proportion of business and corporate travel due to the large government and tertiary industry economy in Wellington. It was anticipated given the uptake of online meeting platform's such as Zoom and Microsoft Teams, that business travel would be much slower to return and may never fully recover. Air New Zealand on the 30th of March 2021 published a press release stating that domestic corporate bookings were now back to 90% of pre-C19 levels, significantly eclipsing their own expectations of a 70% return in 2022. In Air New Zealand's words "New Zealand has the strongest domestic travel market in the world at the moment".

34. Looking ahead, it is expected that domestic travel will continue to fully recover over the next 2-3 years (by FY23-FY24) led by a continuation in friends/family and holiday travel, a stronger than anticipated corporate travel recovery and the return of international visitors to New Zealand, many of which also use domestic services.

35. During FY21 (to April 2021), Wellington Airport had no scheduled international services, with Auckland and Christchurch Airports being used as the main repatriation and cargo gateways. Prior to C19, around 15% of Wellington Airport's traffic was on direct international services, with around two-thirds travelling to Australia and the Pacific.

36. The development of a Tasman and Pacific safe travel zone (selected nations) has been a high priority for the governments involved. At the time of writing this evidence, unrestricted travel with Australia began on the 19th of April, with the Cook Islands to follow on from 17 May.

37. Over the first two weeks of unrestricted travel with Australia demand has been at levels lower than pre-Covid as passengers take a cautious approach. With the short notice of service resumption, the uncertainty of government responses to cases, and the relatively low proportion of vaccinated in both countries, the recovery will be cautious for some months to come.

38. Indications from international airline customers is that they anticipate strong levels of demand once confidence is back as a result of pent-up demand by friends/family and then business relationships; leisure travel will also be strong, particularly if long haul markets continue to be restricted depending on travel requirements. 27% of Wellington Airport's pre-C19 international

capacity returned in April with current schedules showing an increase to around 55% during May-July and 65% by October.

39. There is still significant uncertainty as to when other international markets will open – however, Wellington Airport has low exposure to these markets comprising around 6% of the Airport's passenger traffic. WIAL's current expectation is that international passengers will return to pre-C19 levels around FY24, consistent with IATA's global view.

Climate Change

40. The impacts of climate change were not considered as part of InterVistas MP2040 forecasts. While assessing the impact of C19 on the forecasts, consideration was also given to the most recent information around climate change, its impact on the aviation industry and in particular Wellington Airport traffic. Matt Clarke and Ken Conway discuss the implications of climate change in their evidence, and I respond to issues raised by submitters relating to impacts on forecasting.

41. Climate change is an important issue that the globe needs to address, and while the aviation sector is a small generator of CO2, without strong some responses from the sector, governments, and the travelling public, its likely to become a much more significant contributor as demand for air travel continues to increase and other sectors decarbonise. While there are long-term, plans in place to transition the industry, the journey has only just begun with uncertainty around policy details, technological developments, public responses, and timing which makes it difficult to forecast the impact of climate change at this stage. Also, as with other sectors, different countries will have varying abilities and willingness to respond to climate change when the negative impacts of such measures are considered.

42. Climate change can impact passenger forecasts in a number of ways. The pricing of carbon may increase the cost of travel, government policies may restrict certain types of travel, or the behaviour of the travelling public may change. It's too early to say definitively what will happen, but Wellington Airport has assessed the impact of climate change based on the information available today.

43. Firstly, it should be noted that global airlines, through IATA, have signed up to CO2 reduction targets, which over time will be met through a combination of

technical enhancements to operations (more efficient flying), and the development and adoption of new aircraft that will be more fuel efficient.

44. Airlines have shown that when disruption occurs, they have the capacity to quickly adopt new technology in what is a highly competitive environment. Just as high fuel prices in the 2000's supported the rapid development of more fuel-efficient aircraft, future carbon prices or CO2 caps will accelerate the next phase of aircraft development – the stronger the signals, the faster the adaptation.

45. Fuel is typically the largest component of an airlines operating cost (17-25%); reducing fuel use reduces operating costs. Lower fuel use also allows airlines to carry more passengers and cargo and open up new markets by being able to fly further, increasing revenue for an airline. There are very strong commercial, competitive, and social incentives to reduce fuel use as quickly as possible, and for manufacturers to develop and build the aircraft airlines demand to achieve fuel use reductions.

46. The Climate Change Commission (**CCC**) released their draft advise to government in February where they outline a path for New Zealand to reach net zero emissions of long-lived gases by 2050. The CCC has recognised the difficulty in decarbonising aviation, and forecasts CO2 emissions from domestic aviation to reduce from 1.1MT in 2018 to 1.0MT in 2040 (-7%) and from international aviation to reduce from 3.9MT to 3.7MT (-5%) over the same period under the "headwind" scenario.

47. Relating these changes to the projections for the most-likely MP2040 scenario (delayed by 4 years) would mean domestic aviation would need to be 38% more fuel efficient and international 48% more fuel efficient to meet those CO2 targets in 20-years' time. The more optimistic "tailwinds" scenario implies a 51% efficiency improvement for domestic and 62% efficiency improvement for international over the same period. This is entirely achievable given the historic rates of aircraft efficiency improvements of 4.3%pa on average between 1950 and 2018. The outlook for new technology is discussed further by Ken Conway's evidence.

48. The CCC also suggests a future trajectory for the price of carbon to provide prices of at least $140/tonne in 2030. In 2018, a productivity commission

report suggested prices could reach between $200 and $250/tonne in 2050 to reach “net zero emissions”.

49. To estimate what these prices may mean for an air traveller, I use the example of an A321Neo aircraft flying between Wellington and Auckland. The aircraft uses around 2.5 tonnes of fuel for the flight which equates to 3,125 litres or 8.2 tonnes of CO2. The current price of carbon (around $35/tonne) means that every passenger would have $1.68 added to their fare (assuming 80% average load on a 214-seat aircraft). Were the price of carbon to increase to $70/tonne the cost per passenger would increase by $1.92 which is around 1% of an average $200 fare. An increase in the price of carbon to $150/tonne would add $5.52 (or 3%) to the fare, and an increase to $250/tonnes would add $10.32 (or 5%). An increase in the price of carbon within the ranges currently suggested are likely to have little impact on fares or passenger demand; particularly given airlines may not pass on the cost evenly due to their revenue management of air fares (less price sensitive passengers may be charged more), price increases are likely to be incremental over time, and aircraft fuel efficiencies as discussed above will reduce the cost of carbon.

50. In some cases, such as Europe, air travel growth may slow with policies to encourage travel via alternative modes which are comparable in travel time. France for example has recently agreed to ban short domestic flights on routes which can be covered by rail in under 2.5 hours. In the New Zealand context, the ability to shift travellers from air to other modes is more limited. Domestically, New Zealand’s topography, sparse population, and separate islands would make it incredibly difficult to offer reasonable, efficient alternatives to air. Internationally, being an island at the bottom of the globe, air links are fundamentally critical to the country, with no other realistic options. If a similar “french ban” was applied to the New Zealand situation there would be no air routes that would qualify. As a consequence, in my view the requirements for substitutability of aviation in New Zealand will necessarily have to be less onerous than countries where real alternatives exist.

51. The flight-shaming movement (originating in Sweden as flygskam) is an emerging social trend primarily in Europe. The movement looks to discourage individual’s flying through the transition to lower carbon emission modes (primarily rail). The impacts of flight shaming are hard to determine given it was only in its infancy prior to C19, although in Sweden where the movement

had its origins, airports saw a 4% reduction in people travelling in 2019 with domestic travel down 9%. In New Zealand, where travellers will have little alternative, it's unlikely that flight shaming will be a significant influence on travel behaviour, and any impact is likely to dissipate in the future as aviation's impact on the climate is reduced through aircraft technology.

Updated forecasts

52. Given the evidence of Wellington Airport's recovery and the industry wide review of a full recovery to pre-Covid levels by 2024, WIAL has concluded that traffic will be back to pre-Covid levels by FY23-24, representing a 3-4 year delay in the original MP2040 forecasts.

53. Beyond the C19 recovery, WIAL believes the fundamental drivers for air travel growth (population, economic, competition, and cost) will remain. It is anticipated there will be some minor reduction in the propensity to travel meaning that the recovery will not reach the pre-Covid trajectory. WIAL expects a small reduction in business travel as use of remote meeting technology continues, however corporate travel, which was expected to be low for some time, appears to have recovered more quickly than expected. The possible impact of climate change, as we understand it today, is unlikely to have a significant impact on passenger demand in New Zealand. Air travel caters for a market where there is no alternative mode which is more sustainable. Carbon pricing signals will be of limited effect particularly if the commitments of the aviation industry with regard to new aircraft technologies are realised.

Summary

54. The MP2040 BAU forecast 8 Million passengers per annum in FY28/FY29 and 10.5 Million in FY40; a CAGR of 2.4%.

55. C19 has had a devastating impact on the aviation and associated industries; Wellington Airport is recovering faster than most due to its high proportion of domestic travel.

56. Markets that dominate at Wellington Airport (domestic, Australia and Pacific) have, and are likely to recover faster than the global average to a growth trend similar to that in MP2040.

57. It is expected that traffic will recover to pre-Covid levels in FY23-FY24 and resume the same MP2040 growth trajectories. Climate change considerations, as currently understood, are not likely to have a material impact on the forecasts at Wellington.

58. The MP2040 forecasts will be delayed by 3-4 years (more conservative than IATA's view of 2-years) are an appropriate planning input (8 Million passengers per annum in FY31/FY32, 9.7 Million in FY40). A summary of the revised forecasts are **attached** as **Annexure F.**

OPERATIONAL PLANNING

59. The airport's role is to provide the infrastructure required to support the current and near future needs of the airlines it serves. Airports have very little influence over the schedules that airlines operate; and while airports, airlines, and other aviation stakeholders collaborate closely to improve efficiencies (e.g. working together to reduce time on the ground at airports which can result in more efficient use of infrastructure) in the system which can defer investment, usually these improvements allow a small increase in throughput, but do not cater for long term market growth.

60. Airlines schedule aircraft with consideration for the following:

    (a) *The days of week and times of day people want to travel* – for Wellington, with a high proportion of business and government travel, this means peaks between 8 and 9am and 4pm-7pm aligned with the working day, as well as a good level of frequency throughout the day to appeal to the corporate traveller.

    (b) *Network connecting opportunities* – airlines generally operate as a hub and spoke network, where services from spokes arrive and depart from a hub at similar times to allow connections to be made. Wellington Airport, due to its central New Zealand location and large domestic market, operates as Air New Zealand's domestic hub linking travel between the North and South Islands. Wellington is a spoke to Air New Zealand's international hub in Auckland, and Qantas' hub in Sydney. The scheduling of services is carefully coordinated by the airlines to maximise the greatest number of connections at each hub.

(c) *Operational factors* – availability and location of aircraft and crew are also a key determinant of schedules. An aircraft may not be available in the right place at the right time to operate an optimal schedule, and so the airline will have to accept a sub-optimal schedule or not operate the service. Sometimes the schedule will be determined by the availability of facilities at the destination airport; a good example is services into Sydney Airport which is normally highly congested, so an airline may only have a limited number of arrival times available, meaning the arrival time in Sydney will determine the departure time in Wellington.

(d) *Commercial reasons* – sometimes there is a good commercial reason for flying a particular schedule. For example, the trans-Tasman services that normally operate at Wellington Airport. Dedicated international aircraft and crew start their day in Wellington and are scheduled to fly four sectors (2 return flights) in that day. This is the best way to utilise aircraft and crew, taking into account time-zone differences, and flight times between New Zealand and the East coast of Australia. This commercial behaviour causes most flights to Australia to depart Wellington between 6am and 7am, returning to Wellington around 2pm-3pm, departing again between 4pm-5pm and then returning between 11pm and 1am; resulting in international facilities that have pronounced peaks of use. Some international flights are operated as a single daily from Australia or Fiji which do not need to conform to this operating pattern.

61. Management of these international infrastructure peaks occur through the slot coordination process. Wellington Airport is a designated 'level 3' airport for international services, and as such, airlines adhere to the World Slot Coordination Guidelines. Prior to the start of a scheduling season (there are two per year), airlines provide their ideal schedule to an independent slot coordinator (Airport Coordination Limited) who in turn collates all the airline requests and assesses them against a series of infrastructure parameters (minimum time between services, number of passengers per hour) representing the capacity of the airport's international system.

62. If parameters are not exceeded, then airlines are able to fly the schedules they requested. If parameters are exceeded, the coordinator works with the

impacted airlines to retime schedules so that parameters are met (usually moving flights by 5 or 10 minutes); recognising the constraints airlines must work within as outlined above. If a scheduling solution cannot be found, then the service will not be able to fly unless investment is made to increase the capacity (and parameters) of the system.

63. The above illustrates how complicated airline scheduling is, and in particular the significant number of constraints that airlines have to work within when determining when aircraft land and take off. The role of the airport is to not be yet another constraint that airlines have to work within (within reason) and airport operators frequently revise their master plans to ensure the timely provision of infrastructure required to meet current and future needs.

RESONSE TO SUBMISSIONS

64. A number of submissions were received to the NOR's which made some comment regarding the traffic forecasts, with two key themes emerging; the first being the impact of climate change on the forecasts and the second Covid-19.

65. These submitters consider that the forecasts should be reviewed in the wake of C19 as well as the policies, social views, and possible future impacts of climate change. As discussed above, the aviation industry is anticipating full recovery to pre-C19 in approximately 2024, and Wellington Airport has taken a consistent view (although trends suggest recovery at Wellington may be quicker). WIAL expects C19 will have little impact of the drivers of long-term growth, and as the industry adopts measures which will streamline travel in a health-focused future. As would be expected WIAL has spent a good deal of time considering how best to adapt to and plan for C19 and to understand its future based on the huge disruption to its operations caused by C19. WIAL's consideration of C19 is that it delays the Airport's long-term forecasts by 3-4 years as being the length of the recovery.

66. While not originally considered as part of the original MP2040 forecasts, climate change is becoming an increasingly important consideration in the aviation industry. The anticipated impact of climate change is discussed above. Given the importance of aviation to New Zealand domestic and international travel, the absence of any alternative modes of travel, and the minor impact of a carbon pricing mechanism (particularly if anticipated aircraft

technology improvements are realised) WIAL does not consider climate considerations will have a material impact on passenger demand at this stage.

67. Some submitters also suggested the forecasts should have been developed without the inclusion of a runway extension. I can confirm that the forecasts used for the NORs do not include the impact of an extended runway. InterVistas provided forecasts for the MP2040 process for both an existing and extended runway future, with the "existing runway" scenarios used.

68. Several submitters questioned the value of tourism, suggesting that less tourism is desirable. One submitter had the view that Wellington's economy had been doing well during Covid despite the lack of international visitors. There are a number of responses I would make to this assertion:

    (a) Prior to Covid, international tourism was New Zealand's largest export market with tourists spending over $17 Billion in New Zealand in 2019, of which $1.8 Billion is paid in GST to the government, and $3.9 Billion is from international students studying for less than 1 year. International tourism has wide-reaching benefits across many industries ranging from accommodation and food providers, to retail, transport, education, cultural and recreational sectors. Around 230,000 people were directly employed in tourism (2019) further 164,000 indirectly – 14.4% of the New Zealand workforce. Tourism provides employment opportunities for a range of people across most ages (and particularly young adults), cultures, and social-economic situations – jobs at varying degrees of skill/qualification, and flexibility part/full time.

    (b) Tourism supports a number of non-directly related industries which the locally community benefits from. In-fact international visitors are the life blood for many local communities in New Zealand. The impact of C19 and closing of the borders has highlighted the value of international tourism to these local communities which, through prolonged absence of tourism will see local employment, services and other amenities disappear.

    (c) The view that Wellington's economy has been doing alright without visitors in my view is a false one. The Wellington region has seen one of the largest reductions in tourism visitor spend according to MBIE's

newly released Tourism Electronic Card Transactions (TECTs) dataset. For the year-ending January 2021, the Wellington region saw a fall in electronic card spend of -20% versus the same year prior (with only Auckland -32% and Otago -26% performing worse). Prior to Covid, Wellington welcomed $929 Million in international visitor spend for the year-ending February 2020, an increase of 28% from $725 Million 3 years before, and almost all of this revenue has now disappeared. Wellington's economy has been supported by an expansion in central government and related services to support the rollout of C19 stimulus packages; a temporary economic uplift that will eventually disappear as the world returns to normal.

(d) These submitters also ignore the other non-economic benefits of tourism, with visiting friends and family one of the largest components of Wellington's international travel market.

(e) The NOR's support this future travel of not only international visitors but everyone travelling from and to Wellington, whether they be domestic or international, visitors or residents, friends, family, students, businesses. Efficient and effective travel is required for a community to properly function.

69. Two submitters suggested that the curfew for international aircraft should be extended from the current 12am-6am (departure),1am-6am (arrival) to 10pm-6am (departure), 11pm-6am (arrival), citing other airport examples where curfews are stricter.

70. As outlined above, airports have very little influence as to when airlines schedule aircraft operations. In the case of Wellington Airport's international flights, the majority are operated by airlines flying 4 trans-Tasman sectors a day, which optimises aircraft usage, crewing, and takes advantage of time differences between New Zealand and Australia.

71. The shortest 4 sectors that can operate from Wellington is a WLG-SYD-WLG-SYD-WLG rotation. Assuming turn times of 1 hour at each airport, the shortest time has the aircraft departing at 6am (the earliest after curfew) and returning at 11:10pm (within the existing hours of operation put outside the hours proposed by the submitters).

72. Another common 4-sector route is WLG-BNE-WLG-BNE-WLG which if it departed at 6am could not return before 12:10am given the longer sector lengths. Other existing destinations such as Melbourne are even longer flight times, and potential new destinations such as the Cook Islands and Adelaide longer again.

73. The effect of the current curfew is comparatively lower than when it was first put in place, as newer aircraft are much quieter, as well as the continued investment in the Quieter Home's rollout. In summary, were the international curfew hours to be increased as suggested, airlines would lose their ability to operate 4 sectors in a day resulting in the likely loss of many (or even most) of the Airport's international services.

CONCLUSION

74. In summary, the NOR is based on a set of forecasts that have been developed using a robust methodology account for the best information available at the time. The forecasts have been reviewed based on the current expectations of recovery from Covid 19, where Wellington Airport has recovered quicker than most, and a lag of 3-4 years on the original MP2040 forecasts is considered to be appropriate.

75. The original MP2040 forecasts developed in 2018 did not include the impacts of climate change. On consideration of these impacts, including the CCC's draft report, emerging travel behaviour trends, government policies to encourage modal transfer, and future commitments by the airline industry to adopt new technology it is anticipated that climate change considerations will not materially impact the forecasts.

76. Accordingly, WIAL expects passenger growth to continue into the future albeit somewhat delayed as discussed above. The consequence of this growth and its impact on the footprint of the Airport is discussed in the evidence of others.

Mike Vincent

5 May 2021

ANNEXURE A: INTERVISTA'S FORECAST REPORT

InterVISTAS

a company of Royal HaskoningDHV

FINAL REPORT

Wellington International Airport Master Plan Air Traffic Forecast Update FY2018-FY2050

CONFIDENTIAL

Wellington International Airport Ltd.

PREPARED BY

InterVISTAS Consulting Inc.

3 December 2018

Contents

Title Page Photo Credit:
Wellington International Airport Authority

1 Introduction

Inter*VISTAS* Consulting Inc. (**Inter*VISTAS***) was commissioned by Wellington International Airport Ltd. (**WIAL**) to develop a long-term air traffic forecast for the Wellington International Airport (**WLG**) as an update to the forecast previously provided for the airport master plan in 2017. The forecast period covers the years FY2018-FY2050.[1] The forecasts presented in this report represent an application of the existing methodology employing updated traffic, demand, and macroeconomic data.

This forecast consists of two parts:

- **Part A: Business as Usual Airport Traffic Forecast** consisting of both passenger and aircraft movement forecasts under a scenario where the airport's runway infrastructure is unchanged.
- **Part B: Runway Extension Scenario Forecast** consisting of both passenger and aircraft movement forecasts under a scenario in which WLG's runway length is extended allowing the operation of larger aircraft and the possibility of long-haul international services. Additional services were introduced into the Runway Extension scenario based on Inter*VISTAS*' previous forecast assumptions as well as Inter*VISTAS'* two studies on the viability of long-haul international services at WLG, with updated guidance provided by WIAL. Relative to the 2017 Master Plan forecast, which assumed that the extended runway would become operational by FY2021, this updated forecast assumes a later opening date, in FY2025, based on guidance from WIAL.

Both forecast parts employ Inter*VISTAS*' risk-based forecasting methodology to provide a range of possible forecast outcomes and are used to define the Conservative (5th percentile) and Optimistic (95th percentile) forecasts for each scenario.

1.1 Forecast Output

Forecasts are provided for both Origin/Destination (**O/D**) and Enplaned/Deplaned (**E/D**) passenger traffic. **O/D traffic** captures the final origin and destination of the passenger, regardless of their routing. For example, O/D traffic between Wellington and China would count all the passenger traffic between Wellington and China regardless of the routing they take. For example, a Wellington-China O/D passenger may travel via Auckland or Christchurch or an Australian airport.

E/D traffic measures the number of passenger enplanements and deplanements at the airport based on the passenger's immediate origin or endpoint airport. It can differ from the O/D traffic in the geographical categorization of the passenger. Continuing the example above, a passenger travelling China-Auckland-Wellington would be categorized as an international O/D passenger but a domestic E/D passenger as their immediate point of origin was Auckland. In addition, E/D traffic includes passenger connecting at WLG whereas O/D traffic does not.

For the purposes of this study, WLG's passenger traffic (both O/D and E/D) is divided into the following market segments:

[1] The fiscal year used in this report corresponds to that employed by WIAL starting on 1 April of each year and ending on 31 March the following year, i.e., FY2018 runs from 1 April 2017 to 31 March 2018.

Figure 1-1: Forecast Market Segmentation

Domestic Traffic	International Traffic
Domestic Trunk (AKL + CHC)	Australia
Domestic Regional[2]	China[3]
Domestic Other[4]	Japan
	Other Asia
	United Kingdom
	United States of America
	Pacific Islands
	All Other International

Additionally, International O/D passengers are segmented into outbound (i.e. New Zealand residents) and inbound (i.e. foreign visitors) traffic.

Forecasts of commercial air traffic movements (**ATMs**) and landed weight were also developed and derived from the air passenger forecast, along with a forecast of busy hour commercial movements and passengers.

1.2 Report Structure

This report presents the air traffic forecasts prepared by Inter*VISTAS* as well as documentation on the methodology and assumptions underlying the forecasts. The report is structured as follows:

- Chapter 2 describes the historic and current aviation activity at the airport.
- Chapter 3 discusses the approach and methodology of the forecast.
- Chapter 4 presents the results of the traffic forecast for both the Business as Usual (BAU) and Runway Extension scenarios.
- The Appendices provide additional detail on aspects of the methodology and assumptions.
- Accompanying spreadsheets provide detailed results of the forecasts.

[2] Consisting of seven airports with greater than 100,000 E/D passengers in FY2018: NSN, DUD, HLZ, BHE, NPE, TRG, ZQN.
[3] Including the Hong Kong and Macao SARs.
[4] All other domestic routes with fewer than 100,000 E/D passengers in FY2018.

2 Historic Traffic Development

2.1 About Wellington International Airport

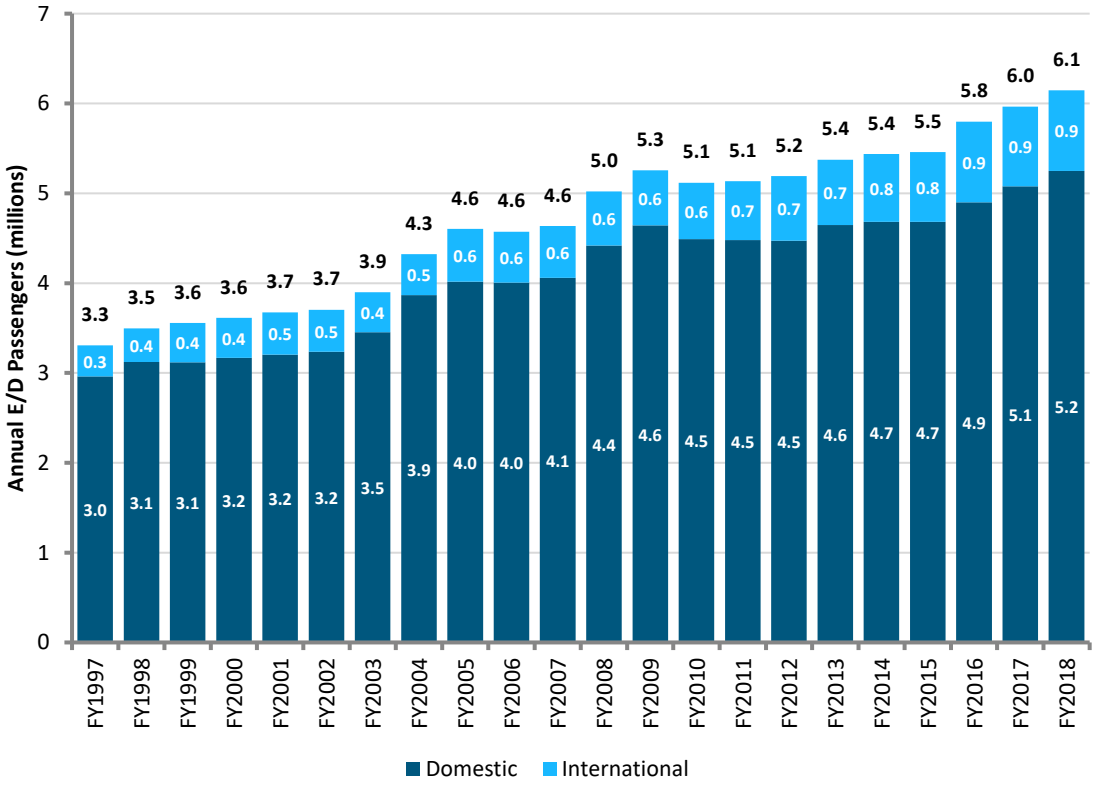
Wellington International Airport is New Zealand's third busiest airport after Auckland and Christchurch. The airport serves the nation's capital as well as the surrounding Wellington Region and residents located in the Manawatu-Wanganui Region. Located 5.5 kilometers south-east of the city centre, WLG operates a single 1,950 metre long runway[5] which is equipped with precision landing systems allowing for operations in adverse weather conditions. The airport is a hub for Air New Zealand, its largest carrier, and featured non-stop services to some 25 destinations in New Zealand, Australia, and Fiji in FY2018.

2.2 Historical Airport Activity

2.2.1 Air Passenger Traffic

In FY2018, WLG served 6,144,961 E/D passengers, an increase of 3.0% from the 5,964,906 passengers served in FY2017. **Figure 2-1** presents the historical evolution of E/D passenger traffic at the airport over the past two decades.

Figure 2-1: Historical E/D Passenger Traffic at WLG



[5] WIAL.

Since FY1997, WLG's total air passenger traffic has grown from 3.3 million annual passengers to more than 6.1 million in FY2018 at a rate of 3.0% per annum, on average. Over the past two decades, International E/D passengers to/from Australia and the Pacific Islands have grown the fastest, from 344,000 passengers in FY1997 to nearly 896,000 passengers in FY2018 at an average rate of 4.7% per annum. Domestic passengers, WLG's largest traffic segment, have grown from 3.0 million to 5.2 million over the past 21 years, at an average rate of 2.8% per annum.

Overall traffic growth at the airport has been nearly continuous since FY1997, with the exception of the decline in traffic volumes in FY2010 as a result of the global financial crisis and ensuing Great Recession. The airport's Domestic traffic experienced a notable surge in growth during the early 2000s, largely due to the restructuring and expansion of Air New Zealand's domestic product.

On the International side, non-Domestic passenger traffic was not as negatively impacted by the global recession experienced in FY2010-11 and posted positive growth during those years. More recently, international traffic saw significant year-over-year growth in FY2016 due to the introduction of new capacity by Jetstar to MEL and OOL. However, Jetstar subsequently eliminated its MEL service at the end of FY2017. In September of FY2017 Singapore Airlines inaugurated WLG's first direct service to Asia via Canberra, Australia. Dubbed the 'Capital Express', the four-times-weekly service is also the airport's only regularly scheduled widebody aircraft. Given the initial success of the service, Singapore Airlines relocated the transit stop from Canberra to Melbourne starting in May 2018 (FY2019), which better incorporates the service into the carrier's network (e.g. with more convenient onward connections to both Asia and Europe) and allows more opportunity for increasing capacity on the route in the future.

However, due to the airport's current limited runway length, long-haul widebody aircraft are generally unable to operate at WLG except to relatively short-haul destinations in eastern Australia and the Pacific Islands, limiting potential international E/D passenger growth through new non-stop services. In July 2018, Airbus engaged in a series of operational tests at WLG with an A350-900 widebody aircraft to assess the performance of their latest widebody jet on shorter runways.[6]

Aside from infrastructural constraints, International traffic at WLG faces additional uncertainty given the termination of the trans-Tasman codeshare alliance between Air New Zealand and Virgin Australia, effective October 2018 (FY2019). The breakup affects service to some of the largest Australian routes operated by either or both carriers including Sydney and Brisbane – in some cases, an increase in capacity on certain routes (at the expense of others) by the now competitors which could eventually be rationalized or, alternatively, support continued incremental growth. Since the announcement, Virgin Australia commenced its own five-times-weekly service to Sydney and began a new codeshare arrangement with Singapore Airlines to further enhance connectivity between Wellington and Singapore and points beyond.

International Origin/Destination Passengers

The estimated distribution of WLG's International O/D passenger markets in FY2018 are presented in **Figure 2-2** and the estimated split of passenger origins by inbound (i.e., foreign visitor) and outbound (i.e., New Zealand resident) travellers is presented in **Figure 2-3**. O/D passenger market sizes are estimated using ticket booking data, sourced from Sabre AirVision Market Intelligence, data on resident departures and visitor arrivals from Statistics New Zealand, and Inter*VISTAS*' own analysis. O/D market

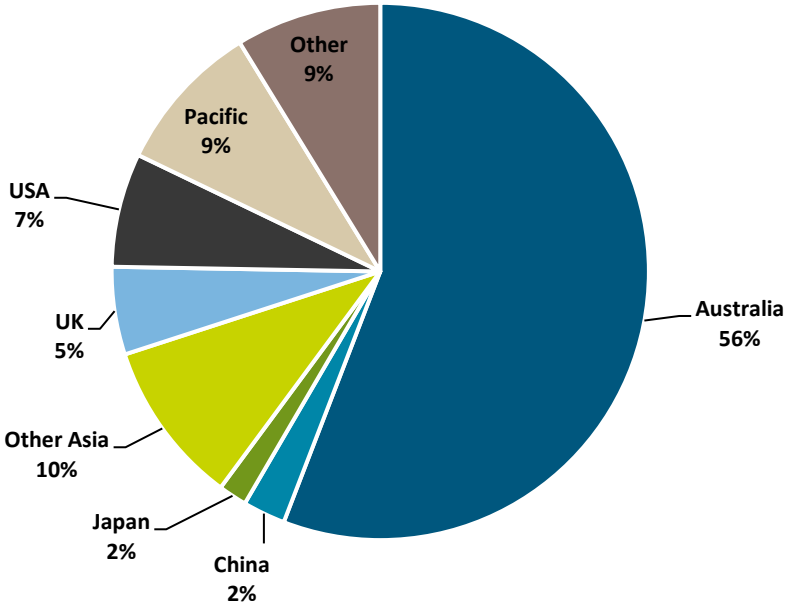
[6] Wellington Airport, "Airbus A350 XBW to be tested at Wellington Airport", *Airport News & Updates*, 1 Jun 2018.

sizes are calibrated to match the airport's observed E/D traffic volumes, accounting for connecting traffic, using itinerary level data to identify the E/D segment of O/D traveller itineraries provided by Sabre.

Australia is WLG's largest International O/D market and was estimated to make up more than half of all international O/D passengers in FY2018, followed by Other Asia[7] at 10% and the Pacific at 9%. In terms of directionality of travel, WLG is a primarily an outbound O/D market with 56% of International O/D passengers estimated to be New Zealand residents while 44% of travellers are foreign residents visiting Wellington and New Zealand. With the exception of Australia, all International travel markets are estimated to be primarily outbound markets. Australia is estimated to be split roughly 46% / 54% between New Zealand residents and Australian visitors, respectively, owing to the availability of non-stop services to the Australian East coast as well as the mix of both Australian and New Zealand carriers providing service. The visitor/resident split on the WLG-Australia O/D market may fluctuate from year to year, but typically hovers around an even split, with the difference in market share being less than 10% The Pacific region, consisting of Fiji and other island nations in the Pacific, is heavily dominated by outbound New Zealand travellers owing to Fiji as a popular leisure destination.

Chapter 3 provides an additional discussion on the estimation methodology for O/D passengers and estimated directionality of passenger travel.

Figure 2-2: International Origin/Destination Passengers by Market, FY2018



Source: Saber AirVision Market Intelligence and Inter*VISTAS* analysis.

[7] All other countries in Asia excluding China, Hong Kong, Macau, and Japan.

Figure 2-3: Estimated International O/D Passenger Origins, FY2018

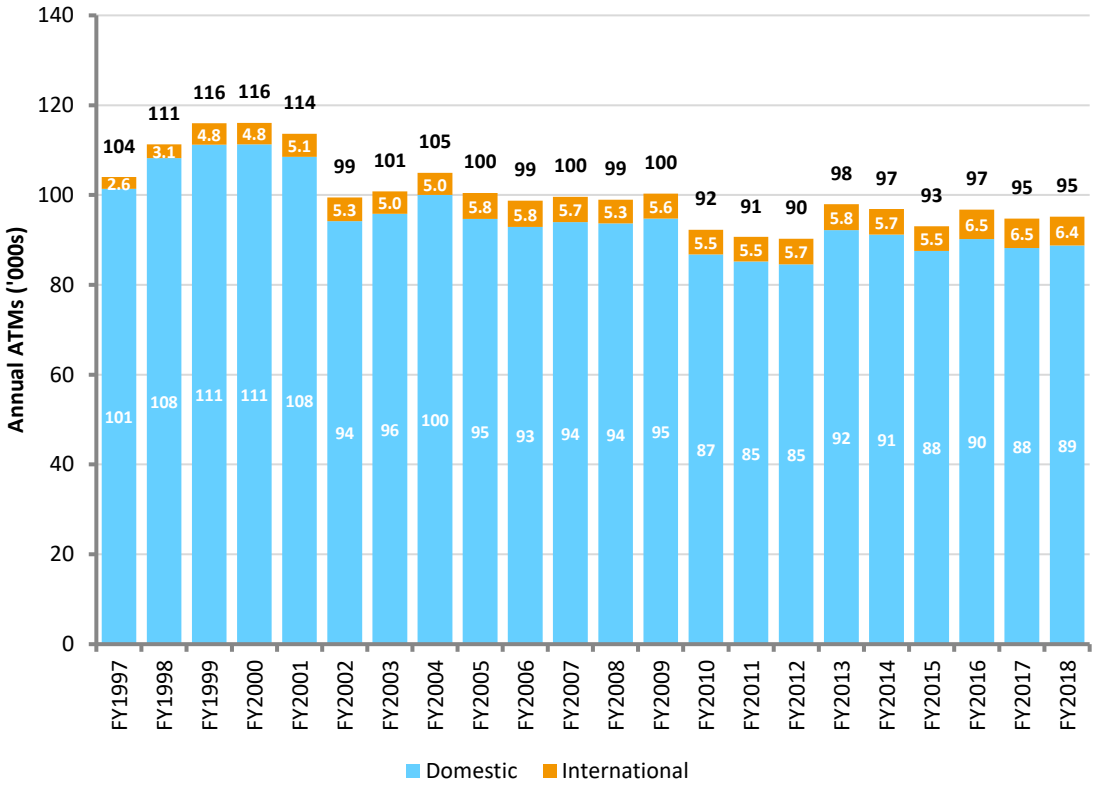
O/D Market	Australia	China	Japan	Other Asia	UK	USA	Pacific	Other	Total
Inbound	54%	28%	44%	30%	42%	35%	16%	39%	**44%**
Outbound	46%	72%	56%	70%	58%	65%	84%	61%	**56%**

Sources: Sabre AirVision Market Intelligence, Statistics New Zealand, Inter*VISTAS* analysis.

2.2.2 Air Traffic Movements

The historical evolution of air traffic movements[8] (ATMs) at WLG, including all commercial and general aviation operations, is presented in **Figure 2-4** below. Over the past twenty years, ATMs have generally been declining at the airport as a result of ongoing fleet renewal and upgauging of aircraft in service at WLG. In FY2018, the airport handled 95,148 ATMs, a nominal increase of 0.4% from FY2017.

Figure 2-4: Historical Air Traffic Movements at WLG



The trend toward static or declining movements in recent years is largely related to the retirement of Air New Zealand Link's Beech 1900D aircraft which were replaced with larger Dash-8 300 and ATR72 aircraft. In addition, Air New Zealand has also retired its fleet of 737-300 Classic narrowbody jets and replaced those services in part by upgauging to 171-seat A320s.

[8] An air traffic movement consists of a landing or a takeoff.

In FY2016 International movements saw a marked increase (+18% vs FY2015) due to increases in service levels to Australia by Jetstar and to Fiji by both Fiji Airways and Air New Zealand. However, by FY2018, Jetstar eliminated its service to Melbourne leading to an estimated reduction of approximately 400 ATMs per year.

Historically, ATMs have either declined or only grown at a fraction of the rate of passenger traffic growth at WLG. As previously mentioned, this has been accomplished by the general upgauging of aircraft in service at the airport along with trends in increasing load factors and airline network optimization allowing a greater number of passengers to be carried for a given number of movements. We expected that this trend will continue into the future and potentially intensify in the coming 5-10 years as all of WLG's major carriers are expected to undergo a renewal of their narrowbody fleets. While it is expected that some carriers will retain similar or only marginally increased seat capacities as they transition from A320*ceo*/737NG aircraft to the latest generation A320*neo*/737MAX family of aircraft, there is also evidence that some carriers (e.g. Air New Zealand) introducing larger aircraft variants like the A321 to replace existing narrowbodies and increase capacity on a per flight basis. A further advantage of the shift to latest generation narrowbody aircraft is the potential to reduce capacity limitations due to operational reasons.[9] As the latest generation aircraft are more fuel efficient, some operational restrictions on trans-Tasman routes are expected to be lifted effectively increasing average aircraft size on a number of routes on an annual basis.

[9] E.g., poor weather conditions requiring larger fuel reserves for possible diversions to alternate airports on trans-Tasman operations requiring lower than standard passenger loads to accommodate increased fuel loading and airport operational constraints.

3 Approach and Methodology

3.1 Overview and Approach

Inter*VISTAS*' forecasting approach blends statistical and quantitative methodologies with professional judgement on the future trends affecting air traffic levels at WLG over the next 30 years. The quantitative analysis includes econometric analysis to identify the fundamental drivers of historic and future air passenger traffic levels at the airport along with Inter*VISTAS*' quantitative risk analysis process which employs a Monte Carlo simulation methodology to recognize and incorporate the inherent uncertainty in the future. Supplementing the quantitative analyses are bottom-up, route-level forecasts of aircraft operations and air passenger traffic up to FY2030, which reflect the forecast team's analysis of historical schedules and airline operations along with professional judgement regarding how traffic volumes and airline operations will evolve over the next twelve years at WLG. In this way, our methodology blends both the art and science of traffic forecasting to provide an integrated view on the potential level of airport activity over the coming 30 years.

The sections in this chapter will briefly discuss the methodology and assumptions employed to develop the forecasts presented in Chapter 4.

3.2 Forecasts are Unconstrained

It should be noted that the forecasts presented in this report are unconstrained forecasts and have not been developed with consideration for the airport's facilities to handle the existing traffic demand. Short-term route-level forecasts are unconstrained relative to facility capacity constraints but do account for carrier fleet sizes and known fleet plans which may limit potential capacity and flight frequency growth.

3.3 Air Passenger Forecast Methodology

Air travel is a derived demand. Demand for air transportation between origin and destination markets is derived from the socioeconomic interactions between these markets, shaped by carriers' networks and available airlift capacity. Generally, business/trade activity, tourism/visitor activity as well as visiting friends and relatives (VFR) constitutes the primary components of air travel at an airport.

Dependable forecasting practice requires awareness of the uncertainties surrounding the forecasts. Considerable effort by the project team went into analysing the factors affecting traffic activity at WLG. A combination of statistical analysis, market and industry outlook plus professional judgement was used to produce the passenger forecasts.

Figure 3-1 provides an overview of the forecasting model components and sequence, highlighting the key components of the forecast. In essence, air passenger forecasts were generated using a combination of econometric analysis, risk analysis, short-term schedule development, and scenario development. In addition to the BAU forecast, forecasts of passenger traffic, aircraft movements, and landed weight were developed for a runway extension scenario, based off the BAU forecasts. The benefit of this approach is that it allows the forecast team to utilize data-driven econometric analysis while integrating internal and external judgement on the hypothetical development of long-haul international passenger services.

Figure 3-1: Air Traffic Forecasting Methodology

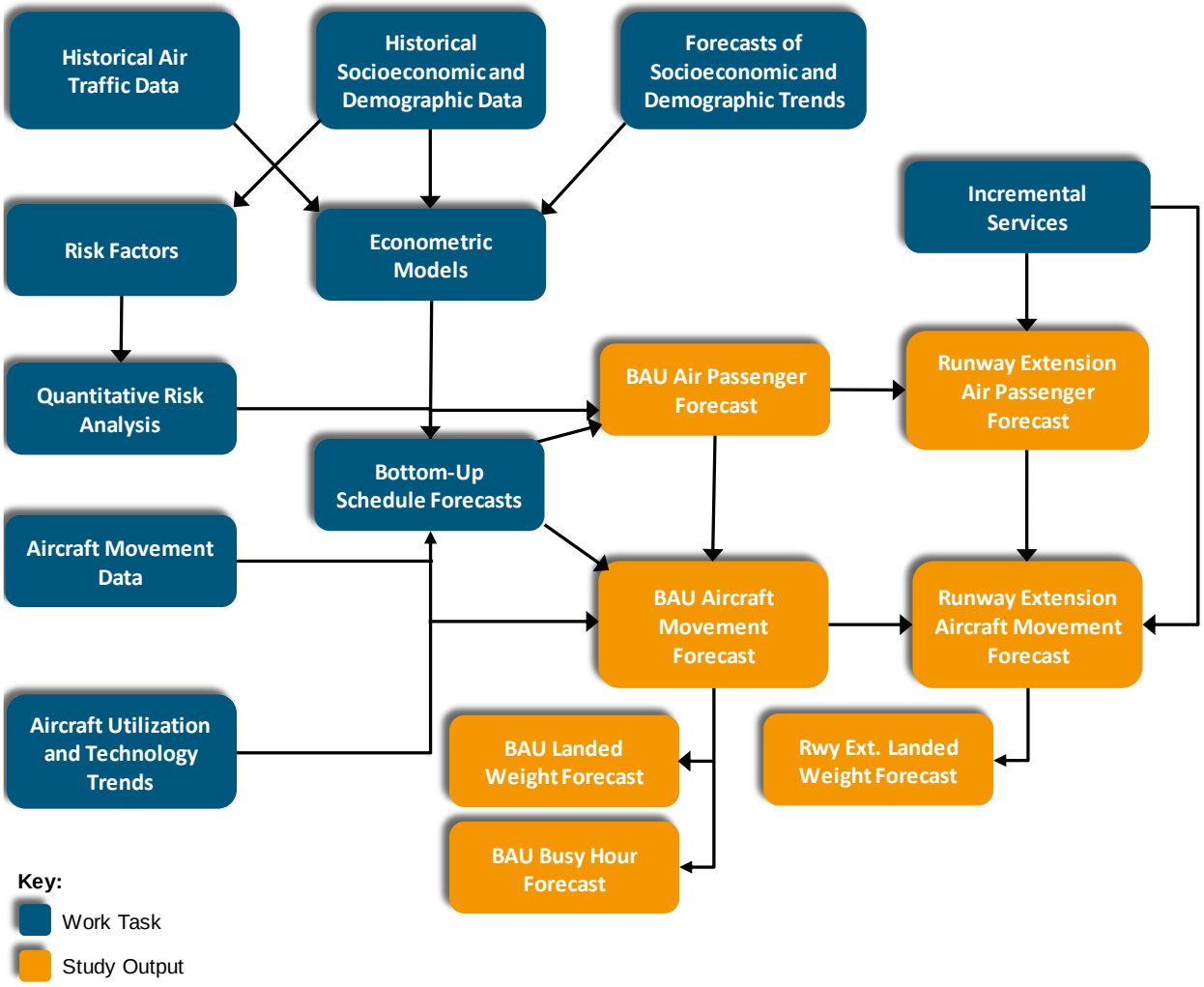


Figure 3-2 shows the segmentation of passenger traffic into forecast markets. Domestic traffic was separated into three O/D markets, while International traffic was segmented into eight overall markets with further splits into inbound (i.e., foreign visitor) and outbound (i.e., New Zealand resident) travellers. This market segmentation compliments Inter*VISTAS*' previous forecasting exercises and expands on the segmentation of domestic traffic into three distinct markets versus just two.

Figure 3-2: Air Traffic Forecast Market Segmentation

Domestic Traffic	International Traffic
Domestic Trunk (AKL + CHC)	Australia
Domestic Regional[10]	China[11]
Domestic Other[12]	Japan
	Other Asia
	United Kingdom
	United States of America
	Pacific Islands
	All Other International

Furthermore, air passengers were forecast at the route level for the first twelve years (i.e., FY2019-2030 inclusive) at the request of WIAL. The short-term bottom up forecasts, discussed further in this section, are based on increasing flight frequency, capacities, and load factors developed with guidance from the econometric and risk-based models. Beyond the first twelve years, forecasts by route are estimated using the aggregate region-level growth rates applied to the route within that region. Route-level forecasts beyond FY2030 should be treated as indicative.

3.3.1 Econometric Forecasts

The econometric modelling approach used an update to the regression analysis performed for the 2017 Master Plan forecast, relating historical passenger traffic at the airport and by air to New Zealand to various macroeconomic and socioeconomic factors such as economic growth, population, fuel prices, etc. Using projections of these factors it was possible to produce forecasts of air traffic at WLG through the econometric models. The econometric models were devised using either estimated O/D passenger volumes or resident/visitor air passenger volume data sourced from Statistics New Zealand. Models were developed for the three domestic sectors (Trunk, Regional, and Other) based on estimated O/D data while International markets were analyzed using visitor arrival and resident departure data from Statistics New Zealand. Where possible, Statistics New Zealand data was used for travellers specific to WLG. However, due to the small size of certain international markets for travellers reporting clearing customs at WLG, national-level arrival/departure data was used to estimate a market's overall travel demand elasticity to New Zealand and outbound international markets for residents. This approach replicates the methodology employed by Inter*VISTAS* in our previous forecasts for WLG.

For this forecast update, long-term air travel elasticities were not re-estimated and the elasticities estimated in the 2017 airport master plan traffic forecast were employed based on historical travel data from FY19977-FY2017. Specifics of these elasticities are provided in **Appendix B**. In all cases, it was found that the air travel demand elasticities in relation to GDP were in line with established estimates published by industry and academic sources, as well as with previous analyses for WLG conducted by

[10] Consisting of seven airports with greater than 100,000 E/D passengers in FY2018: NSN, DUD, HLZ, BHE, NPE, TRG, ZQN.
[11] Including the Hong Kong and Macao SARs.
[12] All other domestic routes with fewer than 100,000 E/D passengers in FY2018.

Inter*VISTAS*. In general, International markets have an elastic (i.e., >1 such that traffic grows faster than income growth) estimated response to income/economic growth which is consistent with long-haul travel markets with a mix of business and leisure travellers. Short-haul Domestic markets, Domestic Regional and Domestic Other, were found to have an inelastic (i.e., <1 such that traffic grows slower than income growth) response which is also consistent with established theory and research on air travel demand.

Forecasts of source-market GDP to drive the econometric forecasts were developed using a consensus approach. Both short and long-term forecasts for GDP were obtained from various sources and finalized into a 'base case' set of GDP forecasts along with professional judgement. Short and long-term forecasts of GDP were updated as part of this forecast updated with the latest projections on macroeconomic growth available. Details on the long-term GDP forecasts underlying the econometric forecasts can be found in **Appendix A**.

3.3.2 O/D Market Size Estimates

Inter*VISTAS* estimated the FY2018 market sizes for all of the relevant forecast markets (as described in Figure 3-2 above) based on analysis of O/D market size estimates provided by Sabre using ticket booking data as well as Statistics New Zealand data. O/D market sizes for both Domestic and International markets were calibrated to match reported E/D traffic volumes at the airport in FY2018 based on itinerary-level data provided by Sabre. As itineraries were able to be observed for each O/D passenger reported by Sabre, the E/D segment for each itinerary can be identified along with the passenger's O/D market. This then allowed for the calibration of O/D passengers to match the Domestic and International E/D passenger volumes reported at WLG.

Inbound and outbound traveller market splits were developed using an integrated methodology incorporating ticket point of sale data provided by Sabre as well as resident departure and visitor arrival data sourced from Statistics New Zealand. The updated estimation methodology incorporates the best data available to the forecast team. While previous forecasting engagements had used solely point of sale data, provided by Diio FMg, this study (in conjunction with 2017 Master Plan forecast) supplements ticket point of sale data with StatsNZ data. Resident departures are estimated using StatsNZ data on international departures via WLG from residents in the Wellington and Manawatu-Wanganui regions along with permanent migration data in the aforementioned regions. Visitors are estimated through a combination of StatsNZ visitor arrival data at WLG (identifying the component of visitors arriving via Australia or Fiji and clearing customs at WLG) while Sabre point of sale data is employed to estimate inbound visitors connecting over a domestic gateway airport (e.g., Auckland or Christchurch). The estimated inbound versus outbound passenger splits are then applied to the overall O/D market size, estimated from Sabre and calibrated to match airport E/D traffic based on traveller itineraries.

The revision to the O/D market and passenger origin methodology has resulted in a slightly different estimate of resident versus visitor splits across the eight international O/D markets. As previously estimated, long-haul markets remain predominantly outbound markets with the majority of travellers estimated to be New Zealand residents. However, as O/D market sizes and traveller origins are always estimates they may shift from year to year and as methodologies are updated to incorporate the best available information at the time they are developed.

3.3.3 Risk-Based Forecast Methodology

As with any projection of future activity, the air traffic forecasts for WLG are subject to a degree of risk and uncertainty. The forecasts are based on underlying assumptions regarding economic growth, traffic

development, fuel prices, aviation technology, etc. which are developed from the best available intelligence and analysis. However, it is not possible to determine how these factors might vary over time and when certain events may occur; .e.g., the timing of recessions, fuel price spikes, etc. Furthermore, one-off events may have an impact on traffic but are impossible to predict, such as terrorist attacks and major natural disasters.

The traditional approach to this issue in air traffic forecasting is to supplement the base case forecasts with high and low case forecasts. This conveys that there is uncertainty in the forecast, and provides a rough range for likely outcomes. However, the low case should not be interpreted as a “worst” case, but rather a conceivable though low probability outcome. The low scenario typically embodies slower growth in airport traffic over the medium to long term due to the combined effect of a slower economy, high air fares, high fuel prices, etc.

An approach to better understanding the range of possible future scenarios is to apply quantitative risk analysis to the forecast. Quantitative risk analysis recognises that there are a number of key drivers of the forecast (economy, fares, fuel prices, etc.) and that each of these drivers has its own level of uncertainty or its own probability distribution. This type of risk analysis utilises the probabilities of these drivers to create a large number of potential scenarios. One scenario might be normal economic performance but with high fuel costs and a terrorism event. Another might be weak economic performance and high fuel costs but with no terrorism event. Typically, the quantitative forecasts will create thousands of such scenarios, each time randomly generating values for each of the forecast drivers. This is often referred to as Monte Carlo simulation.

Monte Carlo simulation (or the Monte Carlo method) is a computerized simulation technique which makes use of randomization and probability statistics to investigate problems involving uncertainty. Typically, it involves a computer model of a system or project (e.g., air traffic at an airport). The inputs to the model, instead of being fixed numbers or variables, are specified as probability distributions. For example, rather than traffic growth being set at X% per annum, it might be defined as having Normal (bell-curve) distribution with a mean of X% and a standard deviation of Y%. Using computer software, the model is run multiple times, each time randomly sampling from the input distributions, resulting in different outcomes each time. Often, the model will be run (known as iterations) thousands or tens of thousands of times and the results are collected from each run.

With enough iterations of the model, the output can demonstrate the range of possible outcomes and provide statistical estimates of the probabilities of various outcomes. Depending on the complexity of the model and input distributions assumed, the range of outcomes can be large and are not always linear. Expected or “most likely” values can also be generated.

Monte Carlo can be seen as a powerful “what-if” or scenario-generating exercise where every possible what-if or scenario is generated (within the confines of the model specification), including interactions between the various input factors. Another way of looking at it is that each iteration of the model represents one possible future for the system being modelled. By running the model thousands of times, the user can view whole sets of possible futures and assess which are most likely to occur; and identify areas of greatest downside or upside.

Monte Carlo is used extensively in a wide range of fields. One of its first applications was in designing the shielding for nuclear reactors at the Los Alamos National Laboratory in the 1940s (The name “Monte Carlo” was coined as a codename by scientists at the laboratory in reference the Monte Carlo casino

resort). Monte Carlo simulation has since been used in finance, project planning, engineering studies, traffic modelling, cancer radiation therapy, and telecommunications network design, among many other applications.

The real power of the Monte Carlo simulation lies in its ability to provide more meaningful statements regarding this range of possible forecast outcomes. Rather than produce just a single static outcome, the process can also provide a probability-weighted range of traffic outcomes and allow questions to be addressed, such as:

- What is the probability that passenger traffic growth will exceed 3% per annum over the next five years?
- What is the probability that passenger traffic will be greater than 7 million in FY2032?
- What is the probability that passenger traffic in FY2047 will be less than 10 million?

The risk-based simulation process was employed to develop the Conservative and Optimistic forecasts. Aligning with Inter*VISTAS*' previous forecasts for WLG, the Conservative forecast was defined as the 5th percentile outcome, while the Optimistic forecast was defined as the 95th percentile outcome.

The list of risk factors employed in this forecast is provided in **Appendix C**. The risk factors cover a wide array of macroeconomic (e.g., simulations of future levels of GDP growth), industry and socioeconomic (e.g., risks to propensity to travel or the NZ tourism industry), as well as external shocks. The risk factors employed for this forecast represent a continued update and extension of the risk factors developed for WLG's 2015/16 traffic forecasts and the 2017 Master Plan Forecast.

3.3.4 Short-Term Bottom-Up Forecast and Assumptions

For the first twelve years of the forecast (i.e., FY2019-2030), Inter*VISTAS* developed a bottom-up flight schedule based forecast to develop the route-level forecasts required for this study. This section discusses the approach and assumptions used to develop the bottom-up forecasts.

It should be noted that the assumptions of specific routes or carriers operating services assumed in the bottom-up forecast is meant to be *indicative* only. These assumptions are used as a basis to suggest potential and realistic ways in which forecast traffic growth may be realized. Actual future traffic may not be realized in exactly these ways or may be realized on different routes to the same forecast region. These assumptions are not an air service development strategy.

Four key assumptions were used to develop the bottom-up forecast:

- The econometric and risk-based forecasts provide guidance on the overall potential level of traffic development over the coming twelve years.
- Filed schedules for FY2019 inform the level of scheduled service to be expected in the first year of the forecast. The flight schedule for FY2019 is identical across all three forecast scenarios but the estimated load factors vary between forecasts to account for above- or below-Most Likely passenger traffic.
- The carriers serving WLG will continue to add capacity and flight frequencies to meet the forecast passenger demand in patterns similar to recent historical levels. In the Conservative forecast, capacity

and frequency growth is limited or non-existent, reflecting diminished passenger demand in that forecast, while in the Optimistic scenario capacity and frequency growth is greater than in the Most Likely schedule to account for higher than Most Likely passenger demand. Forecast capacity growth in all scenarios is considered against known fleet sizes and fleet plans which places a reasonable limit on how much capacity and flight frequencies may grow over the bottom-up period.

- Anticipated fleet changes are incorporated into the bottom-up schedule to account for both incremental capacity as well as swaps of existing aircraft to new aircraft based on projected carrier fleet plans and trends in aircraft usage. This includes the introduction of new aircraft (e.g. the A320/321*neo* and 737MAX aircraft) and changes of gauge on existing services.

In the BAU Most Likely and Optimistic scenarios, two new Australian routes are hypothesized to emerge as next-generation narrowbody aircraft enter carrier fleets. In addition, the Optimistic scenario incorporates two new routes in the Pacific region. A likely Pacific destination would be Faleolo, Samoa which is operationally viable with an A320*neo*, while Adelaide and Cairns are likely potentials for a 737MAX or *neo* aircraft which is currently beyond typical operating limits of the 737-NG/A320*ceo* aircraft.[13] It should be noted that these destinations are *indicative* of potential routes which would be operationally feasible using next-generation narrowbody aircraft. Inter*VISTAS* received guidance from WIAL during the forecast development that these could be potential expansion options, and the forecast team found them to be reasonable examples of potential new routes in the short- to medium-term to represent forecast growth in the trans-Tasman market. In both cases these new routes capture demand potential projected from the econometric and risk-based forecasts within those forecast regions.

In the runway extension scenario, it is assumed that in FY2025 a carrier will take over the WLG-MEL service as the Singapore Airlines direct flight becomes a non-stop to Singapore. Additionally, no new domestic routes (i.e. new destinations) are introduced as a part of the bottom-up forecast. Therefore in the bottom-up forecasts passenger traffic growth comes directly from load factor growth, increased service frequencies, and capacity growth through aircraft upgauging.

In general, the Conservative scenario features lower load factors and more limited frequency and capacity growth that in the Most Likely scenario. Furthermore, the Conservative scenario assumes that WLG will receive lower levels of service from new or A321*neo* aircraft than in the Most Likely scenario, assuming that carriers will opt to deploy aircraft with relatively higher capacities to other markets. In the Optimistic scenario, load factor and frequency growth are both assumed to be higher than in the Most Likely forecast and that WLG will receive a relatively higher proportion of new A320*neo* and A321*neo* aircraft to meet the higher demand projected in this forecast.

The following are a number of carrier assumptions incorporated into the bottom-up forecast:

[redacted]

[13] Given the current runway's length and based on input from WIAL.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[14] Short-haul widebody services have materialised at WLG, with Singapore Airlines debuting a Wellington to Singapore service, via Canberra, using a Boeing 777-200 beginning in FY2017 (subsequently re-routing from Canberra to Melbourne in FY2018). Short-haul, small widebody services are also likely to emerge on Domestic Trunk and trans-Tasman routes with WLG's current runway length.

[redacted]

[15] Diio FMg, Origin Destination travel itineraries from New Zealand to the world.

[redacted]

[redacted]

[redacted]

Schedule of Long-Haul Service Introduction

[redacted]

[redacted]

Description	Forecast Region	Aircraft Type	Conservative Forecast		Most Likely Forecast		Optimistic Forecast	
			Start Year	Weekly Frequency	Start Year	Weekly Frequency	Start Year	Weekly Frequency
[redacted]								

[redacted]

3.4 Air Traffic Movements and Landed Weight Forecast

Passenger carrier aircraft movements are generally a function of passenger traffic demand and air service development, shaped by carriers' networks and average aircraft size. Forecasts of future aircraft operations are derived forecasts, taking into consideration passenger traffic demand, potential service improvements/expansion, changes to airline fleets, and load factors.

[16] Note that this long-haul service consolidates two services which were previously modelled on a service to Malaysia and one initially to Thailand to more generally describe long-haul services to Southeast Asia.

Forecasts of annual aircraft movements were based on forecast passenger traffic demand. Passenger aircraft movements depend on the average aircraft size and average load factor (i.e., average passengers per flights), as represented by the formula below:

$$\text{Aircraft Movements} = \frac{\text{E/D Passenger Forecasts}}{\text{Average Aircraft Size} \cdot \text{Average Load Factor}}$$

Where: Average Aircraft Size ·Average Load Factor = Average Passengers per Aircraft Movement

To provide an additional level of detail to aircraft movement forecasts, Inter*VISTAS* developed a bottom-up approach to produce aircraft movement forecasts by aircraft type. Projections of average load factor by forecast region (e.g. domestic trunk, domestic regional, Australia, etc.) were applied to a projected mix of aircraft types operating at WLG in the future on an annual basis. The projections of average load factor and forecast sector aircraft mix average aircraft size determined the number of annual movements required to serve the E/D passenger demand. Forecast movements by aircraft type were then established using the projected mix of aircraft and the forecast sector's total annual required movements.

Projections of load factors, type aircraft in operation, mix of operating aircraft, and average aircraft size reflect:

- Current airline and fleet mix;
- Market development and new air services;
- Carrier fleet replacement plans and improved aircraft utilization.

Forecasts of landed weight are based on the generated aircraft movement forecast as well as the forecast fleet mix, by aircraft type, in a given year. Landed weights are based on the maximum certified take-off weight (MCTOW) of each aircraft. WIAL has provided Inter*VISTAS* with a schedule of MCTOWs by aircraft types currently operating at WLG. For future aircraft, such as the A320*neo* and 737MAX, manufacturers' recommended specifications are used to estimate MCTOW along with a study developed by Astral Aviation Consultants for WIAL regarding operational options for aircraft should WLG extend its runway.[17]

It should be noted that the forecasts of aircraft movements beyond twelve years (i.e., FY2030) are intended to be indicative of the type of aircraft in operation, not necessarily the exact type of aircraft indicated by the forecast. For example, the forecast features the use of the ATR72 throughout the entire 30-year forecast period. While over the coming decade or so it is most likely that that exact aircraft type will remain in service on domestic routes out of WLG, it is uncertain if that exact type will continue to operate throughout the latter half of the forecast. The forecasts of specific aircraft types in the long-term are then intended to be indicative of the type (turboprop, narrowbody jet, etc.) and general gauge of aircraft based on seat capacity.

[17] Astral Aviation Consultants, *Review of Proposed Runway Extension Lengths*, 2015. Provided to Inter*VISTAS* by WIAL.

4 Traffic Forecast Results

This chapter presents a summary of the air traffic forecasts developed for WLG employing the methodology described in Chapter 3. Full detail of the passenger forecasts, including data on route-level forecasts, forecasts by aircraft movement type, and landed weight can be found in the supplemental spreadsheets accompanying this report.

4.1 Air Passenger Forecasts - BAU

In the Business as Usual scenario, Most Likely forecast, passenger traffic is forecast to grow from FY2018's 6.1 million E/D passengers to 12.7 million passengers by FY2050 at an average rate of 2.3% per annum, as shown in **Figure 4-1** and **Figure 4-2** below. Domestic traffic is forecast to reach 10.3 million passengers (+2.1% per annum) while international passengers are forecast to grow to 2.4 million (+3.1% per annum) by FY2050. Total passenger traffic in the Conservative and Optimistic forecasts are for 9.9 million (+1.5% p.a.) and 15.9 million (+3.0% p.a.), respectively in FY2050.

Figure 4-1: Business as Usual Scenario, Most Likely E/D Passengers by Sector

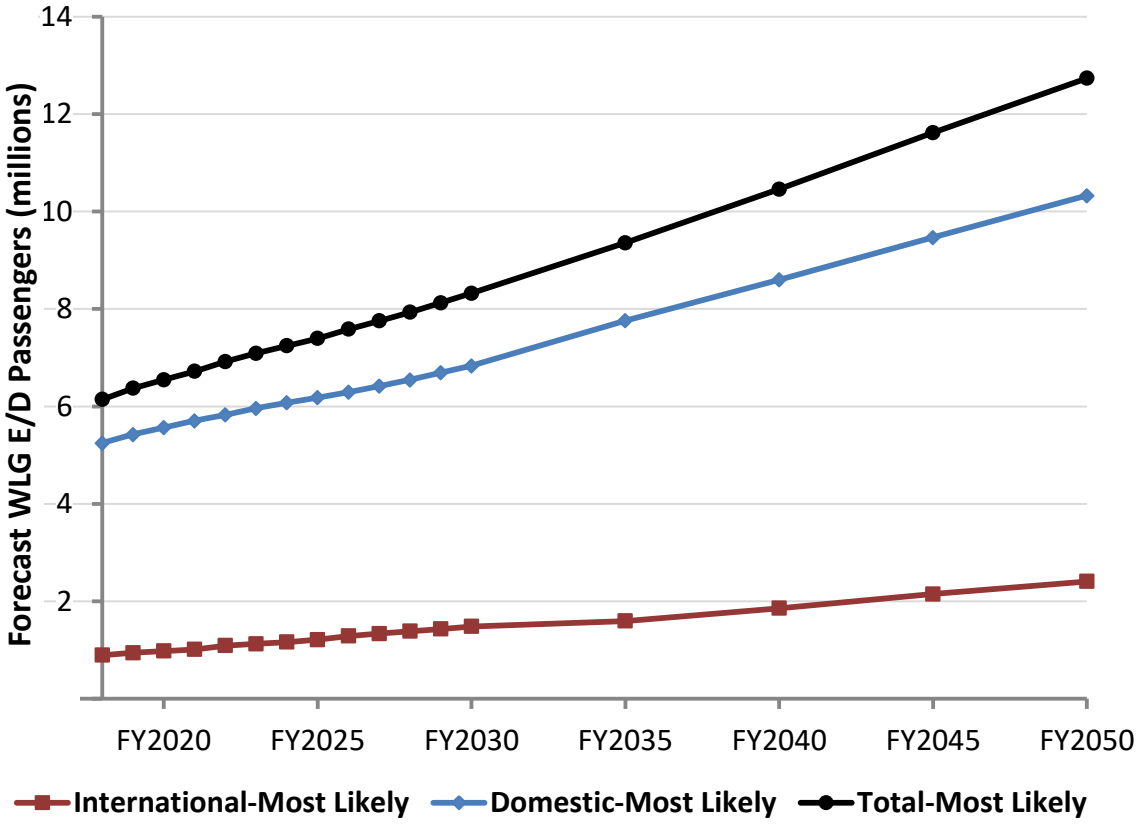
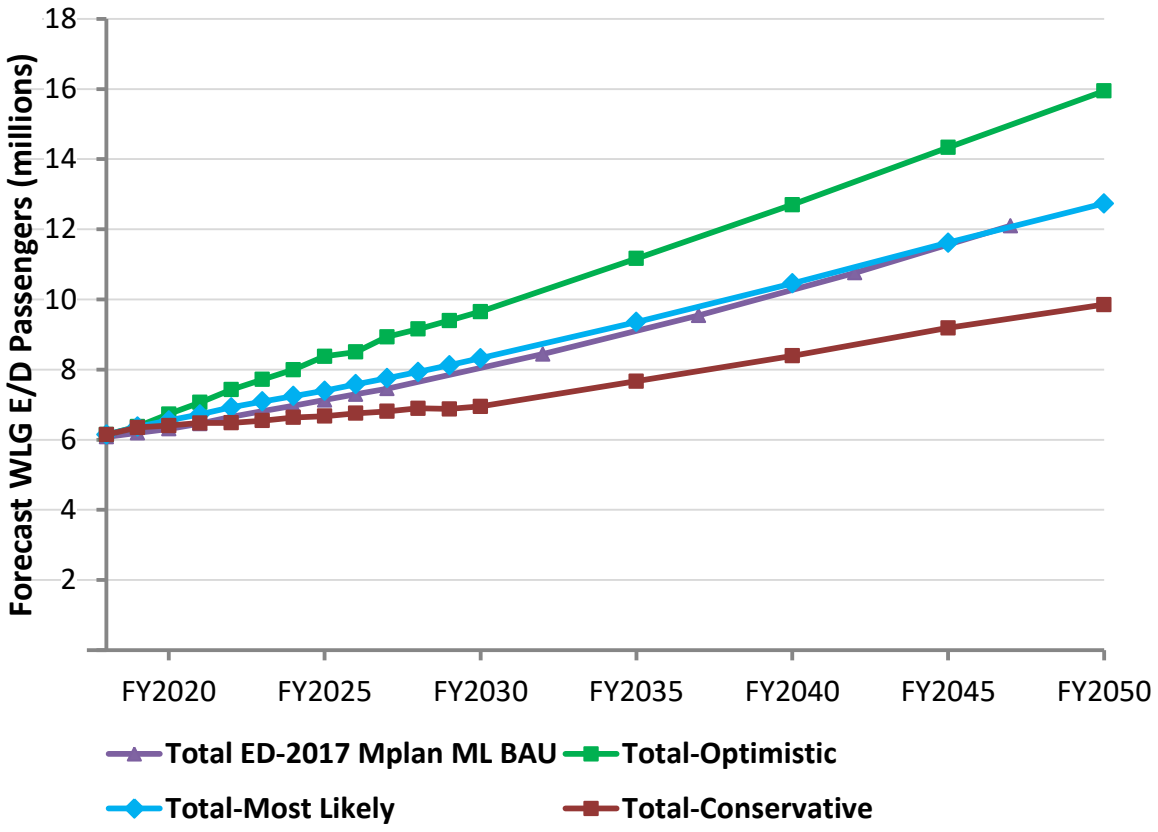


Figure 4-2: Business as Usual Forecast, Total E/D Passengers



Total passenger traffic is forecast to be broadly similar to Inter*VISTAS'* forecast of WLG's traffic for the 2017 Master Plan, which projected 12.1 million passengers in FY2047 versus the 11.6 million and 12.7 million for FY2045 and FY2050, respectively, in the current forecast, with both forecasts trending toward a similar outlook in the long-term. In the short-term and medium-term (i.e., to FY2030) traffic is forecast to be slightly higher than in the 2017 Master Plan forecast, owing to *a)* higher realized traffic in FY2018 than previously forecast, shifting the forecast line up somewhat, *b)* greater information regarding future fleet mix and capacity growth, particularly for Air New Zealand, and *c)* stimulatory competitive effects resulting from the ending of the VA-NZ codeshare partnership, increasing travel demand slightly.

4.2 Air Passenger Forecast – Runway Extension Scenario

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

4.3 Air Traffic Movements Forecast

In the Business as Usual scenario, Most Likely forecast, total scheduled commercial ATMs are forecast to grow from the current of 84,192 to 116,700 in FY2050 at an average rate of 1.0% per annum. Forecast commercial ATMs are projected to only grow at a fraction of the rate of passenger traffic, due to projections of increasing average aircraft size from expected fleet changes and growing load factors. In

the Most Likely BAU forecast, Domestic movements are projected to grow to 101,900 (+0.8% per annum) and International movements to 14,800 (+2.7% p.a.).

[redacted]

Appendix A: Macroeconomic Growth Assumptions

Figure A-1 below presents the forecast real GDP annual growth rates employed in the air traffic forecast. Short and long-term forecasts of real GDP were obtained from major banks (ANZ Bank, Westpac, and ASB Bank), and international institutions including the IMF, OECD, Oxford Economics, and IHS Research, to produce a consensus forecast of real GDP for the forecast source markets over the forecast horizon.

Figure A-1: Real GDP Annual Growth Rates (Forecast)

Country	FY2018	FY2023	FY2050
New Zealand	2.8%	2.4%	2.1%
Australia	2.4%	2.6%	2.3%
China	6.4%	4.9%	2.2%
Japan	1.5%	0.6%	1.1%
Other Asia[18]	5.2%	5.5%	3.5%
UK	1.5%	1.9%	2.1%
USA	2.3%	2.0%	2.0%
Pacific Islands	3.0%	3.0%	2.7%
Other (World GDP)	3.3%	3.0%	2.2%

A key assumption in the development of these consensus forecasts is that, as economies mature and evolve, their rate of annual GDP growth will tend to decrease. This is a key trend being observed in advanced economies across the world where long-term growth rates of between 1.8%-2.2% per annum are considered the long-term expected growth, rather than 2.5% or 3% per annum as may have been forecast 10 years ago. This assumption applies also to China, which will undoubtedly see its exceptionally high GDP growth rate trend down towards that of other advanced economies.

There are two factors driving this expected attenuation of economic growth across economies. The first is arithmetic; as the base size of an economy grows, a lower annual growth rate is required to achieve the same aggregate growth in the economy. The second is related to working age population and demographics: As economies advance, birth rates tend to decline and the natural growth rate of an economy's working age population slows. While during high population growth period, economic growth can be easily achieved in advanced economies purely on the size of its supply of labour. As labour supply growth slows, or even declines as in the case of Japan, economic growth then relies primarily on labour efficiency and technological advancement to drive economic growth. A key factor in the 'slowing' of growth in China's economy is the size of its working age population. Recent estimates suggest that China's working age population may have already reached its peak as a result of the One Child Policy,

[18] Other Asia GDP is a composite of all nations in Asia (including India) other than China, Hong Kong, Macao, and Japan.

and that its labour force will shrink into the future.[19] The declining population of available labour is one of the key drivers in the forecast slowing of economic growth in China over the forecast period.

[19] IMF, https://www.cnbc.com/2017/05/08/imf-warns-asia-on-population-and-productivity.html;
Business Insider, http://www.businessinsider.com/china-working-age-population-already-shrinking-2016-5.

Appendix B: Econometric Analysis

As discussed in Chapter 3, regression analysis was conducted on the major source markets of WLG's O/D traffic relating economic growth to historical traffic growth. The results of this analysis fed into the base case forecasts of O/D traffic at the airport. In all cases, the most robust and reliable models were produced using national or regional GDP as the explanatory variable.

The econometric analysis of traffic was initially conducted during forecasting engagements for WLG in 2015/16 and subsequently updated in 2017 for the Master Plan Air Traffic Forecast using FY1997-FY2017 historical traffic data. **Table B-1** below presents the results of the analysis conducted for the 2017 Master Plan forecast and notes any adjustments made for the 2018 forecast update.

Table B-1: Estimated GDP Elasticities by WLG O/D Source Traffic Market

WLG O/D Market	Estimated Elasticity
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

* Long-term elasticity not including short-term adjustment for increased tourism.

In the case of three specific International Inbound O/D market regions (Japan, Other Asia, and Pacific Islands) it was not possible to estimate robust models of traffic growth. In those cases, a model was used based on established income elasticities for air travel. In the case of Japan Other Asia, elasticities were taken from *Estimating Air Travel Demand Elasticity*, an IATA report produced by Inter*VISTAS* in 2007 and adjusted for local market factors.[21] In the case of Pacific Islands-Inbound, the Other World GDP estimated GDP elasticity was used conforming to assumptions used in previous forecasts for WLG.

[20] For outbound international trips by NZ residents from the Wellington catchment area, all forecast market segments except Australia and the Pacific Islands were aggregated to provide more robust parameter estimates.

[21] [redacted]

Attenuation of Air Travel Demand Elasticities

In all cases, the application of the GDP elasticity parameters to the forecast GDP variables assumed some tapering of the elasticities as the market matures. In other words, the GDP elasticity is assumed to decline further into the future – GDP growth produces a relatively smaller amount of additional air service. For example, the GDP elasticity for inbound UK visitors is assumed to decline from [redacted]

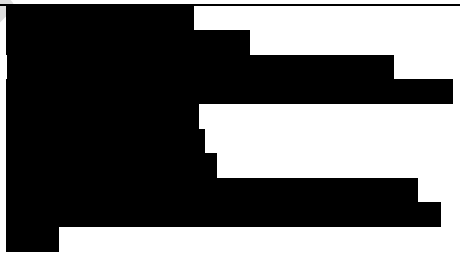
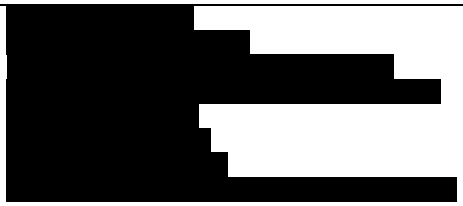
Appendix C: Risk Analysis of the WLG Air Traffic Forecasts

Table B-1 below outlines the factors selected affecting traffic development at WLG and the probability distributions applied. The identification of these factors was a result of previous analysis during prior forecasting engagements for WIAL and expert judgement by the study team. The 2018 update to the WLG long-term air traffic forecast has updated and reviewed these factors, in particular the potential economic growth of countries and world regions, and made short-term and long-term adjustments to reflect current outlooks on economic activity.[22] While indicative mean values for economic growth risk factors (i.e. GDP) are quoted, the mean value will vary over the forecast period based on the base case economic growth assumptions discussed in **Appendix A**.

Table B-1: Forecast Risk Factors

Risk Factor	Comments	Distribution Details
Economic Growth in New Zealand		
Economic Growth in Australia		
Economic Growth in China		
Economic Growth in Japan		
Economic Growth in Other Asia Region		

[22] It should be noted that, while the maximum and minimum ranges for economic variables are based on historical data, the distributions employed are typically concentrated about the mean reflecting the likely range of future economic growth variation.

Risk Factor	Comments	Distribution Details
Economic Growth in UK		
Economic Growth in USA		
Economic Growth in Pacific Islands Region		
Economic Growth in Other Regions (World GDP)		
Terrorism		
Pandemic		
Fuel Price Spike		

Risk Factor	Comments	Distribution Details
Fuel Price Dip	[redacted]	[redacted]
New Zealand Tourism Grows Faster Than Expected	[redacted]	[redacted]
New Zealand Tourism Does Worse Than Expected	[redacted]	[redacted]
New Zealand Residents Increase Propensity to Travel Internationally	[redacted]	[redacted]
New Zealand Population Variation	[redacted]	[redacted]

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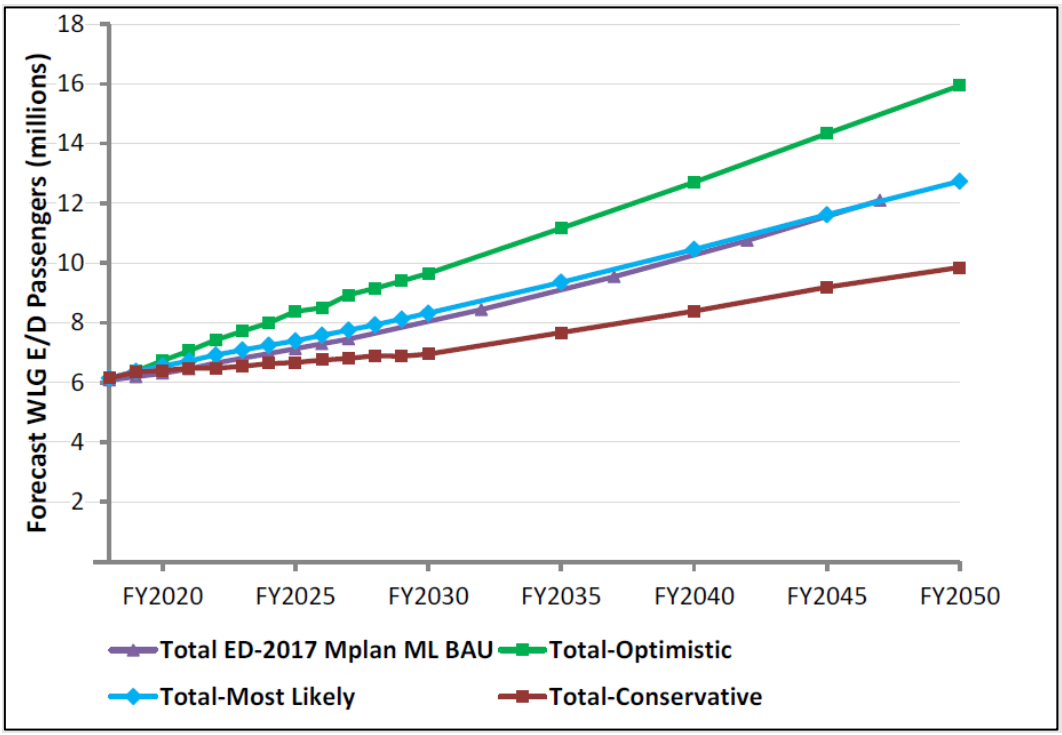
ANNEXURE B: MP2040 BAU PASSENGER FORECASTS



ANNEXURE C: INTERVISTAS COMMENTARY ON LONG TERM TRENDS

Commentary on Medium to Long-Term Aviation Trends

3 May 2021

Inter*VISTAS* Consulting (**Inter*VISTAS***) was asked by Wellington International Airport Ltd. (**WIAL**) to comment on how the air traffic outlook has been impacted by COVID-19 and what are the likely implications of increased climate change concerns and related policy measures. The comments provided in this brief are general in nature on the broader industry trends that may impact future traffic levels at WLG. We have not conducted any analysis specifically relating to the Wellington International Airport (**WLG**) master plan air traffic forecast prepared prior to the COVID-19 pandemic.

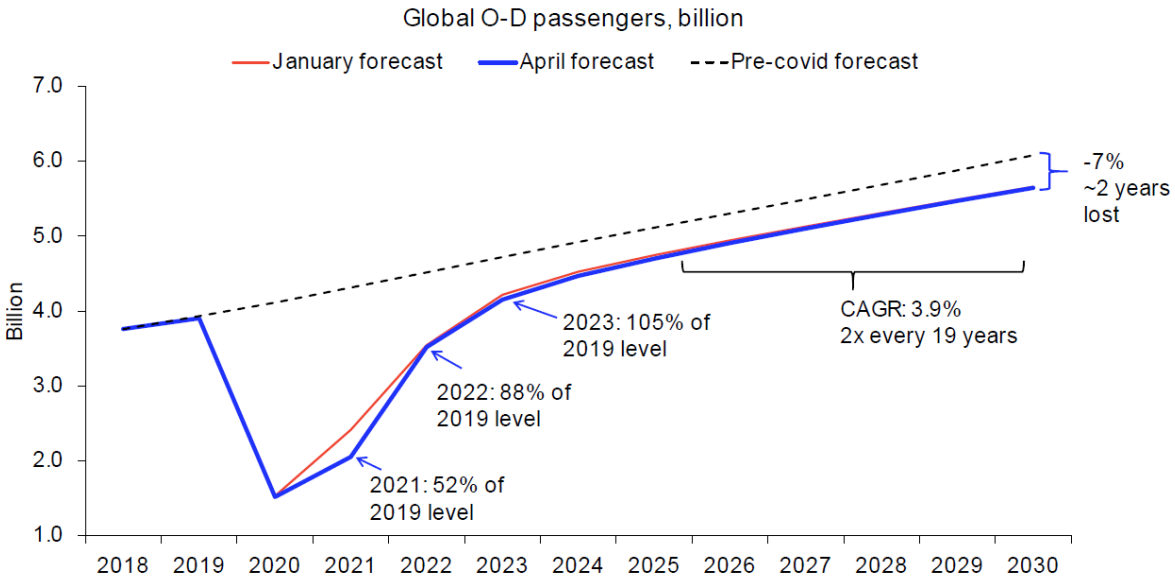
The commentary contained in this brief looks particularly at the medium- to longer-term implications on traffic growth. We note that there is a widely held view that aviation traffic will eventually recover to pre-COVID19 levels in the near to medium term but, there remains significant uncertainty regarding the specific path and for the aviation industry recovery from the impacts of the COVID-19 pandemic, both in terms of air travel demand and industry supply of seat/flight capacity. We also comment on trends regarding the evolving government policy and public perception towards aviation and its impact on climate change.

Impacts on Longer-Term Traffic Outlooks from COVID-19

Passenger traffic. The COVID-19 pandemic has resulted in the single largest downturn in global aviation activity since global aviation statistics were reported following World War II, with 2020 global aviation traffic declining by 66% compared to 2019.[1] International traffic was more negatively impacted, down 76% in 2020 vs 2019, due to many nations imposing travel restrictions and closing borders. Domestic traffic has not been as severely impacted, declining 49% globally vs 2019, but still remains well below pre-COVID levels. Regarding WLG, as of February 2021, it had experienced a 54% reduction in total passenger traffic over a rolling 12-month period versus the same period in 2019/20.[2]

Previous shock events to the global aviation industry – such as the 9/11 terrorism event, the 2003 SARS outbreak, and the Great Financial Crisis of 2008/2009 – have generally seen an eventual return not only to the previous, pre-shock level of traffic, but also back to long term trends in global total air traffic. There seems to be a consensus in the industry that traffic will recover to 2019 levels by 2024, if not earlier. However, there remains uncertainty in the industry and amongst forecasters whether global traffic will eventually see a return to the pre-COVID trend line, particularly as the impact of the pandemic has been much greater than past shock events. A recent industry forecast produced by IATA projected that global air passenger traffic will lag behind its pre-COVID trend forecast by approximately 7% by 2030, equivalent to the loss of approximately 2 years of growth over the coming decade, as illustrated in the chart below.[3]

[1] IATA, *Air Passenger Market Analysis December 2020*, 2021.
[2] Site statistics from Wellington International Airport Ltd. March 2020-February 2021 vs March 2019-February 2020. This rolling 12 month period allows for an assessment of pre-pandemic and during pandemic traffic more clearly than calendar year comparisons which will include 2-3 months of normal traffic levels before the pandemic began to impact traffic heavily in March 2020.
[3] IATA Economics forecast presented in Oxford Economics, *Air Passenger Forecasts: Will air travel take-off again in 2021?*, 27 April 2021.



Source: IATA Economics using data from Tourism Economic/IATA Air Passenger Forecast, April 2021.

Furthermore, different market segments are expected to recover at different rates. Some studies have suggested that business travel could be reduced by 20-40% on a permanent basis,[4] due to greater use of internet communications (Zoom, Teams, etc.). As business travel is about 20% of total global travel, this loss translates into approximately a long-term loss of 4-8% of global passenger traffic. This could be higher for WLG, the national capital, as it has a somewhat higher proportion of business travel. However, the opportunity posed by the potential for strong economic recovery and the release of pent-up demand for leisure and VFR travel in a "roaring 2020s" could offset some or all of the business travel loss.

Broadly across the industry, the general consensus (which we agree with based on our own analysis) is that domestic travel will recover faster than international travel. The currently expectation is that, globally, domestic travel could return to pre-COVID levels by 2022/23 but that the recovery of international traffic will lag 1-2 years behind that. For airports with a passenger market share which is predominantly domestic, it is likely they will see future traffic recover towards pre-COVID forecast levels in the longer term more quickly than airports which have a larger component of international traffic.

As WLG's pre-COVID origin-destination passenger market was estimated to be more than 75% domestic, it can be anticipated that WLG will recover to pre-COVID traffic levels faster than a more international-traffic focused airport (e.g., AKL).[5] Over the three most recent months of available traffic data at WLG (Dec'20-Feb'21), the airport's domestic traffic volumes have recovered to an average of 75% of pre-COVID levels (Dec'19-Feb'20). Recently Air New Zealand has reported that domestic business and corporate travel levels in early 2021 are returning to near pre-COVID levels; a positive sign for near-term recovery to pre-COVID levels at airports with both a domestic and business traveller focus like WLG.[6] Furthermore, WLG's primary international markets are, and have been forecasted to remain, Australia and the Pacific Islands where COVID-19 pandemic has been more successfully controlled compared with international markets such as Europe, the U.S., and South Asia. Thus, WLG's dependence on domestic

[4] IdeaWorks, *The Journey Ahead: How the Pandemic and Technology Will Change Airline Business Travel*, December 2020.
[5] Inter*VISTAS* analysis and Sabre Market Intelligence GDD data.
[6] Air New Zealand, *It's business time – business travellers return to the skies in record numbers*, 30 March 2021.

traffic and relatively limited exposure to international markets suggest that it is likely to experience a relatively fast recovery. Whether traffic in the long term will recover to the pre-COVID trend, or lag by several years as suggested by the IATA forecast, is more difficult to determine at this stage without further analysis.

Aircraft Fleet. The COVID-19 pandemic has had a substantial impact on the global fleet of passenger aircraft, with many airlines accelerating the retirement of older and less fuel-efficient aircraft during the downturn in aviation demand.[7] Recent projections suggest that the global fleet of active, in-service commercial aircraft will be smaller than the size of the global fleet projected pre-COVID, at least until 2030.[8] Narrowbodies (which make up the backbone of WLG's passenger services) are expected to make up a larger share of the global fleet, at the expensive of widebodies, and are projected to recover within 10% of pre-COVID projections by 2030. While the global fleet is expected to remain smaller than previously forecast, the global fleet will consist of newer, more fuel-efficient aircraft than those retired during the COVID-19 pandemic. Furthermore, much of the fleet replacement – particularly in narrowbody aircraft – will be from aircraft which are relatively higher seat capacity than the older aircraft they relace; either by airlines shifting up an aircraft size increment (e.g., an A320 being replaced with an A321neo) and/or through higher density seating configurations. Newer aircraft, particularly narrowbody aircraft, also feature longer operational ranges which is relevant for WLG's development of international services to Australian and Pacific Islands markets. These pre-COVID trends are expected to continue in the post-COVID aviation industry. While global capacity is likely to be below previously projected levels over the coming 10 years, aircraft deliveries are projected to eventually accelerate to meet future renewed demand for global air travel in a post-COVID world and scheduled retirements.

Economic Growth. One of the mains drivers of future traffic development will be economic growth. Recent developments in late 2020 and early 2021 on global vaccination progress and a rebound in economic activity has led to a number of forecasters improving short-term economic outlook compared to projections developed in mid- to late-2020.[9] The recent evidence is that in most nations economic recovery is V-shaped. However, forecasters note that there are still significant uncertainties regarding the near-term economic outlook, largely hinging on effective vaccination rates and government responses to support and stimulate economic activity. At a national or regional level, forecasters indicate that economic recovery is likely to be faster in regions with higher levels of control on COVID-19 case counts and vaccination rates – two areas in which New Zealand is doing well compared to many other advanced economies in Europe and North America. The economic outlook for New Zealand indicates that real GDP growth rates are forecast to be strong and positive in the near term, but it may still be one to two years before the level of GDP returns to pre-COVID levels. This is not dissimilar from the projected IATA global traffic forecast trend.[10]

Over the long-term, there remains uncertainty on how the path of global economic growth relative to pre-COVID trends. Comparison of Oxford Economics GDP forecasts for world GDP from January 2021 and early 2019 suggest that post-COVID global GDP growth will be relatively lower than pre-COVID expectations, comparing 2.1% p.a. growth 2025-2050 in January 2021 versus 2.4% p.a. growth over the

[7] Qantas, for example, accelerated the retirement of their 747-400 fleet in 2020 as the pandemic halted almost all international traffic to/from Australia. The carrier has likewise placed its A380 fleet into long-term storage until 2023 or later. (Qantas 2020 Annual Report)
[8] Oliver Wyman, *Global Fleet and MRO Market Forecast 2021-2031*, 2021.
[9] See: Oxford Economics, *World Economic Prospects,* April 2021; International Monetary Fund, *World Economic Outlook*, April 2021; OECD, *OECD Economic Outlook, Interim Report*, March 2021.
[10] ANZ Bank, *ANZ New Zealand Economic Outlook*, February 2021.

same forecast period from projections of early 2020.[11] These projections suggest that global GDP growth rates will remain broadly similar, but potentially slightly lower in the very long-run.

Socio-economic trends. Beyond economic growth trends, it is expected that a number of broad socioeconomic trends which drive aviation traffic will remain following the COVID-19 pandemic. Trends such as the emergence and growth of a global middle class, growth in emerging and developing economies, and an increasing global interconnectedness are expected to remain in some fashion, post-COVID, to support the long-term growth of global aviation in both emerging (e.g., China, India) and established (e.g., New Zealand, Australia, Europe) markets. So too, it is likely that future generations will have higher propensities to travel across all stages in life than the generations that came before them, continuing an observed trend for many years in aviation. Furthermore, if past shock events (e.g., 9/11 terrorism event, SARS pandemic, global financial crisis) are an indicator of future recovery, then it is not likely that the COVID-19 pandemic will change medium to long-term attitudes to leisure and VFR flying. Like, 9/11 the air travel experience post-COVID will be different than the experience pre-COVID,[12] but leisure and VFR travellers will most likely adapt to this "new normal" with the benefits of travel and flying outweighing procedural drawbacks. However, at this stage in the pandemic's recovery exactly how these socioeconomic and traveller attitude factors may impact the longer-term recovery and growth outlook for air traffic – both globally and at WLG – remain uncertain.

Trends Relating to Climate Change

In regards to climate change initiates, we provide commentary on three issues: traveller behaviour, carbon emissions initiatives, and aircraft technology. One emerging social trend related to climate change is the flight shaming movement in some countries, primarily European. Originating in Sweden as *flygskam*, the movement sought to change air travellers' behaviour to discourage flying and transition to lower carbon emission modes of travel to reduce the impacts of climate change. From its origins in 2018 to the onset of the COVID-19 pandemic, the flight shaming movement gained traction in Europe where comparable alternatives to air travel (i.e., high-speed rail) offered travellers a viable alternative to air travel for some short-haul trips. Some European airlines have reduced capacity on short-haul routes and have offered travellers the option to book interconnected rail journeys as part of their air travel itinerary.[13] France is planning to enact legislation to ban short haul flights where high speed rail is a viable alternative and Austria introduced additional taxes on short haul flights.[14] However, the industry is pointing out that short haul travel's impact on carbon emissions is only a few percent – the overwhelming share of aviation carbon emissions are from long to medium haul travel. The extent to which recent flight-shaming and government legislation have materially impacted air traffic volumes in Europe is hard to determine given that traffic levels are already depressed by the COVID-19 pandemic. Outside of Europe, the impact of the flight shaming movement has not made an appreciable impact on public attitudes and air traffic, including in Asia where high-speed rail alternatives are present in some countries. In the case of New Zealand, the country's geography and current lack of high-speed transportation alternatives suggest that sort of short-haul modal substitution effect trying to be encouraged in Europe could not occur in New Zealand. There remains the possibility that the climate impacts of aviation will become a more prominent issue in New Zealand, leading to changes in consumer behaviour and new government policies, but this is not certain at this stage.

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[11] Inter*VISTAS* analysis of Oxford Economics forecasts.
[12] For example, health testing and screening processes, but also improved touchless processes, cleaning procedures, and onboard experiences to create a safe travel environment.
[13] Forbes, *Dutch Airline KLM To Replace A Plane With A Train*, 19 September 2019.
[14] https://www.reuters.com/business/environment/french-lawmakers-approve-ban-short-domestic-flights-2021-04-11/

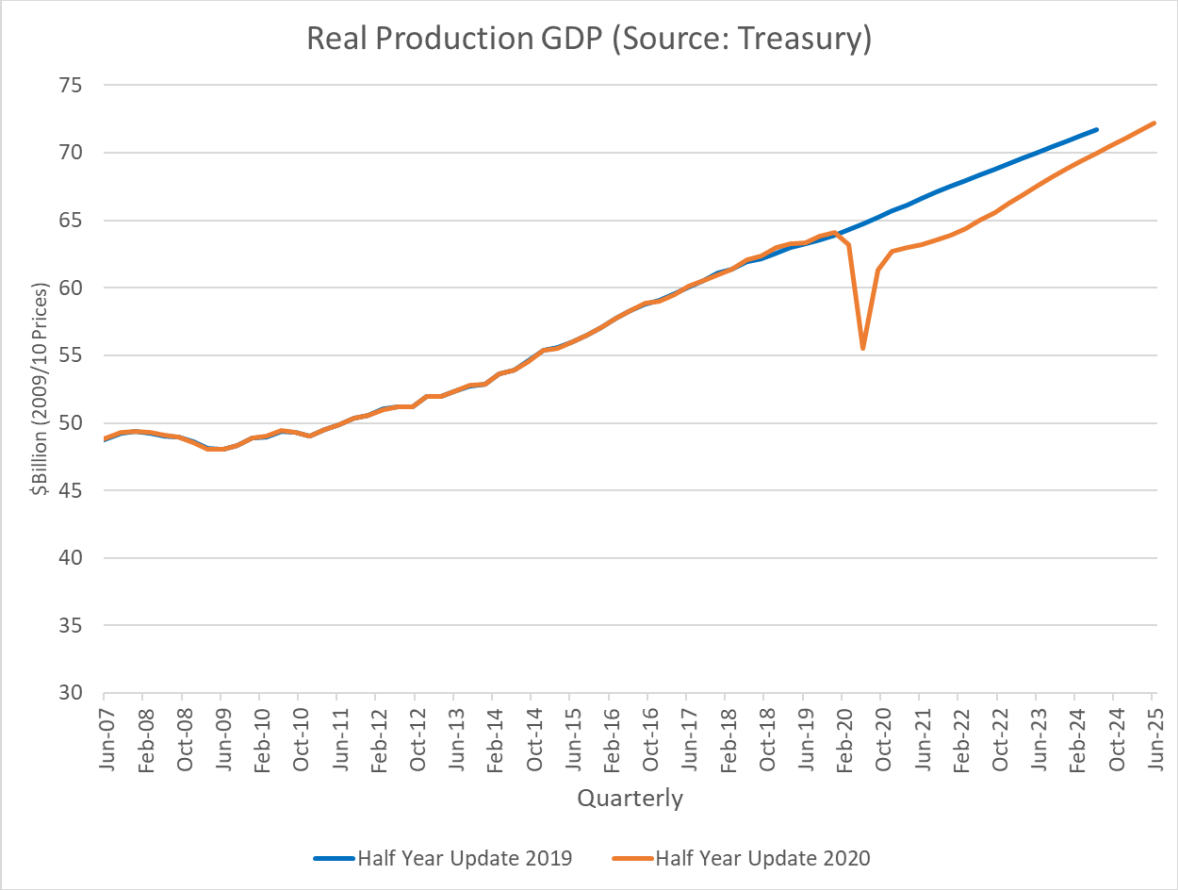
The Carbon Offsetting Scheme for International Aviation (CORSIA), a carbon offset and carbon reduction scheme developed by ICAO (a UN body), is due to start in 2021. New Zealand has signed up to the programme along with Australia, Europe, the U.S. and parts of Asia (India and China are expected to join in 2027 when the programme become mandatory). The aim of the programme is to stabilise (rather than reduce) aviation's net carbon emissions. The programme is expected to encourage the use of cleaner technologies and purchase of offsets rather than reducing traffic levels by significantly raising flight costs. As such, the impact of global traffic development is anticipated to be modest as things stand.

Air New Zealand, WLG's largest carrier, will participate in CORSIA and will adhere to IATA's industry targets for fuel efficiency and carbon emissions. In 2020, the airline re-affirmed these commitments but due to the impacts of the COVID-19 pandemic had decided to extend their target of being zero net emissions to 2050.[15]

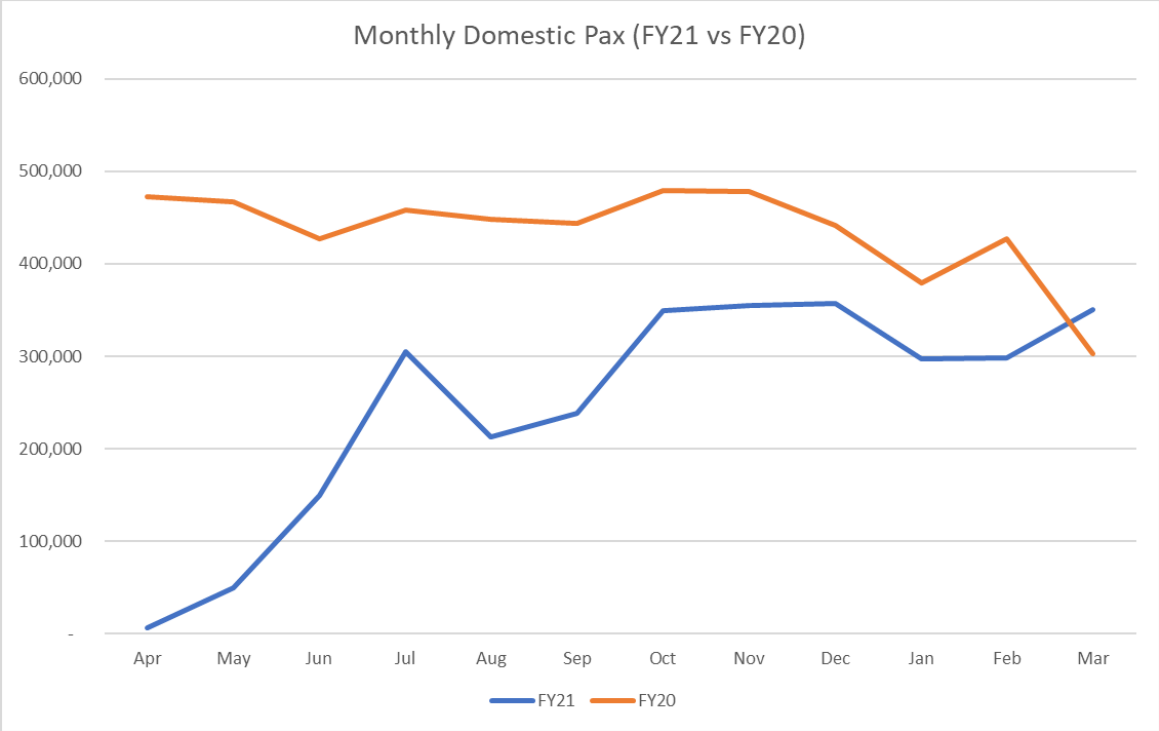
Within the forecast horizon (to FY2050), it is likely that the aviation industry will see the introduction of electric, hybrid electric, or hydrogen (fuel-cell) powered aircraft for commercial service, especially for regional and short haul services where there already are aircraft development projects underway. These propulsion technologies present an opportunity to significantly reduce, or nearly eliminate, the emission of greenhouse gasses for aviation propulsion. Given New Zealand's geography and the variety of short-haul domestic routes that WLG serves, it could be a potential candidate for electric aircraft adoption for domestic services. AVINOR, the state-owned airport operator in Norway, in conjunction with the Norwegian government and airlines, is pursuing a plan to electrify all domestic aviation in Norway by 2040. Given some geographic, and population density similarities between Norway and New Zealand, this suggests that the adoption of electric aircraft at WLG could be possible and a potential measure to mitigate climate change impacts on air travel.

[15] Air New Zealand, *2020 Annual Data Book*, 2021.

ANNEXURE D: PRODUCTION GDP



ANNEXURE E: DOMESTIC PASSENGER FORECASTS



ANNEXURE F: REVISED FORECASTS

Annual passengers (millions)	Approximate Year	Annual Aircraft Movements	Busy Hour Passengers (Departures + Arrivals)
6.2	2019	85,000	1,400
8.0	2027 – 2033	90,000	1,800
10.0	2034 – 2042	100,000	2,300
12.0	2041 – 2054	105,000	2,700