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Air New Zealand

AKL Domestic Terminal – Affordable Pathways

Final Report

11 August 2023

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Content

Executive Summary

Arup has undertaken a review of the Integrated Domestic Terminal (IDT) proposal and rapid development of alternative Domestic Terminal pathways over an 8 week period.

AIAL has provided its area measurements for the IDT and these show a GFA of 64,100m^2. Arup is unable to match these areas when measuring off the drawings provided by AIAL. However, the GFA of 50,300m^2 as generated using Arup's terminal facility requirements model is 25% less than the GFA of 64,100m^2 provided by AIAL.

Benchmarking indicates that area provision in the IDT is up to 6,800m^2 per million passengers in 2043, when taking the full GFA of the facility at 76,400m^2. This ratio is higher than other airports in the New Zealand domestic context. CHC and WLG are estimated at 5,100m^2 and 3,775m^2 per million passengers per annum respectively. The proposed pier width at the IDT measures 33m. This is also wide in the context of other domestic airports in the region.

The DTB will not have capacity to 2033 without expansion. Arup has therefore explored alternative pathways to provide domestic terminal capacity.

Several alternatives have been identified and scored, based on a range of criteria including terminal, runway, operational impact and affordability.

The highest scoring option is an Adjacent Terminal including pier A1 (similar to IDT but with a reduced level of integration).

An option that provides an additional eastern processor for Regional services along with continued use of the DTB and a remote pier on A1 for Domestic Jet operation scores second best and could be an initial step on the pathway to an Adjacent or Integrated Domestic Terminal.

The IDT is the most expensive of the costed options. WT Partnership estimate that the IDT will cost in the region of $1.8 billion, based on New Zealand cost schedules. This is $400 million less than the costs provided to AIAL by Air New Zealand – however escalation costs have not been included WT Partnership's estimate. Note, the assumptions behind AIAL's costings have not been provided so are unknown.

Arup estimate that an Adjacent Domestic Terminal could cost up to $1.4+ billion, so 30% less than the cost of the IDT, based on a reduced processor requirement and simplified integration of the two terminals.

Arup recommends a Phase 3 for this study prior to sharing of options in detail with any third party.

1. Aims and Objectives

Domestic Terminal - Affordable alternative pathways

Auckland Airport has communicated its intent to replace the existing Domestic Terminal Building (DTB) with a Domestic Jet headhouse and pier (A1) integrated with the existing International Terminal. [redacted] are aligned with the 2014 Auckland Airport Masterplan [redacted]

There are two challenges arising from Auckland Airport's proposed solution, the high cost causing a serious dampening of demand to fly, and the need to extend the life of the DTB to at least 2030 and potentially longer. These challenges create two streams of work that are inter-related:

- Seeking an alternative affordable domestic terminal pathway that challenges the efficacy of the 2014 Masterplan.
- Extending the life of the DTB through operational improvements and capital investment.

Based on a site visit and discussions with Air New Zealand, Arup has developed the following approach to answer these inter-related scope items, including:

1. Assessing the sizing and area provision in the proposed Integrated Domestic Terminal (IDT).
2. Assessing the capacity of the current DTB ecosystem and how all airlines might make best use of the space within and around it at an appropriate level of customer experience and operational performance to at least 2030, and potentially beyond.
3. To explore alternative pathways for providing Domestic Terminal capacity which meet future year requirements to 2043 but which, at a minimum, meet health & safety requirements, are feasible and affordable. These aspects are "non-tradeable". Other elements including customer experience are considered "tradeable" if savings could lead to a feasible and affordable Domestic pathway.

This preliminary draft report captures the above approach and assessment of alternative Domestic Terminal pathways at Auckland Airport.

2. Disclaimer

Important considerations prior to reviewing this document

- Arup has undertaken a review of the IDT proposal and rapid development of alternative Domestic Terminal pathways over an 8 week period. Auckland Airport's Master Plan and terminal development proposals have been developed and evolved over more than a decade.
- Accordingly the information in this document is preliminary and requires further review and evolution in Phase 3 before being formally used to promote an alternative direction(s) with external stakeholders.
- We would recommend a review and sense-check by other Air New Zealand squads to help inform further option development, including the Operations team as well as those involved in Project Paheko.
- Overnight stand demand has been estimated using current stand requirements grown in line with annual DKMA forecasts and validated using L&B flight schedule data for 2018 and 2032. 2019 and 2033 DKMA flight schedule data was received from AIAL late and needs confirming following discussion with AIAL, as it currently does not have sufficient information to reconfirm overnight stand requirements.
- IDT measurements as provided by AIAL do not align with the measures Arup has made from the drawings as described in this report.
- A first pass at productivity improvements has been undertaken but further sensitivity testing and reality checking is required (e.g. feasibility of International-Domestic transfer passengers rechecking and having their baggage made-up at the International Terminal).
- The passenger transfer operation required for any remote lounge has yet to be fully explored. This could be significant operation depending on option and would therefore need to be well-planned and delivered.
- Application of the costing comparison for the long list of options has been undertaken by Arup, based on three main options costed by WT Partnership. It should be noted that these are estimates only and are provided to enable scoring of options. All cost estimates require further refinement in Phase 3 before being relied upon by Air New Zealand or any other third party.

3. Forecast Review

Methodology

Forecast data forms the basis of Arup's Programme of Facility Requirements modelling.

The following three sources have been used to generate busy hour demand:

1. DKMA Traffic Forecast Study (February 2023)
   Attachment A – DKMA Traffic Forecast Study – AirNZ
2. DKMA Design Day Flight Schedules FY19 and FY33
   Design Day – Flight Schedules AKL – FY19 – blank
   Design Day Flight Schedules AKL –FY33-blank
3. Landrum & Brown Air Traffic Forecasts
   AKL-ANZ Air Traffic Forecasts_04June2018

The data has been analysed to generate busy hour demand and stand requirements for FY2019, FY2028, FY2033, FY2038 and FY2043.

The primary data source is the DKMA Traffic Forecast which aligns with AIAL's planning and therefore allows a like-for-like comparison.

The DKMA Traffic Forecast provides a combined busy hour across the Domestic Jet and Regional sectors.

In addition, DKMA Design Day flight schedules have been used to inform the individual Domestic Jet and Regional busy hours.

Overnight stand requirements are based on current requirements which have been grown in line with annual Domestic Jet and Regional demand in the DKMA schedules. Landrum & Brown schedule data was then used to verify the Domestic Jet and Regional stand requirements for FY2019 and FY2033. Additional 2019 and 2033 DKMA flight schedule data was received from AIAL late in this study. Interrogation of this dataset has shown that key data such as date, airline and aircraft type have not been provided. In addition, some very long ground times are shown (e.g. 18+ and 19+ hours for flights to Christchurch and Palmerston North). These schedules require further discussion with AIAL or Air New Zealand before being used to reconfirm requirements.

Landrum & Brown data would allow comparison of Air New Zealand and other airline splits but the study is not at that level of granularity at this stage.

Historic busy hour data for 2019 (pre-Covid) has been used as a base as this aligns with Air New Zealand's experience of capacity issues at the Domestic Terminal Building.

3. Forecast Review

Key considerations and findings

The primary data source for the planning work documented in this pack is the DKMA Traffic Forecast which aligns with AIAL's masterplanning and terminal planning work and therefore allows a like-for-like comparison.

The data has been used generate busy hour demand for passengers and aircraft movements to FY2043.

The following busy hours have been used:

- Combined Domestic Jet and Regional for assessment of the DTB.
- Regional only for assessment [redacted]
- Domestic Jet only for assessment of the IDT.

Overnight stand requirements for 2019 align with contact stand provision on the DTB, namely 10 Domestic jets and 11 Regional turboprops.

Contact stand requirements increase to 17 Domestic jets and 16 Regional turboprops by 2043 when applying DKMA annual passenger growth forecasts.

These stand requirements drive development of the long list of alternative Domestic Terminal pathways shown in Section 8.

3. Forecast Review - Approach

Approach

DKMA Forecast *(FY2019 – 2043)*	Forms basis of busy hour demand (overall) and annual Regional, Domestic Jet and International demand	Basis of stand requirements, grown in line with annual Regional and Domestic Jet forecast
DKMA Flight Schedules *(FY2019 and FY2033)*	Applied DKMA split to understand specific Regional and Domestic Jet busy hour requirements	Uplifted busy hours by annual Regional and Domestic Jet forecast for FY2028, FY2038 and FY2043
L&B Forecast *(FY2017 – 2032)*	Analysed L&B flight schedule to split Regional and Domestic Jet and ATMs and compare overnight stands	Potential to apply airline split from L&B to understand Air New Zealand's requirements only

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3. DKMA Traffic Forecast (2023 study)

Attachment A - DKMA Traffic Forecast Study

Demand for all airlines flying Domestic Jet and Regional turboprop routes is included in the DKMA Traffic Forecast Study and in the adjacent table.

A limitation of the DKMA data is that Domestic Jet and Regional demand is combined into one forecast number. Therefore Arup has used the DKMA FY2019 and FY2033 flight schedules to inform the split between Domestic and Regional busy hours.

Busy Day Flight Schedule - Key Figures					
	Total for Domestic Jet and Regional				
	FY2019	**FY2028**	**FY2033**	**FY2038**	**FY2043**
Annual Passengers excl. Transit (000)	9594	11481	12874	14211	15623
Annual growth		2.0%	2.3%	2.0%	1.9%
Busy Day Passengers (incl. Transit)	31020	36929	40960	44753	48785
Annual Growth		2.0%	2.1%	1.8%	1.7%
Share of Annual	0.3%	0.3%	0.3%	0.3%	0.3%
Ratio over busy day	1.18	1.174	1.161	1.149	1.14
Busy Day Seats	35028	41541	46014	50070	54442
Annual Growth		1.9%	2.1%	1.7%	1.7%
Average Seat per Movement	102.1	117.3	120.5	123.3	126
Annual Growth		1.6%	0.5%	0.5%	0.4%
Load Factor	88.6%	88.9%	89.0%	89.4%	89.6%
Peak Hour Passengers (excl. Transit)					
Arrivals	1363	1679	1879	1977	2107
Annual Growth		2.3%	2.3%	1.0%	1.3%
Share of Busy Day	9.0%	9.3%	9.3%	8.9%	8.8%
Departures	1355	1625	1736	1893	2113
Annual Growth		2.0%	1.3%	1.7%	2.2%
Share of Busy Day	8.5%	8.6%	8.4%	8.4%	8.5%
Busy Day ATMs (Comm. Pax Acft)	343	354	382	406	432
Annual Growth		0.4%	1.5%	1.2%	1.2%
Peak Hour ATMs					
Arrivals	15	16	17	17	18
Share of Busy Day	8.8%	9.1%	8.9%	8.4%	8.4%
Departures	16	17	19	20	21
Share of Busy Day	8.3%	8.6%	9.0%	9.3%	9.3%

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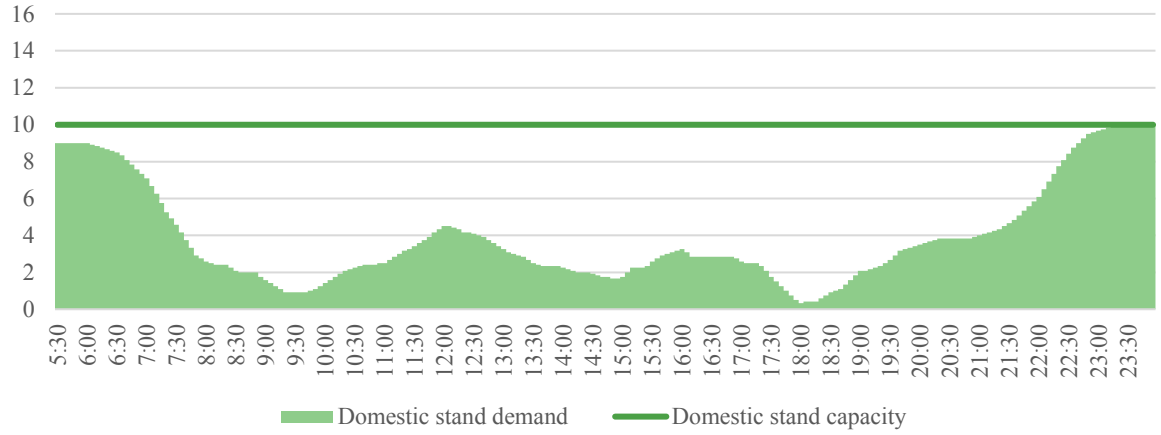
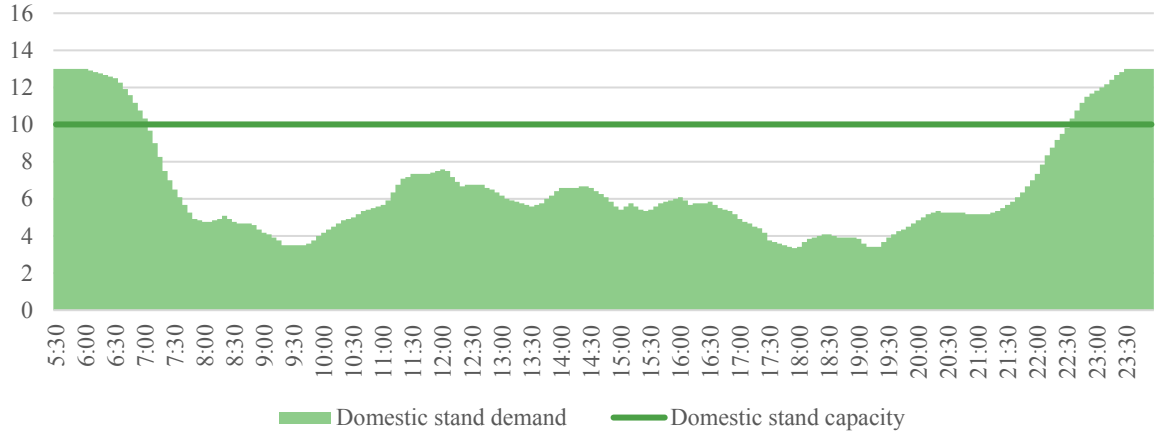
3. L&B Air Traffic Forecasts (2018 study)

Overnight stand analysis in 2018 and 2032

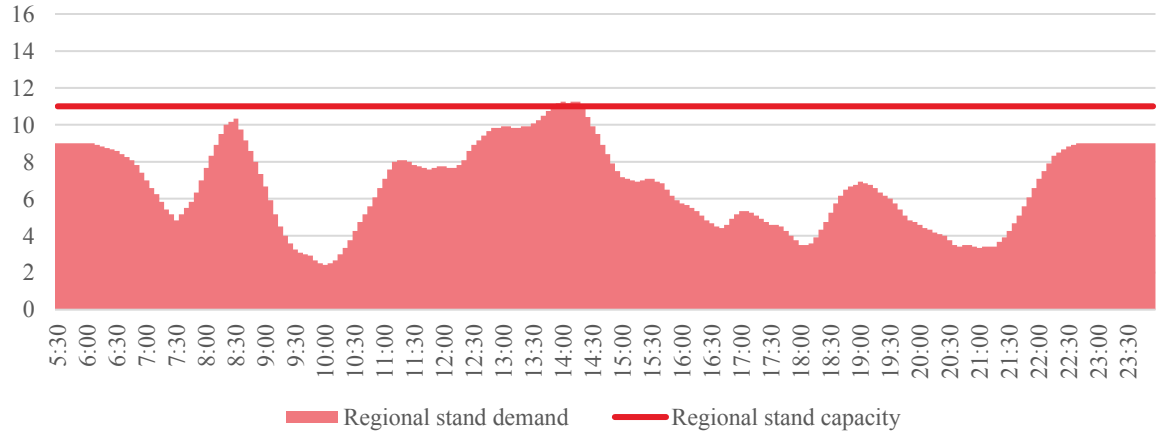
Auckland Domestic Jet stand capacity assessment, FY2018



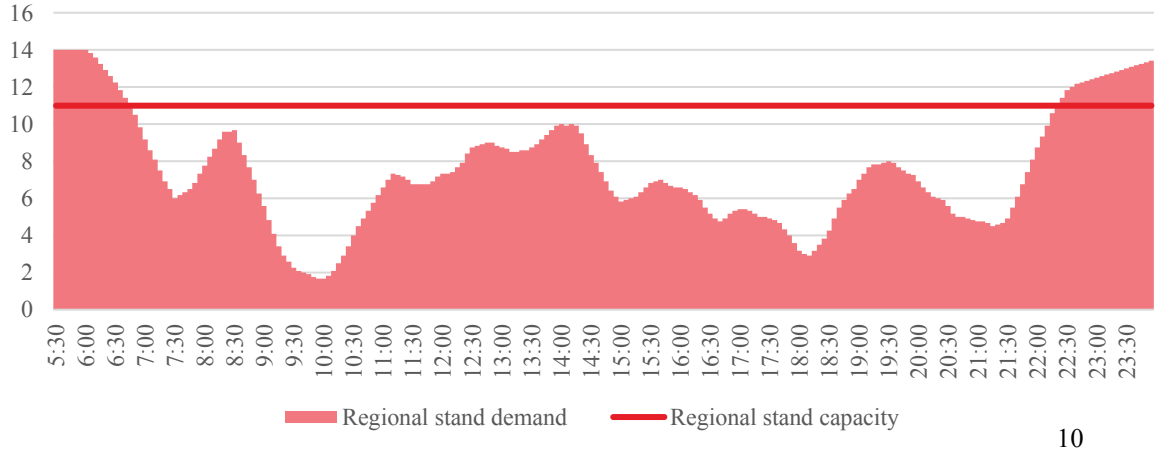
Auckland Domestic Jet stand capacity assessment, FY2032



Auckland Regional stand capacity assessment, FY2018



Auckland Regional stand capacity assessment, FY2032



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3. L&B Air Traffic Forecasts (2018 study)

Airline split – percentage of Air New Zealand

The L&B flight schedule data can be used to derive Air New Zealand's busy hour share and the proportion applied to the DKMA dataset.

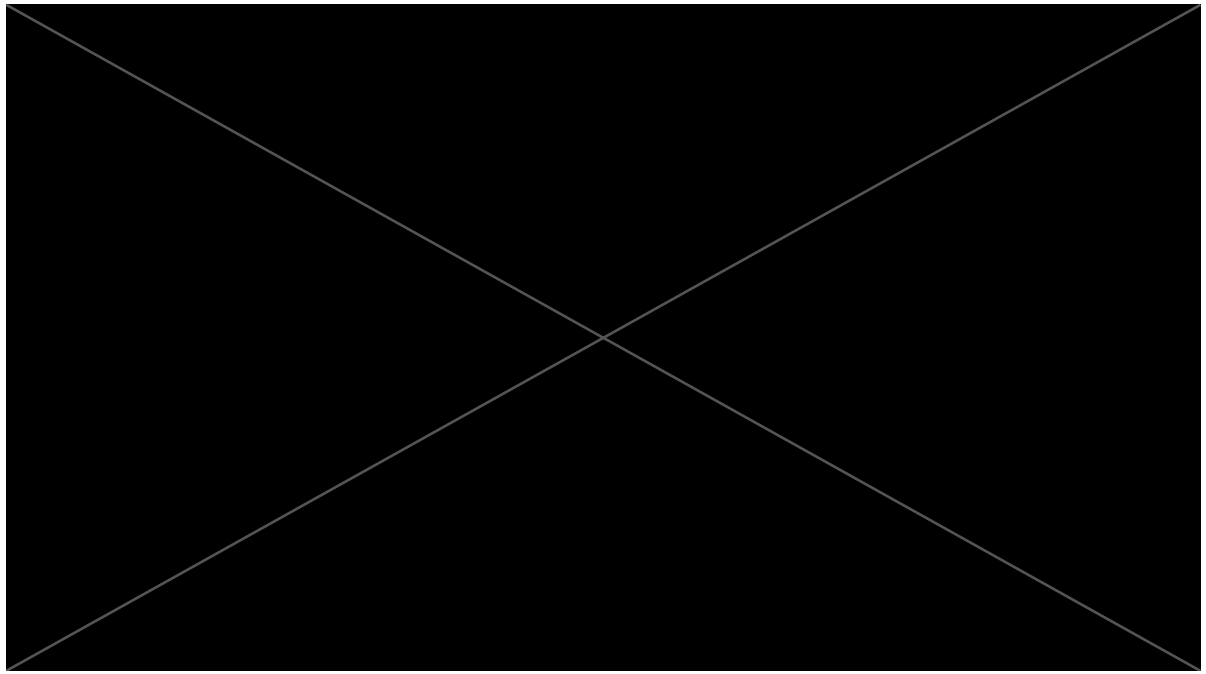
Note: this study has not used Air New Zealand and other airline carrier shares at this point.

AKL Forecast Summary – Passengers (All Airlines)

		FY2017	FY2018	FY2022	FY2027	FY2032
Domestic Passengers	Annual	8,601,841	9,031,000	10,468,000	12,221,000	13,855,000
	Peak Month Ratio	*9.5%*	*9.5%*	*9.5%*	*9.5%*	*9.5%*
	Peak Month	817,781	855,400	991,500	1,157,600	1,312,100
	Design Day Ratio	*3.4%*	*3.4%*	*3.4%*	*3.4%*	*3.4%*
	Design Day	27,818	29,210	33,754	39,321	44,563
	Peak Hour Ratio	*10.1%*	*9.1%*	*9.1%*	*8.9%*	*8.3%*
	Peak Hour	2,800	2,648	3,074	3,497	3,711
International Passengers	Annual	10,418,732	11,019,000	13,357,000	16,230,000	18,737,000
	Peak Month Ratio	*9.9%*	*9.8%*	*9.8%*	*9.8%*	*9.8%*
	Peak Month	1,030,163	1,081,800	1,308,900	1,590,000	1,835,200
	Design Day Ratio	*3.6%*	*3.4%*	*3.5%*	*3.5%*	*3.5%*
	Design Day	37,029	37,105	46,433	56,079	65,130
	Peak Hour Ratio	*8.6%*	*9.6%*	*9.5%*	*9.6%*	*9.7%*
	Peak Hour	3,175	3,550	4,417	5,402	6,301
Total Passengers	Annual	19,020,573	20,050,000	23,825,000	28,451,000	32,592,000
	Peak Month Ratio	*9.7%*	*9.7%*	*9.7%*	*9.7%*	*9.7%*
	Peak Month	1,847,944	1,937,200	2,300,400	2,747,600	3,147,300
	Design Day Ratio	*3.5%*	*3.4%*	*3.5%*	*3.5%*	*3.5%*
	Design Day	64,846	66,315	80,188	95,399	109,693
	Peak Hour Ratio	*8.5%*	*8.4%*	*8.2%*	*8.0%*	*7.8%*
	Peak Hour	5,495	5,564	6,572	7,601	8,527

Notes: Design day and peak hour metrics derived from the DDFS.

Landrum & Brown ▪ 64



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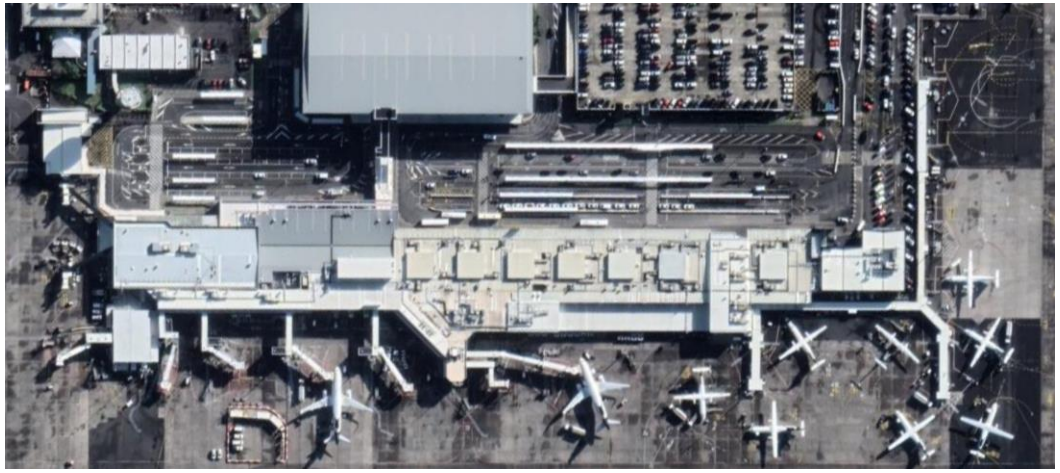
3. Overnight Stand Requirements

Grown in line with DKMA | L&B used as a check

2019 overnight stand requirement matches current provision and is therefore used as base from which to grow requirements.

Future stand requirements have been grown in line with the DKMA forecast.

Comparison of 2018 and 2032 L&B DDFS stand requirements with 2033 output indicates appropriateness of this growth method.



© Google Earth, accessed 12/05/2023

	FY2019	**FY2028**	**FY2033**	**FY2038**	**FY2043**	**FY2048**
	Current provision	*Grown Annually*	*Grown Annually*	*Grown Annually*	*Grown Annually*	*Grown Annually*
Domestic mppa	6771000	8239000	9294000	10321000	11414000	13046000
Regional mppa	2823000	3242000	3580000	3890000	4209000	4548000
Domestic	10	12	14	15	17	19
Regional	11	13	14	15	16	18
Total stands	21	25	28	30	33	37

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3. Forecast Review – Output for PoR

Busy hour passenger and aircraft movements

The following table of demand data forms the basis of the Programme of Requirements calculations. The demand shown is across all airlines (i.e. Air New Zealand and other carriers).

Busy Hour Passenger movements	FY2019	FY2028	FY2033	FY2038	FY2043
Regional Arrivals	443	536	592	643	696
Regional Departures	564	516	570	619	670
Domestic Arrivals	985	1,242	1,401	1,556	1,721
Domestic Departures	991	1,320	1,489	1,654	1,829
Regional + Domestic Arrivals	1,363	1,679	1,879	1,977	2,107
Regional + Domestic Departures	1,355	1,625	1,736	1,893	2,113
International Arrivals	1,584	1,865	2,462	2,883	3,305
International Departures	1,657	1,974	2,308	2,667	3,043

Busy Hour ATMs (All Aircraft)	FY2019	FY2028	FY2033	FY2038	FY2043
Regional Arrivals	10	11	11	11	11
Regional Departures	11	11	11	12	12
Domestic Arrivals	5	5	6	6	7
Domestic Departures	5	6	8	8	9
Regional + Domestic Arrivals	15	16	17	17	18
Regional + Domestic Departures	16	17	19	20	21
International Arrivals	8	10	13	14	15
International Departures	8	9	10	12	14

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4. Programme of Requirements

Methodology

Taking the base and future year busy hour demand and ATMs, Arup has developed a Programme of Requirements (PoR) model to inform facility requirements at the airport. The model includes both facility requirements (such as the number of check-in kiosks and security lanes) as well as area requirements for key processes, including:

- Check-in
- Security
- Airside Baggage Handling
- Stand requirements
- Gate lounges
- Airline lounges
- Retail
- Baggage Reclaim
- Arrivals Hall

In addition to busy hour demand, a number of assumptions form the basis of the PoR model. Where known, we have used Air New Zealand data such as check-in splits (online, conventional, kiosk) and processing times, as well as domestic jet and regional lounge requirements. IATA targets and benchmarked assumptions complete the list of assumptions.

Auckland Airport's 50% call-to-gate operation has been reflected in the PoR calculations. This means that the gate lounges have been sized based on 50% of departing passengers waiting in the gate lounge, which aligns with AIAL's planning approach.

Separate PoRs have been created for Domestic Jet and Regional, Regional only and Domestic Jet only scenarios. These PoR outputs further inform the area requirements for the alternative pathways that are identified in this study.

The PoR model is an estimate of facility requirements and can tend to be leaner than actual facility sizing when considering architectural form, structure, circulation etc. An estimate is made for this using a Net to Gross ratio to give an estimated Gross Floor Area.

4. Programme of Requirements

Key findings

The PoR model has been developed for the:

- Combined Domestic Jet and Regional traffic for the assessment of the DTB. This shows a total GFA of 37,200m^2 in 2043. The current DTB is 25,000m^2 and therefore additional capacity is required.
- Regional only for assessment of [redacted] This shows a total GFA for a Regional facility of 13,100m^2 in 2043.
- Domestic Jet demand only for assessment of the IDT, as described in Section 5.

4. DTB PoR

Output summary

Combined requirements for Domestic Jet and Regional demand in the DTB for all airlines are shown in the adjacent PoR summary to 2033. This scenario most closely resembles the current operation of the DTB, with shared facilities for Domestic Jet and Regional operations, such as baggage make-up.

The PoR is based on DKMA busy hour demand and facility requirements to meet this demand assuming benchmarked processing rates, IATA Optimum queuing times and space per passenger. Where appropriate, the PoR uses Air New Zealand data to inform requirements, such as check-in utilisation, processing times and bag per passenger ratios.

Gate lounges have been sized based on the number of departing flights in the busy hour, and assuming 70% of passengers are seated at 2.2m² in line with IATA Optimum. In addition, this PoR assumes contiguous gate lounges for regional and domestic jet operations, as opposed to dedicated gate lounges, which reflects the lower level of gate lounge provision in the DTB currently.

2033 DTB PoR Summary

Domestic and Regional

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		FY2019	FY2028	FY2033
Annual Domestic Trunk MPPA		6,771,000	8,239,000	9,294,000
Annual Regional MPPA		2,823,000	3,242,000	3,580,000
Total Domestic MPPA		9,594,000	11,481,000	12,874,000
Check-In				
Total Check-In	m^2	1,000	1,100	1,300
Security				
Domestic Security	m^2	700	900	1,100
Regional Security	m^2	500	500	500
Total Security	m^2	1,200	1,400	1,600
Airside Baggage Handling		-	-	-
Total Airside Baggage Handling	m^2	2,700	3,250	3,550
Stands		-	-	-
Domestic Jet stands required	no.	10	12	14
Regional stands required	no.	11	13	14
Total stands required	no.	21	25	28
Gate lounges (based on departures)				
Domestic gate lounges (departures)	no.	5	6	8
Regional gate lounges (departures)	no.	11	11	11
Domestic gate lounges (departures)	m^2	900	1,100	1,400
Regional gate lounges (departures)	m^2	900	900	900
Total Gate Lounges (departures)	m^2	1,800	2,000	2,300
Domestic + Regional Airline Lounges				
Regional estimates (based on current provision,	m^2	1,000	1,200	1,300
Domestic requirements (from AirNZ)	m^2	1,800	2,200	2,500
Total Requirements (Regional plus Domestic)	m^2	2,800	3,400	3,800
Domestic + Regional retail (based on 500m2/MPPA)				
Total retail (average)	m^2	4,800	5,700	6,400
Baggage Reclaim				
Total Baggage Reclaim	m^2	1,500	1,500	1,500
Arrivals hall				
Domestic arrivals hall	m^2	600	700	800
Regional arrivals hall	m^2	300	300	400
Total arrivals hall	m^2	900	1,000	1,200
Total Net Area	m^2	16,700	19,350	21,650
Total Gross Area	m^2	28,700	33,300	37,200

4. Regional PoR

Output summary

The Regional only PoR is shown adjacent. This PoR is based on DKMA busy hour demand and facility requirements to meet this demand assuming benchmarked processing rates, IATA Optimum queuing times and space per passenger.

A slight decrease in Regional demand is anticipated between 2019 and 2033 owing to some Hawke's Bay (NPE) flights switching to larger jet aircraft, thereby effectively becoming Domestic Jet routes.

Should Regional screening be introduced in Auckland, the PoR has identified that two screening lanes are required based on busy hour demand to 2043.

Overall, once screening is introduced for passengers and bags, a facility of around 13,000m^2 is anticipated just to serve Regional traffic, equivalent to half the size of the current DTB.

2023 Regional PoR Summary

Regional stand-alone facilities

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		FY2019	FY2028	FY2033	FY2038	FY2043
Annual Regional MPPA		2,823,000	3,242,000	3,580,000	3,890,000	4,209,000
Check-In						
Regional check-in kiosks	no.	11	10	11	12	13
Regional check-in counters	no.	4	3	4	4	4
Regional Check-In	m^2	400	300	400	400	400
Total Check-In	m^2	400	300	400	400	400
Security						
Regional lanes (if required)	no.	2	2	2	2	2
Regional Security	m^2	500	500	500	500	500
Total Security	m^2	500	500	500	500	500
Total Departures	m^2	900	800	900	900	900
Airside Baggage Handling						
Baggage make-up positions	no.	11	11	11	12	12
Baggage make-up	m^2	550	550	550	600	600
Hold baggage screening	m^2	400	400	400	400	400
Off-load and handling support	m^2	100	100	100	100	100
Total Airside Baggage Handling	m^2	1050	1050	1050	1100	1100
Stands						
Regional stands required	no.	11	13	14	15	16
Total stands required	no.	11	13	14	15	16
Gate lounges (based on departures)						
Regional gate lounges (departures)	no.	11	11	11	12	12
Regional gate lounges (departures)	m^2	900	900	900	1000	1000
Total Gate Lounges (departures)	m^2	900	900	900	1000	1000
Airline Lounges						
Regional requirements (estimated)	m^2	1000	1100	1300	1400	1500
Regional retail						
Airside	m^2	1100	1200	1300	1500	1600
Landside	m^2	400	400	400	500	500
Total retail (average)	m^2	1500	1600	1700	2000	2100
Baggage Reclaim						
Regional reclaim belts	no.	2	2	2	2	2
Regional reclaim	m^2	400	400	400	400	400
Circulation and cart storage	m^2	200	200	200	200	200
Total Baggage Reclaim	m^2	600	600	600	600	600
Arrivals hall						
Regional arrivals hall	m^2	400	300	400	400	400
Total arrivals hall	m^2	400	300	400	400	400
Total Net Area	m^2	6,350	6,350	6,850	7,400	7,600
Total Gross Area	m^2	11,000	11,000	11,800	12,800	13,100

5. Evaluation of the IDT

Methodology

Auckland Airport is developing a new integrated International-Domestic Jet terminal to replace the DTB in the longer term. The proposed design includes integrated security and baggage systems, as well as a Domestic Jet pier with space for up to 12 Code C stands.

[redacted]

Three components make up Arup's assessment of the Integrated Domestic Terminal:

- Area measurements from the proposed IDT provided in PDF *23.03.10 AKL DOM Integrated Terminal Concept Design*
- IDT area provision as provided by AIAL in *Copy of 2023 05 19_RFI_AIAL Programme of Requirements information (002) (version 1).xlsb*
- Arup's Programme of Requirements model for the IDT – the facility requirements generated assess the provision of infrastructure and space within the IDT and identify where there may be opportunities for savings.

The following pages provide a summary of each of these components.

5. Evaluation of the IDT

Key findings

The assessment of the IDT has identified the following key findings:

- The total IDT GFA as measured by Arup using PDF drawings provided by AIAL totals 76,400m².
- Taking the International security and lounge out of this total gives a "Domestic" component of the IDT at 70,400m² (note this area includes combined Domestic and International baggage make-up which is one system and cannot be disaggregated).
- AIAL has provided its area measurements for the IDT and these show a GFA of 64,100m². Accordingly the areas measured by Arup are ~6,300m² larger than those provided by AIAL.
- Comparing individual facilities within the IDT, Arup has identified notable differences for airside retail and the arrivals hall.
- For airside retail and F&B, AIAL's areas do not include dwell or key components of each F&B facility such as kitchens.
- For the arrivals hall, the difference in areas is unclear as AIAL has provided its areas without any supporting material showing how these have been measured.
- Arup has also generated a PoR model for assessment of the IDT. 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, and the fact that the IDT baggage make-up facility is combined International and Domestic, the GFA requirement increases to 50,300m².
- The GFA of 50,300m² as generated using Arup's PoR model is therefore 25% less than the GFA of 64,100m² provided by AIAL.
- Compared to the areas provided by AIAL, key differences in the PoR include security, gate lounges in the pier, retail/F&B including dwell and the arrivals hall.
- Note, the PoR model is an estimate of facility requirements and can tend to be leaner than actual facility sizing when considering architectural form, structure, circulation etc.

5. IDT Area Provision

Approach

Areas have been scaled from the IDT pdf, entitled “23.03.10 AKL DOM Integrated Terminal Concept Design.pdf”, as provided to Air New Zealand by AIAL.

Areas are scaled from all 5 levels and categorised as follows:

- Security
- Baggage Make Up
- Departure Gate Lounges
- Airline/Airport Lounges
- Retail Airside and Landside
- Baggage Reclaim
- Arrivals Hall
- Toilets
- Vertical circulation provision (public)
- Back of House

Note, Departures Hall and Check-In are not included in the drawings.

5. IDT Area Provision by Facility

Initial scaling from 23.03.10 AKL DOM Integrated Terminal Concept Design.pdf

An initial review of the IDT drawings identified areas for further consideration, as presented in the Milestone 1 Workshop on 18 May 2023 and to the Air New Zealand Leadership Squad on 1 June 2023. Findings have further evolved as described in this section of the report with a more refined measure of areas on every floor of the IDT provided.

- **Security:** Area per security lane seems high. PoR suggests ~200m^2 per lane, including queue and re-composure, as compared to 300+m^2 on the AIAL drawings.
- **Baggage make-up:** Includes provision for International baggage also. Volume and complexity of baggage system may drive higher cost.
- **Gate lounge:** Area per gate lounge higher than expected. Appears to assume more passengers at gate (early call-to-gate). Limited allowance for passengers seated in F&B despite significant area provision.
- **Airside retail:** ~750m^2 per passenger by 2043 including offices and back-of-house. However, New Zealand domestic context could drive lower provision. Needs further consideration.
- **Baggage reclaim**: Two carousels with passive provision for a third carousel. Number of facilities aligns with PoR. However, larger belts provided which are more appropriate for wide-body aircraft.

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5. Specific facilities

From 23.03.10 AKL DOM Integrated Terminal Concept Design.pdf

Security

PoR indicates 200m^2 required per lane including queuing, assuming 10 minute maximum wait. Note, shape of building dictates the additional space.

Volume and complexity of baggage system will likely drive higher cost.

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5. IDT sizing assumptions

Provided by AIAL

Area	AIAL assumption	Arup PoR assumption*	Notes on assumptions
Maximum wait time security	7.5min	10min	AIAL assumption should reduce waiting space required at security
Passengers seated in hold room	60%	70%	
Seating space (sq m per passenger)	2	2.2	
Passengers standing in hold room	40%	30%	
Standing space (sq m per passenger)	1.4	1.5	
Passengers in concessions	50%	20%	Arup PoR also assumes 10% in airline lounge. Arup has adapted 50% in concessions in its PoR calculations.
Arrivals hall % dwelling	18%	10%	Drives a higher area requirement in the arrivals hall.
M/G per passenger	0.8	0.2	
Space utilisation at arrivals hall	2.1	1.8	

*Arup has aligned the PoR assumptions around AIAL's 50%-call-to-gate operation to enable a like-for-like comparison.

5. IDT Area Provision

As provided by AIAL

	Area
Domestic Security	3,977
Total Baggage Handling	12,674
Domestic Gate Lounges	3,675
Domestic Airline Lounges	4,497
Airside retail	1297
Airside F&B	2237
Landside retail	227
Landside F&B	327
Total retail	4,088
Domestic Baggage Reclaim	Incl. below
Domestic Arrivals hall	7686
Total Net Area	36,597
Total Gross Area (including Back of House)	64,093

Notes:

1. Domestic security includes departures, D-I, bulk screening, non-pax screening.
2. Baggage handling includes international and domestic areas (excl reclaim and check-in).
3. Gate area only, circulation excl.
4. Lounge area incl. lobbies etc.
5. Retail BOH excluded.
6. Net area excludes all circulation, VT, BOH areas, central dwell, airbridges, plant etc.
7. Total gross is domestic only

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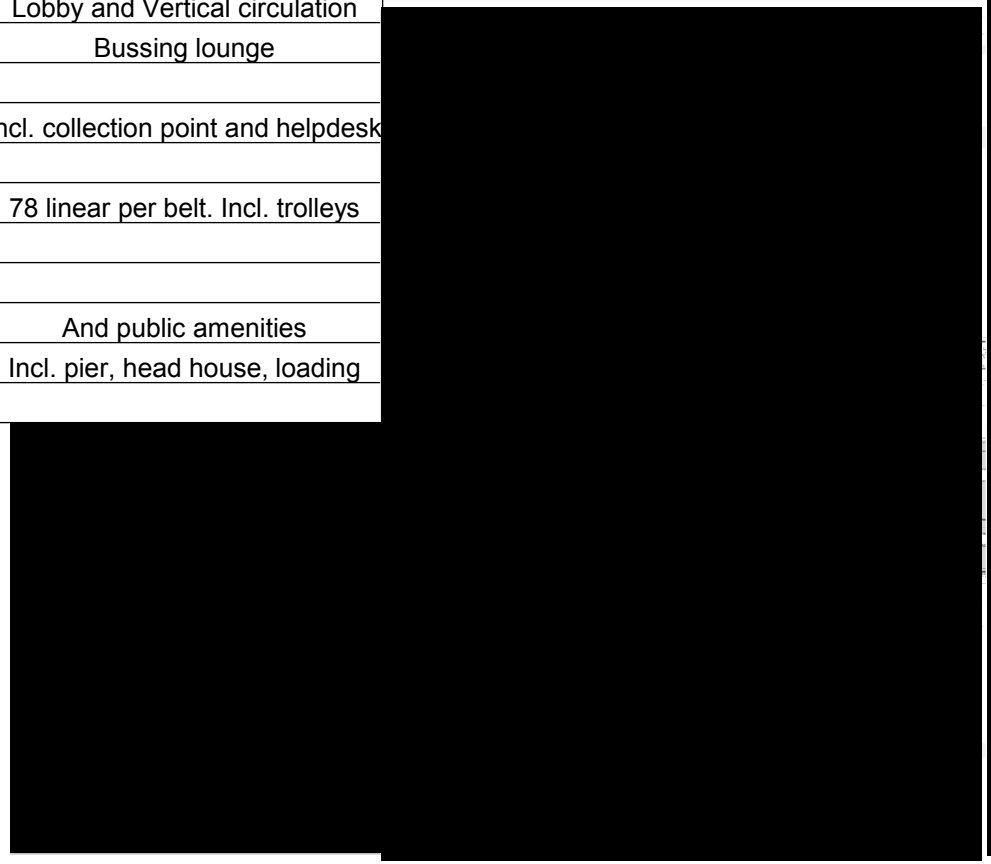
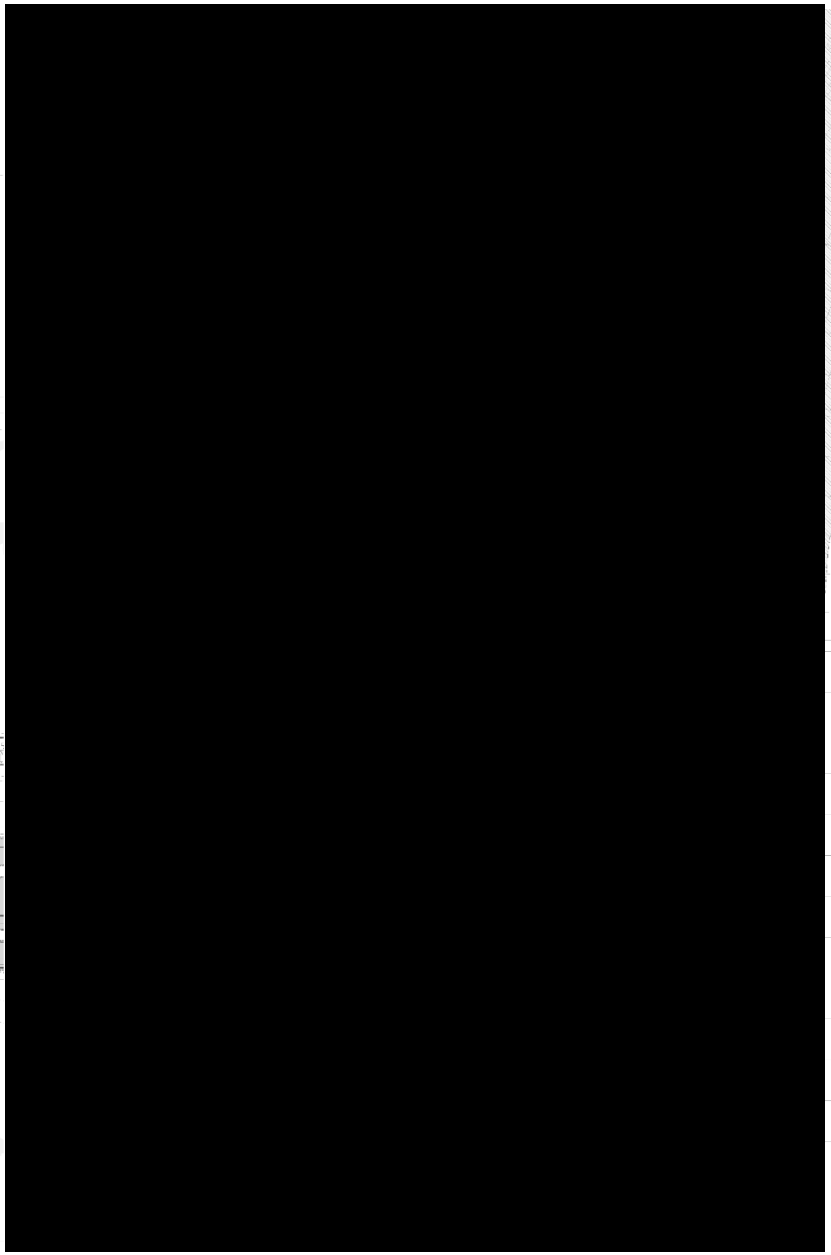
5. IDT Area Provision – Measured

Ground Floor

Ground Floor	Key	Count	Area in m²	Comments
Baggage systems			**12,050**	
Baggage outbound			8,700	Serves new check-in hall
Baggage inbound			1,850	Serves dom. reclaim hall
Early bag store			1,500	Serves new check-in hall
Pier			**1,279**	Lobby and Vertical circulation
Gate lounge seating			645	Bussing lounge
Podium + circulation			634	
Concessions			**637**	Incl. collection point and helpdesk
Arrivals			**4,517**	
Baggage reclaim		3	3,095	78 linear per belt. Incl. trolleys
Meeter-greeter area			424	
Circulation			998	
Restrooms			**859**	And public amenities
BoH (all) and VT			**9,855**	Incl. pier, head house, loading
Total			**29,197**	





5. IDT Area Provision – Measured

Ground Mezzanine Floor

Ground Mezzanine Floor	Key	Count	Area in m²	Comments
Baggage outbound				Catwalks and floors not defined in plans but would exist in BHS
Baggage inbound				
Early bag store				
Back of House			1,656	Pier
Total			**1,656**	

[redacted]

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5. IDT Area Provision – Measured

First Floor

First Floor	Key	Count	Area in m²	Comments
Pre-boarding screening			**7,650**	Incl. boarding pass check, Dom + Int security, D – I, circulation and customs
Dom security		6	2,908	
D to I		2	582	
Int security		8	4,160	
Pier (boarding gates)			**5,961**	
Gate lounge			1,200	
Casual seating			1,300	
Podium, boarding Q			886	Gate podium and queuing space
Pier circulation			2,575	
Airline/Airport lounge			**192**	Lobby and Vertical circulation
Concessions			**8,706**	
Retail and F&B			4,545	
Seating/dwell			1,846	Incl. food court
Circulation			2,315	
Arrivals circulation			277	
Restrooms			**1,408**	Incl. public amenities
Back of House			**4,849**	
Circulation			**1,000**	
Total			**30,043**	

5. IDT Area Provision – Measured

Second Floor

Second Floor	Key	Count	Area in m²	Comments
Back of House			**7,720**	
Airline/Airport lounges			**5,649**	Includes Strata, domestic, international and extentions
Air NZ domestic			2,869	Includes extensions
Air NZ international			1,847	
Strava lounge			933	
Circulation			**1,067**	
Total			**14,436**	

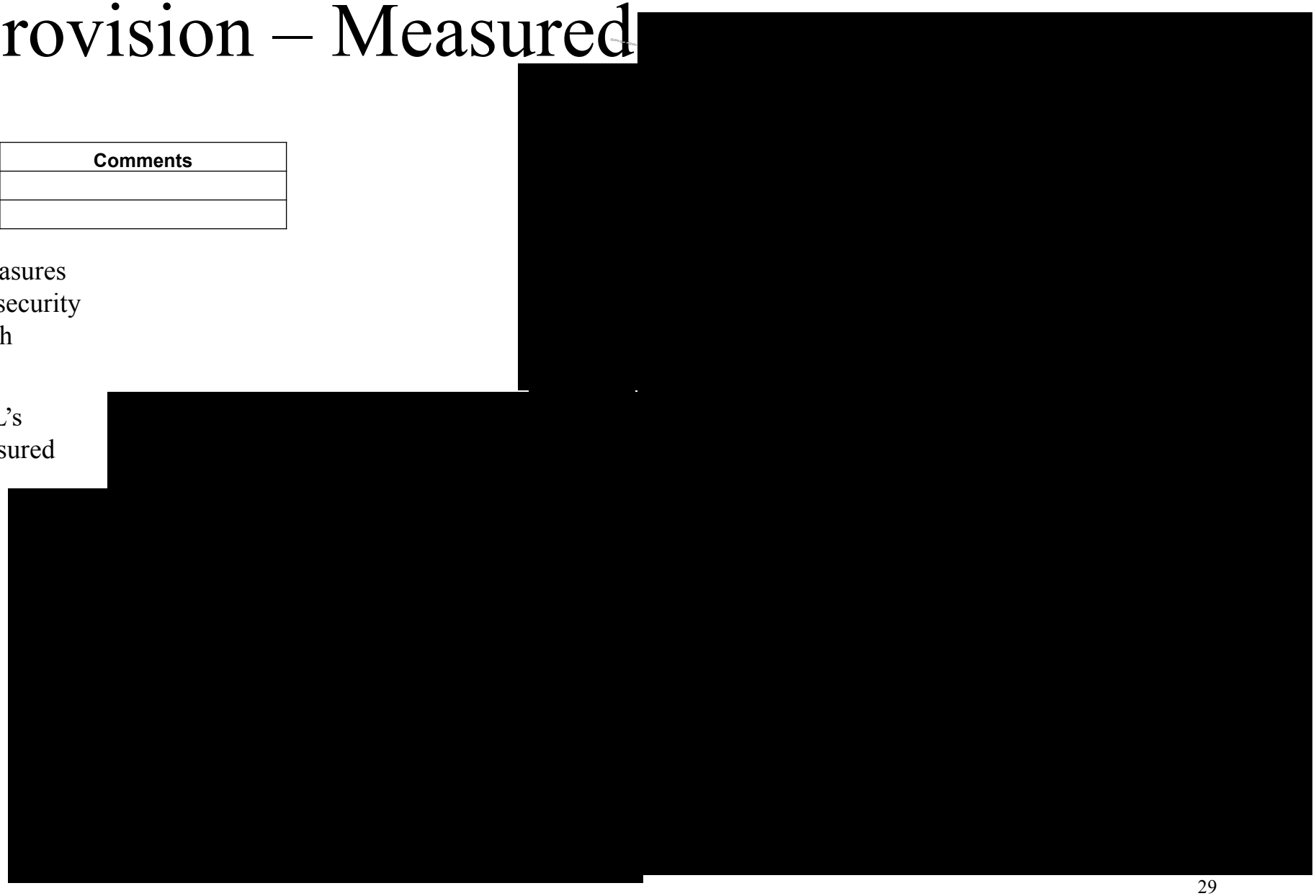
5. IDT Area Provision – Measured

Third Floor

Third Floor	Key	Count	Area in m²	Comments
Back of House			1,085	
Total			**1,085**	

The total area across all five floors measures 76,417m². This includes international security and a baggage system that handles both domestic and international baggage.

The following page sets out how AIAL's provided numbers differ from the measured areas on the IDT drawing.



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5. IDT Area Provision

Measured from PDF

Area in m²	AIAL Area Provisions	Measurements from IDT PDF	Difference	Notes on measurements
Domestic Security	3,977	4,810	833	Includes D-I, bulk screening, non-passenger screening
Total Baggage Handling	12,674	12,050	-624	
Domestic Gate Lounges	3,675	4,075	400	Includes seats, desks and bus lounges, casual seating
Domestic Airline Lounges	4,497	3,994	-503	Includes domestic, extensions and Strata
Airside retail + F&B	3,534	6,391	2,857	Includes kitchen, dwell
Landside retail + F&B	554	637	83	
Domestic Arrivals Hall (incl. reclaim)	7,686	4,517	-3,169	Includes luggage belts, trolley storage, meet & greet, arrivals hall
Total Net Area	36,597	36,473	-124	
Total Gross Area (incl. BoH)	**64,093**			
Other measured areas in m²	**AIAL Area Provisions**	**Measurements from IDT PDF**	**Difference**	**Notes on measurements**
International security		4,161		
International lounge		1,847		
Back of House		26,109		
Circulation		7,827		Pier (lounge) circulation, concessions, escalators, stairs
Total Gross Area (incl. BoH)		**76,417**		

The main differences between the area provisions and PDF measurements are at the airside retail and Domestic arrivals. The airside retail area measured by Arup is nearly 3,000m² larger than the stated provision – owing to the inclusion of kitchens and retail dwell such as food courts and other F&B seating. It is unclear where retail dwell has been accounted for in AIAL's stated area provision.

Secondly, AIAL has stated a Domestic arrivals hall provision of 7,686m². On the PDF, Arup measures an area which is ~3,000m² smaller.

When discounting the ~6,000m² of specific International functions in the IDT (security and airline lounge), the remaining "Domestic" component of the measured building is ~70,400m², or ~6,300m² larger than the area stated by AIAL.

5. IDT Area Provision

Difference in measured areas

5. IDT PoR

Output summary

The PoR for the Integrated Domestic Terminal considers three options to 2043:

- Domestic only: a "bare-bones" option capturing the Domestic Jet only requirements of the IDT.
- Domestic plus geometric constraint: as above but reflecting the shape of the integrated terminal and airfield geometric constraints caused by the need to accommodate Code E aircraft west of the new pier.
- Domestic with International baggage plus geometric constraint: as above, includes International baggage make-up component as it is impossible to disaggregate the proposed IDT baggage system.

Note, the PoR shows overall stand requirements to 2043, comprising 17 jet stands. Gate lounges for some of these stands may need to be accommodated elsewhere.

Note, check-in has not been included in the IDT PoR as this facility is not part of the IDT plans.

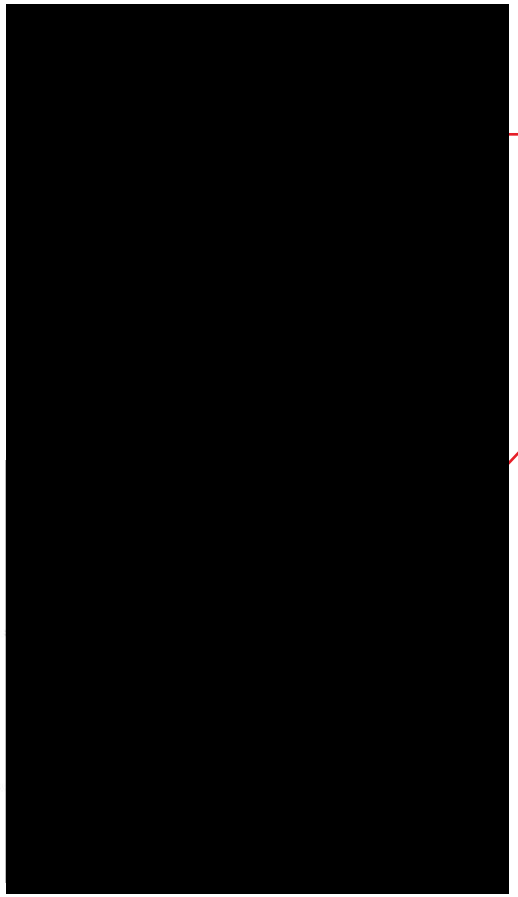
2043 IDT PoR Summary

AIR NEW ZEALAND ARUP

		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

5. IDT – AIAL as compared to PoR model

Impossible to disaggregate Domestic and International baggage make-up



Area	AIAL Area Provisions	PoR 2043	Notes on measurements
Domestic Security		1,700	
Geometric constraint		*1,500*	
Total Domestic security	3,977	3,200	D-I included in the PoR
Domestic baggage handling incl. off-load		2,650	Includes make-up, screening and off-load
International baggage make-up and screening		3,700	Assumes off-loading occurs at international terminal
Geometric constraint		*4,000*	
Total Baggage Handling	12,674	10,350	
Domestic Gate Lounges	3,675 (4,665 with other pier seating)	3,100	Note, PoR requirement is also for 17 stands. 12 stands would require less than 2,500m^2 of gate lounge space.
Domestic Airline Lounges	4,497	4,300	Air New Zealand requirement plus Strata lounge
Airside and landside retail + F&B	4,088 (5,888 including dwell)	5,700	Retail in PoR include dwell space
Domestic Arrivals Hall (incl. reclaim)	7,686	2,500	Based on 3x50m reclaim belts and lower M/G ratio
Total Net Area	36,597	29,250	
Total Gross Area (incl. BoH)	64,093*	50,300	PoR BoH ratio is 1.72, AIAL is 1.75
* Additional space (pier seating, F&B dwell, offices, unallocated areas) not included.			

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6. Benchmarking with other airports

Methodology

Arup has compared the current DTB and proposed IDT against other airports both in New Zealand and internationally. The following pages provide a summary of the benchmarking, including:

- IDT and DTB area sizing comparison
- IDT and DTB Gross Floor Area (GFA) per Million Passengers Per Annum (MPPA) compared against other airports
- IDT and DTB area compared to Wellington (WLG) and Christchurch (CHC) domestic
- Number of contact stands by MPPA
- Pier widths

Note: the IDT has been benchmarked against the measured overall GFA from the PDF drawings provided, at 76,417m^2.

In addition, specific comparisons to Melbourne T4 and Perth T1 are provided.

6. Benchmarking with other airports

Key findings

Key findings when benchmarking area provision in the current DTB, the proposed IDT and other airports include the following:

- Area provision in the DTB is lean, at 2,600m^2 per passenger when considering 2019 throughput of 9.6 MPPA across the Domestic jet and Regional sectors.
- Provision in the IDT would increase the area per MPPA significantly to 6,800m^2 in 2043, when taking the full GFA of the facility at 76,400m^2.
- This ratio is higher than other airports in the New Zealand domestic context. CHC and WLG are estimated at 5,100m^2 and 3,775m^2 per MPPA respectively. (Note, taking AIAL's measures of 64,100m^2 at face value would give a more comparable area per MPPA to CHC at 5,600m^2 by 2043).
- The number of contact stands per MPPA required by 2043 benchmarks with typical global airport provision, reconfirming the approach taken to grow overnight stand demand in this assessment.
- However, it is noted that AIAL's ultimate provision of 58 Domestic Jet and Regional turboprop stands is high, potentially equivalent to Domestic and Regional demand at 25 million passengers per annum i.e. beyond the 2050s.
- The proposed pier width at the IDT measures 33m. This is wide in the context of other domestic airports in the region.
- Melbourne's T4 pier measures 11m – 22m. However, this pier is narrow, when considering seating, boarding queues, circulation and waiting behaviour, and would not be recommended.
- Perth T1, when removing the International swing component (sterile corridors), is closer to a pier width of 30m. As per IDT, the pier serves 12 Code C stands but is also shorter than AIAL's IDT proposals at only 205m long. The IDT pier is 235m long.
- When compared to IDT at 235m long and 33m wide, the pier for Perth T1 is 6,150m^2 as compared to 7,755m^2 for the IDT so a saving of 1,605m^2 or ~25% and over multiple levels.

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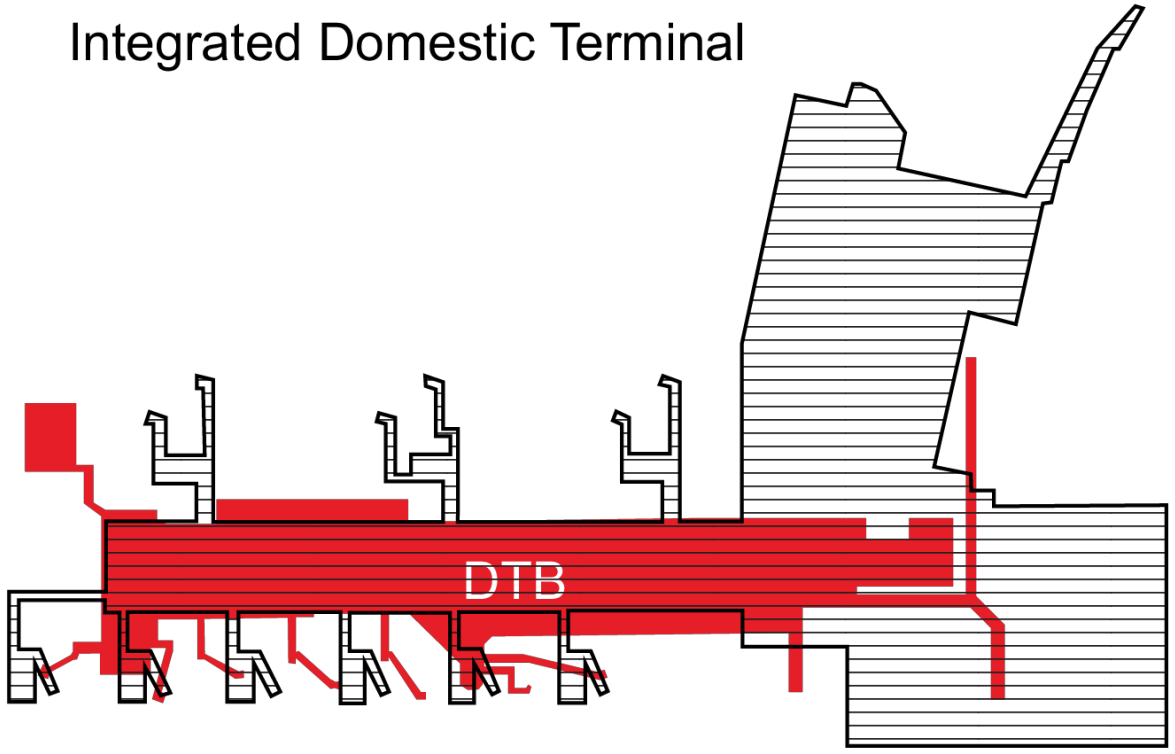
6. IDT and DTB Comparison

Sizing comparison

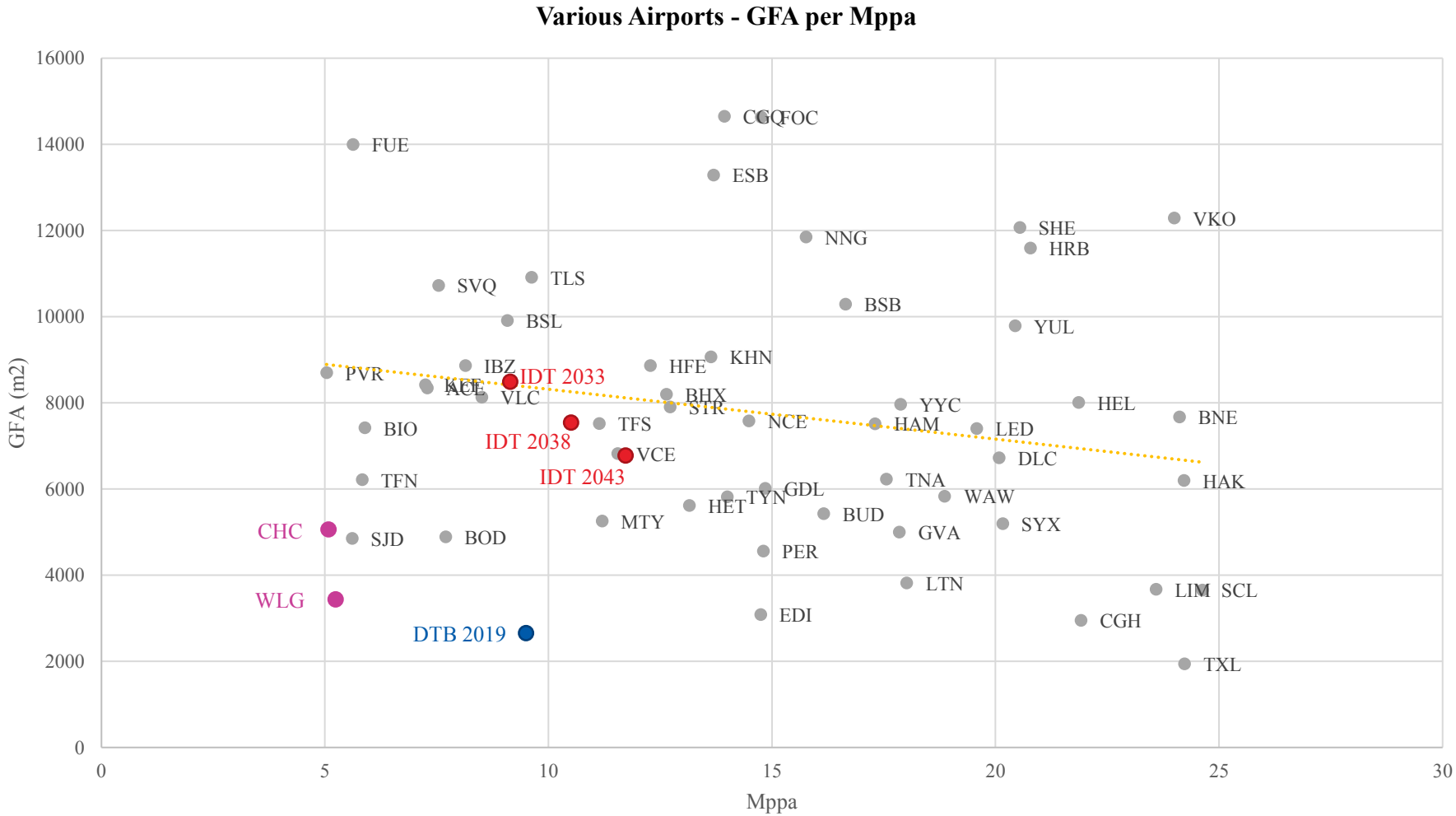
	Demand in MPPA	Area in m² per MPPA
DTB 2019	9.6	2,600
IDT DOM 2043	11.4	6,800

IDT
Integrated Domestic Terminal



6. Benchmarking GFA per MPPA

Area comparison including DTB, IDT, CHC and WLG



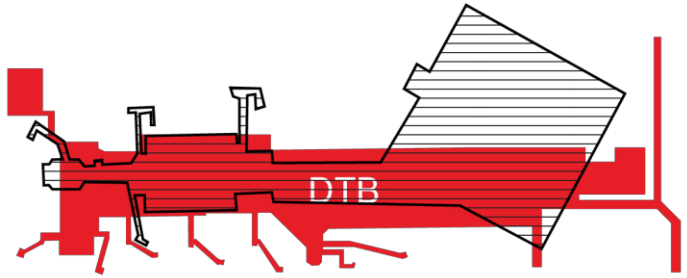
Note, benchmarks include Domestic and International Airports

6. Comparison with NZ Domestic Airports

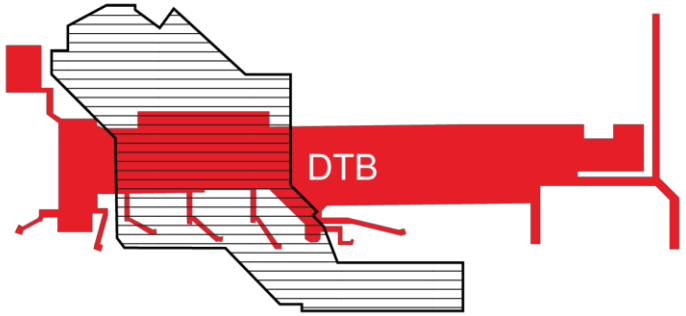
Wellington and Christchurch

	Demand in MPPA	Area in m^2 per MPPA
DTB 2019	9.6	2,600
IDT 2043	11.4	6,800
CHC 2019	5.1	5,100
WLG 2019	5.3	3,775

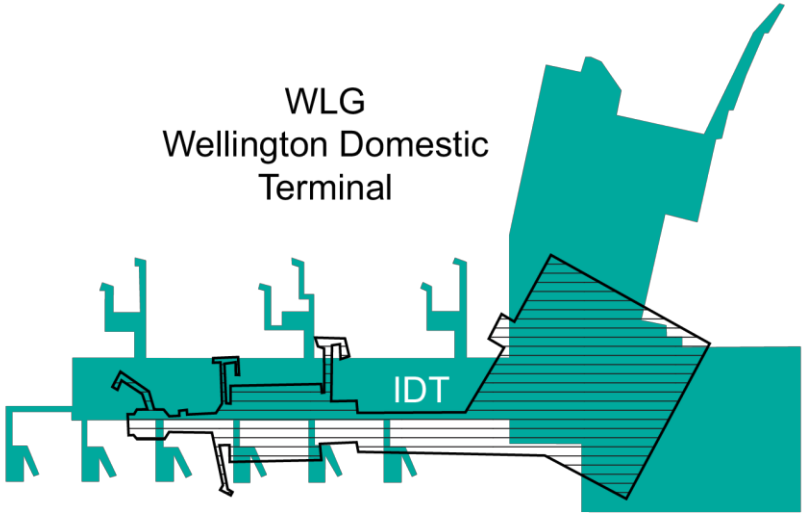
WLG
Wellington Domestic
Terminal



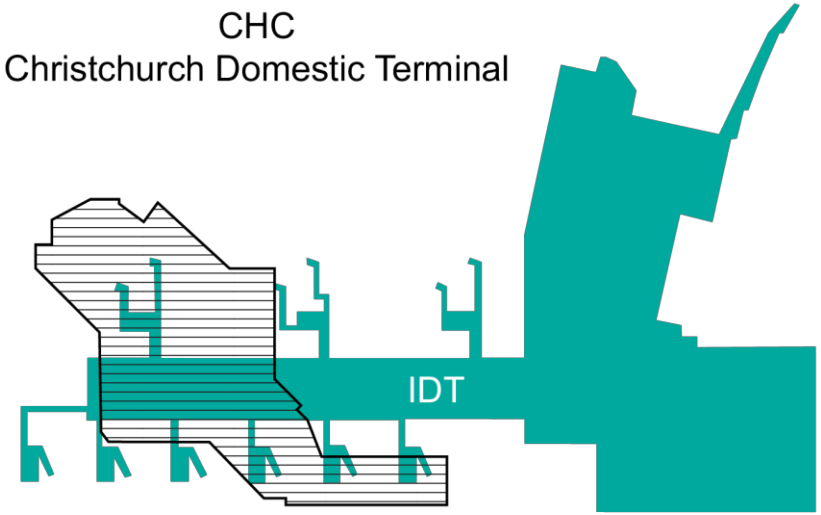
CHC
Christchurch Domestic Terminal



WLG
Wellington Domestic
Terminal

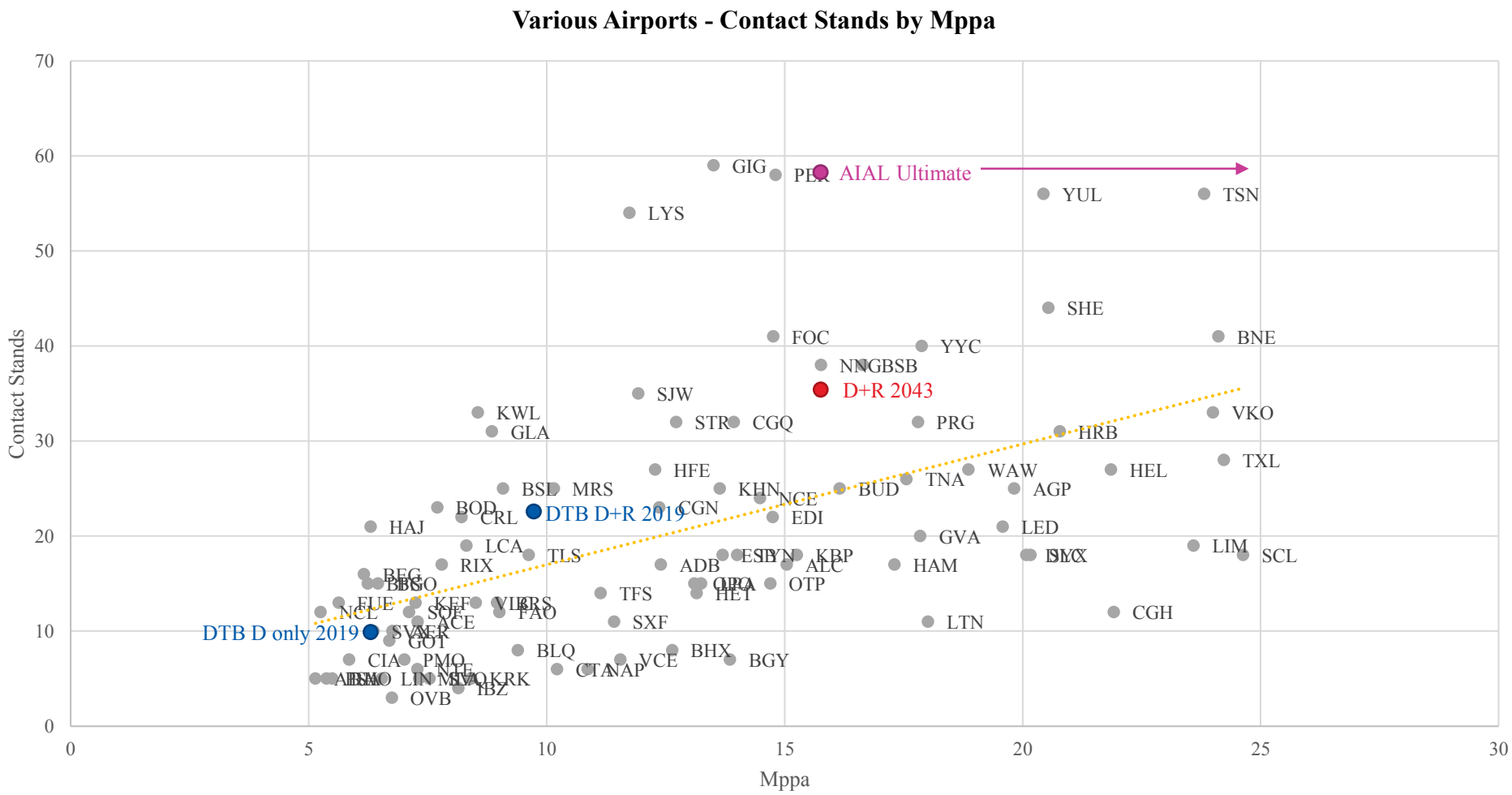


CHC
Christchurch Domestic Terminal



6. Benchmarking contact stands

Number of contact stands per mppa



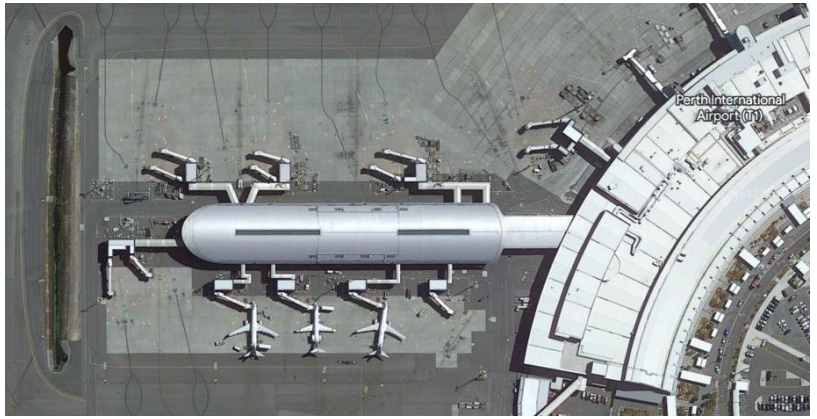
Note, benchmarks include Domestic and International Airports

The number of contact stands per MPPA required by 2043 benchmarks with typical global airport provision, reconfirming the approach taken to grow overnight stand demand in this assessment. However, it is noted that AIAL's ultimate provision of 58 Domestic Jet and Regional turboprop stands is high, potentially equivalent to Domestic and Regional demand at 25 million passengers per annum i.e. beyond the 2050s.

6. Pier Width

Comparison with other airports

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



Perth T1

Melbourne T4 pier G

Wellington

6. Melbourne T4

Site visit

As part of the workshop for the long list of options, Air New Zealand and Arup undertook a site visit to Melbourne Airport's Terminal 4 (T4). This terminal came online in 2015 and is designed for use by Australian low-cost domestic operators, including Jetstar, Rex and Bonza.

T4's GFA measures ~ 26,600m^2 and features a common user departure lounge. Gates are announced 45 minutes before departure.

A key observation shared during the site visit is that some passengers want to be in the pier and close to the boarding gate, in particular noting the long walk distances from the terminal processor and dwell area to the gate, and this has resulted in additional seats having to be provided in the pier. The proposed IDT pier at Auckland will not be as long and passengers will not have to walk as far to get to their gate.

At Melbourne T4, the pier width at 11m to 22m is narrow when considering circulation, boarding queues, seating and waiting behaviour. These widths are not considered suitable for Auckland Airport.

Terminal 4 processor

Pier G internal

6. Comparison Perth T1 Pier and IDT

Key elements

IDT is 235m long and 34m wide. Perth T1 is 205m long and 30m wide (minus sterile corridors).

- Difference in area equivalent to 7,755m^2 – 6,150m^2 = 1,605m^2 or ~25% and over multiple levels.

Gate lounges in IDT from 280m^2 to 300m^2 per gate. Gate lounges in Perth T1 at 220m^2 to 230m^2.

- Assuming an A321, 280m^2 to 300m^2 would reflect 20% of passengers seated elsewhere (airline lounge/F&B).
- Assuming an A321, 220m^2 to 230m^2 would reflect 40% of passengers seated elsewhere (airline lounge/F&B).

F&B and retail.

- 250m^2 of F&B and 450m^2 of retail in IDT. Most provided F&B and retail provided in processor.
- 1,100m^2 of F&B and 600m^2 of retail in Perth T1 Pier.

IDT: additional pier lounges highlighted in red

6. Perth T1 Pier

Swing International and Domestic facility

4 MARS stands including Code F capability

12 Code C stands

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6. Perth T1 Pier

Internal Detail

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6. Perth T1 Pier

Internal Detail

7. Assessment of the DTB to 2030

Methodology

The current Domestic Terminal Building measures ~25,000m^2 across two levels.

To assess the DTB to around 2030, Arup has considered the current area provision for the separate facilities and compared this to the 2028 and 2033 PoR requirements for Domestic Jet and Regional demand.

The area provision shown in the adjacent table has been estimated based on shared MAPI PDFs of the DTB, and checked against AIAL CAD files received on 22 June 2023. These area provisions form the basis of the performance assessment. It should be noted that retail and circulation spaces have been included in the "other" category. Maps are included on the next slide, colour-coded to match the areas in the table.

The following section summarises the capacity constraints of the DTB, as well as touching on the impact of potential productivity and technology enhancements. There has not been time to explore these potential productivity enhancements fully with Air New Zealand and Arup would welcome the opportunity to do so in Phase 3.

Area	Estimated area in m^2
Check-in (incl. all airlines, Domestic jet & Regional)	900
Baggage Handling (incl. all baggage handling)	3,000
Security	600
Airside Dwell	1,300
Regional landside gate lounge	800
Airline lounges	2,300
Baggage reclaim (incl. all baggage reclaim)	1,400
Arrivals Hall (All Domestic jet and Regional)	800
Total net area	11,100
Other, incl. Back of House estimate (~56%)	13,900
Total gross area	25,000

DTB area in m^2 estimates

7. Assessment of the DTB to 2030

[redacted]

Area	Estimated area in m²
Check-in (incl. all airlines, Domestic jet & Regional)	900
Baggage Handling (incl. all baggage handling)	3,000
Security	600
Airside Dwell	1,300
Regional landside gate lounge	800
Airline lounges	2,300
Baggage reclaim (incl. all baggage reclaim)	1,400
Arrivals Hall (All Domestic jet and Regional)	800
Total net area	11,100
Other, incl. Back of House estimate (~56%)	13,900
Total gross area	25,000

[redacted]

7. Assessment of the DTB to 2030

Key findings

Key findings of the DTB assessment include:

- The current DTB measures ~25,000m^2 across two levels.
- The PoR has identified that ~37,200m^2 is required to accommodate passengers at IATA Optimum Level of Service in 2033. This figure is based on the FY2033 busy hour and includes all airlines at the DTB (i.e. all Domestic Jet and Regional demand).
- The current DTB lacks sufficient area at check-in, security, baggage handling, and airside dwell to 2033. It also does not provide sufficient aircraft stands.
- Some sensitivity testing of productivity and technology enhancements has been undertaken. These indicate that check-in and baggage make-up could be made to last to 2033. Further testing with Air New Zealand is recommended including other enhancements (such as remote baggage make-up).
- The current splitting of the Domestic forecourt is inefficient. Joining the forecourts will provide additional and appropriate drop-off and pick-up capacity for passenger demand to 2033.

7. DTB PoR

Combined Domestic jet and Regional requirements

The PoR for DTB to 2033 includes combined requirements for Domestic Jet and Regional demand in the DTB across all airlines.

The PoR indicates that the DTB would need to be 50% larger to deliver IATA Optimum Level of Service by 2033.

2033 DTB PoR Summary

Domestic and Regional

AIR NEW ZEALAND ARUP

		FY2019	FY2028	FY2033
Annual Domestic Trunk MPPA		6,771,000	8,239,000	9,294,000
Annual Regional MPPA		2,823,000	3,242,000	3,580,000
Total Domestic MPPA		9,594,000	11,481,000	12,874,000
Check-In				
Total Check-In	m^2	1,000	1,100	1,300
Security				
Domestic Security	m^2	700	900	1,100
Regional Security	m^2	500	500	500
Total Security	m^2	1,200	1,400	1,600
Airside Baggage Handling		-	-	-
Total Airside Baggage Handling	m^2	2,700	3,250	3,550
Stands		-	-	-
Domestic Jet stands required	no.	10	12	14
Regional stands required	no.	11	13	14
Total stands required	no.	21	25	28
Gate lounges (based on departures)				
Domestic gate lounges (departures)	no.	5	6	8
Regional gate lounges (departures)	no.	11	11	11
Domestic gate lounges (departures)	m^2	900	1,100	1,400
Regional gate lounges (departures)	m^2	900	900	900
Total Gate Lounges (departures)	m^2	1,800	2,000	2,300
Domestic + Regional Airline Lounges				
Regional estimates (based on current provision,	m^2	1,000	1,200	1,300
Domestic requirements (from AirNZ)	m^2	1,800	2,200	2,500
Total Requirements (Regional plus Domestic)	m^2	2,800	3,400	3,800
Domestic + Regional retail (based on 500m2/MPPA)				
Total retail (average)	m^2	4,800	5,700	6,400
Baggage Reclaim				
Total Baggage Reclaim	m^2	1,500	1,500	1,500
Arrivals hall				
Domestic arrivals hall	m^2	600	700	800
Regional arrivals hall	m^2	300	300	400
Total arrivals hall	m^2	900	1,000	1,200
Total Net Area	m^2	16,700	19,350	21,650
Total Gross Area	m^2	28,700	33,300	37,200

7. DTB Performance

Performance of existing DTB

The PoR assessment of the areas currently provided in the DTB has identified capacity constraints across all facilities, when considering all airlines and sectors. Areas where demand exceeds capacity by more than 25% include:

- Check-in.
- Security (queuing area). The number of security lanes is appropriate but requires proper staffing in peak periods.
- Airside dwell including gate lounges.
- Jet and Regional stands.

Item	FY23	FY28	FY33
Check-In	103%	114%	129%
Baggage handling	90%	108%	118%
Security Lanes (Domestic Jet)	60%	80%	100%
Security Queuing Area (Domestic Jet)	92%	122%	152%
Airside dwell (gate lounge)	106%	127%	170%
Baggage Reclaim	106%	106%	106%
Domestic Jet Stands	100%	120%	140%
Regional Stands	100%	118%	127%

7. DTB Extension of Life

Productivity and Technology

The current DTB lacks the aircraft stands required to operate a full schedule in 2033. If the shortfall in stands can be remedied, the stated productivity and technology enhancements below provide the opportunity to extend the life of the DTB:

Check-in

- 60% of passengers check in online
- Passengers checking-in online use bag tag printer and bypass kiosks

Check-in and baggage handling

- 10% of passengers check-in and drop bags at International (transfer bags)

With technology and productivity enhancements, PoR calculations indicate a reduction of ~2,000m^2 in net area may be achievable.

In addition, the security queuing area could perform at a reduced (IATA sub-optimal) Level of Service performance until 2033.

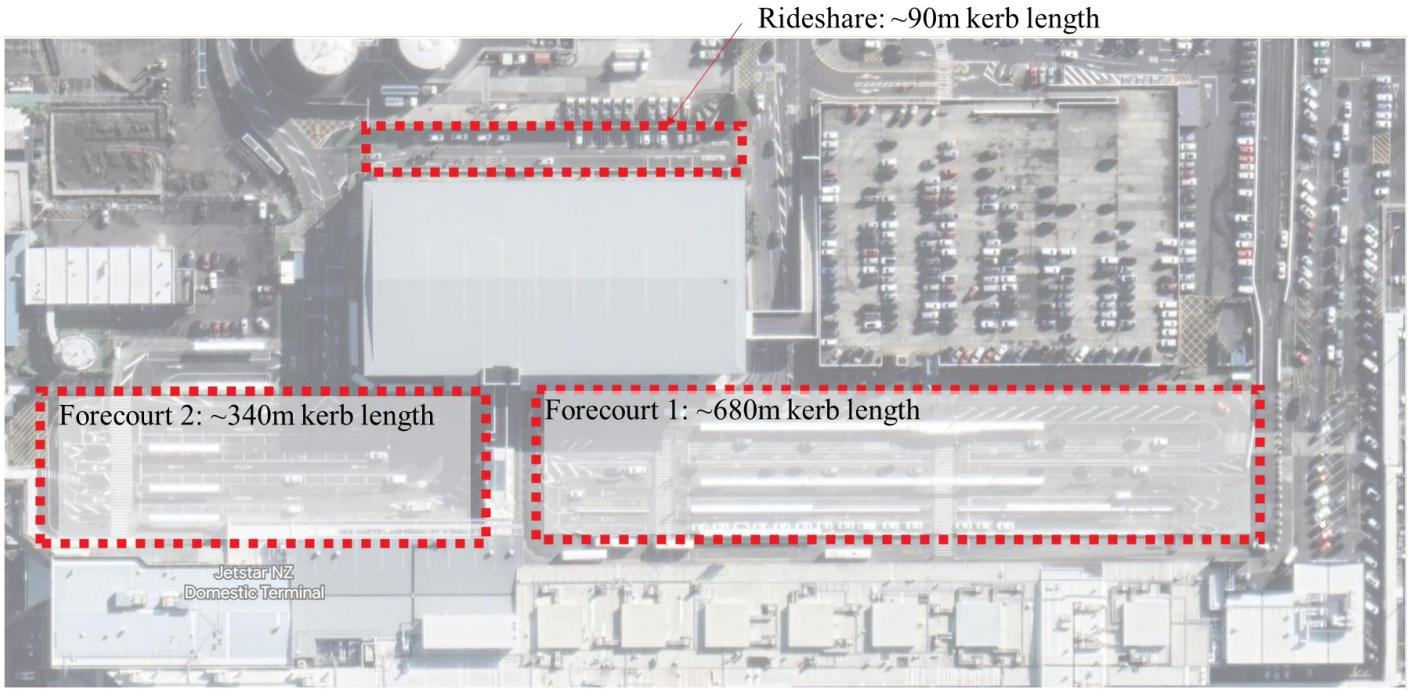
A key capacity constraint remains the airside dwell for the Domestic Jet side of the terminal. Even with operational enhancements around re-routing arriving passengers and better wayfinding to use the "Jetstar" exit route, there is insufficient space to accommodate departing Domestic passengers comfortably in 2033.

Item	FY23	FY28	FY33
Check-In	70%	79%	89%
Baggage handling	78%	94%	100%
Security Queuing Area	92%	92%	122%
Airside Dwell (gate lounge)	82%	98%	131%

Note: Airside dwell is based on current DTB functionality of shared gate dwell.

7. DTB Landside

Forecourt capacity enhancements



Forecourt 2 is used as commercial drop-off, off-airport pick-up and pre-booked taxi pick-up only. It is not accessible to the public, and utilisation of the forecourt is low.

Should Forecourts 1 and 2 join for common use, this would provide an additional 44% of forecourt capacity.

As busy hour passenger growth is forecast to increase by 33% between 2019 and 2033, a joined forecourt can provide sufficient space to accommodate increased passenger demand to that time horizon.

The PoR shows this to be the case.

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8. Long list of alternative pathways

Methodology

Arup has created a long list of alternative pathways to the DTB and IDT, which comprises of 8 options (with additional sub-options). Starting with the DTB as a baseline, these options consider capacity enhancements and potential phasing of the AIAL Master Plan, as well:

- A hybrid of DTB, A1, A3 and Headhouse.
- An expanded DTB with JUHI removed.
- An Adjacent Domestic Terminal (as opposed to Integrated) along with the DTB.
- Domestic Terminal North (MP layout for reference)

The initial long list was presented at a workshop held on 7 June 2023 in Arup's Melbourne office. Following feedback from this workshop, additional categories were included to reflect the passenger experience and operational impact.

The scoring of the long list is through a Red, Amber, Green (RAG) scoring, as follows:

1	2	3	4	5	x
Worst	Worse	Average	Better	Best	Show-stopper

Key questions that form the basis of the assessment are shown overleaf, and include the following categories:

- Landside
- Terminal
- Airside
- Passenger Experience
- Runway
- Feasibility
- Operational Impact
- Affordability

The Long List was further explored with Air New Zealand at the Milestone 2/3 Workshop on 26 June 2023.

Affordability has been considered based on costing data provided by WT Partnership and as described in more detail in Section 10.

8. Long list of alternative pathways

Key Findings

Exploration of a long list of alternative Domestic terminal pathways has shown that:

- The provision of Pier A3 and a Regional headhouse alone to the east of the DTB do not provide sufficient aircraft stand capacity in 2033 and 2043.
- However, provision of 12 stands in the vicinity of a Pier A1 provides the necessary stands required for future growth to 2033 and beyond, as well as providing resilience should Taxiway Bravo require realignment for Contingent Runway operations.
- A remote pier and gate lounge could initially be provided on the A1 alignment to reduce cost. Note, this approach would require a significant and well-planned airside transfer operation to move passengers to and from the DTB.
- Realigning pier A1 will enable dual Code C taxilane operations with continued operation of the DTB.
- Options requiring JUHI being moved early or that are dependent on a Northern Runway for operational efficiency do not score well, particularly in terms of phasing and operational impacts.
- An Adjacent Terminal including Pier A1 (similar to IDT but with reduced integration) scores the highest in initial evaluation, with options that provide an additional eastern processor for Regional services along with continued use of the DTB and a remote pier on A1 for Domestic Jets having the second best score.
- Domestic Terminal North is not a viable option owing to the cost associated with building a new processor, forecourt and apron. In addition, the airfield operation requires a Northern Runway otherwise there will be a significant operational impact related to long taxi times to the current runway, likely resulting in poor OTP.

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8. Key Questions

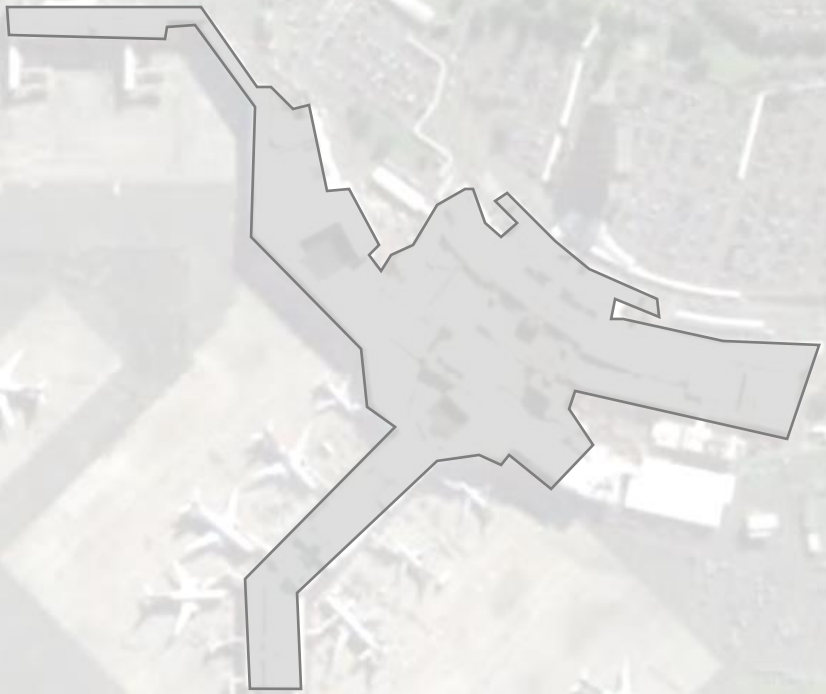
Evaluation of options

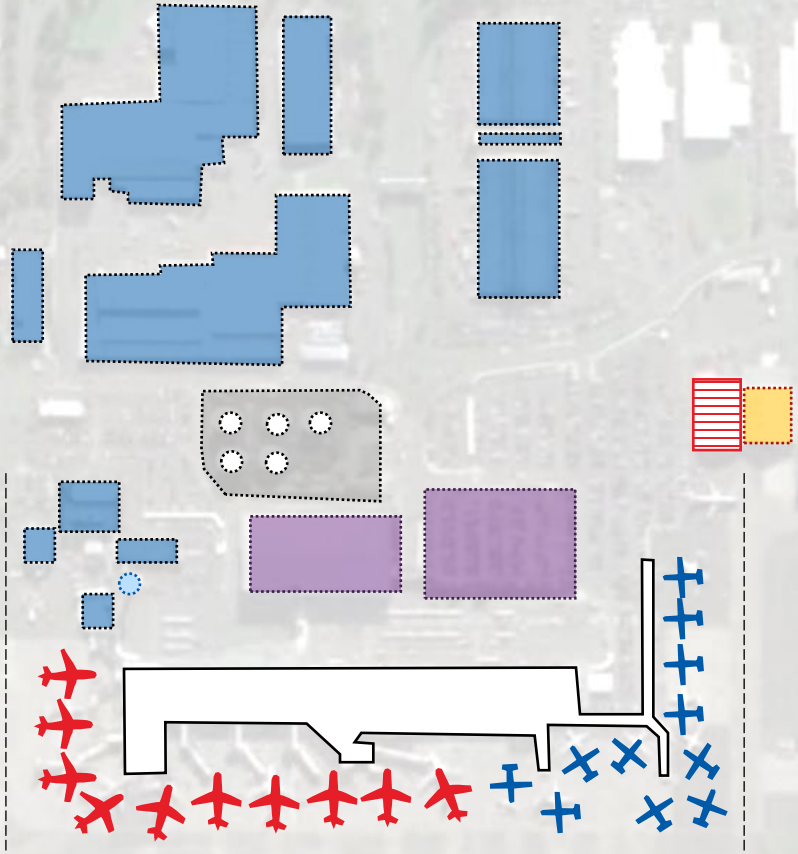
Landside:	Does the forecourt provide sufficient capacity to support this option? Is the Ground Transport Hub located sufficiently close to the terminal?
Terminal:	Does the terminal provide sufficient capacity to accommodate passengers at IATA Optimum at 2033? Does the terminal provide sufficient capacity to accommodate passengers at IATA Optimum at 2043?
Airside:	Does the proposed option provide a sufficient number of contact stands? Does the option achieve appropriate taxilane and taxiway separation and clearances?
Passenger Experience:	Does the option provide a sufficient Int <> Dom, Dom <> Reg and Int <> Reg transfer experience? Is passenger wayfinding intuitive?
Runway:	Can the option operate efficiently with the realigned taxiway and contingent runway? Can the option operate effectively without a Northern Runway?
Feasibility:	Can this option be delivered without impacting on other uses (airside, landside, JUHI, hangars)
Operational Impact:	Can this option deliver a full future flight schedule?
Affordability:	What level of CAPEX and OPEX is required to deliver this option? (high score = lower cost)*

**Note: for the second iteration of this report, cost estimates have been used to rate the affordability of each option*

1. DTB: Status Quo

	Code C Jets	Code C TurboProps	Notes
2033 Requirement	14	14	
2043 Requirement	17	16	
Provision	10	11	DTB does not have sufficient stands.

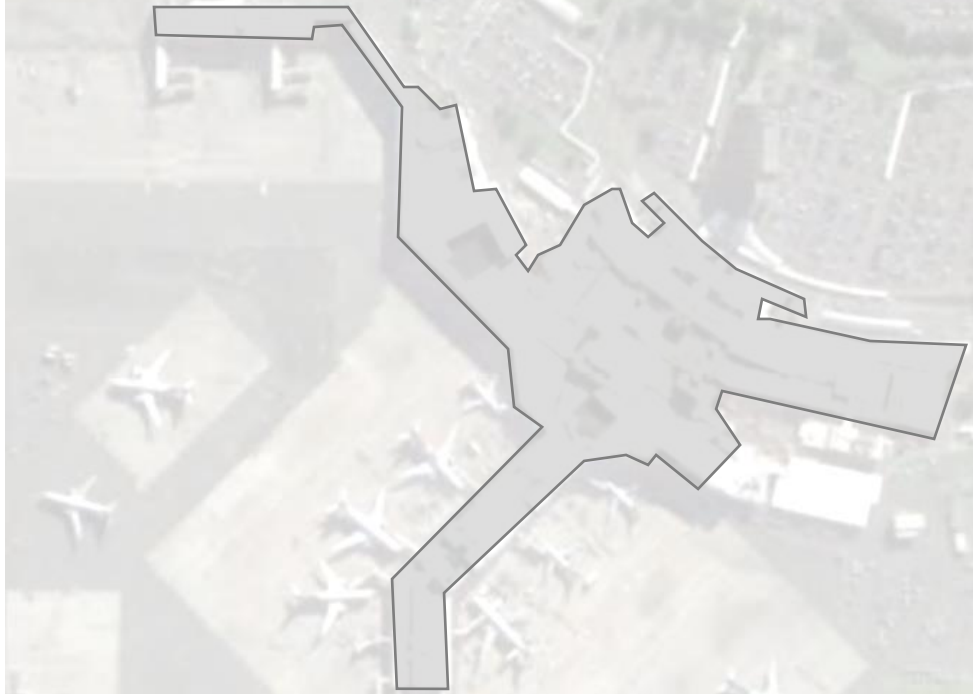


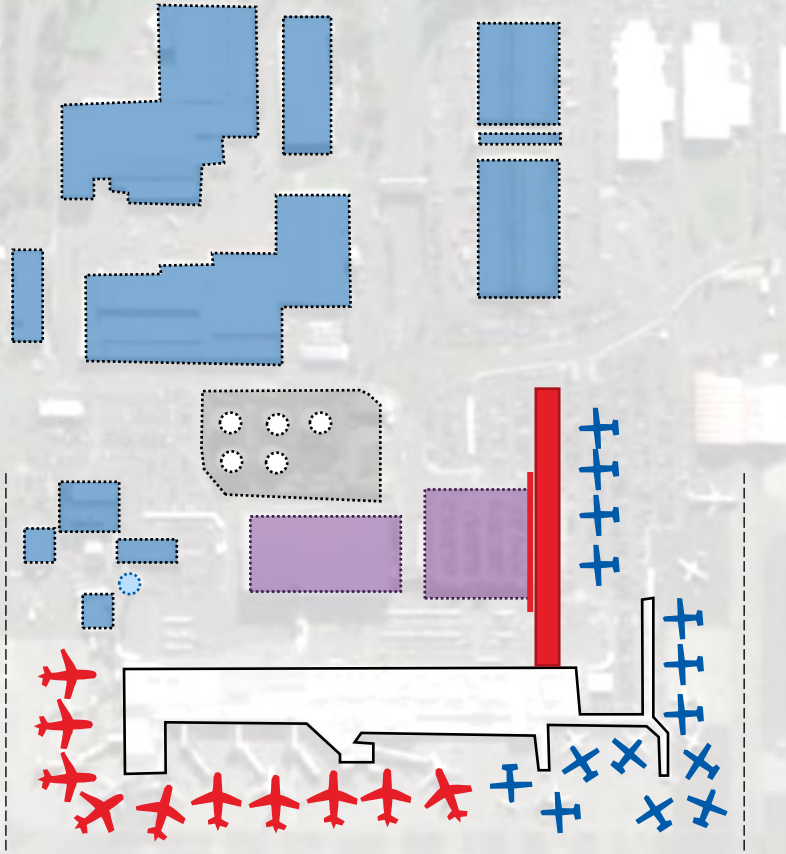


Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
1. DTB: Status Quo	Join forecourts to provide more capacity. Not proximate to new Ground Transport Hub.	Limited capacity to grow and does not perform at IATA Optimum in 2019.	10 jet stands (not all A321 capable), 14 required by 2033, 17 required by 2043.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding.	Impacted by realignment of TWY Bravo in 2028/29.	No construction, therefore no impact on other uses.	Approximately 50% of future schedule cannot be delivered owing to lack of stands for overnight peak. Requires descheduling.	No additional CAPEX or OPEX required

2a. DTB + Pier A3

	Code C Jets	Code C TurboProps	Notes
2033 Requirement	14	14	
2043 Requirement	17	16	
Provision	14	11	Not enough stands, especially by 2043.

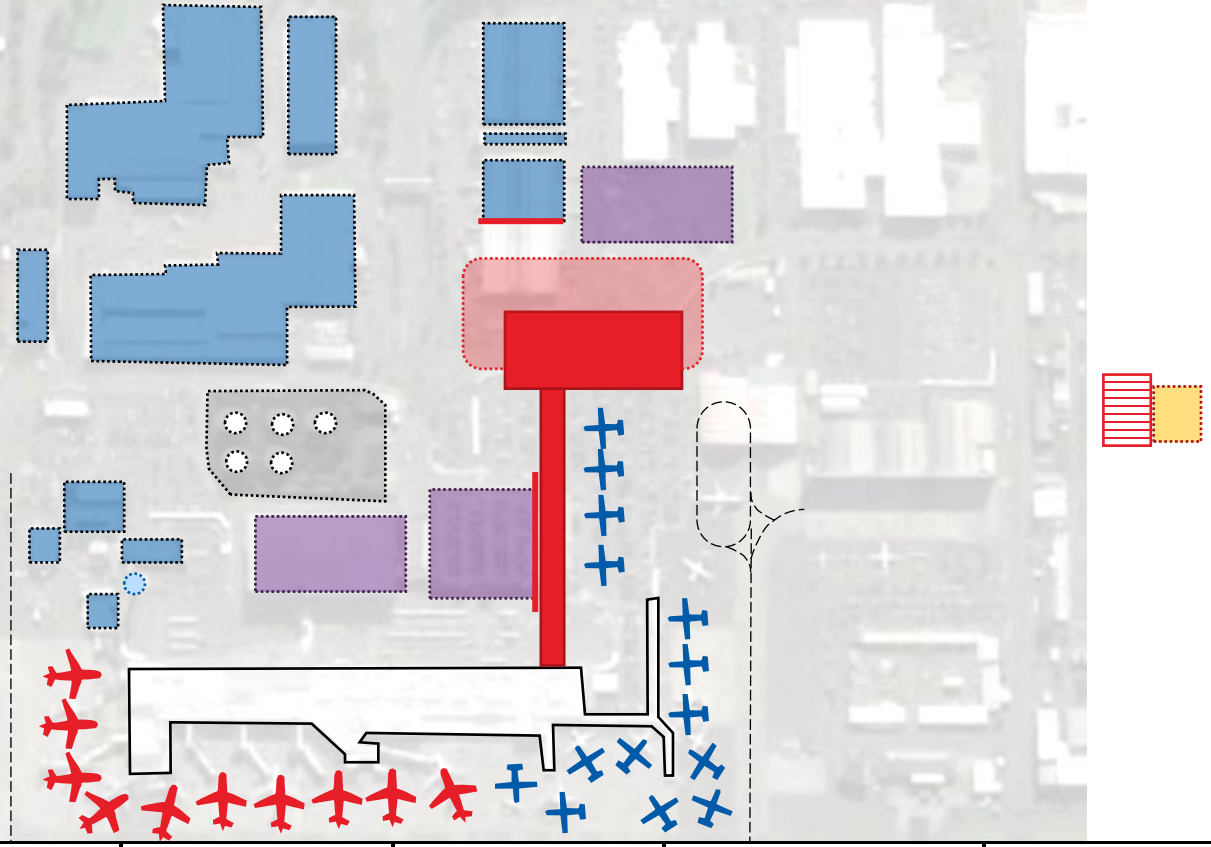




Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
2a. DTB + Pier A3	Opportunity to reconfigure forecourt and provide additional car parks but will require relocating other land uses. Not proximate to new Ground Transport Hub.	Could provide for regional screening and additional gate lounge. Unlikely to provide much capacity beyond 2030.	3-4 additional jet/turbo-prop stands, sufficient to late 2020s but not beyond.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding.	Impacted by realignment of TWY Bravo in 2028/29.	Some impact on access to DTB and car park areas as well as hangar.	Approximately 25% of future jet schedule cannot be delivered due to overnight peak. Improvement on DTB, but still requires descheduling.	Requires A3 and forecourt remodelling.

2b. DTB + Pier A3 + Regional Headhouse

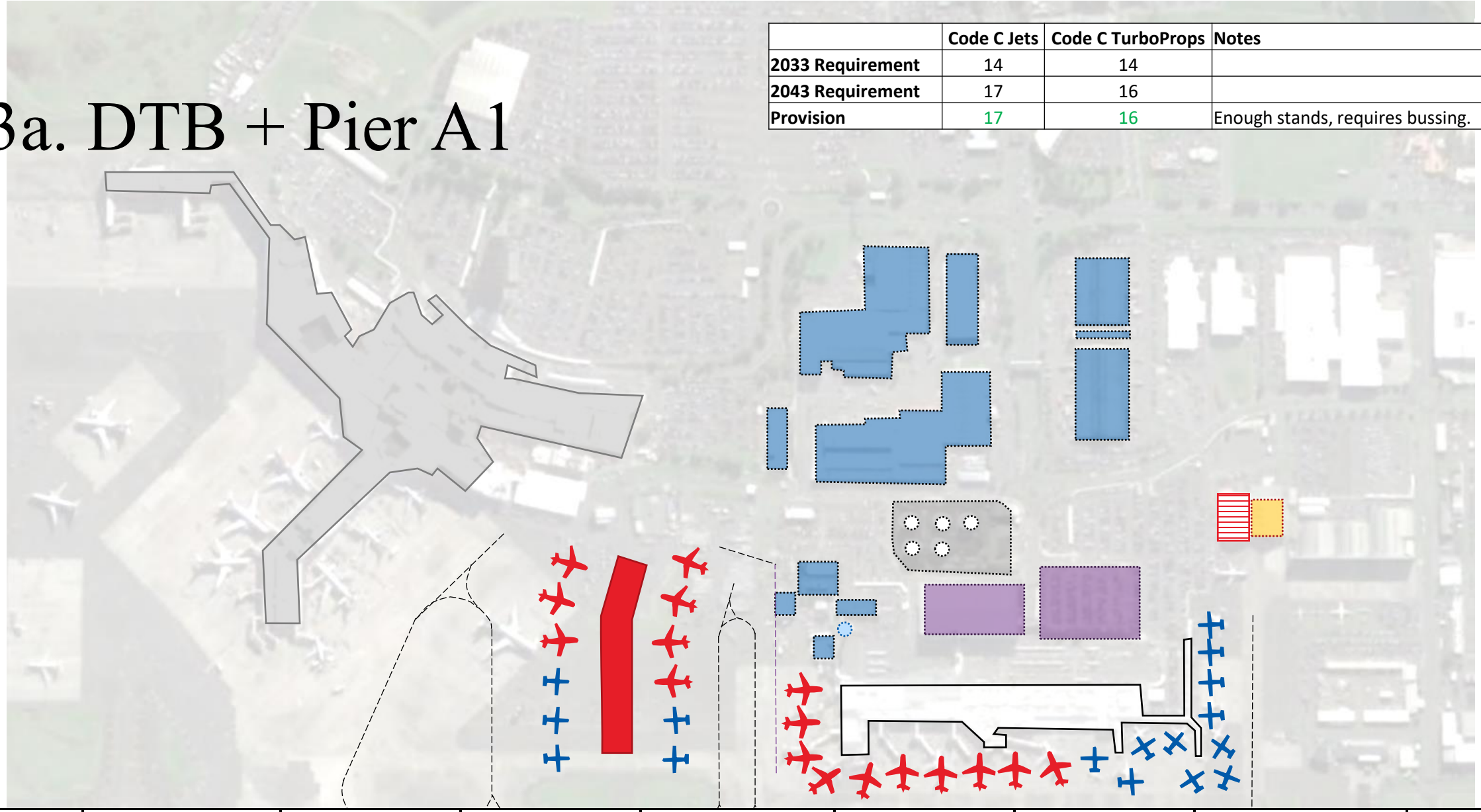
	Code C Jets	Code C TurboProps	Notes
2033 Requirement	14	14	
2043 Requirement	17	16	
Provision	14	11	Not enough stands, especially by 2043.



Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
2b. DTB + Pier A3 + Regional Headhouse	Opportunity to reconfigure forecourt and provide additional car parks but will require relocating other land uses. Not proximate to new Ground Transport Hub.	Provides for regional processing. Will provide capacity beyond 2030 and potentially to 2043.	3-4 additional jet/turbo-prop stands, sufficient to late 2020s but not beyond.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding.	Impacted by realignment of TWY Bravo in 2028/29.	Impact on access to DTB and car park areas. Impacts Laurence Stevens Drive. Impacts hangars.	Approximately 25% of future jet schedule cannot be delivered due to overnight peak. Improvement on DTB, but still requires descheduling.	Requires A3, Regional Headhouse, forecourt remodelling.

3a. DTB + Pier A1

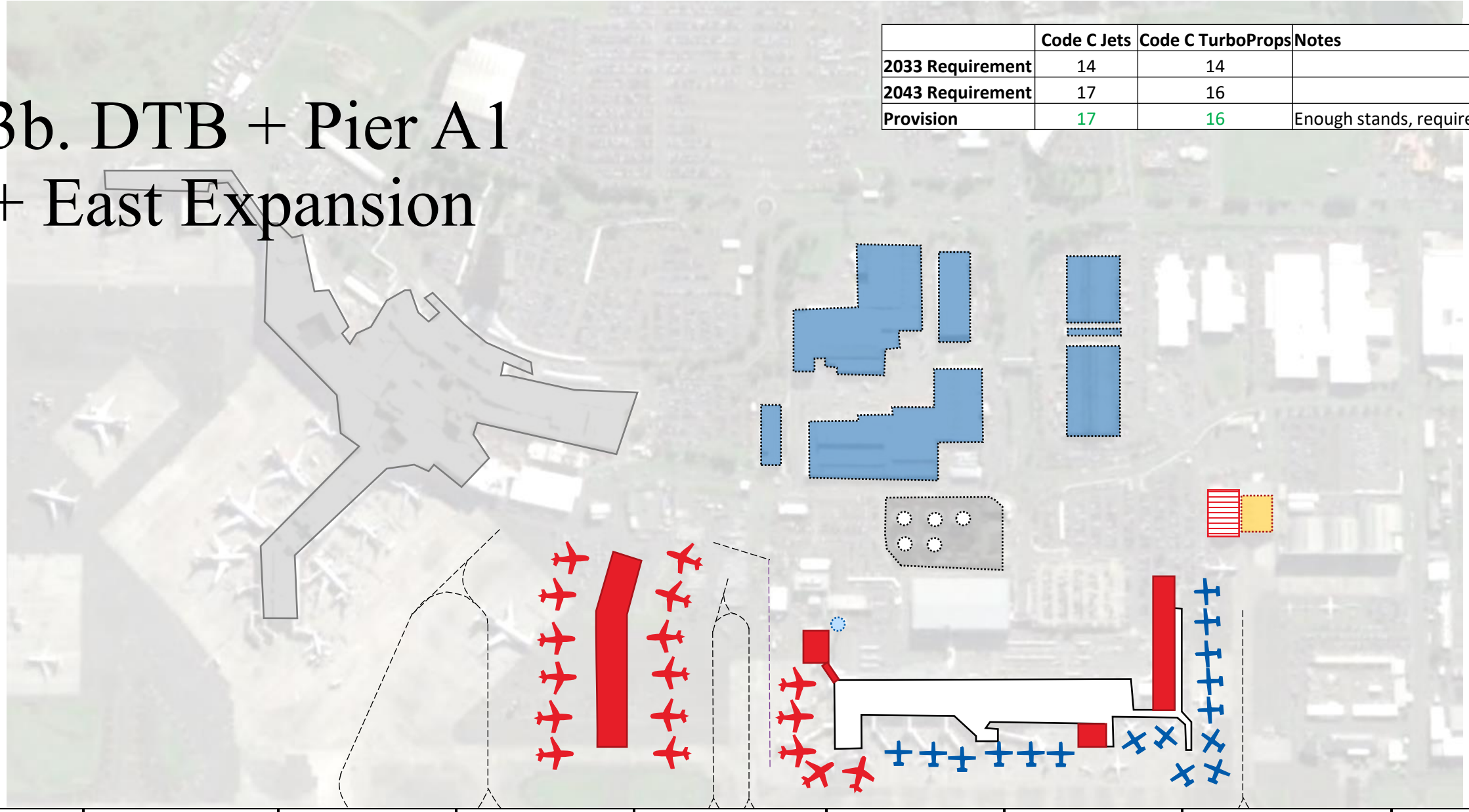
	Code C Jets	Code C TurboProps	Notes
2033 Requirement	14	14	
2043 Requirement	17	16	
Provision	17	16	Enough stands, requires bussing.



Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
3a. DTB + Pier A1	Join forecourts to provide more capacity. Not proximate to new Ground Transport Hub.	Additional gate lounge provided. Limited terminal processor capacity. Requires bussing lounge in DTB.	12 additional stands, sufficient to 2043, assuming DTB stands retained.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding. Will require bussing.	Impacted by realignment of TWY Bravo in 2028/29 but provides 12 stands so can cope with closure of DTB short-term if A1 provided before 2029.	Impact on "tennis courts" but new stands being provided north of Pier B. Does not require relocation of prior uses.	Full schedule can be achieved, however likely to affect block times or check-in/bag drop close off times to transfer passengers to Pier A1. Confusing mix of Reg and Dom Jet	Requires A1 and bussing OPEX.

3b. DTB + Pier A1 + East Expansion

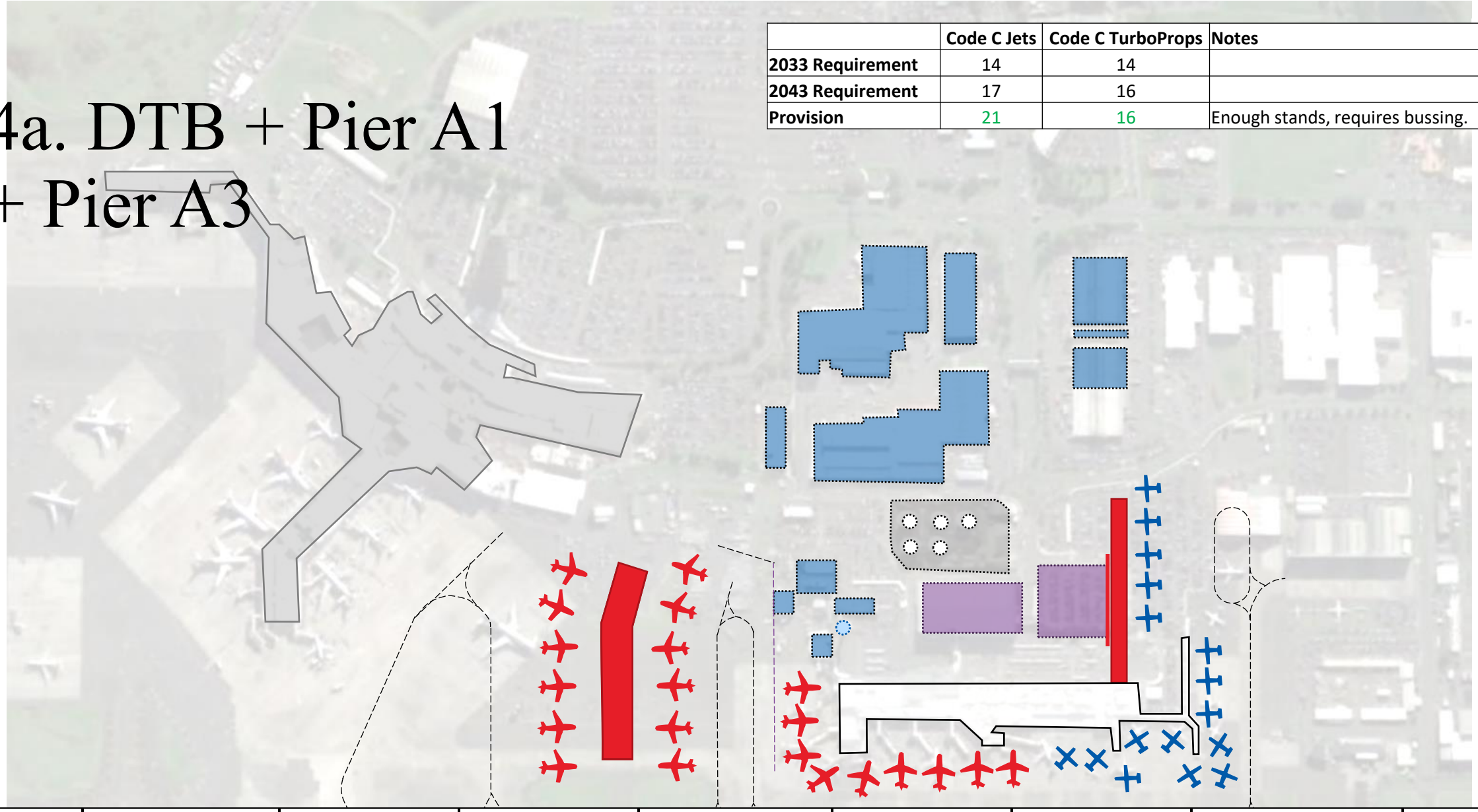
	Code C Jets	Code C TurboProps	Notes
2033 Requirement	14	14	
2043 Requirement	17	16	
Provision	17	16	Enough stands, requires bussing.



Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
3b. DTB + Pier A1 + East Expansion	Join forecourts to provide more capacity. Not proximate to new Ground Transport Hub.	Provides for regional processing and additional stands through A1. Requires bussing lounge in DTB.	12 additional stands, sufficient to 2043, assuming DTB stands retained.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding. Will require bussing.	Impacted by realignment of TWY Bravo in 2028/29 but can provide A1 and additional jet and turbo prop stands to mitigate.	Some impact on DTB forecourt.	Full schedule can be achieved, however likely to affect block times or check-in/bag drop close off times to accommodate time required to transfer passengers to Pier A1.	Requires A1 and bussing OPEX and DTB expansion.

4a. DTB + Pier A1 + Pier A3

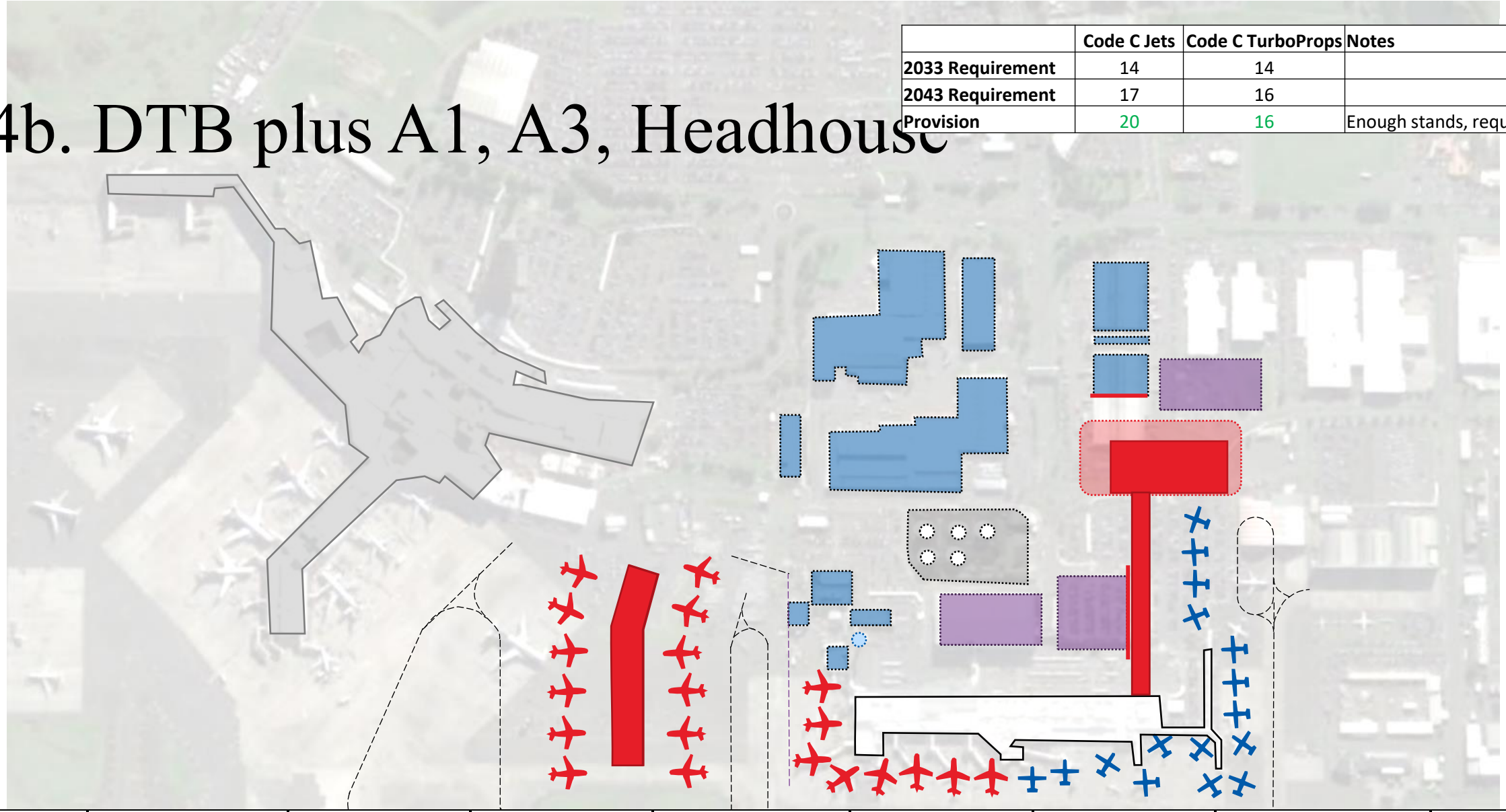
	Code C Jets	Code C TurboProps	Notes
2033 Requirement	14	14	
2043 Requirement	17	16	
Provision	21	16	Enough stands, requires bussing.



Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
4a. DTB + Pier A1 + Pier A3	Opportunity to reconfigure forecourt and provide additional car parks but will require relocating other land uses. Not proximate to new Ground Transport Hub.	Additional gate lounge provided. Limited terminal processor capacity. Requires bussing lounge in DTB.	16 additional stands, sufficient beyond 2043 and would provide for regional growth.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding. Will require bussing.	Impacted by realignment of TWY Bravo in 2028/29 but can provide additional jet and turbo prop stands to mitigate.	Some impact on access to DTB and car park areas as well as hangar.	Full schedule can be achieved, however likely to affect block times or check-in/bag drop close off times to accommodate time required to transfer passengers to Pier A1.	Requires A3, A1, forecourt remodelling.

4b. DTB plus A1, A3, Headhouse

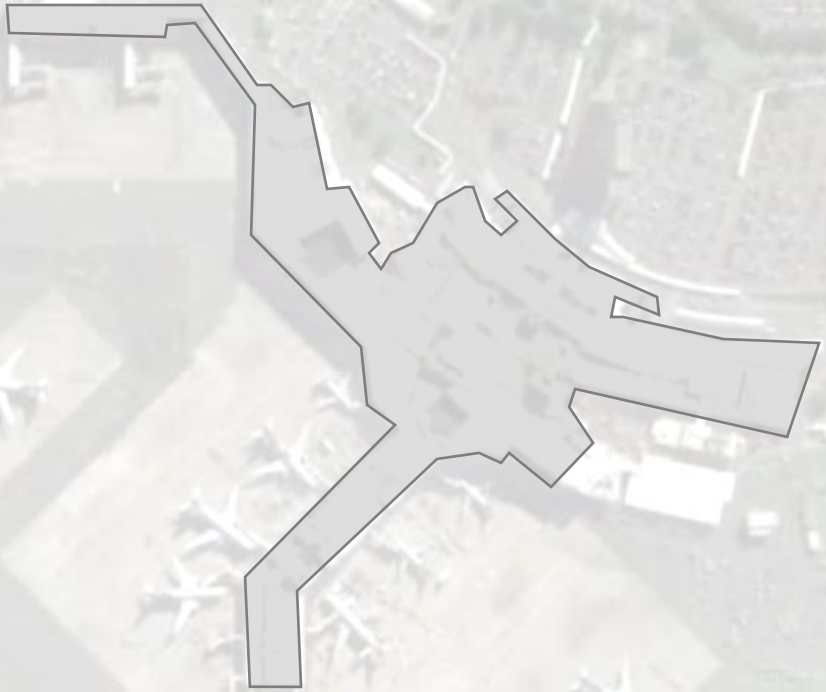
	Code C Jets	Code C TurboProps	Notes
2033 Requirement	14	14	
2043 Requirement	17	16	
Provision	20	16	Enough stands, requires bussing.

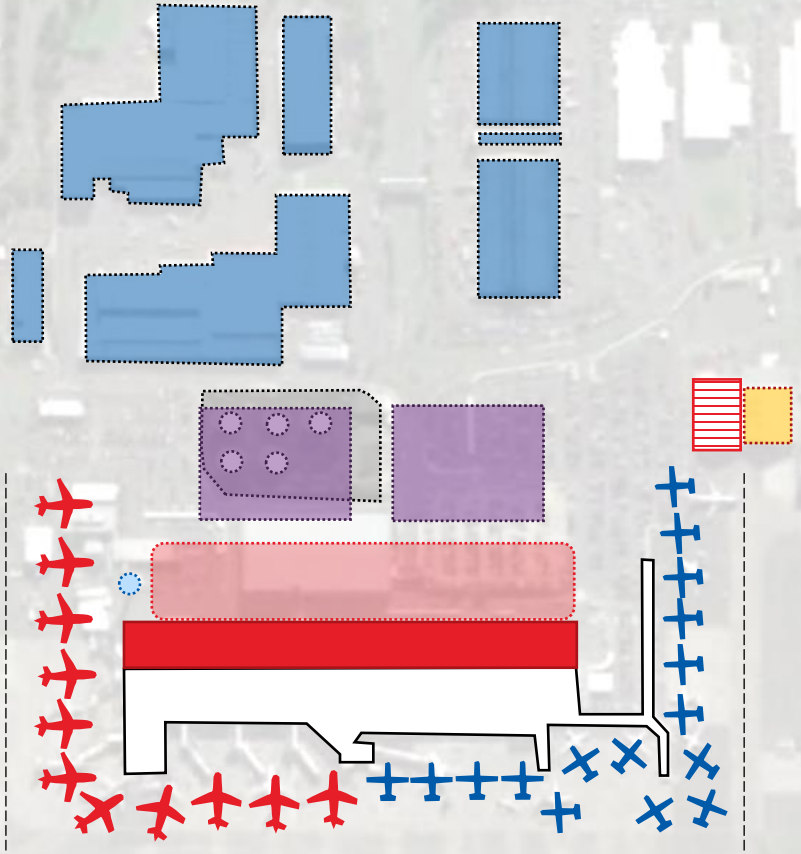


Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
4b. DTB + Pier A1 + Pier A3 + Regional Headhouse	Opportunity to reconfigure forecourt and provide additional car parks but will require relocating other land uses. Not proximate to new Ground Transport Hub.	Provides for regional processing. Will provide capacity beyond 2030.	16 additional stands, sufficient beyond 2043 and would provide for regional growth.	Poor Int<>Dom-Reg experience, Dom<>Reg experience improved. More intuitive wayfinding when all regional passengers are processed in one headhouse. Will require bussing.	Impacted by realignment of TWY Bravo in 2028/29 but can provide additional jet and turbo prop stands to mitigate.	Impact on access to DTB and car park areas. Impacts Laurence Stevens Drive. Impacts hangar.	Full schedule can be achieved, however likely to affect block times or check-in/bag drop close off times to accommodate time required to transfer passengers to Pier A1.	Requires A3, A1, Headhouse and forecourt remodelling.

5a. DTB Expanded (No JUHI)

	Code C Jets	Code C TurboProps	Notes
2033 Requirement	14	14	
2043 Requirement	17	16	
Provision	11	16	Not enough jet stands



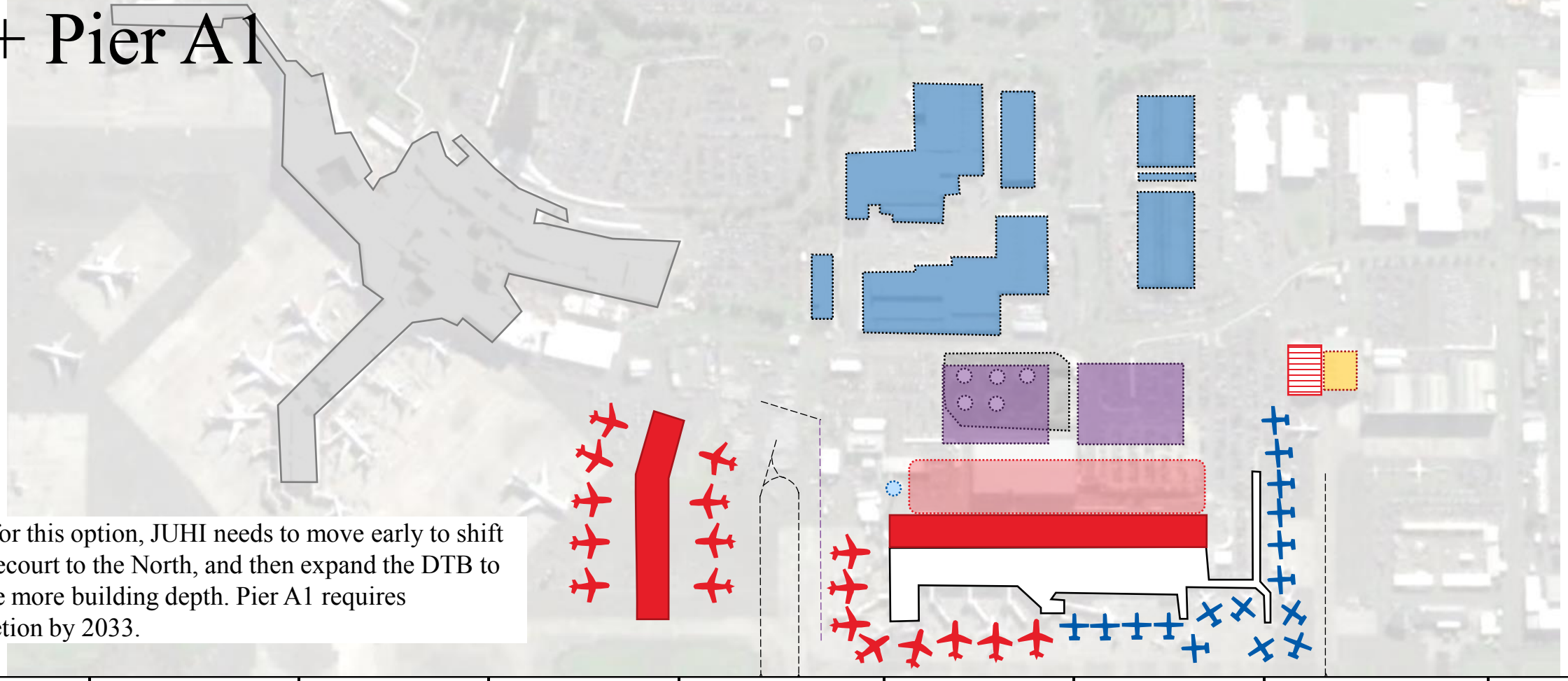


Note: for this option, JUHI needs to move early to shift the forecourt to the North, and then expand the DTB to provide more building depth.

Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
5a. DTB Expanded (No JUHI)	Complex forecourt reconfiguration and phasing. Will deliver appropriate capacity by 2043.	Limited terminal processor capacity until JUHI removed and DTB expanded.	Additonal turbo-prop stands but not enough jet stands.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding.	Impacted by realignment of TWY Bravo in 2028/29.	Needs JUHI out early	Approximately 25% of future jet schedule cannot be delivered due to overnight peak. Requires descheduling.	Move JUHI early, decontaminate, rebuild car parks and forecourts, rebuild terminal.

5b. DTB Expanded (No JUHI) + Pier A1

	Code C Jets	Code C TurboProps	Notes
2033 Requirement	14	14	
2043 Requirement	17	16	
Provision	17	16	Enough stands, requires bussing.

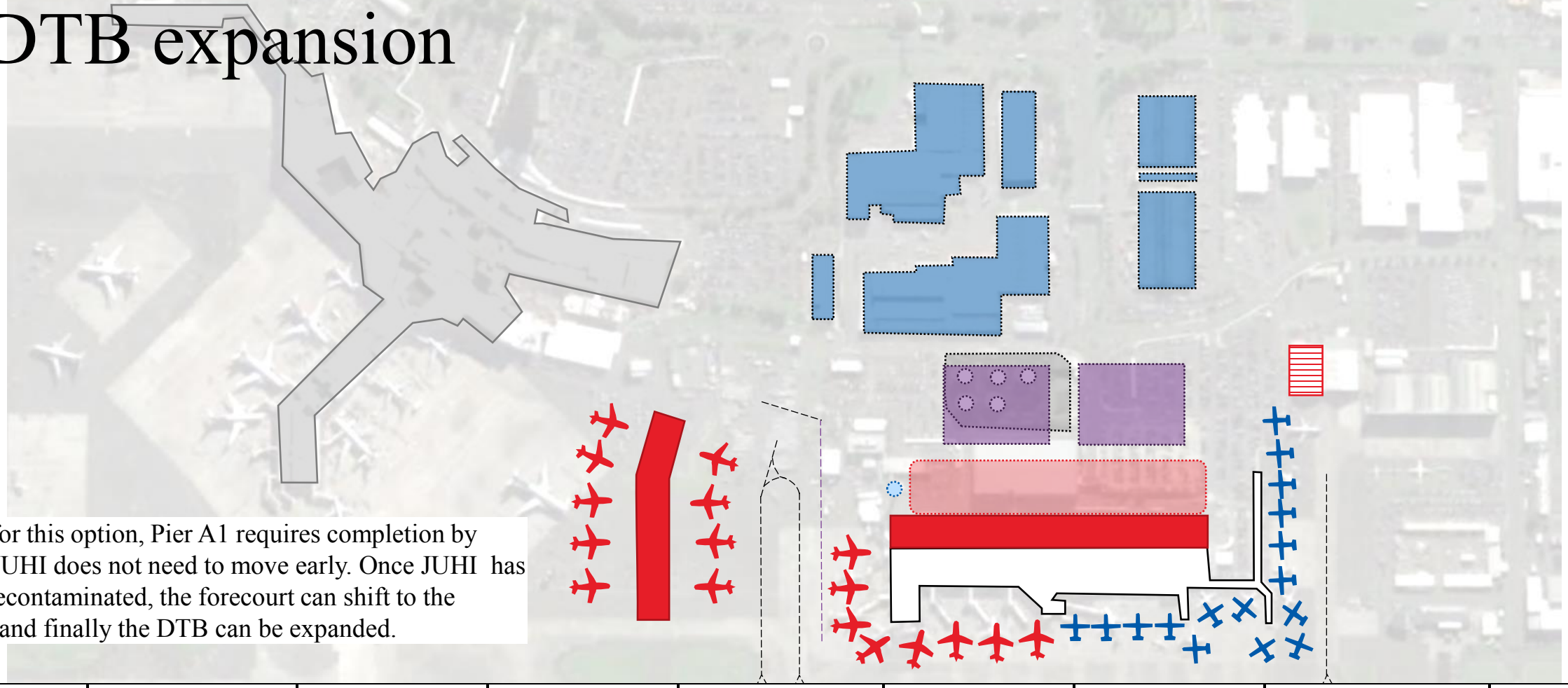


Note: for this option, JUHI needs to move early to shift the forecourt to the North, and then expand the DTB to provide more building depth. Pier A1 requires completion by 2033.

Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
5b. DTB Expanded (No JUHI) + Pier A1	Complex forecourt reconfiguration and phasing. Will deliver appropriate capacity by 2043.	Limited terminal processor capacity until JUHI removed and DTB expanded. Additional gate lounge provided by 2043. Requires bussing lounge.	Some additional stands but not sufficient until A1 is constructed.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding.	Impacted by realignment of TWY Bravo in 2028/29 but provides 12 jet stands so can cope with closure of DTB short-term if A1 provided before 2029.	Needs JUHI out early	Full schedule can be achieved, however likely to affect block times or check-in/bag drop close off times to accommodate time required to transfer passengers to Pier A1.	Move JUHI early, decontaminate, rebuild car parks and forecourts, rebuild terminal, A1.

5c. Pier A1 + then DTB expansion

	Code C Jets	Code C TurboProps	Notes
2033 Requirement	14	14	
2043 Requirement	17	16	
Provision	17	16	Enough stands, requires bussing.

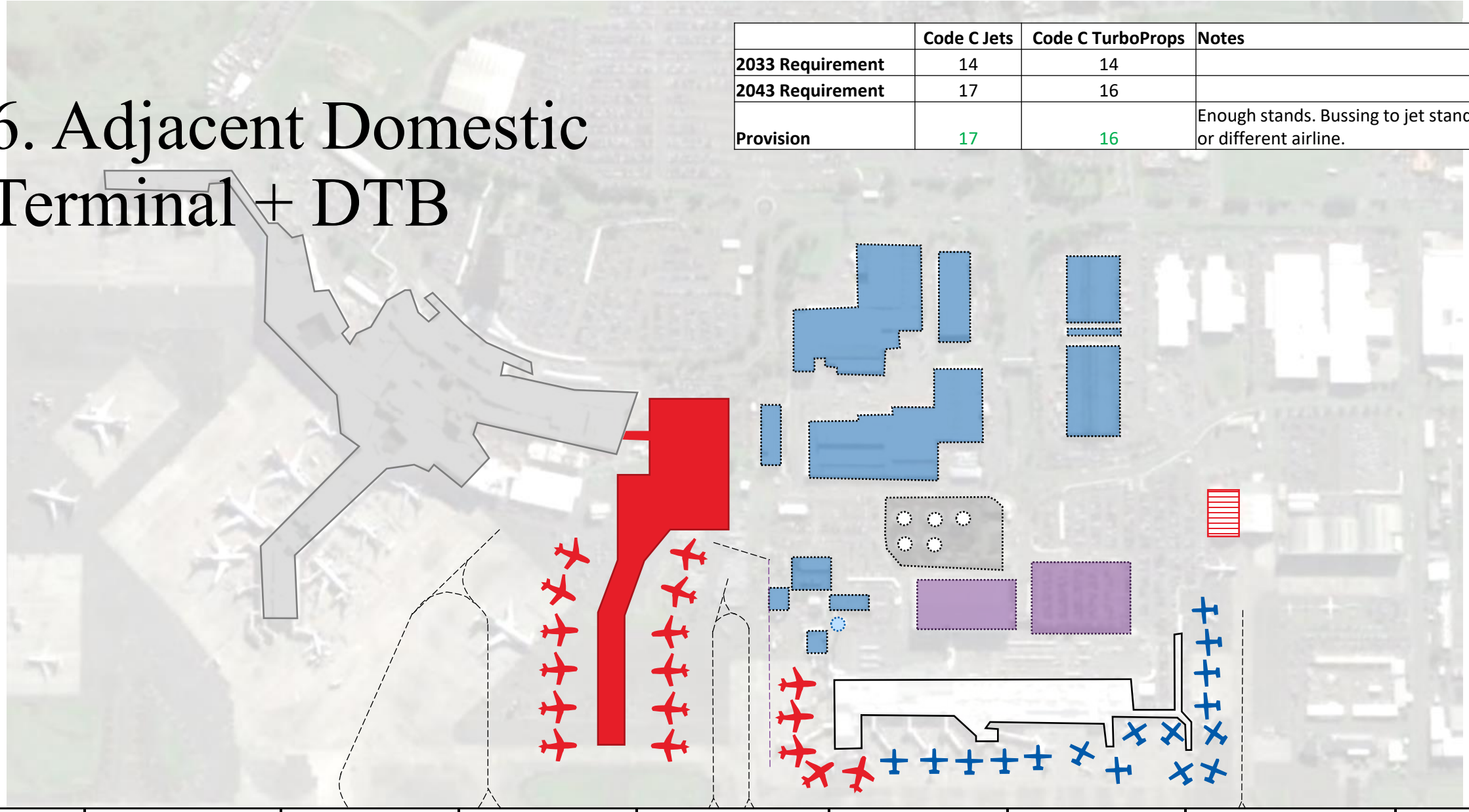


Note: for this option, Pier A1 requires completion by 2033. JUHI does not need to move early. Once JUHI has been decontaminated, the forecourt can shift to the North, and finally the DTB can be expanded.

Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
5c. Pier A1 + then DTB expansion	Complex forecourt reconfiguration and phasing. Will deliver appropriate capacity by 2043.	Additional gate lounge provided. Limited terminal processor capacity until JUHI removed and DTB expanded. Requires bussing lounge.	Sufficient stands	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding.	Impacted by realignment of TWY Bravo in 2028/29 but provides 12 jet stands so can cope with closure of DTB short-term if A1 provided before 2029.	Requires significant reconfiguration of the landside. Need to keep terminal operational while expanding.	Full schedule can be achieved, however likely to affect block times or check-in/bag drop close off times to accommodate time required to transfer passengers to Pier A1.	Requires A1 and bussing OPEX and building expansion, forecourt reconfiguration

6. Adjacent Domestic Terminal + DTB

	Code C Jets	Code C TurboProps	Notes
2033 Requirement	14	14	
2043 Requirement	17	16	
Provision	17	16	Enough stands. Bussing to jet stands on DTB, or different airline.



Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
6. Adjacent Domestic Terminal + DTB	Opposite new Ground Transport centre, provides additional forecourt capacity.	New processor sized for appropriate number of domestic passengers	Can provide the appropriate number of stands assuming DTB remains.	Improved Int<>Dom experience. Dom<>Reg experience ok. Opportunity to improve wayfinding.	Impacted by realignment of TWY Bravo in 2028/29 but provides 12 jet stands so can cope with closure of DTB short-term if A1 provided before 2029.	Some impact on other uses, as per IDT.	Full schedule can be achieved.	Requires new terminal processor and Pier A1.

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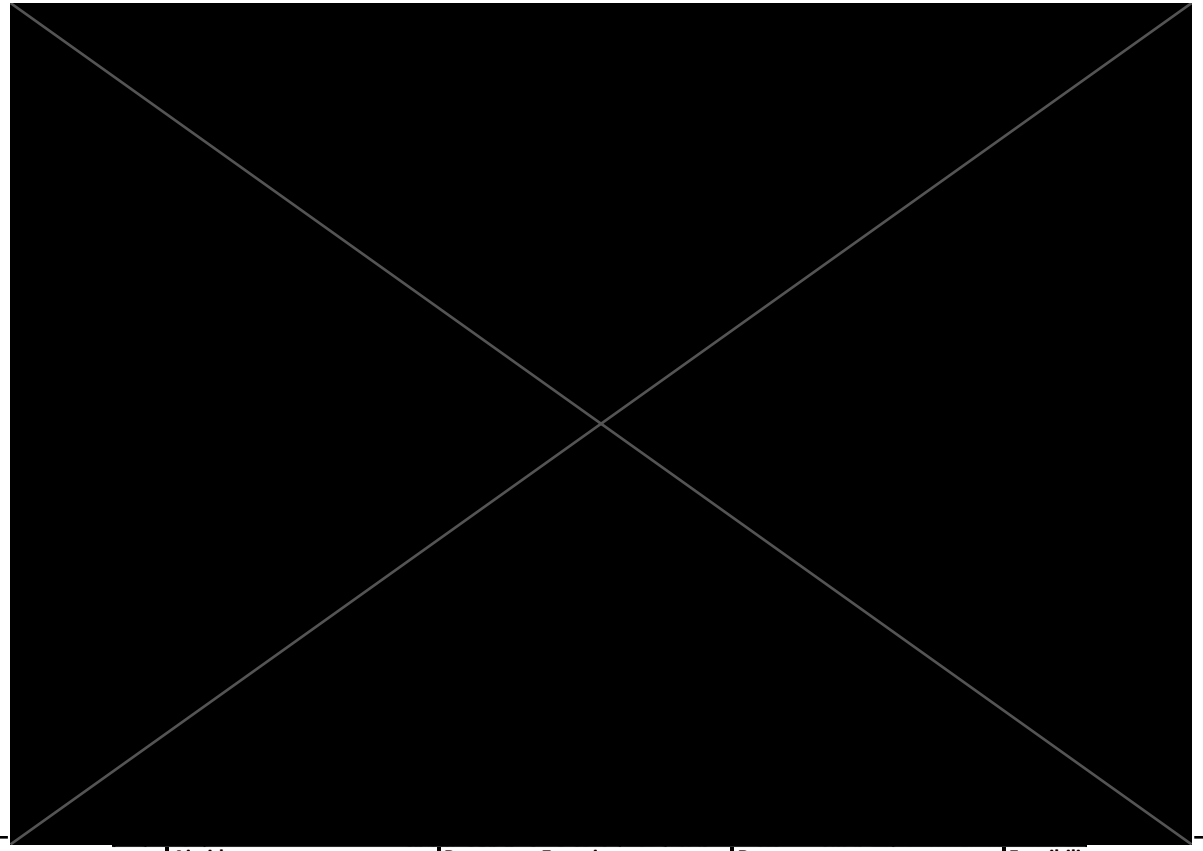
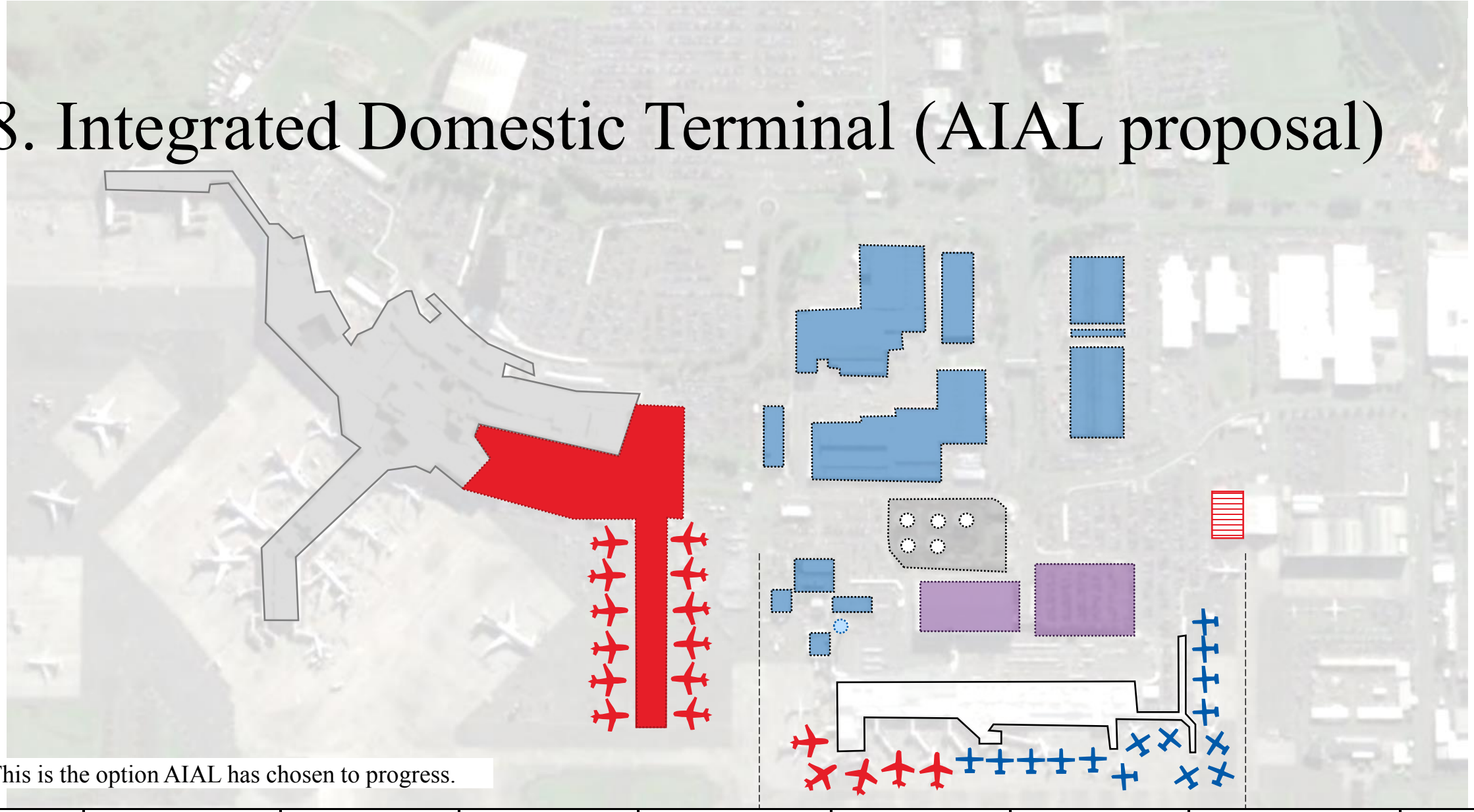
7a and b. Domestic Terminal North: with or without Northern Runway



Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
7a. Domestic Terminal North: with Northern Runway	Will require new forecourt, not proximate to Ground Transport centre. Forecourt can provide appropriate capacity to 2043.	New processor sized for appropriate number of domestic passengers	Can provide the appropriate number of stands.	Improved Int<>Dom experience. Opportunity for improved Dom <> Reg experience.	Northern runway provided.	Will impact the relocation of the cargo handling terminal.	Full schedule can be achieved.	Requires new processor and new runway. Unaffordable.
7b. Domestic Terminal North: without Northern Runway	Will require new forecourt, not proximate to Ground Transport centre. Forecourt can provide appropriate capacity to 2043.	New processor sized for appropriate number of domestic passengers	Can provide the appropriate number of stands.	Improved Int<>Dom experience. Opportunity for improved Dom <> Reg experience.	Operational taxi time penalties on short-hop routes without Northern Runway.	Will impact the relocation of the cargo handling terminal.	Full schedule can be achieved, however long taxi times without Northern Runway impact on OTP.	Requires new terminal and forecourt, new piers for domestic and regional. May require additional aircraft to run full schedule. Unaffordable.

8. Integrated Domestic Terminal (AIAL proposal)



Note: This is the option AIAL has chosen to progress.

Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
8: Integrated Domestic Terminal (AIAL endorsed)	Opposite new Ground Transport centre, provides additional forecourt capacity.	New processor sized for appropriate number of domestic passengers	Can provide the appropriate number of stands assuming DTB remains.	Improved Int<>Dom experience. Dom<>Reg experience ok. Opportunity to improve wayfinding.	Impacted by realignment of TWY Bravo in 2028/29 but provides 12 jet stands so can cope with closure of DTB short-term if A1 provided before 2029.	Some impact on other uses.	Full schedule can be achieved, however single taxilane may impact OTP	Unaffordable

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8. Evaluation

Scoring of the options

Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability	TOTAL
1. DTB: Status Quo	3	2	1	2	1	5	1	5	20
2a. DTB + Pier A3	3	2	2	2	1	3	2	4	19
2b. DTB + Pier A3 + Regional Headhouse	3	5	2	2	1	2	2	3	20
3a. DTB + Pier A1	3	3	5	2	3	5	3	4	28
3b. DTB + Pier A1 + East Expansion	3	5	5	2	4	4	4	3	30
4a. DTB + Pier A1 + Pier A3	3	3	5	2	4	3	4	3	27
4b. DTB + Pier A1 + Pier A3 + Regional Headhouse	3	5	5	3	4	2	4	2	28
5a. DTB Expanded (No JUHI)	3	4	2	2	1	1	1	2	16
5b. DTB Expanded (No JUHI) + Pier A1	3	4	3	2	3	1	4	1	21
5c. Pier A1 + then DTB expansion	3	3	5	2	3	2	4	1	23
6. Adjacent Domestic Terminal + DTB	5	5	5	4	3	3	5	2	32
7a. Domestic Terminal North: with Northern Runway	3	5	5	5	5	3	5	x	31
7b. Domestic Terminal North: without Northern Runway	3	5	5	5	1	3	2	x	24
8: Integrated Domestic Terminal (AIAL endorsed)	5	5	5	4	3	3	3	x	28

Note: Should an alternative to the runway maintenance programme be identified (i.e. expedient concrete, alternative phasing), this may result in TWY Bravo no longer requiring realignment. As a result, the jet stands on the DTB could remain operational in their current location. All options that keep the DTB operational would then score a 5 for the Runway category. As all options retain the DTB, Arup has not produced an assessment on this basis as the overall difference in scores would not change.

8. Evaluation

Summary of scoring

Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
1. DTB: Status Quo	Join forecourts to provide more capacity. Not proximate to new Ground Transport Hub.	Limited capacity to grow and does not perform at IATA Optimum in 2019.	10 jet stands (not all A321 capable), 14 required by 2033, 17 required by 2043.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding.	Impacted by realignment of TWY Bravo in 2028/29.	No construction, therefore no impact on other uses.	Approximately 50% of future schedule cannot be delivered owing to lack of stands for overnight peak. Requires descheduling.	No additional CAPEX or OPEX required
2a. DTB + Pier A3	Opportunity to reconfigure forecourt and provide additional car parks but will require relocating other land uses. Not proximate to new Ground Transport Hub.	Could provide for regional screening and additional gate lounge. Unlikely to provide much capacity beyond 2030.	3-4 additional jet/turbo-prop stands, sufficient to late 2020s but not beyond.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding.	Impacted by realignment of TWY Bravo in 2028/29.	Some impact on access to DTB and car park areas as well as hangar.	Approximately 25% of future jet schedule cannot be delivered due to overnight peak. Improvement on DTB, but still requires descheduling.	Requires A3 and forecourt remodelling.
2b. DTB + Pier A3 + Regional Headhouse	Opportunity to reconfigure forecourt and provide additional car parks but will require relocating other land uses. Not proximate to new Ground Transport Hub.	Provides for regional processing. Will provide capacity beyond 2030 and potentially to 2043.	3-4 additional jet/turbo-prop stands, sufficient to late 2020s but not beyond.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding.	Impacted by realignment of TWY Bravo in 2028/29.	Impact on access to DTB and car park areas. Impacts Laurence Stevens Drive. Impacts hangars.	Approximately 25% of future jet schedule cannot be delivered due to overnight peak. Improvement on DTB, but still requires descheduling.	Requires A3, Regional Headhouse, forecourt remodelling.
3a. DTB + Pier A1	Join forecourts to provide more capacity. Not proximate to new Ground Transport Hub.	Additional gate lounge provided. Limited terminal processor capacity. Requires bussing lounge in DTB.	12 additional stands, sufficient to 2043, assuming DTB stands retained.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding. Will require bussing.	Impacted by realignment of TWY Bravo in 2028/29 but provides 12 stands so can cope with closure of DTB short-term if A1 provided before 2029.	Impact on "tennis courts" but new stands being provided north of Pier B. Does not require relocation of prior uses.	Full schedule can be achieved, however likely to affect block times or check-in/bag drop close off times to transfer passengers to Pier A1. Confusing mix of Reg and Dom Jet	Requires A1 and bussing OPEX.
3b. DTB + Pier A1 + East Expansion	Join forecourts to provide more capacity. Not proximate to new Ground Transport Hub.	Provides for regional processing and additional stands through A1. Requires bussing lounge in DTB.	12 additional stands, sufficient to 2043, assuming DTB stands retained.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding. Will require bussing.	Impacted by realignment of TWY Bravo in 2028/29 but can provide A1 and additional jet and turbo prop stands to mitigate.	Some impact on DTB forecourt.	Full schedule can be achieved, however likely to affect block times or check-in/bag drop close off times to accommodate time required to transfer passengers to Pier A1.	Requires A1 and bussing OPEX and DTB expansion.
4a. DTB + Pier A1 + Pier A3	Opportunity to reconfigure forecourt and provide additional car parks but will require relocating other land uses. Not proximate to new Ground Transport Hub.	Additional gate lounge provided. Limited terminal processor capacity. Requires bussing lounge in DTB.	16 additional stands, sufficient beyond 2043 and would provide for regional growth.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding. Will require bussing.	Impacted by realignment of TWY Bravo in 2028/29 but can provide additional jet and turbo prop stands to mitigate.	Some impact on access to DTB and car park areas as well as hangar.	Full schedule can be achieved, however likely to affect block times or check-in/bag drop close off times to accommodate time required to transfer passengers to Pier A1.	Requires A3, A1, forecourt remodelling.
4b. DTB + Pier A1 + Pier A3 + Regional Headhouse	Opportunity to reconfigure forecourt and provide additional car parks but will require relocating other land uses. Not proximate to new Ground Transport Hub.	Provides for regional processing. Will provide capacity beyond 2030.	16 additional stands, sufficient beyond 2043 and would provide for regional growth.	Poor Int<>Dom-Reg experience, Dom<>Reg experience improved. More intuitive wayfinding when all regional passengers are processed in one headhouse. Will require bussing.	Impacted by realignment of TWY Bravo in 2028/29 but can provide additional jet and turbo prop stands to mitigate.	Impact on access to DTB and car park areas. Impacts Laurence Stevens Drive. Impacts hangar.	Full schedule can be achieved, however likely to affect block times or check-in/bag drop close off times to accommodate time required to transfer passengers to Pier A1.	Requires A3, A1, Headhouse and forecourt remodelling.

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8. Evaluation

Summary of scoring

Possible Pathways	Landside	Terminal	Airside	Passenger Experience	Runway	Feasibility	Operational impact	Affordability
5a. DTB Expanded (No JUHI)	Complex forecourt reconfiguration and phasing. Will deliver appropriate capacity by 2043.	Limited terminal processor capacity until JUHI removed and DTB expanded.	Additonal turbo-prop stands but not enough jet stands.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding.	Impacted by realignment of TWY Bravo in 2028/29.	Needs JUHI out early	Approximately 25% of future jet schedule cannot be delivered due to overnight peak. Requires descheduling.	Move JUHI early, decontaminate, rebuild car parks and forecourts, rebuild terminal.
5b. DTB Expanded (No JUHI) + Pier A1	Complex forecourt reconfiguration and phasing. Will deliver appropriate capacity by 2043.	Limited terminal processor capacity until JUHI removed and DTB expanded. Additional gate lounge provided by 2043. Requires bussing lounge.	Some additional stands but not sufficient until A1 is constructed.	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding.	Impacted by realignment of TWY Bravo in 2028/29 but provides 12 jet stands so can cope with closure of DTB short-term if A1 provided before 2029.	Needs JUHI out early	Full schedule can be achieved, however likely to affect block times or check-in/bag drop close off times to accommodate time required to transfer passengers to Pier A1.	Move JUHI early, decontaminate, rebuild car parks and forecourts, rebuild terminal, A1.
5c. Pier A1 + then DTB expansion	Complex forecourt reconfiguration and phasing. Will deliver appropriate capacity by 2043.	Additional gate lounge provided. Limited terminal processor capacity until JUHI removed and DTB expanded. Requires bussing lounge.	Sufficient stands	Poor Int<>Dom-Reg experience, Dom<>Reg experience ok, non-intuitive wayfinding.	Impacted by realignment of TWY Bravo in 2028/29 but provides 12 jet stands so can cope with closure of DTB short-term if A1 provided before 2029.	Requires significant reconfiguration of the landside. Need to keep terminal operational while expanding.	Full schedule can be achieved, however likely to affect block times or check-in/bag drop close off times to accommodate time required to transfer passengers to Pier A1.	Requires A1 and bussing OPEX and building expansion, forecourt reconfiguration
6. Adjacent Domestic Terminal + DTB	Opposite new Ground Transport centre, provides additional forecourt capacity.	New processor sized for appropriate number of domestic passengers	Can provide the appropriate number of stands assuming DTB remains.	Improved Int<>Dom experience. Dom<>Reg experience ok. Opportunity to improve wayfinding.	Impacted by realignment of TWY Bravo in 2028/29 but provides 12 jet stands so can cope with closure of DTB short-term if A1 provided before 2029.	Some impact on other uses, as per IDT.	Full schedule can be achieved.	Requires new terminal processor and Pier A1.
7a. Domestic Terminal North: with Northern Runway	Will require new forecourt, not proximate to Ground Transport centre. Forecourt can provide appropriate capacity to 2043.	New processor sized for appropriate number of domestic passengers	Can provide the appropriate number of stands.	Improved Int<>Dom experience. Opportunity for improved Dom <> Reg experience.	Northern runway provided.	Will impact the relocation of the cargo handling terminal.	Full schedule can be achieved.	Requires new processor and new runway. Unaffordable.
7b. Domestic Terminal North: without Northern Runway	Will require new forecourt, not proximate to Ground Transport centre. Forecourt can provide appropriate capacity to 2043.	New processor sized for appropriate number of domestic passengers	Can provide the appropriate number of stands.	Improved Int<>Dom experience. Opportunity for improved Dom <> Reg experience.	Operational taxi time penalties on short-hop routes without Northern Runway.	Will impact the relocation of the cargo handling terminal.	Full schedule can be achieved, however long taxi times without Northern Runway impact on OTP.	Requires new terminal and forecourt, new piers for domestic and regional. May require additional aircraft to run full schedule. Unaffordable.
8: Integrated Domestic Terminal (AIAL endorsed)	Opposite new Ground Transport centre, provides additional forecourt capacity.	New processor sized for appropriate number of domestic passengers	Can provide the appropriate number of stands assuming DTB remains.	Improved Int<>Dom experience. Dom<>Reg experience ok. Opportunity to improve wayfinding.	Impacted by realignment of TWY Bravo in 2028/29 but provides 12 jet stands so can cope with closure of DTB short-term if A1 provided before 2029.	Some impact on other uses.	Full schedule can be achieved, however single taxilane may impact OTP	Unaffordable

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9. Airfield planning for alternative pathways

Methodology

The evaluation of the long list identified three primary options to be taken forward for further consideration. A key consideration was whether these options could be delivered whilst also providing an efficient airside operation. The following section shows airfield planning and key taxiway/taxilane separations, including:

- Existing airfield
- Airfield with IDT
- DTB + A1: revised airfield alignment
- DTB + A1, A3, Regional Headhouse
- DTB + Adjacent

It is noted that the proposed IDT layout does not provide sufficient space for a dual taxilane between the DTB and IDT, as the AIAL Masterplan ultimately envisages demolition of the DTB.

As a result, Arup's options have considered an alternative Pier A1 arrangement which allows for a dual taxilane between the DTB and the east side of Pier A1, whilst also providing for Code C and Code E operations on the west side of Pier A1.

Only 2 Code E MARS stands can be provided assuming the revised A1 alignment.

Further exploration of the airfield was undertaken week commencing 3 July 2023 to consider the impact of a dual Code C taxilane with the proposed IDT pier remaining in its current location and this is also shown.

An initial view of the Contingent Runway scenario, with Taxiway Bravo realigned and impact on DTB, has also been explored. This shows the potential for turboprops on the southern face of the DTB with Taxiway Bravo realigned. The option assumes fixed links/bridges are removed and power-in power-out only turboprop operations onto Taxiway Bravo.

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9. Airfield planning for alternative pathways

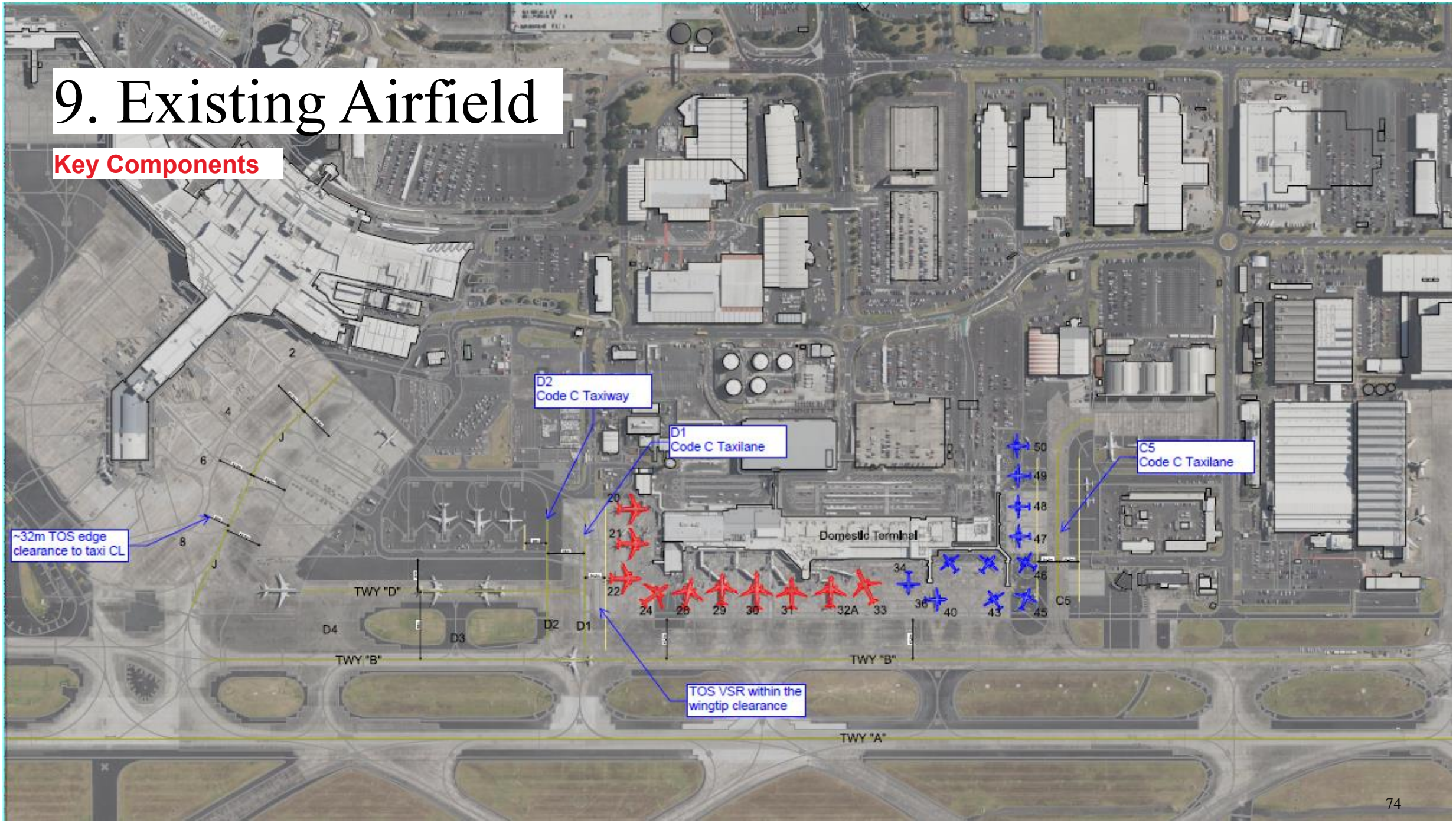
Key findings

The following represent the key findings of the airfield planning undertaken to date:

- The proposed IDT includes a single taxilane between Pier A1 and the DTB as the AIAL Masterplan envisages demolition of the DTB in the early 2030s.
- Arup has provided a revised alignment of Pier A1 that provides sufficient space for a dual taxilane, thereby improving airfield operations
- The revised alignment of Pier A1 can provide 12 Code C jet stands, or alternatively 8 Code C Jet stands and 2 Code E stands in a MARS arrangement.
- An option with DTB + A1 + A3 + Regional Headhouse can provide up to 20 Code C Jet stands and 16 turboprop stands but the Regional headhouse impacts on the “KFC” and adjacent hangar facilities.
- An Adjacent Domestic Terminal option can be provided with 17 Code C jet stands and 16 turboprop stands, which meets 2043 requirements.
- In order to provide a dual Code C taxilane with AIAL’s IDT proposal and pier alignment, a portion of the DTB will require demolition. Should demolition of additional buildings including the current Control Tower be deemed as acceptable, it is possible to re-provide all 10 jet stands on the DTB.
- A contingent runway and realigned Taxiway Bravo have been explored, with turboprop operations on the south face of the DTB. The option assumes fixed links and bridges are removed and turboprops only operating on a power-in power-out basis. 9 turboprops are expected to be able to operate in this way, which would increase the total turboprop operation on the DTB to 14. To maintain and appropriate Domestic Jet operation, 12 additional Code C stands are required at Pier A1 (plus three existing remaining on the west side of the DTB). This level of stand provision is sufficient to 2033.

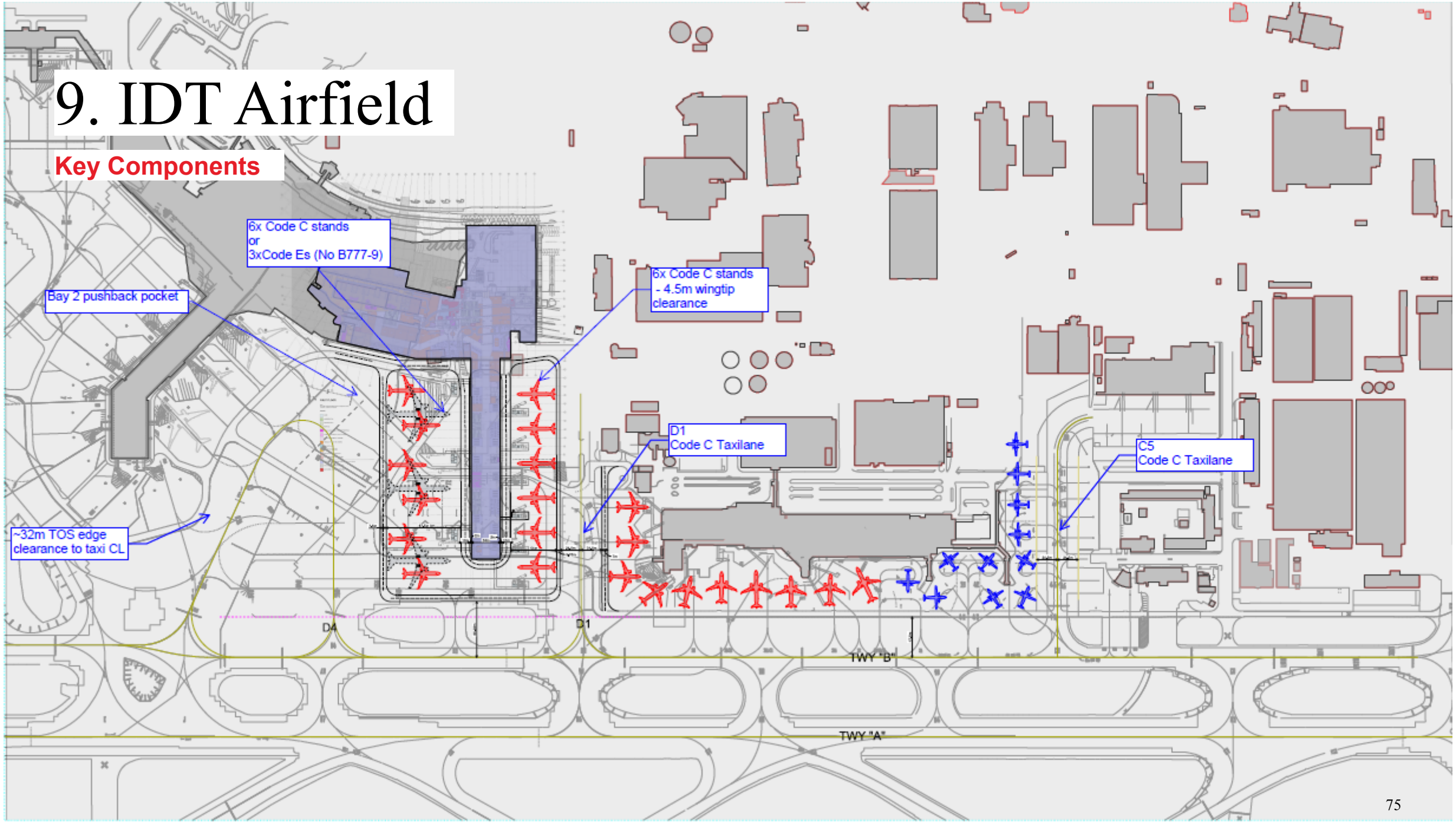
9. Existing Airfield

Key Components



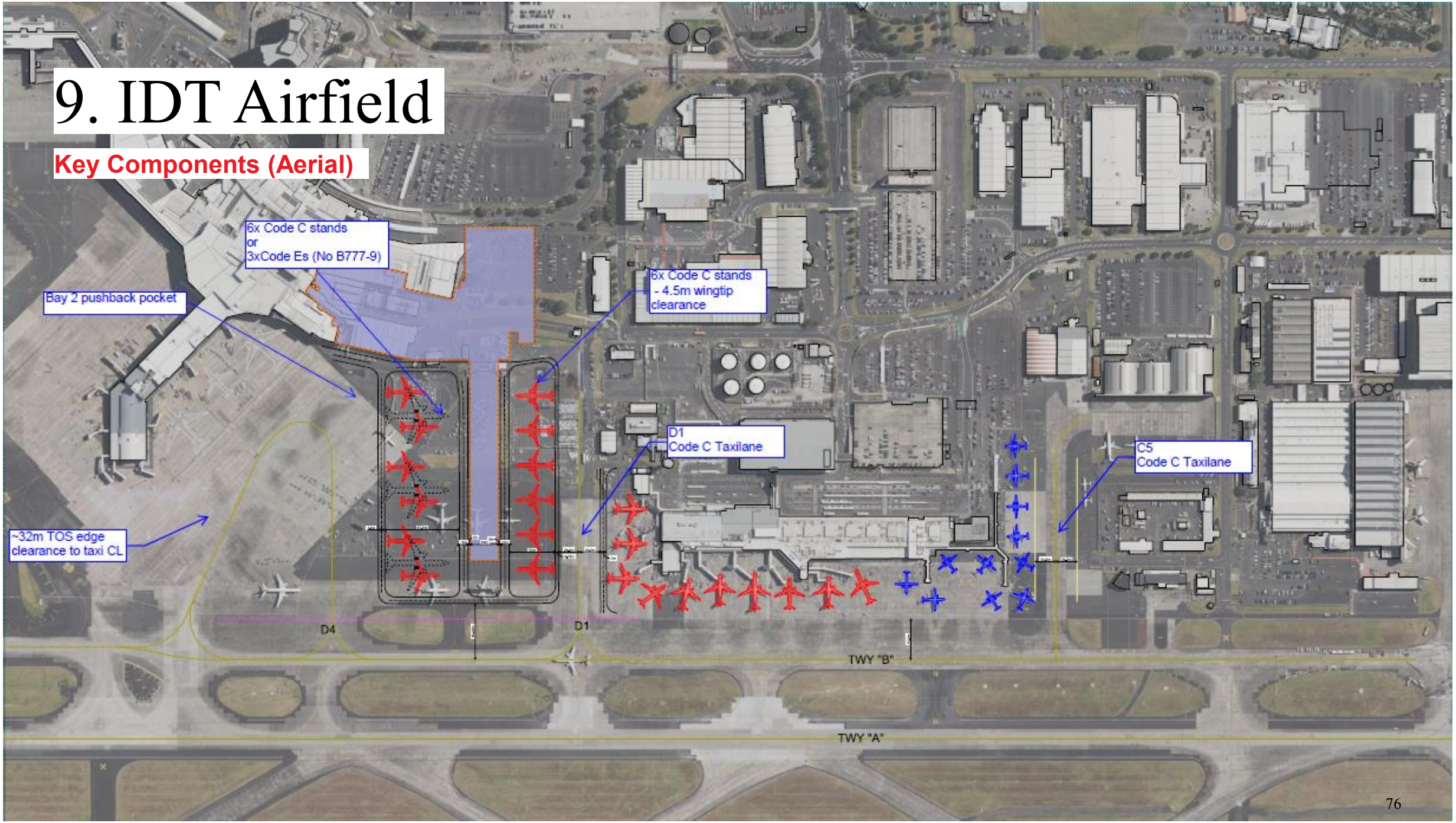
9. IDT Airfield

Key Components



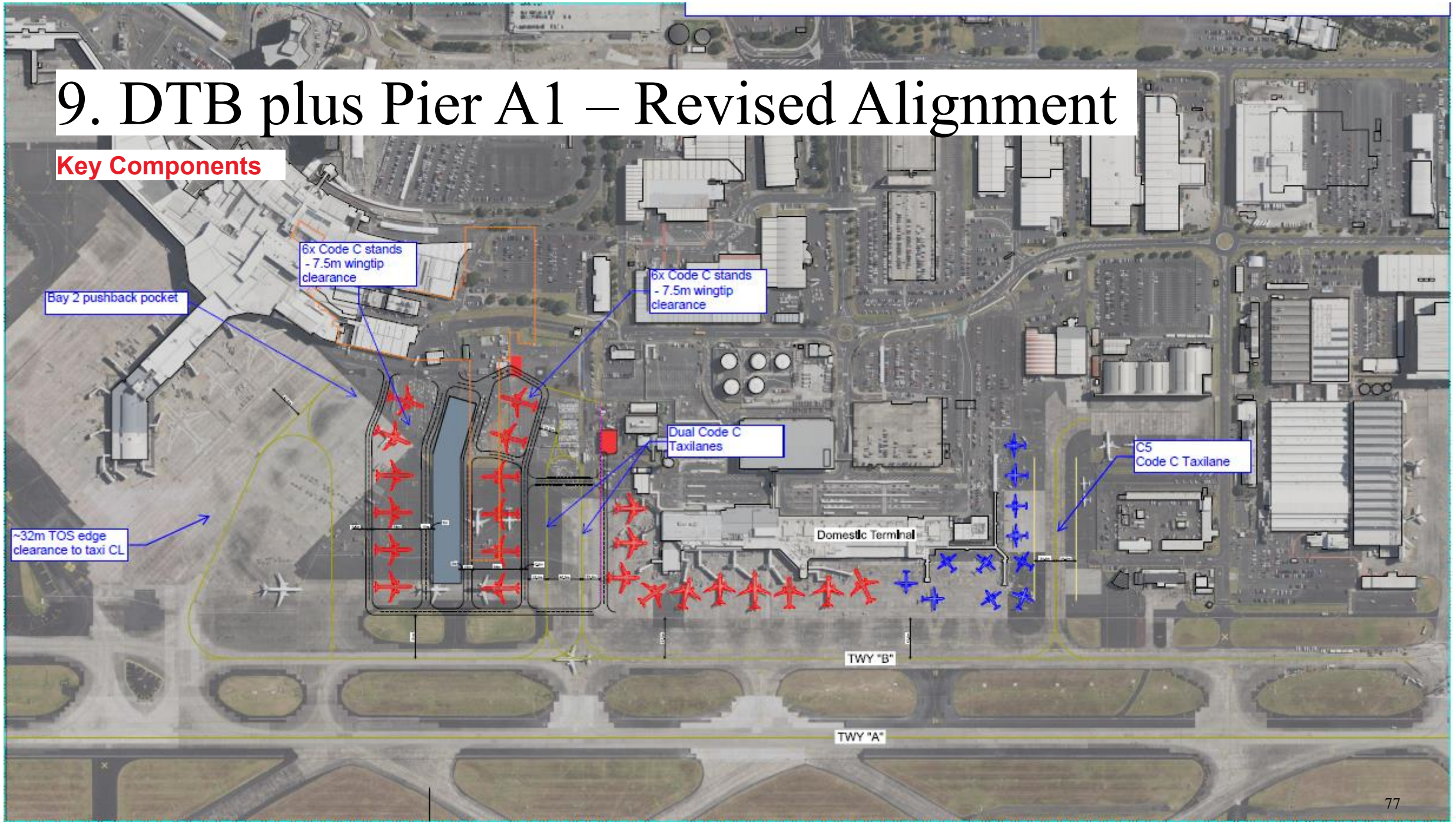
9. IDT Airfield

Key Components (Aerial)



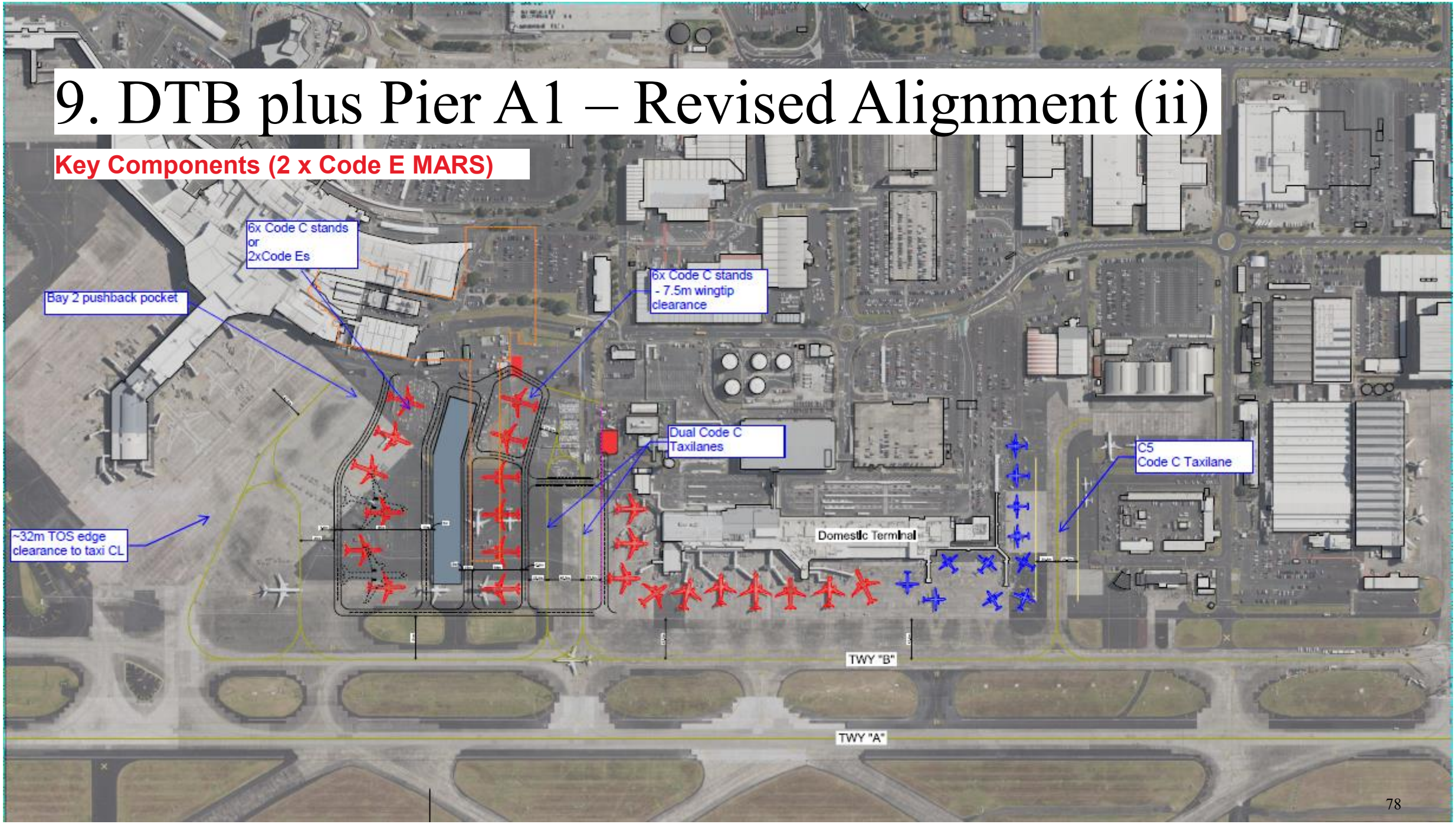
9. DTB plus Pier A1 – Revised Alignment

Key Components



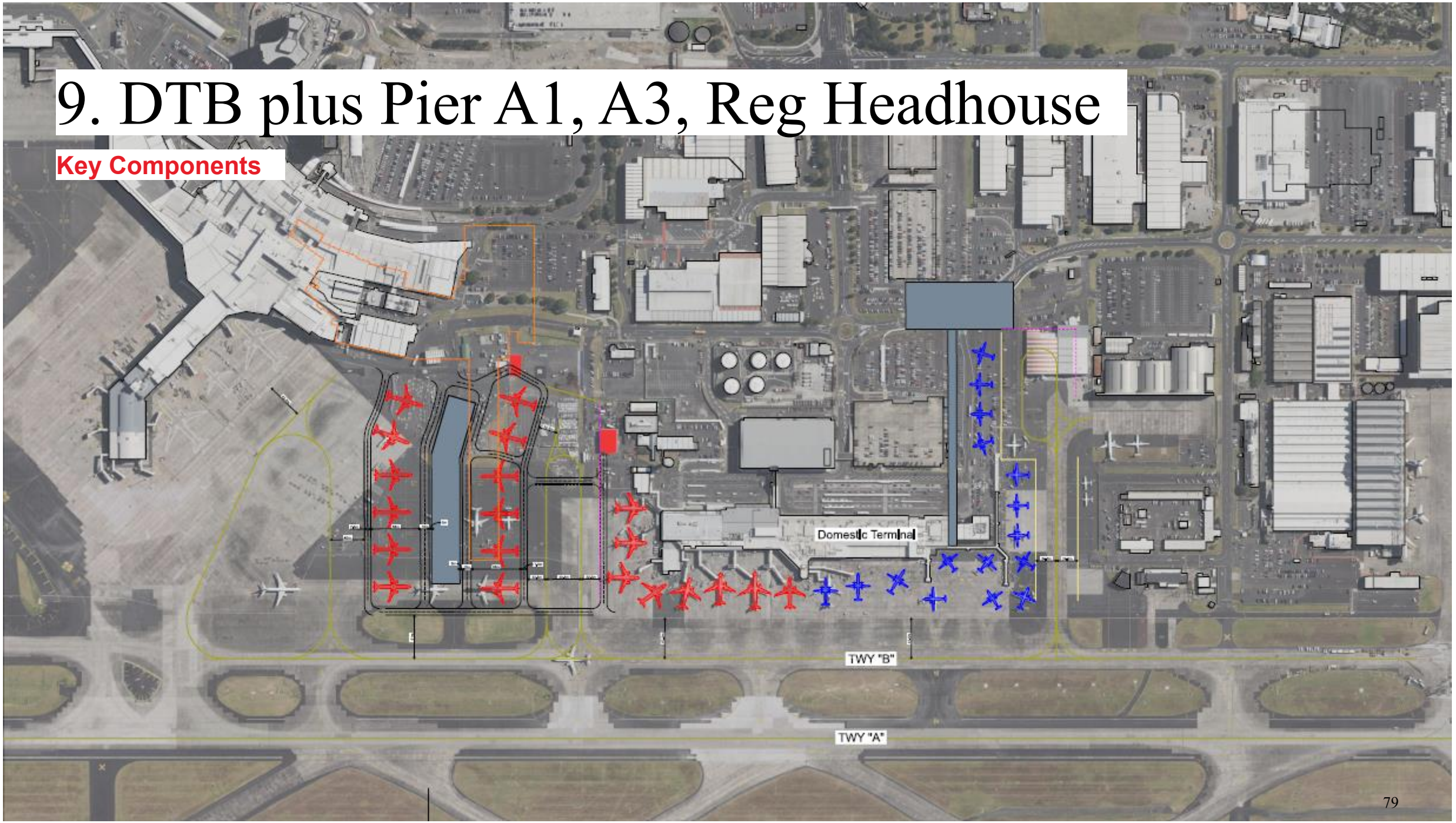
9. DTB plus Pier A1 – Revised Alignment (ii)

Key Components (2 x Code E MARS)



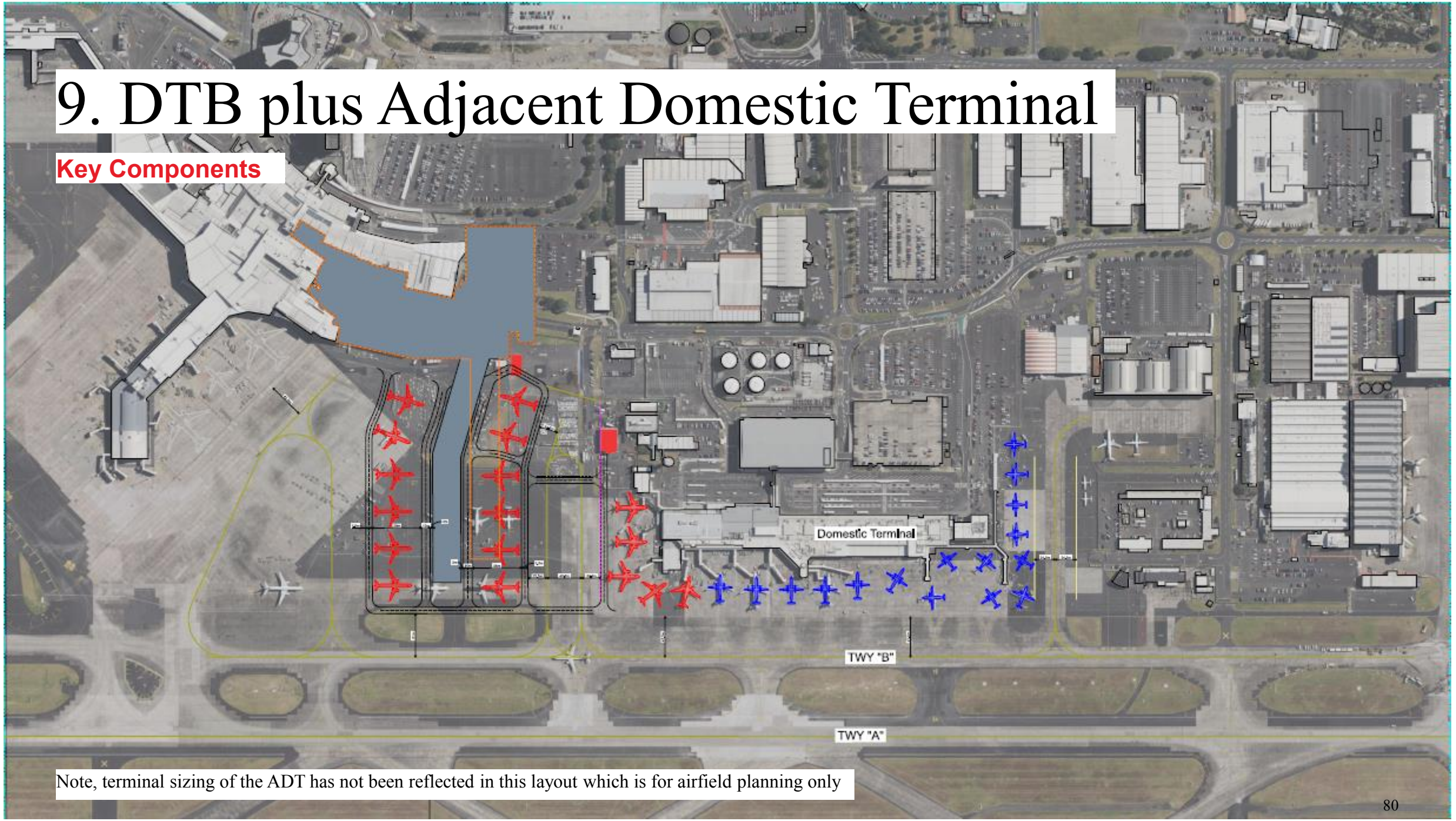
9. DTB plus Pier A1, A3, Reg Headhouse

Key Components



9. DTB plus Adjacent Domestic Terminal

Key Components



Note, terminal sizing of the ADT has not been reflected in this layout which is for airfield planning only

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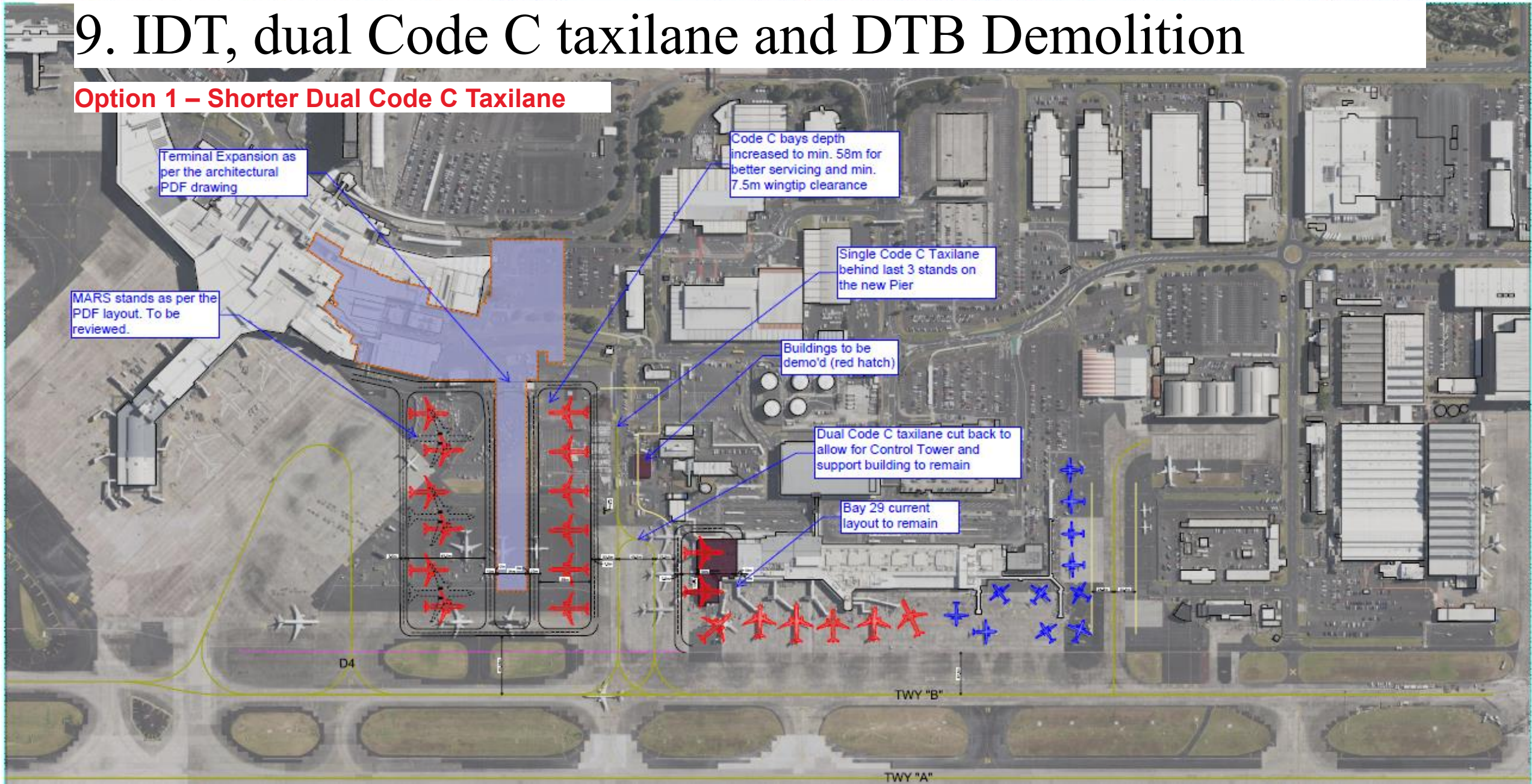
9. IDT, dual Code C taxilane and DTB Demolition

Option 1 – Shorter Dual Code C Taxilane



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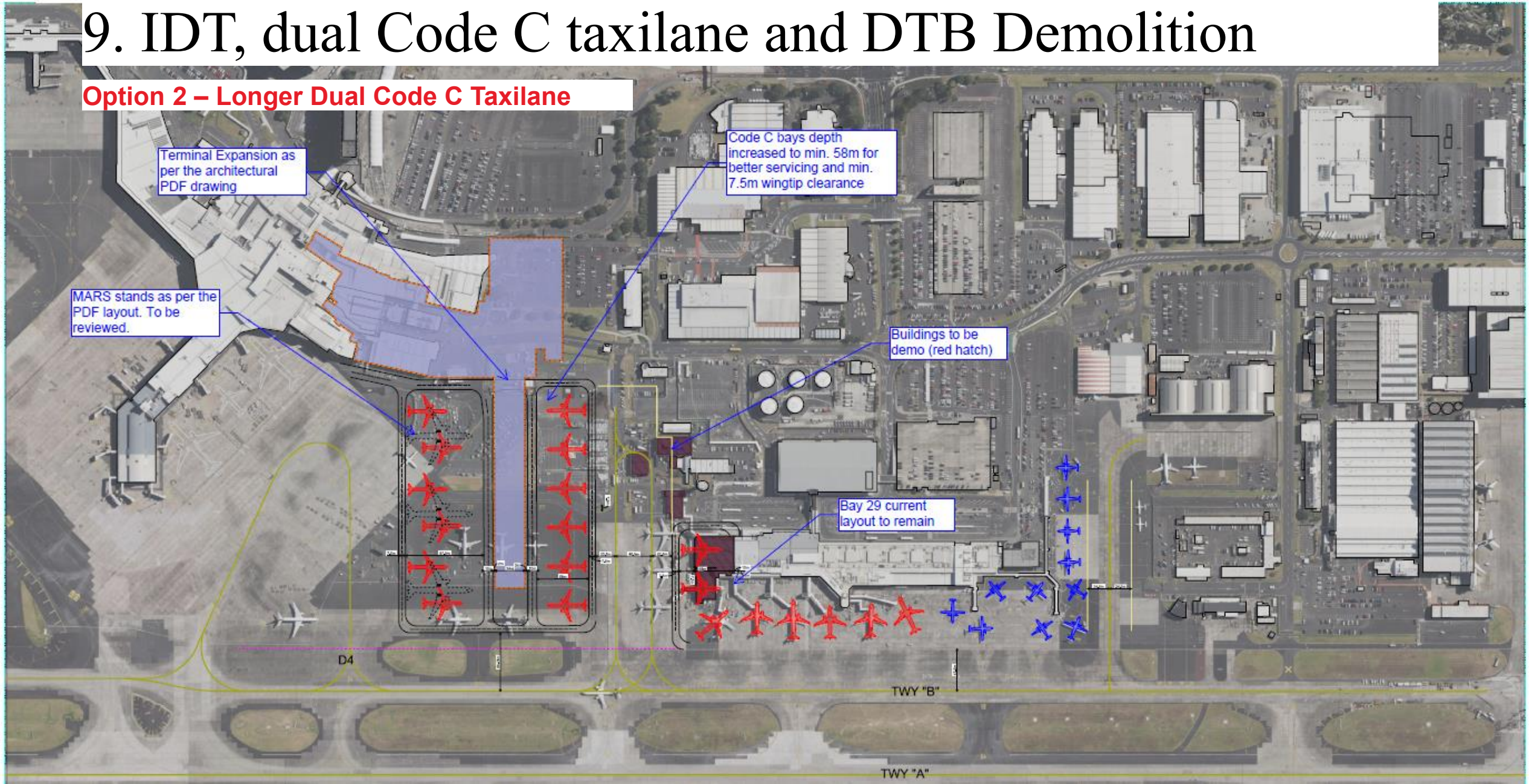
9. IDT, dual Code C taxilane and DTB Demolition

Option 2 – Longer Dual Code C Taxilane



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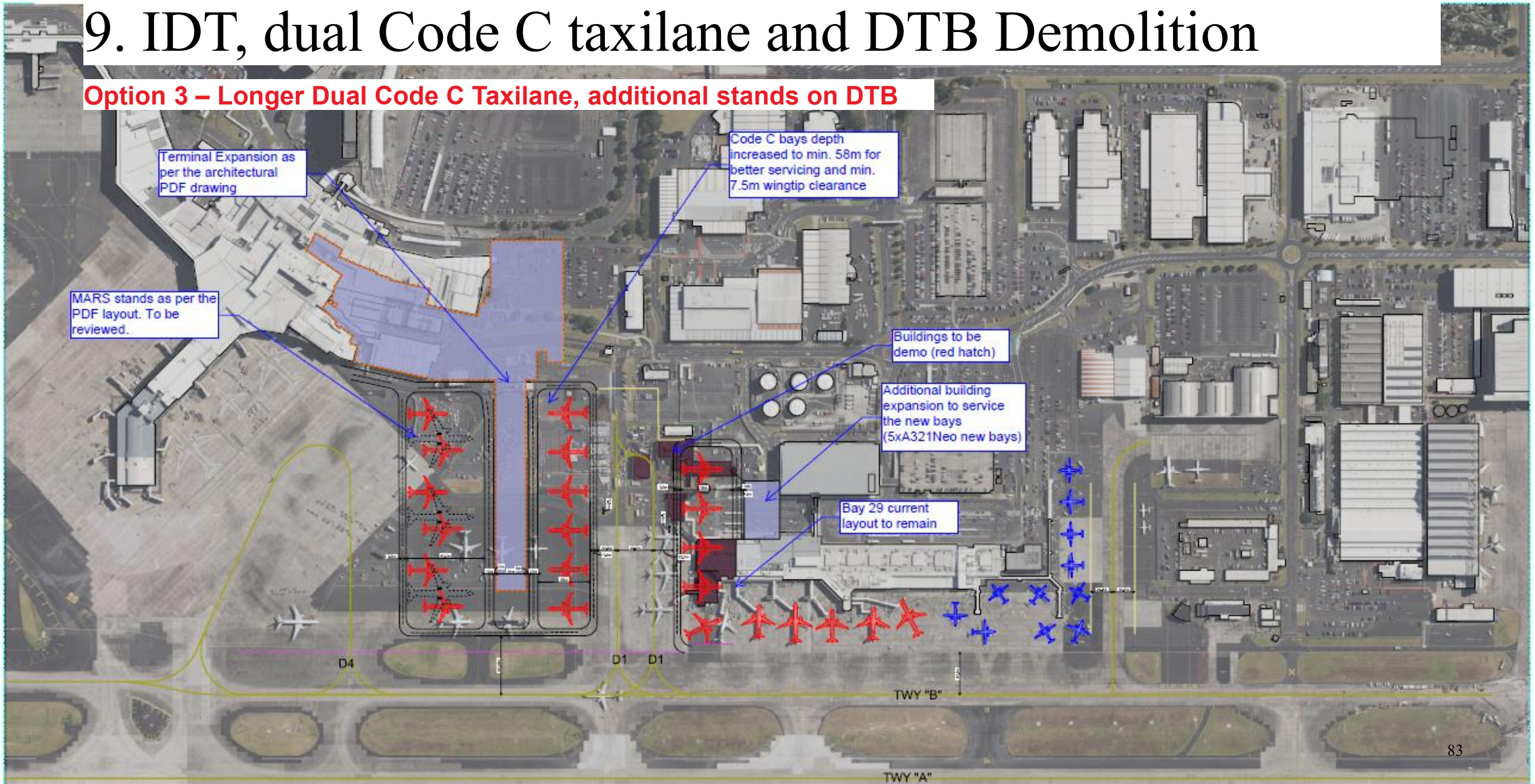
9. IDT, dual Code C taxilane and DTB Demolition

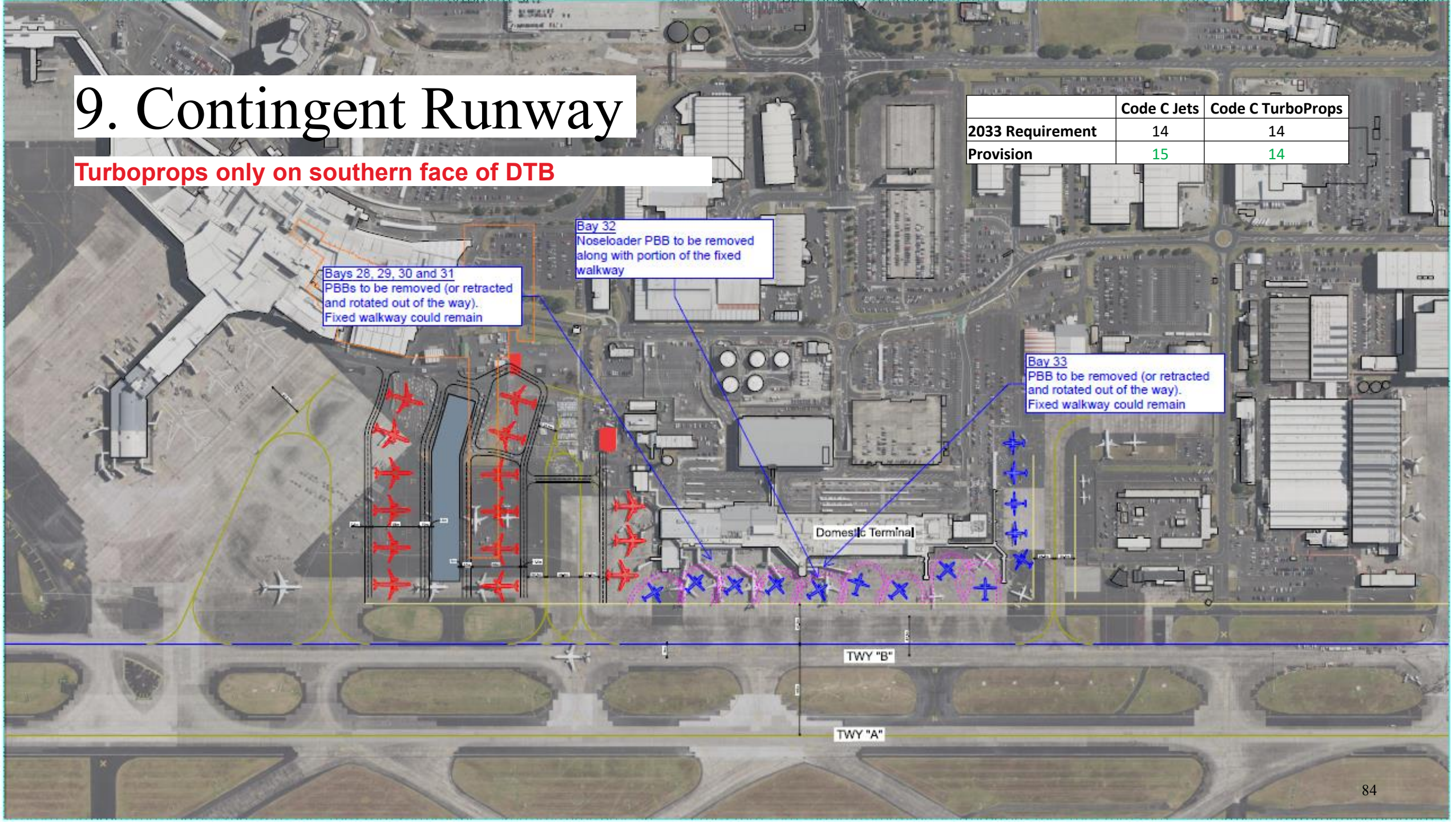
Option 3 – Longer Dual Code C Taxilane, additional stands on DTB



9. Contingent Runway

Turboprops only on southern face of DTB

	Code C Jets	Code C TurboProps
2033 Requirement	14	14
Provision	15	14



10. Costing of alternative pathways

Methodology

The evaluation of the long list identified options for Domestic terminal capacity to be taken forward for further consideration but based on rule-of-thumb costing information.

Accordingly, to provide a more accurate appraisal of these options from an affordability perspective, Arup requested WT Partnership to prepare initial costings for three from the long list of options – note these were not necessarily the preferred options but provided full coverage of all costing aspects including moving JUHI and the IDT.

Based on the work undertaken by WT Partnership, Arup was then to take different elements from these costings to generate an order-of-magnitude cost for all of the long list of options, with exception of Domestic Terminal North which also requires a Northern Runway, the cost of which is unknown.

The following slides describe WT Partnership's approach, the three options it costed and exclusions /clarifications.

10. Costing of alternative pathways

Key findings

Cost estimates are based on NZ pricing schedules. Key findings from the costing exercise are as follows:

- The IDT is the most expensive of the costed options. WT Partnership estimate that the IDT will cost in the region of $1.8 billion, which is $400 million less than the costs provided to AIAL by Air New Zealand. Note, the assumptions behind AIAL's costings have not been provided. WT Partnership has not included escalation in the estimates. However, escalation alone is unlikely to account for the full $400 million.
- Arup estimate that an Adjacent Domestic Terminal could cost up to $1.4+ billion, so 30% less than the cost of the IDT, based on a reduced processor requirement and simplified integration of the two terminals.
- Expansion of the DTB to the east to accommodate a regional processor with provision a remote pier A1 for additional Domestic Jet capacity could cost in the region of $800 million (not including the cost of the bussing operation). This could be the initial step on the pathway to an Adjacent or Integrated Domestic Terminal.
- Options which expand the current DTB once JUHI has been moved will be very challenging from a phasing and operational perspective, as per the scoring in Section 8. The costing provided is a provisional, indicative cost. Remediation of the site is not included, nor is the cost of buying out the remaining JUHI lease.

10. Costing of alternative pathways

APPROACH TO ESTIMATE

Through WT's role as Independent Estimator during the early part of 2020 for the airport alliance, we have access to earlier estimates for the proposed Integrated Domestic Terminal. We have derived empirical rates from these earlier estimates, added allowance for escalation from the February 2020 base date to July 2023, and applied these to the relevant building areas or siteworks areas. We've also added allowances for specific items such as security, baggage handling, check-in etc.

The estimates are for the expected outturn cost inclusive of design, consenting and general provisions for risk around design, procurement and construction, but have not factored in full risk allowances through a QRA, i.e., we have not yet established a P85 estimate. This could be done as part of the next phase of the project.

Estimates are based on July 2023 rates and exclude any specific land purchases where functions are requiring relocation, i.e., Hangars and the JUHI.

10. Costing of alternative pathways

CLARIFICATIONS & EXCLUSIONS

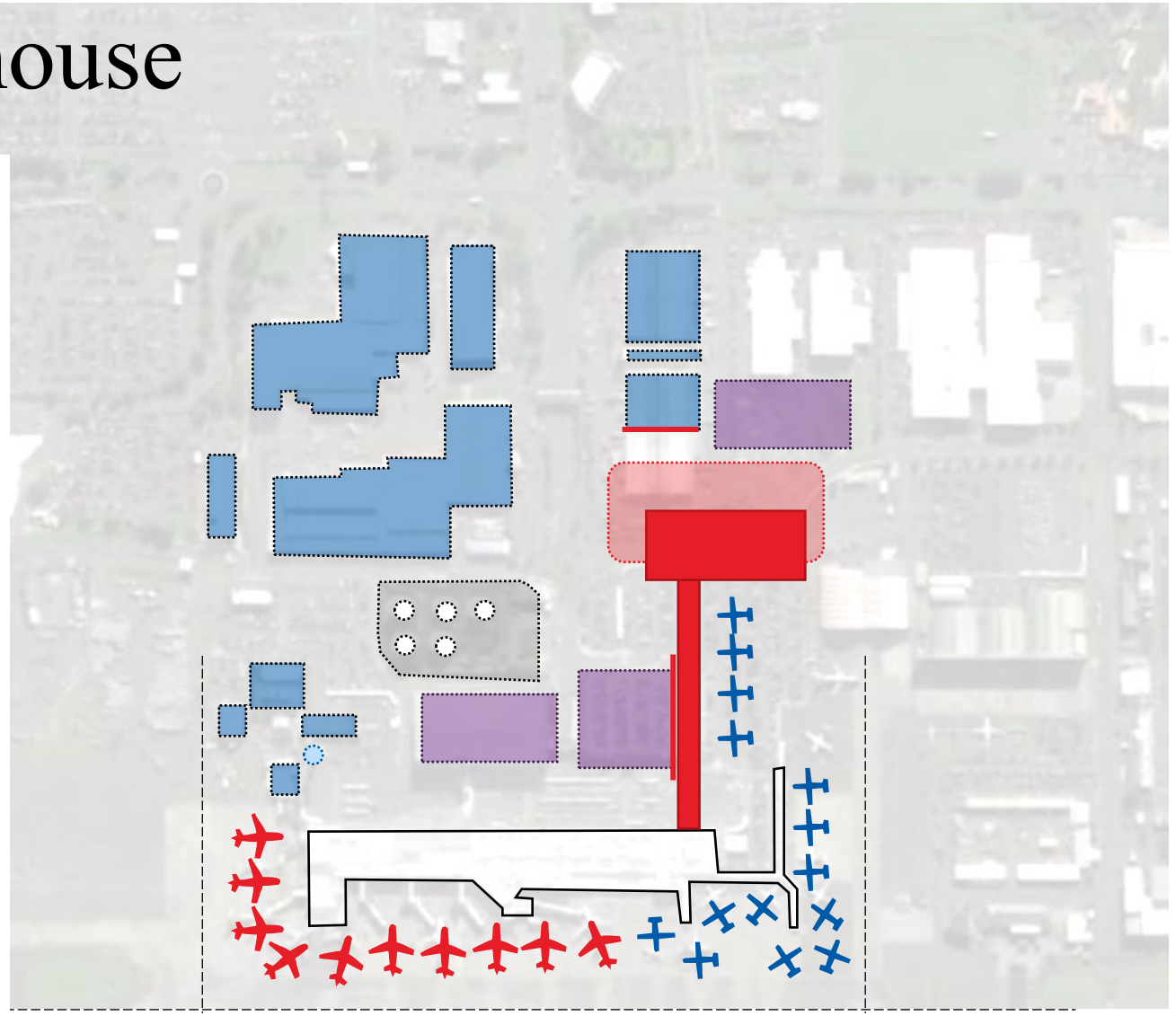
The following clarifications and exclusions should be read in conjunction with the estimated costs above:

- Assumed the works are carried out in conjunction with an operating terminal, but the works generally undertaken during normal working hours.
- Site boundary is confined to the areas allowed in the estimate for building footprint plus civil works.
- Estimate excludes previous design work that may have been undertaken for options.
- Full risk and uncertainty through a Quantitative Risk Assessment (QRA) has not been determined or included in the estimate.
- Items such as link bridges to existing carparks or new carparks are excluded.
- We have assumed the works would be tendered as a P&G and Margin offer and trades negotiated with the successful tenderer.
- General provisions are including for enabling and interface works with the existing terminal. These allowances would be refined in the next phase of design.
- Disposal of highly contaminated materials is excluded and assumes it is reused elsewhere within the Airport precinct.
- Estimates exclude GST and escalation.
- Other development costs such as financing and interest, holding costs, development levies and contributions, marketing, legal and other related development costs.

1. DTB plus A3, Headhouse

Option 1 (as per Arup brief to WT Partnership)

- New regional headhouse/processor at up to 13,300m^2, comprising:
  - Check-in at 400m^2.
  - Security at 500m^2.
  - Baggage handling at 1,100m^2 .
  - Baggage reclaim/arrivals hall at 900m^2.
  - Gate lounge for 14 turborop stands at 1,300m^2.
  - Retail at 2,100m^2.
  - Back-of-house, mech-elec, structure, circulation at 5,600m^2 .
- New pier at 200m x 12m, total area of 2,400m^2.
- 4 additional Code C turboprop stands including new apron.
- All stands walk-out, no airbridges.
- New forecourt – area estimated to be 5,000m^2.
- New short-stay car park at 800 spaces. Multi-storey.
- Impact on:
  - Single storey car park in existing forecourt. Will require demolition. Can be reinstated as at-grade parking as regional capacity provided in new short-stay car park.
  - “KFC” hangar and adjacent hangar will need to be demolished and reprovided elsewhere.
  - Partial/full demolition of GVI Logistics shed.



Costing of alternative pathways

Option 1: DTB plus A3, Headhouse

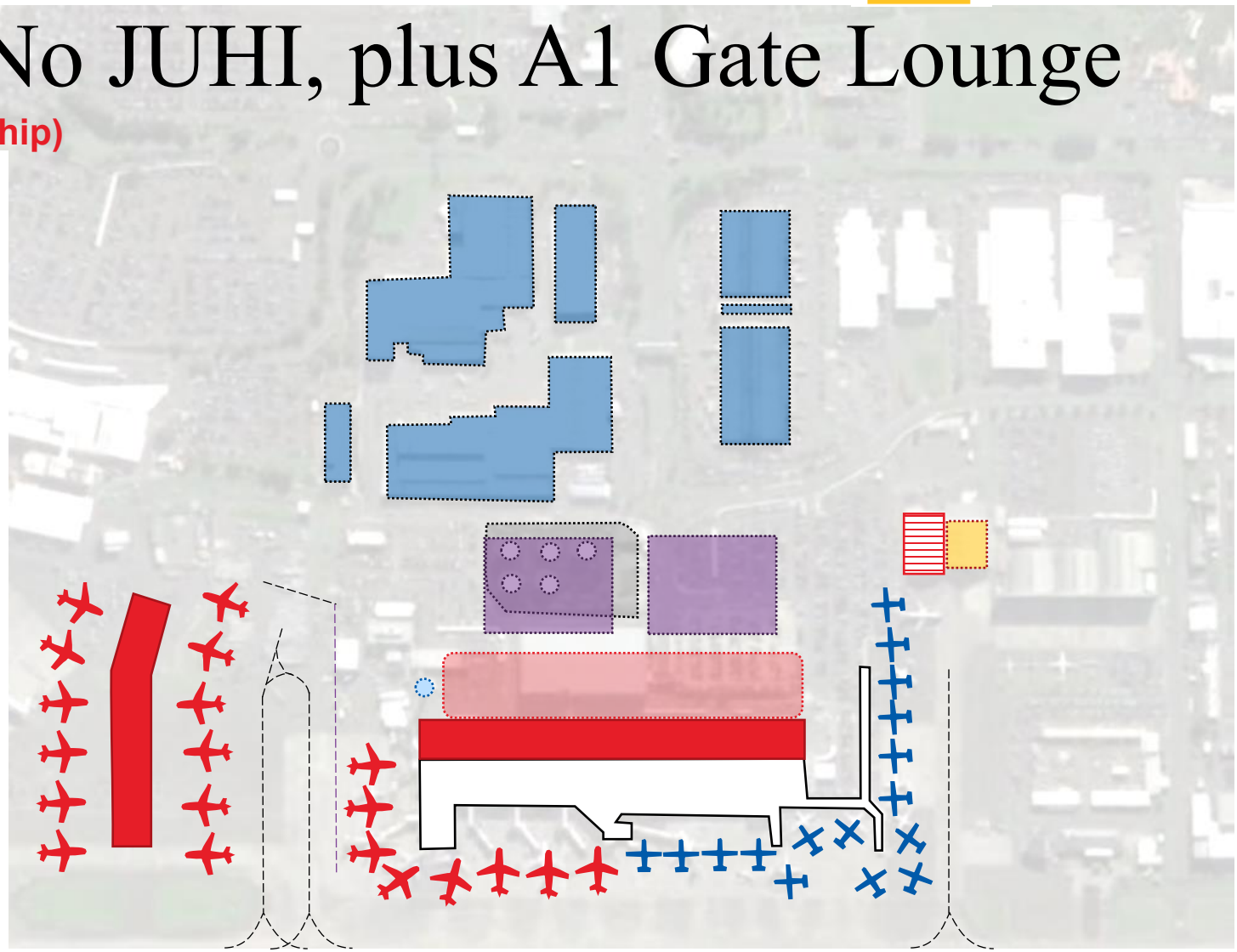
			RATE ($/M2)	TOTAL ($)
NEW REGIONAL HEADHOUSE / PROCESSOR:				
Building area incl structure, envelope and general fitout	13300	m2	12,500	166,250,000
Check-in	1	Item		8,500,000
Security	1	Item		11,500,000
Baggage Handling	1	Item		25,000,000
Total				**211,250,000**
NEW PIER - 200X12:				
Pier building	2400	m2	15,000	36,000,000
Alterations at connection with existing	1	Item		5,000,000
Total				**41,000,000**
CIVIL WORKS:				
4 x turbo prop stands incl apron	15000	m2	1,850	27,750,000
Forecourt	5000	m2	2,500	12,500,000
Short stay carpark (multistorey)	800	spaces	90,000	72,000,000
Total				**112,250,000**

SITE PREPARATION:				
General enabling works	1	Item		10,000,000
Demolition of existing carpark	1	Item		1,000,000
Demolish "KFC" hangar and adjacent hangar and reprovision elsewhere	3500	m2	7,500	26,250,000
Demolition of GVI logistics shed and reprovision elsewhere	2000	m2	7,500	15,000,000
Total				**52,250,000**
BASE ESTIMATE				**416,750,000**
OTHER CONSTRUCTION COSTS:				
Consents	2	%		8,335,000
Professional Fees	15	%		62,513,000
AIAL management costs	3.8	%		15,837,000
Total				**86,685,000**
SUB-TOTAL (AS AT JULY 2023)				**$503,435,000**
RISK AND CONTINGENCY:				
Design phase	5	%		25,172,000
Procurement phase	5	%		25,172,000
Construction Phase	10	%		50,344,000
General / project other	5	%		25,172,000
Total				**125,860,000**
TOTAL (AS AT JULY 2023)				**$629,295,000**

2. DTB Expanded, No JUHI, plus A1 Gate Lounge

Option 2 (as per Arup brief to WT Partnership)

- Two additional Code C turboprop stands on east side of DTB. New apron for one of these stands.
- New remote gate lounge to west. Sized at 200m x 30m, total 6,000m^2, comprising:
  - Gate lounge at 3,400m^2.
  - Retail/F&B at 1,800m^2.
  - Rest toilets, BOH and circulation.
- 12 additional Code C jet stands around remote gate lounge. Additional apron may not be required.
- Walk-out to all gates (i.e. no fixed links or bridges).
- All gate lounge stands will be bussed from existing DTB. Number of buses not yet quantified.
- New processor area of 18,000m^2 , equivalent to extruding the terminal face by 30m over 2 levels. Internal configuration of DTB will need to be extensively modified.
- New forecourt – area estimated to be 18,000m^2. New short-stay car parks for 2 x 1,000 spaces.
- Impact on:
  - Requires JUHI to be moved. Demolished and reinstated elsewhere.
  - Car parks in existing forecourt will need to be demolished.



Costing of alternative pathways

Option 2: DTB Expanded, No JUHI, plus A1 Gate Lounge

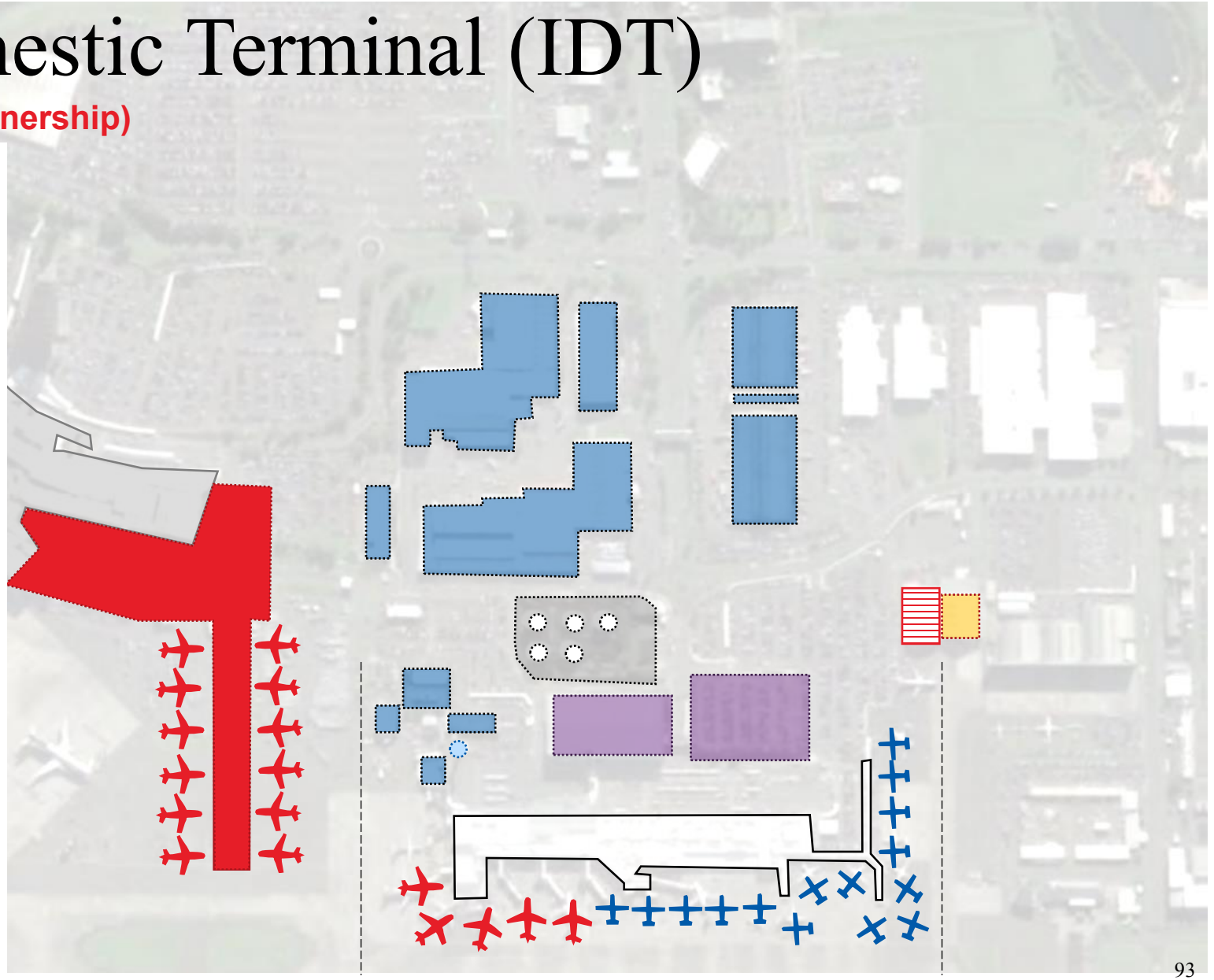
			RATE ($/M2)	TOTAL ($)
NEW REGIONAL HEADHOUSE / PROCESSOR:				
Building area incl structure, envelope and general fitout	18000	m2	12,500	225,000,000
Alterations to existing	10000	m2	5,000	50,000,000
Check-in	1	Item		8,500,000
Security	1	Item		11,500,000
Baggage Handling	1	Item		25,000,000
Total				**320,000,000**
NEW REMOTE GATE LOUNGE:				
New building	6000	m2	15,000	90,000,000
Bridges - excluded				
Total				**90,000,000**
CIVIL WORKS:				
2 x turbo prop stands incl apron	7500	m2	1,850	13,875,000
12 x jet stands incl aprons	90000	m2	1,850	166,500,000
Forecourt	10000	m2	2,500	25,000,000
Short stay carpark (multistorey)	2000	spaces	90,000	180,000,000
Total				**385,375,000**

SITE PREPARATION:				
General enabling works	1	Item		10,000,000
Demolition of existing carpark	1	Item		10,000,000
Demolish JUHI and reprovision elsewhere	1	Item		100,000,000
Total				**120,000,000**
BASE ESTIMATE				**915,375,000**
OTHER CONSTRUCTION COSTS:				
Consents	2	%		18,308,000
Professional Fees	15	%		137,306,000
AIAL management costs	3.8	%		34,784,000
Total				**190,398,000**
SUB-TOTAL (AS AT JULY 2023)				**$1,105,773,000**
RISK AND CONTINGENCY:				
Design phase	5	%		55,289,000
Procurement phase	5	%		55,289,000
Construction Phase	10	%		110,577,000
General / project other	5	%		55,289,000
Total				**276,444,000**
TOTAL (AS AT JULY 2023)				**$1,382,217,000**

3. Integrated Domestic Terminal (IDT)

Option 3 (as per Arup brief to WT Partnership)

- New processor and pier for 12 Code C jet stands.
- Flexibility for 3 Code Es (or 6 Code Cs) on west side of pier in MARS configuration.
- Fixed links and boarding bridges to all gates.
- Processor and pier have a total GFA of 64,000m^2 , comprising:
  - Dom security at 4,000m^2.
  - Baggage handling at 12,500m^2.
  - Arrivals hall incl. baggage reclaim at 7,700m^2.
  - Gate lounges at 3,700m^2.
  - Airline lounges at 4,500m^2.
  - Retail and F&B at 4,100m^2.
  - Other areas and BOH at 27,500m^2.
- AIAL estimated cost of $2.2bn NZD for 64,000m^2 (see next slide).
- Arup estimate additional areas including international security, retail dwell and bussing lounges to bring the total IDT area to 77,000m^2.



Costing of alternative pathways

Option 3: Integrated Domestic Terminal

			RATE ($/M2)	TOTAL ($)
NEW REGIONAL HEADHOUSE / PROCESSOR:				
Building area incl structure, envelope and general fitout	56500	m2	12,500	706,250,000
Pier	7500	m2	15,000	112,500,000
Alterations to existing	1	Item		20,000,000
Check-in	1	Item		17,000,000
Security	1	Item		20,000,000
Baggage Handling	1	Item		55,000,000
Total				**930,750,000**
CIVIL WORKS:				
12 x jet stands incl aprons and taxiways	90000	m2	1,850	166,500,000
Air bridges	12	No	2,500,000	30,000,000
Forecourts and other surrounding civils	10000	m2	2,500	25,000,000
Total				**221,500,000**
SITE PREPARATION:				
General enabling works	1	Item		50,000,000
Total				**50,000,000**
BASE ESTIMATE				**1,202,250,000**

OTHER CONSTRUCTION COSTS:				
Consents	2	%		24,045,000
Professional Fees	15	%		180,338,000
AIAL management costs	3.8	%		45,686,000
Total				**250,069,000**
SUB-TOTAL (AS AT JULY 2023)				**$1,452,319,000**
RISK AND CONTINGENCY:				
Design phase	5	%		72,616,000
Procurement phase	5	%		72,616,000
Construction Phase	10	%		145,232,000
General / project other	5	%		72,616,000
Total				**363,080,000**
TOTAL (AS AT JULY 2023)				**$1,815,399,000**

**Note: check-in was included in the costing for the Integrated Domestic Terminal – however, if excluded the overall cost will reduce by ~$26million including risk and contingency.*

Costing of alternative pathways

Estimates for all options

Arup has used the costings for the three options described earlier in this section as a reference to estimate approximate costs for each option in the long list. It should be noted that the Domestic Terminal North was not included in this exercise as the cost of the Northern Runway required to achieve appropriate operational benefits of this option is unknown.

A summary of cost estimates for each option in the long list is provided in the table adjacent, as well as the affordability score used in the evaluation of the long list.

Note, these are estimates only and are provided to enable scoring of options. These estimates require further refinement in Phase 3 before being relied upon by Air New Zealand or any other third party.

	Long list of options:	Cost estimates ($ million)*	Score
1	Domestic Terminal Building	$ -	5
2	DTB and Pier A3	$ 310	4
3	**DTB and Pier A3 + Regional Headhouse**	**$ 629**	3
4	DTB and Pier A1	$ 402	4
5	DTB East Expansion and Pier A1	$ 768	3
6	DTB and Pier A1 and A3	$ 708	3
7	DTB and Pier A1, A3 + Regional Headhouse	$ 1,027	2
8	DTB Expanded (No JUHI)	$ 1,089	2
9	**DTB Expanded (No JUHI) + A1**	**$ 1,382**	1
10	Plus A1 then DTB expansion	$ 1,382	1
11	Adjacent Domestic Terminal	$ 1,213 - 1,407	2
12	Domestic Terminal North - with Northern Runway	x	x
13	Domestic Terminal North - without Northern Runway	x	x
14	**Integrated Domestic Terminal**	**$ 1,815**	x
	*Note: estimates in bold were provided by WT Partnership.		

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11. Shortlisted pathways and terminal sizing

Methodology

Initial terminal options have been developed based on the outcome of the long list scoring and airfield planning. The PoR calculations have provided the required sizing of the proposed options.

The following pages capture initial terminal options, noting that additional analysis and planning is required to refine the options.

There has not been enough time to fully explore design solutions in this initial phase of work but these would form a key component of any future Phase 3.

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11. Shortlisted pathways and terminal sizing

Key considerations and findings

Key findings from the terminal sizing exercise are as follows:

- Preliminary terminal planning shows that moving Regional operations into a new eastern processor can free up capacity in the existing DTB.
- Combined with the above, a remote pier A1 provides an appropriate number of Domestic jet stands and additional gate lounge capacity.
- In addition, these 12 stands, if provided before any Contingent Runway works, will provide resilience for closure of jet stands on the DTB as a result of realignment of Taxiway Bravo.
- The options shown assume current operation with no productivity improvements and so are considered to be conservative.
- Further exploration of passenger transfer to the proposed A1 remote lounge is essential as a 12 Code C stand remote lounge will require a significant and well-planned transport operation.
- Further design work is required to demonstrate the viability of these options.

11. Terminal options

Existing DTB L0 and L1

The existing DTB has an overall area of 25,000m^2 spread over two floors, with ~17,000m^2 on L0 and ~ 8,000m^2 on L1.

A block plan of the existing layout is shown adjacent.

11. Terminal options

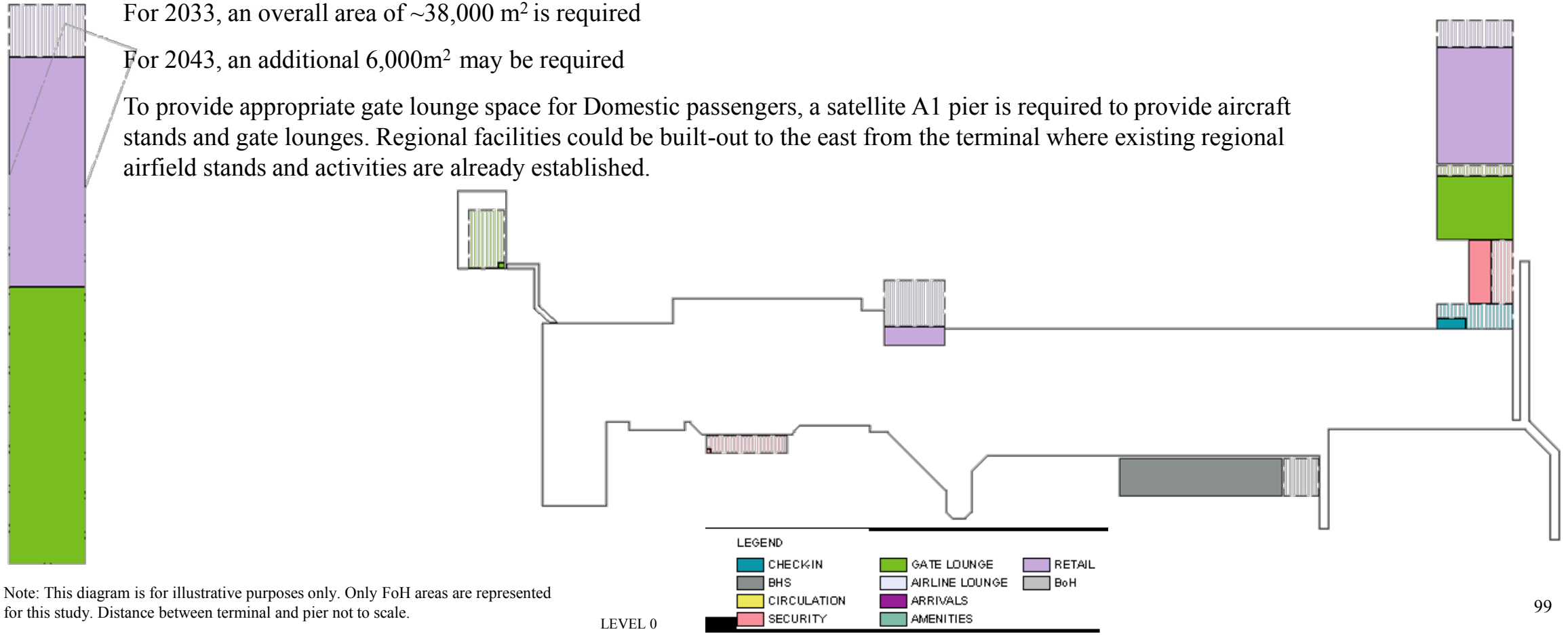
Existing DTB expanded for 2033/2043

Based on the PoR for 2033 and 2043, Arup has developed an order of magnitude block plan for building expansion. The majority of additional space required is to provide for Regional security, gate lounges, baggage handling and retail.

For 2033, an overall area of ~38,000 m^2 is required

For 2043, an additional 6,000m^2 may be required

To provide appropriate gate lounge space for Domestic passengers, a satellite A1 pier is required to provide aircraft stands and gate lounges. Regional facilities could be built-out to the east from the terminal where existing regional airfield stands and activities are already established.



Note: This diagram is for illustrative purposes only. Only FoH areas are represented for this study. Distance between terminal and pier not to scale.

LEVEL 0

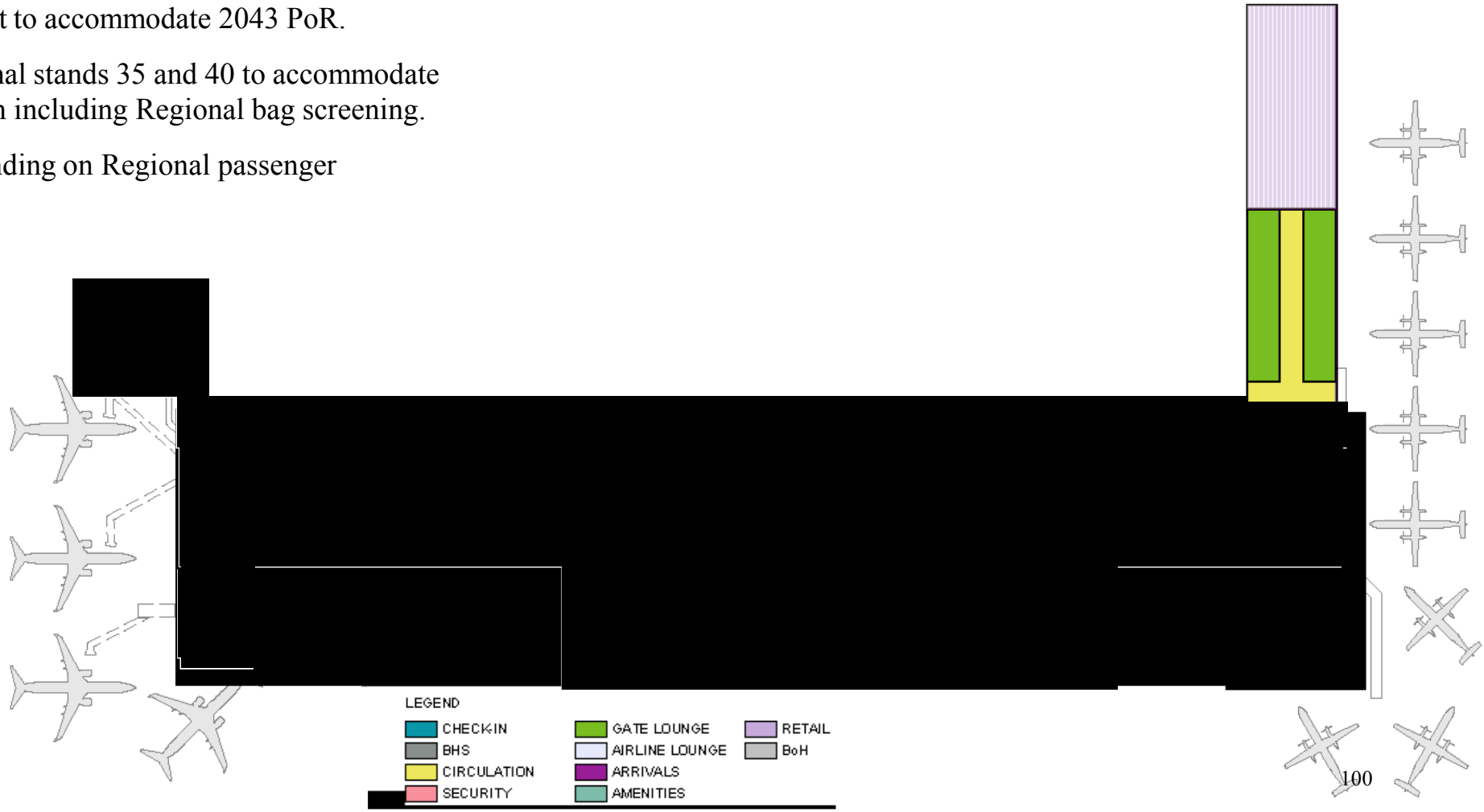
11. Terminal options

DTB + Regional Built-out

In the proposed diagram, Regional facilities occupy 4,500m^2 of current DTB and additional structure built-out to accommodate 2043 PoR.

The proposal considers loss of Regional stands 35 and 40 to accommodate an expanded baggage handling system including Regional bag screening.

Retail allowance can be refined depending on Regional passenger behavior and dwell times.

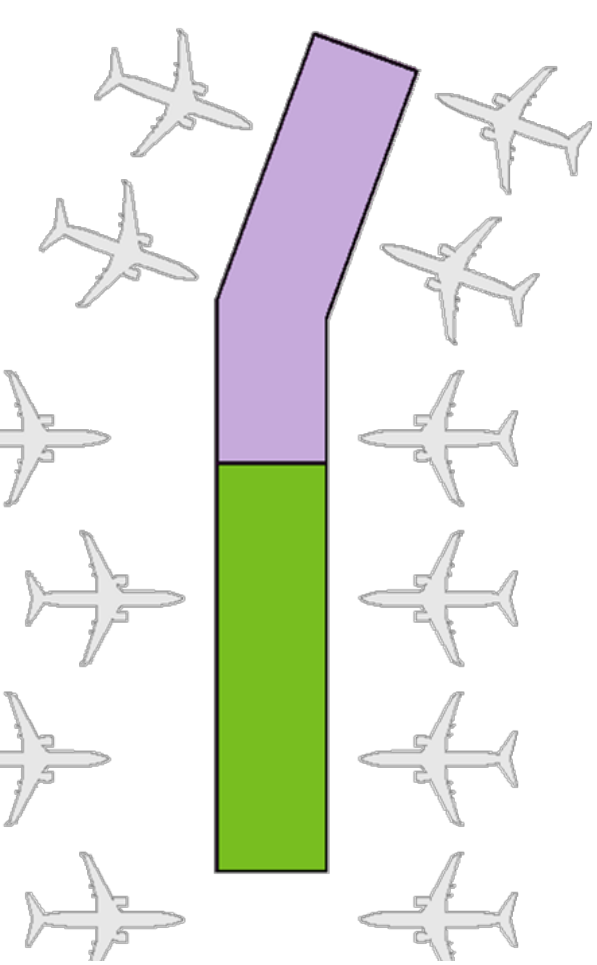


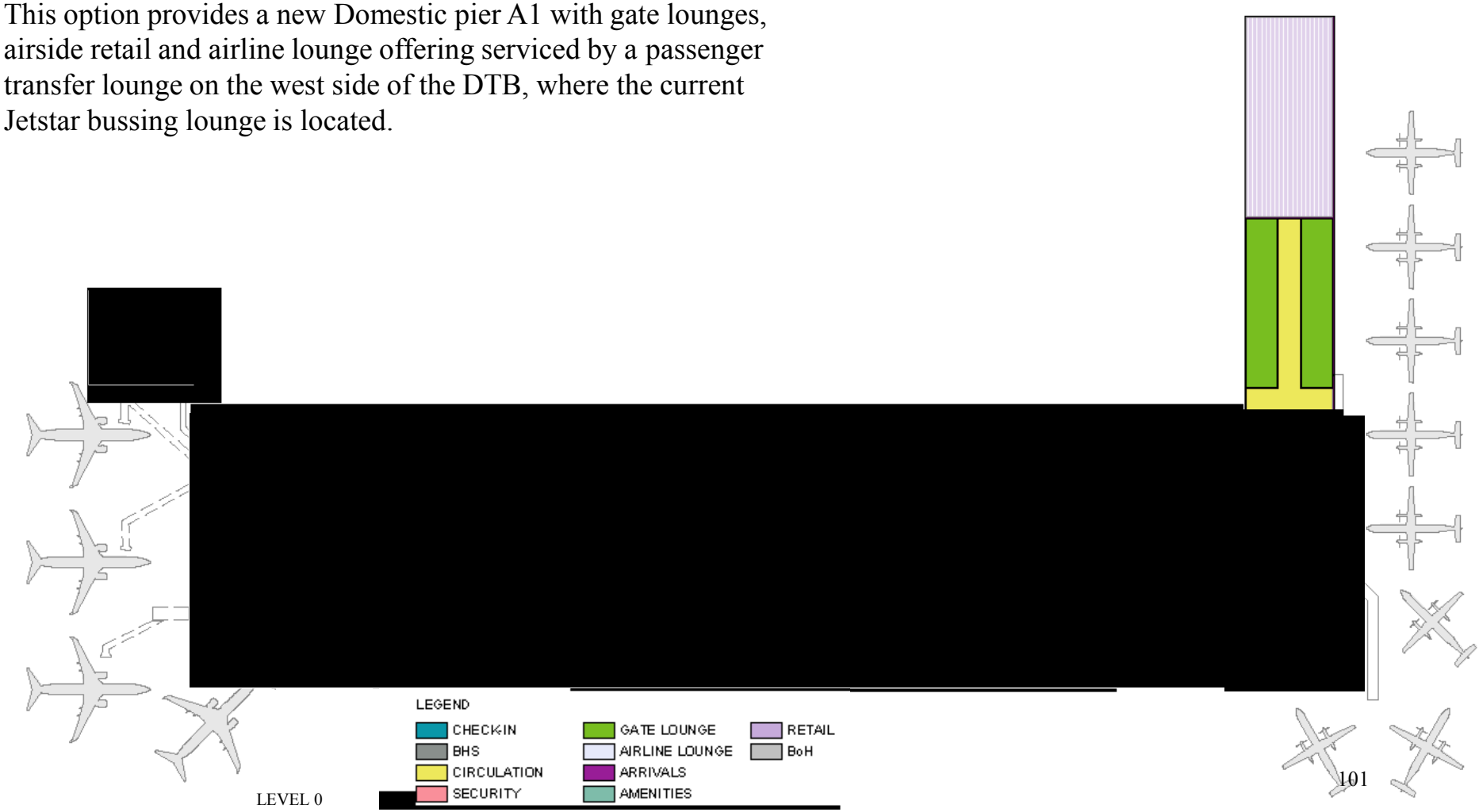
Note: This diagram is for illustrative purposes only. Only FoH areas are represented for this study.

11. Terminal options

DTB + Regional Built-out + A1 Pier and bussing lounge

This option provides a new Domestic pier A1 with gate lounges, airside retail and airline lounge offering serviced by a passenger transfer lounge on the west side of the DTB, where the current Jetstar bussing lounge is located.





Note: This diagram is for illustrative purposes only. Only FoH areas are represented for this study. Distance between terminal and pier not to scale.

LEVEL 0

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11. Passenger transfer to remote lounge

Unused bridge structure

In order to access the existing gate 62-63 lounge, a connection through the adjacent area is required. One option is to connect from Level 1 via the unused bridge structure located near gate 20. This has the advantage of keeping a central security screening facility for Domestic passengers. However, it requires routing passengers up from Level 0 (check-in and security) to Level 1 and then down to Level 0 for transfer to the remote lounge.

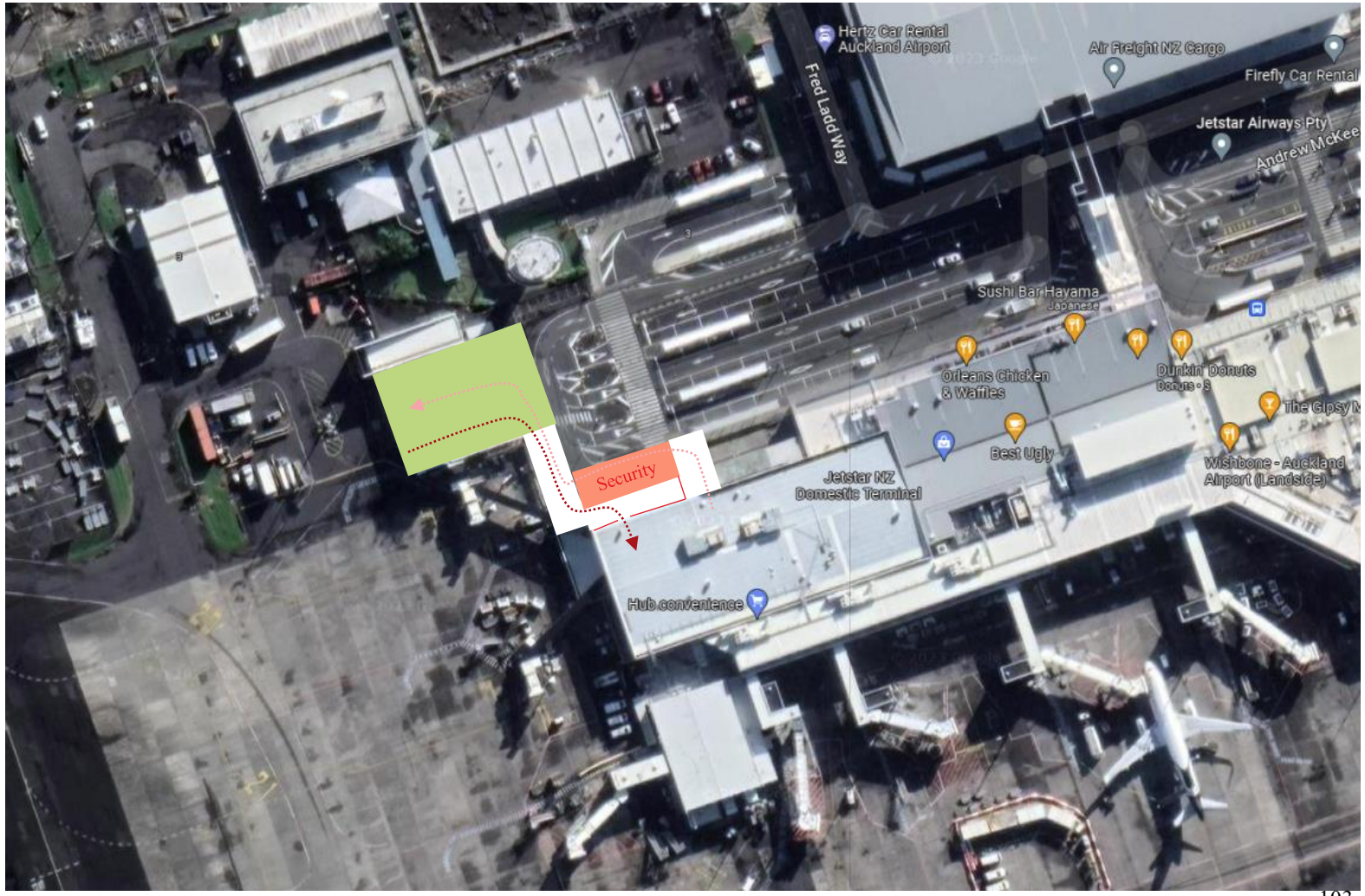
Image of where the unused bridge structure is currently located. (Gate 20 to bus lounge)

11. Passenger transfer to remote lounge

Same check-in but separate security

An alternative solution providing transportation to the remote lounge is shown adjacent, with separate security provision provided at Level 0 for passengers departing from the remote pier. This option then provides direct access into a facility where passengers wait to be transferred to the remote lounge.

This configuration is expected to have higher OPEX cost owing to split security as well as challenging wayfinding for Domestic Jet passengers departing from the remote pier. The intent would be that the current Jetstar end of the terminal would be given over to flights departing the remote facility.



11. Terminal options

Adjacent Domestic Terminal + Regional DTB: Ground Floor

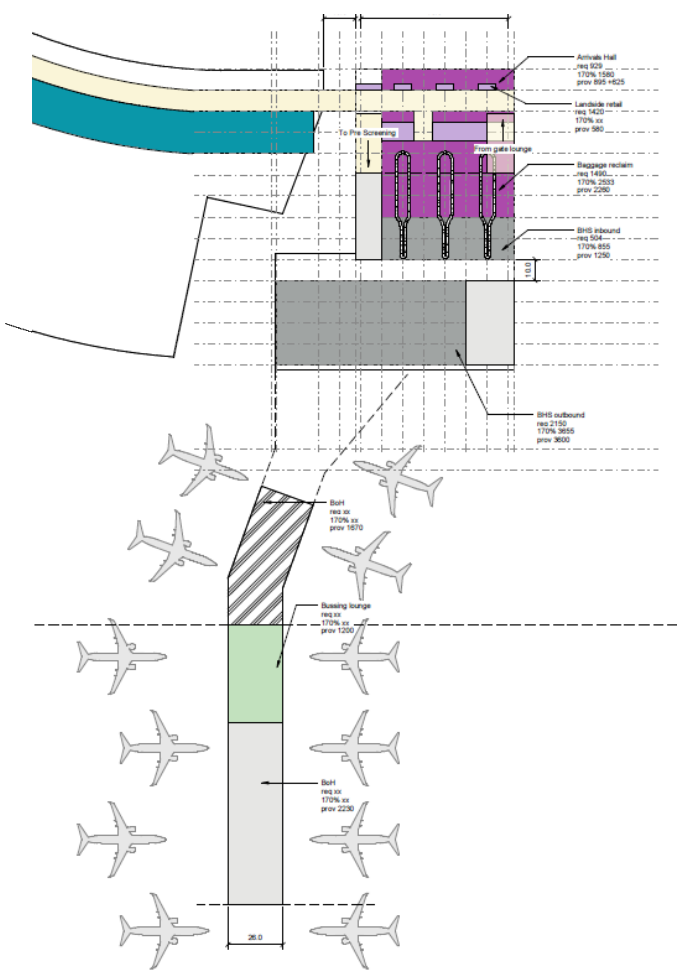
The adjacent Domestic terminal would provide an area of at least 34,000m^2 to 44,000m^2, distributed over two levels in the Domestic processor and pier.

A pedestrian connection into the International terminal is provided to facilitate transfer movements between the Domestic and International terminal.

This option assumes a portion of the DTB is used for bussing operations to provide access to the additional 4 jet stands required by 2043.

The remainder of the DTB would become a Regional operation. In the adjacent terminal, the pier could be built up across two levels separated by BoH and FoH functions.

In addition, airline lounge spaces could be provided on Level 2.

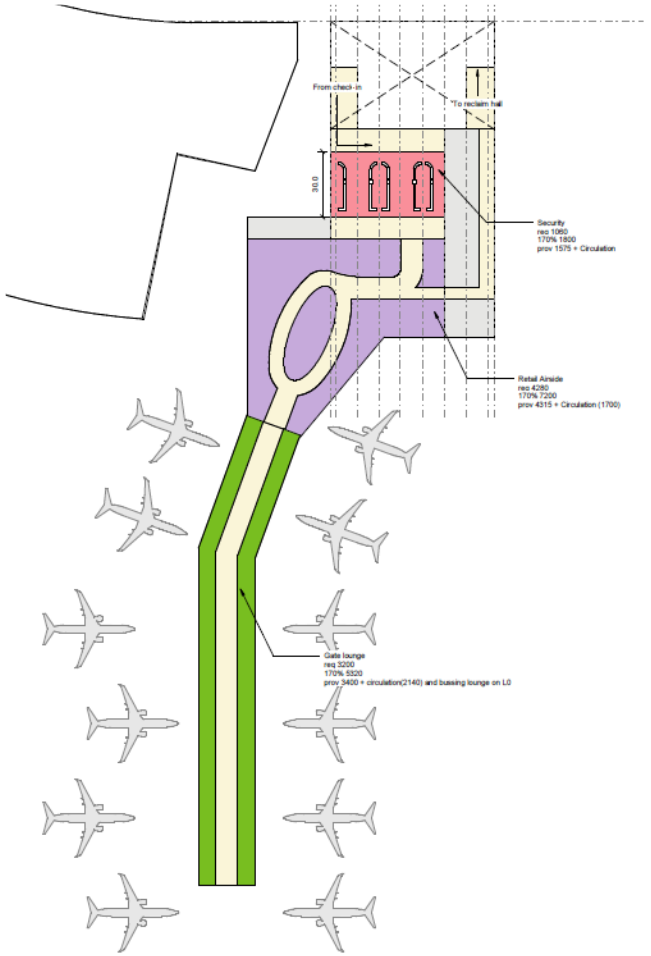


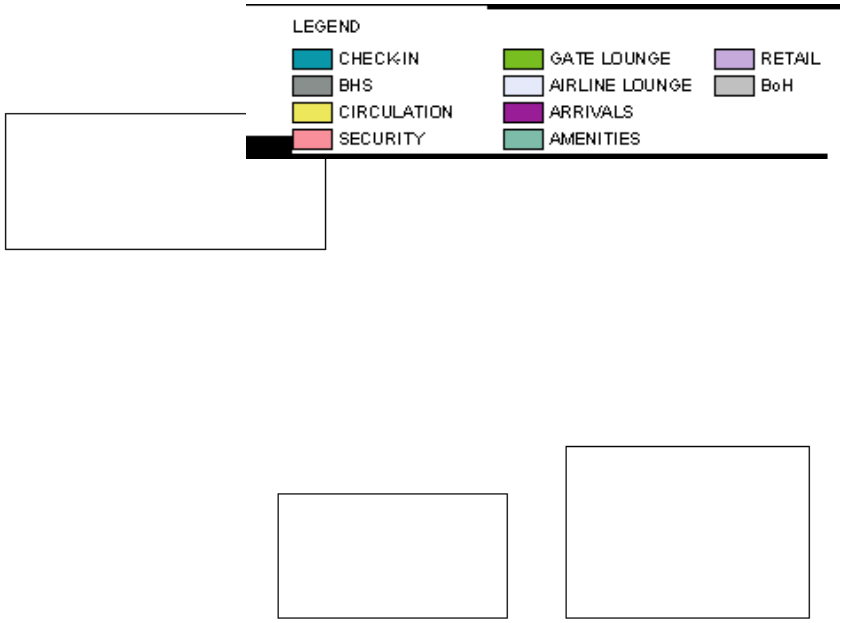
Note: This diagram is for illustrative purposes only

11. Terminal options

Adjacent Domestic Terminal + Regional DTB: Level 1

The image shows what Level 1 of the Adjacent Terminal could look like, with security followed by an airside retail/F&B dwell area provided as passengers head towards the pier.





[redacted]

Note: This diagram is for illustrative purposes only

12. Conclusions (i)

For discussion

- Arup has undertaken a review of the IDT proposal and rapid development of alternative Domestic Terminal pathways over an 8 week period. Auckland Airport's Master Plan and terminal development proposals have been developed and evolved over more than a decade.
- The primary data source for the planning work documented in this pack is the DKMA Traffic Forecast which aligns with AIAL's masterplanning and terminal planning work and therefore allows a like-for-like comparison.
- Using this demand data, Arup has developed a Programme of Requirements (PoR) model to estimate terminal facility requirements.
- A combined Domestic Jet and Regional PoR has been used for the assessment of the DTB. This shows a total GFA of 37,200m^2 in 2043. The current DTB is 25,000m^2 and therefore additional capacity is required. As a result Arup has explored a long list of Domestic terminal pathways to deliver future capacity.
- Arup has also generated a PoR model for assessment of the IDT. Owing to the shape of the terminal and airfield at Auckland, and the fact that the IDT baggage make-up facility is combined International and Domestic, the GFA requirement shown by this PoR is around 50,300m^2.
- AIAL has provided its area measurements for the IDT and these show a GFA of 64,100m^2. Arup is unable to match these areas when measuring off the drawings provided by AIAL. However, the GFA of 50,300m^2 as generated using Arup's PoR model is 25% less than the GFA of 64,100m^2 provided by AIAL.
- Benchmarking indicates that area provision in the IDT is up to 6,800m^2 per MPPA in 2043, when taking the full GFA of the facility at 76,400m^2. This ratio is higher than other airports in the New Zealand domestic context. CHC and WLG are estimated at 5,100m^2 and 3,775m^2 per MPPA respectively (at 2019 demand).
- The proposed pier width at the IDT measures 33m. This is considered wide in the context of other Domestic airports in the region.

12. Conclusions (ii)

For discussion

- The current DTB measures ~25,000m^2 across two levels. The PoR has identified that ~37,200m^2 is required to accommodate passengers at IATA Optimum Level of Service in 2033 and therefore requires expansion.
- Exploration of a long list of alternative Domestic terminal pathways has shown that:
  - Provision of 12 stands in the vicinity of a Pier A1 provides the necessary stands required for future growth to 2033 and beyond, as well as providing resilience should Taxiway Bravo require realignment for Contingent Runway operations.
  - A remote pier and gate lounge could initially be provided on the A1 alignment to reduce cost. Note, this approach would require a significant and well-planned bussing operation from the DTB.
  - Realigning pier A1 will enable dual Code C taxilane operations with continued operation of the DTB. Alternatively the IDT pier alignment can be retained with some demolition of the western side of the DTB.
- An Adjacent Terminal including pier A1 (similar to IDT but with reduced integration) scores the highest in initial evaluation.
- An option that provides an additional eastern processor for Regional services along with continued use of the DTB and a remote pier on A1 for Domestic Jet operations scores second best and could be an initial step on the pathway to an Adjacent or Integrated Domestic Terminal.
- The IDT is the most expensive of the costed options. WT Partnership estimate that the IDT will cost in the region of $1.8 billion, which is $400 million less than the costs provided to AIAL by Air New Zealand – however escalation costs have not been included WT Partnership's estimate. Note, the assumptions behind AIAL's costings have not been provided so are unknown.
- Arup estimate that an Adjacent Domestic Terminal could cost up to $1.4+ billion, so 30% less than the cost of the IDT, based on a reduced processor requirement and simplified integration of the two terminals.
- Arup recommends a Phase 3 for this study prior to sharing of options in detail with any third party (as per 13. Next Steps).

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13. Next Steps

Potential Phase 3

Arup recommends a Phase 3 for this study which would include:

- A review and sense-check by other Air New Zealand squads to help inform further option development, including the Operations team as well as those involved in Project Paheko. Refining outputs based on comments received.
- Exploring and refining productivity improvements with Air New Zealand and what these might mean for future requirements in the DTB.
- Further design work on the DTB to demonstrate required expansion and potential operation (e.g. passenger and baggage flows). Initial options have been provided but more exist. Further airfield planning to support additional options.
- Further exploration of the bussing operation to the proposed A1 remote lounge, including benchmarking and estimation of bus fleet requirements.
- Further refinement of costing based on additional design work and discussion on inclusions, exclusions, risk and contingency with Air New Zealand.
- Additional work on Contingent Runway and realignment of Taxiway Bravo (already covered in a separate commission).

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