

A large white Air NZ aircraft is centered on a tarmac, viewed from the front. The aircraft is being pushed back by a ground support vehicle with two crew members in high-visibility vests. The background shows a clear sky, distant mountains, and airport buildings.

Air NZ / Arup

Affordable Domestic Terminal Pathway

April 2024



Purpose of this document

- This document has been prepared to support Air New Zealand's submission to the Commerce Commission's review of Auckland Airport's 2022 – 2027 Price Setting Event 4 (PSE4).
- It has been prepared to provide a summary of the body of work commissioned by Air NZ with Arup, including the initial project outputs, amendments to the final proposal following presentation and discussion with AIAL, and a description of the supporting original documents supplied as an appendix.
- AIAL has been notified by Air NZ of the intention to share this body of work with the Commission, given the work has been prepared in part based on information supplied by AIAL to Air NZ during the course of the PSE4 consultation process, and subsequently in discussions between AIAL, Air NZ and Arup regarding the Affordable Domestic Terminal Pathway project.
- As some of this information may be commercially or market sensitive, both Air NZ and AIAL request that the Commission considers this information strictly confidential and not for public release.



Background to the project and approach

- During the PSE4 consultation process, Air NZ became increasingly concerned with the escalating costs associated with AIAL's Integrated Terminal Programme (ITP) and the subsequent long-term impact that was being indicated for aeronautical charges.
- This concern was escalated when the results of the airlines' commissioned Domestic Demand Impact study (prepared by BIS Oxford Economics and finalised in March 2023) indicated the demand impact of this higher pricing was more pronounced than the analysis produced by AIAL, as there were key technical flaws in the approach and data used in the report prepared for AIAL by InterVISTAS.
- Having raised all of the concerns above with AIAL, Air NZ again requested AIAL to pause their development programme and collaboratively discuss a more affordable alternative which might produce per passenger aeronautical charges more in line with what had been indicated in earlier stages of consultation. AIAL declined.
- Therefore, in April 2023, Air NZ unilaterally commissioned leading global engineering and design firm Arup to provide expert review and analysis to answer two key questions:
 - Is AIAL's proposed Integrated Domestic Terminal (IDT) the only option available at AKL, or is there an affordable alternative?
 - Can the life of the existing Domestic Terminal Building (DTB) be extended beyond 2030 without negatively impacting growth?
- While AIAL did not collaborate directly on this exercise, they did meet with Arup and Air NZ to provide technical information on the IDT design, and received the outputs of this research which were discussed with Air NZ and Arup.



Decision to engage Arup

- Arup were engaged due to their extensive experience working on leading global Airport projects, including complex integrated solutions similar to the challenge being faced at AKL. These projects include but are not limited to:
 - Western Sydney Airport – airport planning, technical and cargo services
 - Toronto Pearson International – new terminal, runway, more efficient road system and other major upgrades
 - JFK – JetBlue Terminal 5
 - Dublin – Terminal 2
 - Perth – Terminal 1
 - Melbourne – integrated landside domestic terminal and airside development
- Furthermore, this team already had extensive knowledge of Auckland Airport and the new domestic terminal project, as they were the masterplanners who had worked with AIAL on the original masterplan published in 2014.
- The Lead on this project is currently Arup's Global Aviation Planning Leader.
- Arup was engaged for three phases of work: an initial assessment of AIAL's IDT against global benchmarks and the production of a shortlist of alternative options; a deep dive into shortlisted options including cost estimates from quantity surveyors WT Partnership; and a more developed review of Air NZ's final recommended option.



Section 1: Summary of findings



Executive Summary

AIAL's IDT is over sized when compared to international benchmarks

- According to Arup's analysis of the space required to accommodate forecast passenger levels, AIAL's IDT is ~25-50% over sized.
- Excess size has been identified in security screening, baggage make up facilities, gate lounges (influencing the size of the pier) and potentially retail.
- By comparison Perth T1 Domestic (comparable in number of gates, facilities and traffic) is 25% smaller and cost AU\$200m in 2015.

Operational challenges have been identified in the design

- Modelling shows the single taxilane to the east of the IDT will double the delay to aircraft compared to a dual taxilane, adding over 400 hours p.a. of delays with flow on effects to overall airfield delays.
- Before 2033, extensive bussing operations will be required from remote gates to the IDT as AIAL has not provided an alternative solution for a forecast incremental 3 jet stands.

Arup and Air NZ have identified a feasible and more cost-efficient alternative

- A long list of 14 alternative options were developed and scored and a final 4 options were progressed to pre-concept planning and design.
- The final choice, the Adjacent Domestic Terminal (ADT) provides a similar outcome to the IDT for ~\$1bn less; capex for this design could also be staged to avoid large price shocks.
- Furthermore, it was identified that space in the existing Domestic Terminal Building (DTB) could be repurposed to accommodate regional growth with low to moderate capex until such time as work can begin to join up regional facilities with the international and domestic terminals (~2035).

According to Arup's Programme of Requirements (PoR), AIAL's IDT is ~25-50% oversized compared to international benchmarks



A Programme of Requirements is an analysis of the space required to accommodate forecast passenger levels, based on a total passengers and forecasted schedules. Space required is aligned to IATA global benchmarks to size each element of the airport journey to meet a certain level of service.

| | | FY2033 | FY2038 | FY2043 |
|---|----------------|------------|------------|------------|
| Annual Domestic Trunk MPPA | | 9,294,000 | 10,321,000 | 11,414,000 |
| Annual International MPPA | | 15,112,000 | 17,759,000 | 20,752,000 |
| Security | | | | |
| Domestic lanes | no. | 5 | 5 | 5 |
| International lanes | no. | 6 | 7 | 8 |
| D - I screening | m ² | 600 | 600 | 600 |
| Total Domestic Security (incl. search rooms and D-I) | m ² | 1,500 | 1,700 | 1,700 |
| Geometric constraint within IDT | m ² | 1,500 | 1,500 | 1,500 |
| Total Security | m ² | 3,000 | 3,200 | 3,200 |
| Airside Baggage Handling (combined Dom + Int) | | | | |
| Domestic Baggage make-up | m ² | 1,200 | 1,200 | 1,350 |
| Domestic Baggage Screening | m ² | 800 | 800 | 800 |
| Domestic Off-load and handling support | m ² | 500 | 500 | 500 |
| International Baggage make-up and screening | m ² | 2,700 | 3,400 | 3,700 |
| Geometric constraint within IDT | m ² | 4,000 | 4,000 | 4,000 |
| Total IDT Baggage Handling (combined) | m ² | 9,200 | 9,900 | 10,350 |
| Stands | | | | |
| Total Domestic Jet stands required | no. | 14 | 15 | 17 |
| Domestic Gate lounges | | | | |
| Total Gate Lounges (based on stands) | m ² | 2,600 | 2,800 | 3,100 |
| Airline Lounges | | | | |
| Total airline lounges | m ² | 3,500 | 3,900 | 4,400 |
| Domestic Retail (based on 500m2 per 1MPPA) | | | | |
| Total retail | m ² | 4,700 | 5,200 | 5,700 |
| Baggage Reclaim | | | | |
| Domestic reclaim | m ² | 800 | 800 | 1,200 |
| Circulation and cart storage | m ² | 300 | 300 | 300 |
| Total Baggage Reclaim | m ² | 1,100 | 1,100 | 1,500 |
| Arrivals hall | | | | |
| Total arrivals hall | m ² | 800 | 900 | 1,000 |
| Total Net Area (Domestic Only) | m ² | 16,700 | 18,100 | 20,050 |
| Total Gross Area (Domestic Only) | m ² | 28,700 | 31,100 | 34,500 |
| Total Net Area (Domestic Only plus Geo Constraint) | m ² | 22,200 | 23,600 | 25,550 |
| Total Gross Area (Domestic Only plus Geo Constraint) | m ² | 38,200 | 40,600 | 43,900 |
| Total Net Area (Domestic and International) plus Geo Constraint | m ² | 24,900 | 27,000 | 29,250 |
| Total Gross Area (Domestic and International) plus Geo Constraint | m ² | 42,800 | 46,400 | 50,300 |

- When considering Domestic Jet only demand to 2043, the PoR shows a minimum GFA requirement in the IDT of **34,500m²**.
- However, owing to the shape of the terminal and airfield at Auckland (geometric constraint), the GFA requirement increases to **43,900m²**
- Given the baggage make-up facility is combined International and Domestic, and very difficult to separate, the GFA requirement increases to **50,300m²**
- AIAL provided area measurements for the IDT indicating a gross floor area (GFA) of **64,100m²**. However the GFA of the IDT as measured by Arup using PDF drawings provided by AIAL totals **76,400m²**. Comparisons to both numbers have been considered below.
- In all cases, the IDT is oversized compared to Arup's PoR, ranging from **22% to 55%** depending on which measurements are used.

| | PoR GFA | Comparison (to 64,100m ²) | Comparison (to 76,400m ²) |
|---|---------|---------------------------------------|---------------------------------------|
| Domestic Only | 34,500 | -46% | -55% |
| Domestic plus Geo Constraint | 43,900 | -32% | -43% |
| Dom + Int Baggage + Geo Constraint | 50,300 | -22% | -34% |

There are 4 key areas where the terminal exceeds requirements when considering the NZ domestic context



Security

- PoR analysis indicates ~200m² per lane, including queue and re-composure, assuming 10 minute maximum wait
- By comparison, AIAL's drawings indicate 300+m²
- The shape of the integrated building dictates additional space



Baggage Make Up

- Includes provision for both international and domestic baggage
- The volume and complexity of the baggage system may drive higher cost



Gate Lounge

- Area per gate lounge is higher than expected and appears to assume more passengers at the gate (early call-to-gate). In addition to gate lounge provision, there are multiple pier lounges and additional gate spaces.
- There is limited allowance for passengers seated in the food and beverage area despite significant area provision for this.



Airside Retail

- 750m² per million passengers by 2043 aligns with peers, however New Zealand domestic context may support a lower provision given customer needs and behaviour.
- Kitchens and food dwell spaces have not been included in retail provision.
- Needs further consideration.



The IDT pier width also appears wider than necessary when considering global examples of domestic terminals

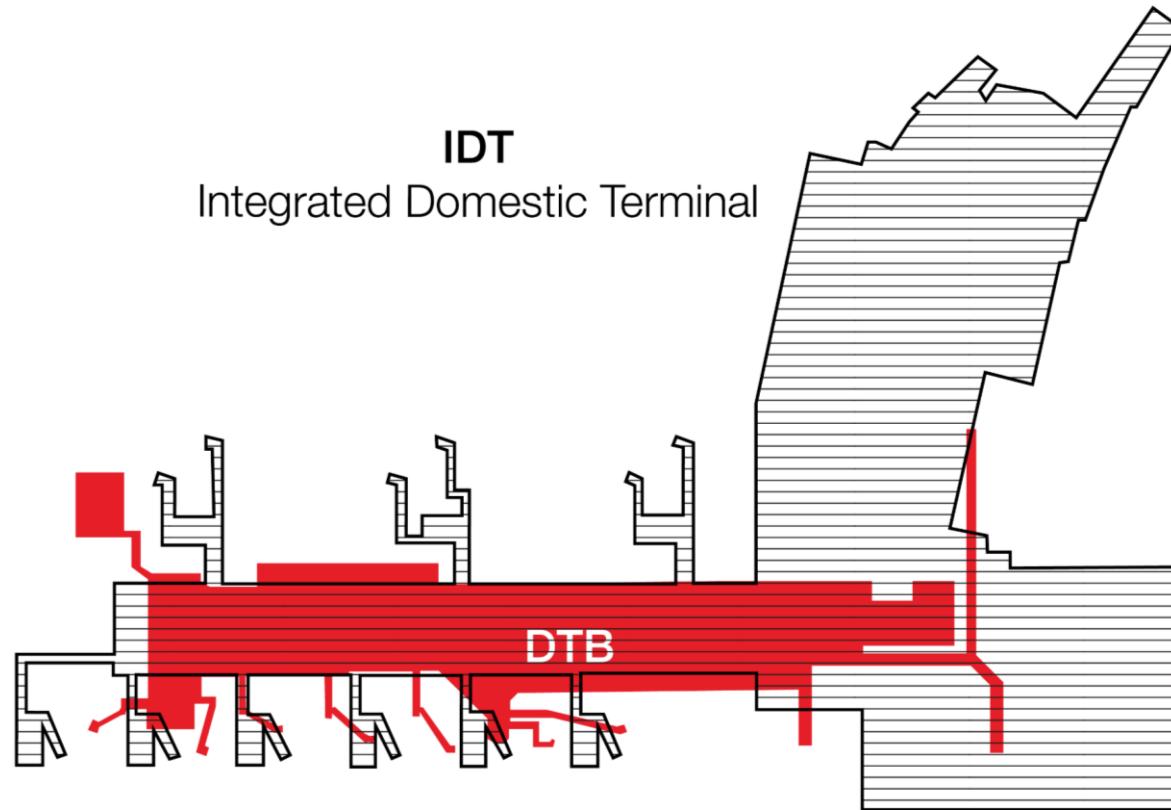
| Airport | Pier Width |
|-----------------------|------------|
| LaGuardia Terminal B | 36m |
| AKL IDT | 33m |
| Christchurch Domestic | 27m |
| Perth T1 Domestic | 22m – 28m |
| Montreal Domestic | 20m – 27m |
| Melbourne T4 | 11m – 22m |
| Wellington Domestic | 6.5m – 20m |
| Brisbane Domestic | 7.5m |

Case Study: Perth T1 Domestic

- Perth T1 is an appropriate case study due to size (12 Code C gates, same as the IDT), traffic levels, and that it caters to a level of service similar to the IDT (e.g. lounge facilities)
- Perth T1 is 25% smaller in area than the IDT
- Perth T1 is also a swing International and Domestic facility (i.e. two narrowbody jet stands can be used to accommodate one long haul widebody jet)
- The Perth T1 Domestic Pier and International Departures expansion was the largest component of Perth Airport's AU\$1bn redevelopment (2015) costing AU\$200m.



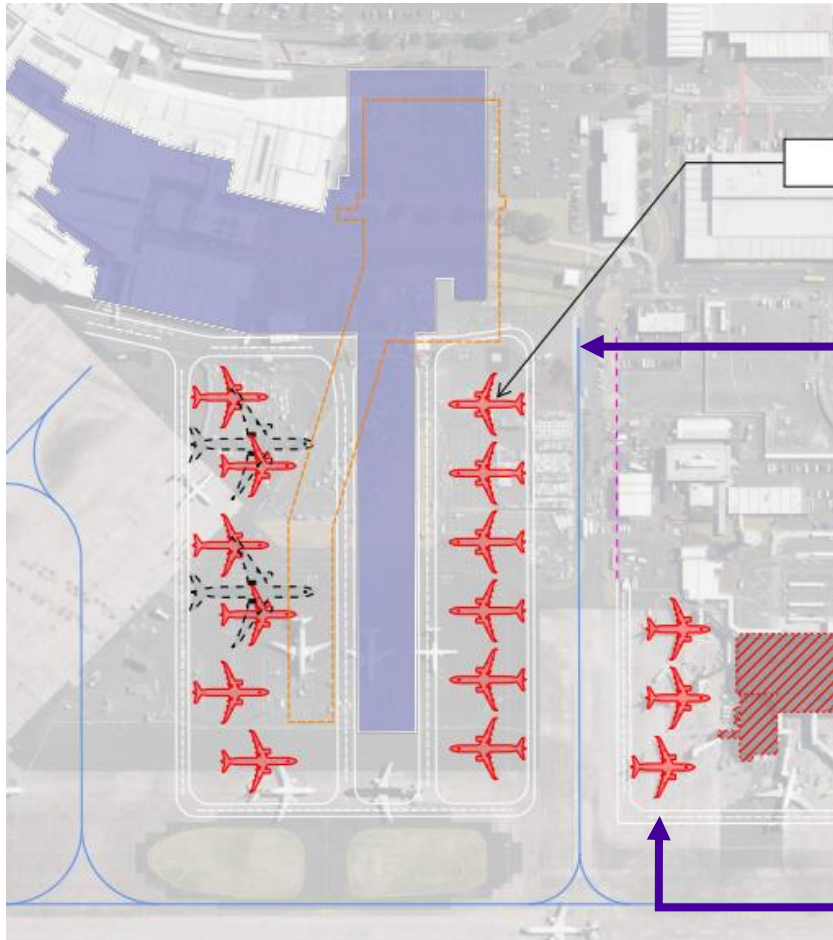
Overlaying the IDT and DTB demonstrates the step change in area between them, noting the new IDT has fewer overall gates



- The current DTB has 10 jet gates (on the western part of the facility – left hand side in this illustration) and 11 regional gates/stands (on the eastern side of the facility).
- The new IDT has 12 jet gates.
- Regional services will continue to operate from the eastern part of the existing Domestic Terminal facility (per AIAL’s proposals).



Furthermore, operational constraints were identified in AIAL's design including a single taxiway and extensive bussing operations



- Single and dual taxilanes were simulated in a CAST model to understand the levels of delay
- The results show the single taxilane proposed **doubles** the delay for aircraft using the eastern side of Pier A1, by 2033, and will have knock on impacts to the overall airfield system delay
- The diagram overlaid in yellow outline indicates how a dual taxilane could be accommodated

| Overall | Single taxilane | Dual taxilane |
|---|-----------------|---------------|
| Average taxi-in delay (sec) | 2 | 1 |
| Average taxi-out delay (sec) | 38 | 16 |
| Number of arrivals | 206 | |
| Number of departures | 206 | |
| Taxi-in delay yearly (hours) | 42 | 21 |
| Taxi-out delay yearly (hours) | 794 | 334 |
| Estimated % of aircraft with no taxi-in delays | 95.1% | 96.6% |
| Estimated % of aircraft with no taxi-out delays | 71.2% | 73.2% |

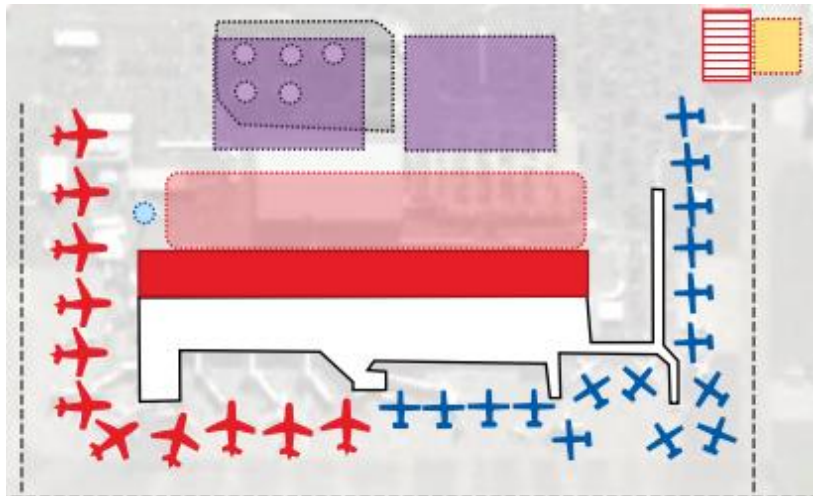
- Separately, while this diagram indicates jets using the western side of the DTB, Air NZ's understanding is that the intention is to demolish this once the IDT is opened. Therefore, the extra 3 jet stands required by 2033 will have to be remote stands with buses operating to the terminal.

The existing DTB cannot accommodate both domestic and regional beyond 2033 without expansion, but otherwise remains a usable asset



Arup's assessment of the existing DTB concluded remaining entirely in the existing DTB is sub optimal by 2033

- Current space is insufficient to accommodate passengers at the IATA Optimum level of service in 2033.
- With productivity and technology enhancements, selected areas such as check in and baggage make up could extend to 2033.
- As part of the long list of options Arup investigated extending the current DTB to 2033. This option was not shortlisted due to cost, lack of sufficient overnight aircraft stands without having to materially change airline schedules, and the difficulty of moving the JUHI early.



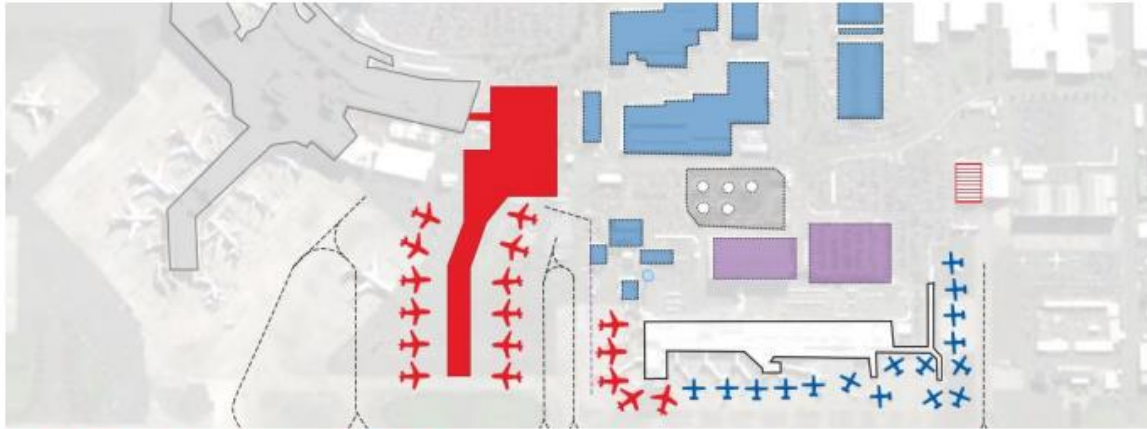
However, the asset itself remains usable and once domestic jets move to a new terminal, regional turboprops can continue to use the facility

- Arup estimates a cost of \$148M for DTB renewals to extend its life for use by regional services until such time as work can begin to join up regional services with the international and domestic jet terminals.
- Note that AIAL already has budgeted \$154m for DTB renewals in its capital plan with further investment of ~\$300m for regional (per public PSE4 disclosures), therefore Air NZ is of the view further overall cost savings can be found through reuse of the existing DTB as a regional solution.
- Some work would be required in order to repurpose the jet stands to cater to turboprop operations.
- Other maintenance work includes:
 - Investigation, relining and renewal of water systems
 - Fire sprinkler system renewal
 - Resolution of roof weather tightness issues
 - HVAC system renewals
 - Vertical transport renewals
 - Electrical system renewals
 - Landside pavement renewals

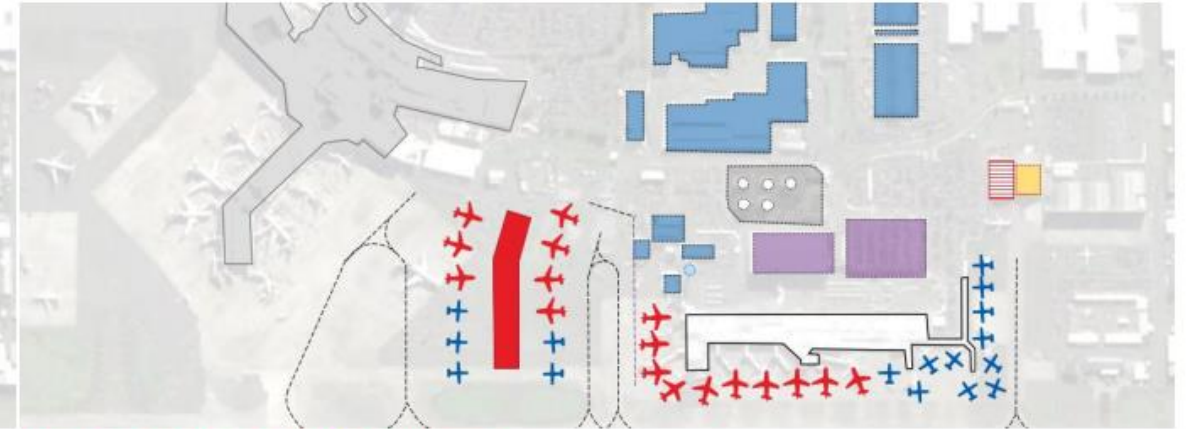
A long list of 14 alternative options were developed and scored and a final 4 options were progressed to pre-concept planning and design



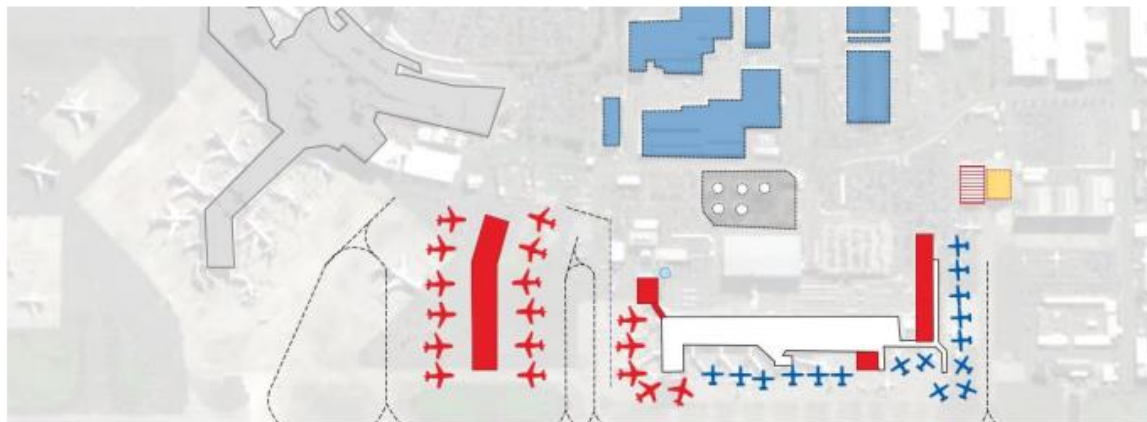
Option 1: Adjacent Domestic Terminal.



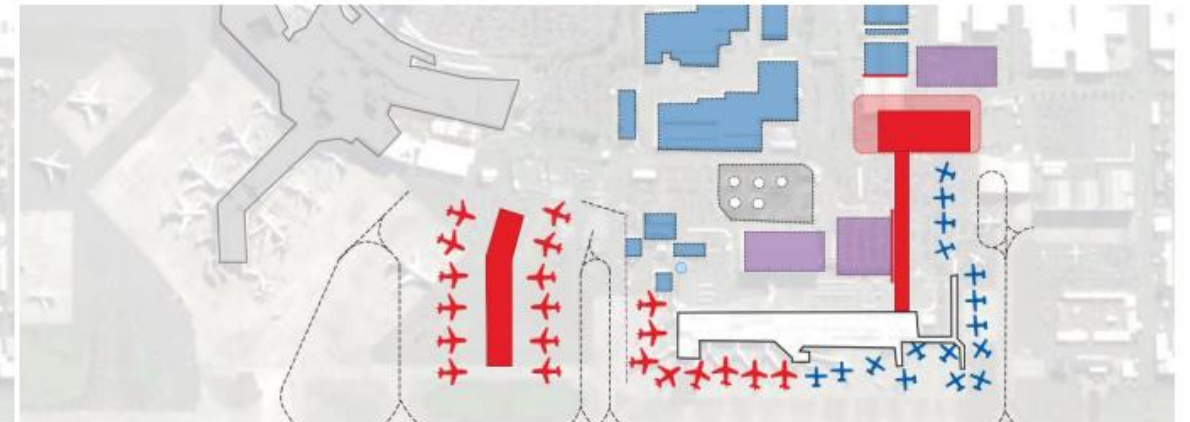
Option 3: DTB plus Pier A1.



Option 2: Eastern expansion.



Option 4: Regional Headhouse.



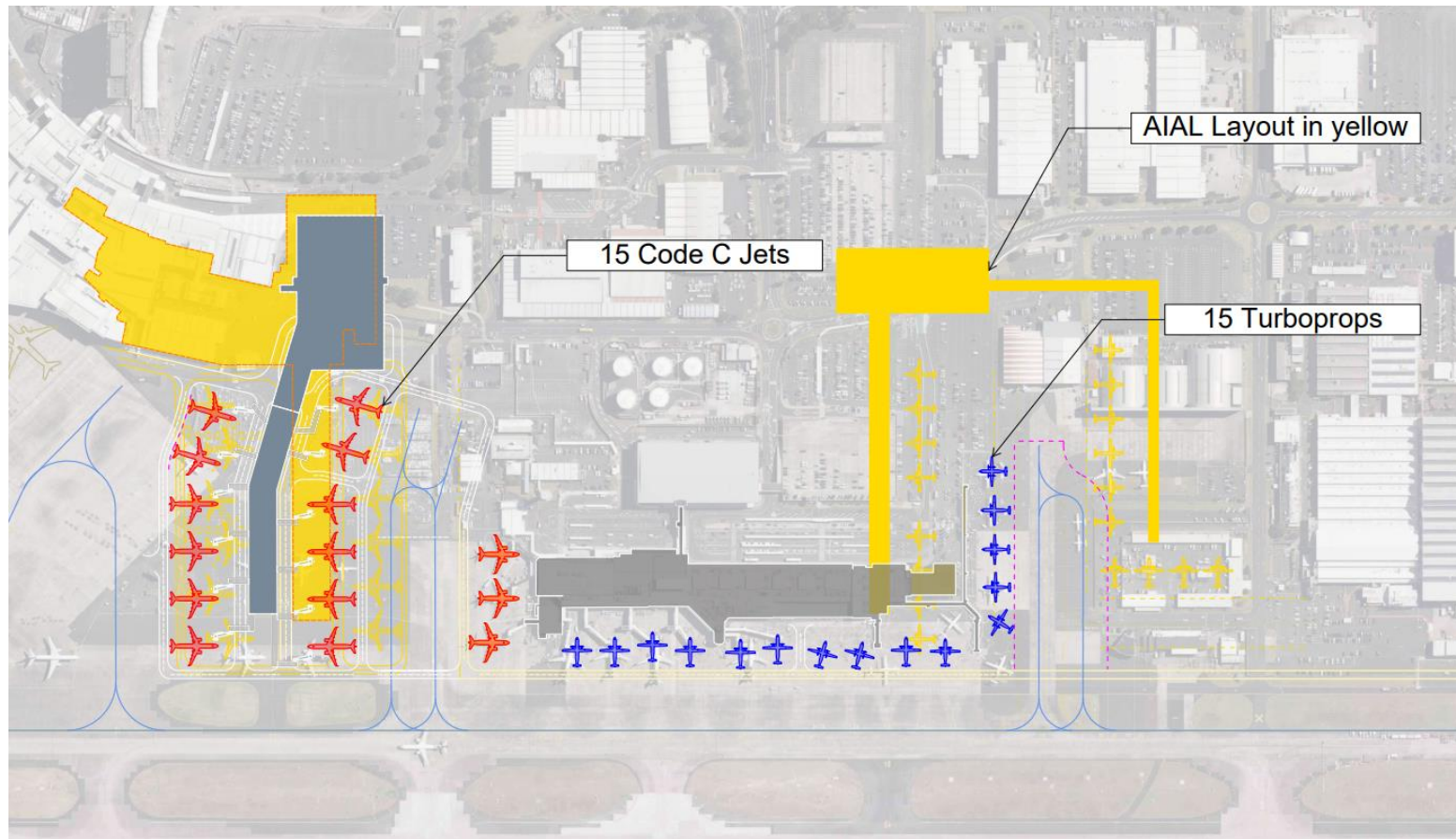
All four options were costed by quantity surveyors WT partnership and ranged from \$766m to \$1,187m



- The cost estimate elements below show the escalated P50 comparable costs of delivering the shortlisted options to the AIAL IDT proposal.
- The costs below include new build domestic terminal infrastructure, new DTB infrastructure, fitout, aviation infrastructure and pavement between the DTB and ADT/Remote Pier A1.
- Estimated on the same basis, the cost for **AIAL's IDT came out at ~\$2.2bn** which is the same cost AIAL has disclosed for the IDT portion of the Integrated Terminal Programme.

| Estimate items (Group 1 - Comparable costs) | Adjacent Domestic Terminal | | Eastern expansion | | DTB plus Pier A1 | | Regional Headhouse | |
|---|----------------------------|-------------------|----------------------|-------------------|----------------------|-------------------|----------------------|-------------------|
| | Estimate (\$NZD) | Escalation period | Estimate (\$NZD) | Escalation period | Estimate (\$NZD) | Escalation period | Estimate (\$NZD) | Escalation period |
| Terminal - Adjacent Domestic Terminal / Remote Pier | \$792,000,000 | 2023-2028 | \$342,000,000 | 2023-2028 | \$342,000,000 | 2023-2028 | \$342,000,000 | 2023-2028 |
| Terminal - Domestic terminal upgrades | \$73,000,000 | 2023-2028 | \$233,000,000 | 2023-2038+ | \$181,000,000 | 2023-2038+ | \$106,000,000 | 2023-2038 |
| Airside - Airside infrastructure | \$9,000,000 | 2023-2028 | \$5,000,000 | 2023-2028 | \$5,000,000 | 2023-2028 | \$5,000,000 | 2023-2028 |
| Airside - Pavement and Fuelling (Domestic) | \$313,000,000 | 2023-2028 | \$313,000,000 | 2023-2028 | \$313,000,000 | 2023-2028 | \$313,000,000 | 2023-2028 |
| Total escalated costs for Group 1 | \$1,187,000,000 | | \$893,000,000 | | \$841,000,000 | | \$766,000,000 | |

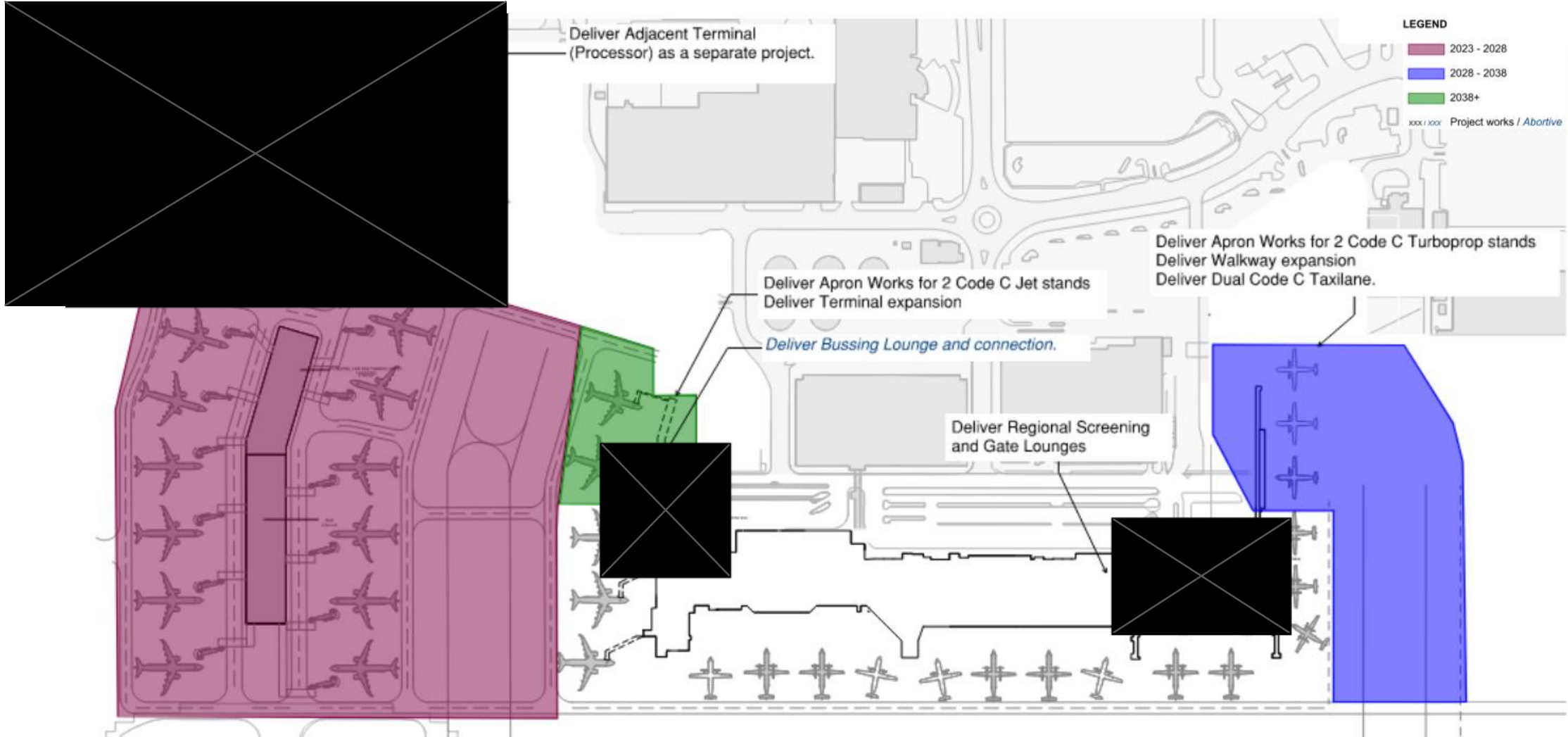
The final choice Adjacent Domestic Terminal (ADT) scored best and provides a similar outcome to the IDT for ~\$1bn less



Key features of the ADT (diagram as at 2033):

- Proposes a more streamlined pier and headhouse with the **same number of jet stands** proposed in the IDT whilst meeting IATA benchmarks.
- **Removes the identified operational constraint** of the single taxilane by providing space for a dual taxilane.
- **Reutilises the capacity** freed up in the existing DTB for regional expansion, without material further capex. (NB – the yellow building on the right-hand side represents further capex on the regional pathway which is incremental to the cost of AIAL's integrated terminal programme)
- Also **reutilises the existing DTB** for three jet stands which would otherwise have to be remote stands. This provides AIAL with flexibility – passengers can either be similarly bussed to the new IDT as if they were remote stands, or these could be retained as jet stands processed at the DTB (potentially under a separate pricing structure) for operators who do not require all the infrastructure of the IDT (e.g. lounges).
- Removes the immediate benefits but also **complexity and cost** of a fully integrated solution however allows for integration to occur at a future time and therefore minimise pricing shocks.

Additionally, a second delivery option was produced for the ADT to demonstrate capex could be staged to further minimise price shocks



For further details, please see appendix 2, section 8



Section 2: Engagement with and feedback from AIAL

Timeline of Engagement with AIAL on the Affordable Domestic Terminal Pathway



April 2023: Air NZ informs AIAL of its intention to engage Arup to investigate alternative terminal proposals, as it is not satisfied with AIAL's resolution that the IDT is the only option and that a more affordable alternative cannot be found.

May 2023: AIAL meets with Air NZ and Arup to answer questions about the IDT design and assumptions for extension of life on the DTB. Various post-meeting follow up correspondence to request further information.

September 2023: Air NZ presents initial findings on the Affordable Domestic Terminal Pathway to AIAL.

October 2023: Air NZ presents final report on the Affordable Domestic Terminal Pathway to AIAL. AIAL requests and receives further information from Air NZ in the following weeks.

December 2023: AIAL provides written feedback on Air NZ's proposals.

January 2024: Air NZ and Arup meet with AIAL to discuss feedback. Written responses subsequently supplied to AIAL.

February 2024: Further written response subsequently supplied by AIAL.

Summary of feedback received from AIAL and subsequent design amendments / responses



AIAL's key issues were reviewed and addressed by Air NZ and Arup. Arup subsequently updated its ADT design drawings to incorporate minor changes and highlight facilities AIAL could not identify on the original drawings (appendix 3). There remain key differences on which AIAL and Air NZ maintain opposing views. These include:

- **AIAL claims a cost difference of only \$100m between the ADT and IDT. Air NZ and Arup disagree.** Arup considers AIAL's cost chart adds facilities to increase the ADT to the same area as IDT to arrive at their stated difference. Arup's Quantity Surveyor (WT) costed the ADT bottom up and generated the cost of \$1.2bn for the ADT.
- **ADT is "incomplete". Air NZ and Arup disagree.** Arup has included a bus lounge for occasional operations and back-of-house (BOH) space appropriate for the smaller operation and retail footprint proposed. At this early stage of design some details may be identified to be missing or may need to be expanded, however fixes for these (such as expanding BOH space) are unlikely to materially impact overall cost savings compared to the IDT.
- **ADT "does not meet requirements". Air NZ and Arup disagree.** AIAL mentions space for border agencies which are not needed in a Domestic terminal. Arup maintains its provisions for security and screening are appropriate.
- **AIAL references high levels of activity at the DTB. Air NZ and Arup disagree.** There will be less activity at the DTB than currently occurs as it will be predominantly a regional operation servicing fewer passengers.
- **Split operations between the ADT and DTB is problematic. This is a manageable overlay.** The operational split is unknown at this stage and AIAL has options to manage this. For example, the DTB gates could be offered at a different price point to a carrier which does not require facilities such as premium lounges. Alternatively, these can be considered "remote gates" to the IDT, which is the type of operation AIAL is already proposing.



Section 3: Air NZ's concluding position and appendices



Air NZ's concluding position

- Referring back to the original questions posed to Arup, Air NZ believes there is sufficient information to reach the following conclusions:
 - **It would have been possible to find a more affordable alternative to AIAL's IDT**, if AIAL had been open to revisiting the fundamental assumptions of the project once cost escalations took aeronautical charges beyond what Air NZ considered reasonable and affordable. After repeatedly expressing concerns over the scale and cost of the Capital Plan earlier in the PSE4 consultation process, Air NZ formally requested a pause to reconsider the plan in December 2022, well before the AIAL Board affirmed their commitment to the IDT in March 2023.
 - **It is possible to continue to use the existing DTB for regional and some jet services**, for what is most likely a lower overall cost than demolishing this asset early and investing in new regional assets which will still be separate from the international and domestic terminals for many years.
- Furthermore, Air NZ believes the following based on the outcomes of this exercise:
 - Not only are there lower cost alternatives, but there are also likely to be ways of staging the build in a more efficient manner which would provide capacity without an immediate upfront capex and pricing burden.
 - This exercise looked at just the IDT spend; it is reasonable to assume applying the same approach to the entire \$6.7-7.7bn capital plan could generate further material cost savings. Air NZ requested Arup to consider a wider exercise based on AIAL's PSE4 disclosures, however Arup considered these disclosures do not provide sufficient detail to make this assessment.
- As a result, Air NZ does not believe that it can be concluded that the level and timing of capital expenditure by AIAL can be considered reasonable, nor that prices can be considered efficient, nor that AIAL is being innovative.
- Air NZ strongly encourages the Commission to consider other data points that have been offered to support analysis into whether the capex proposed is efficient and promoting best outcomes for consumers. This includes items such as IATA's global airport benchmarking cost tool, and the BISOE/airlines' demand impact study.



List of appendices

1. ARUP Final Report – Air NZ AKL Domestic Terminal Affordable Pathways Phase 1+2 – 11 August 2023
2. ARUP Final Report – Air NZ AKL Domestic Terminal Affordable Pathways Phase 3 – 26 October 2023
3. Revised ADT drawings post AIAL feedback – 02 February 2024
4. ADT vs IDT comparison drawings