Auckland Airport

Analysis of Feasibility Study – AKL Domestic Terminal Options

19 December 2023

Table of contents

Defined Terms

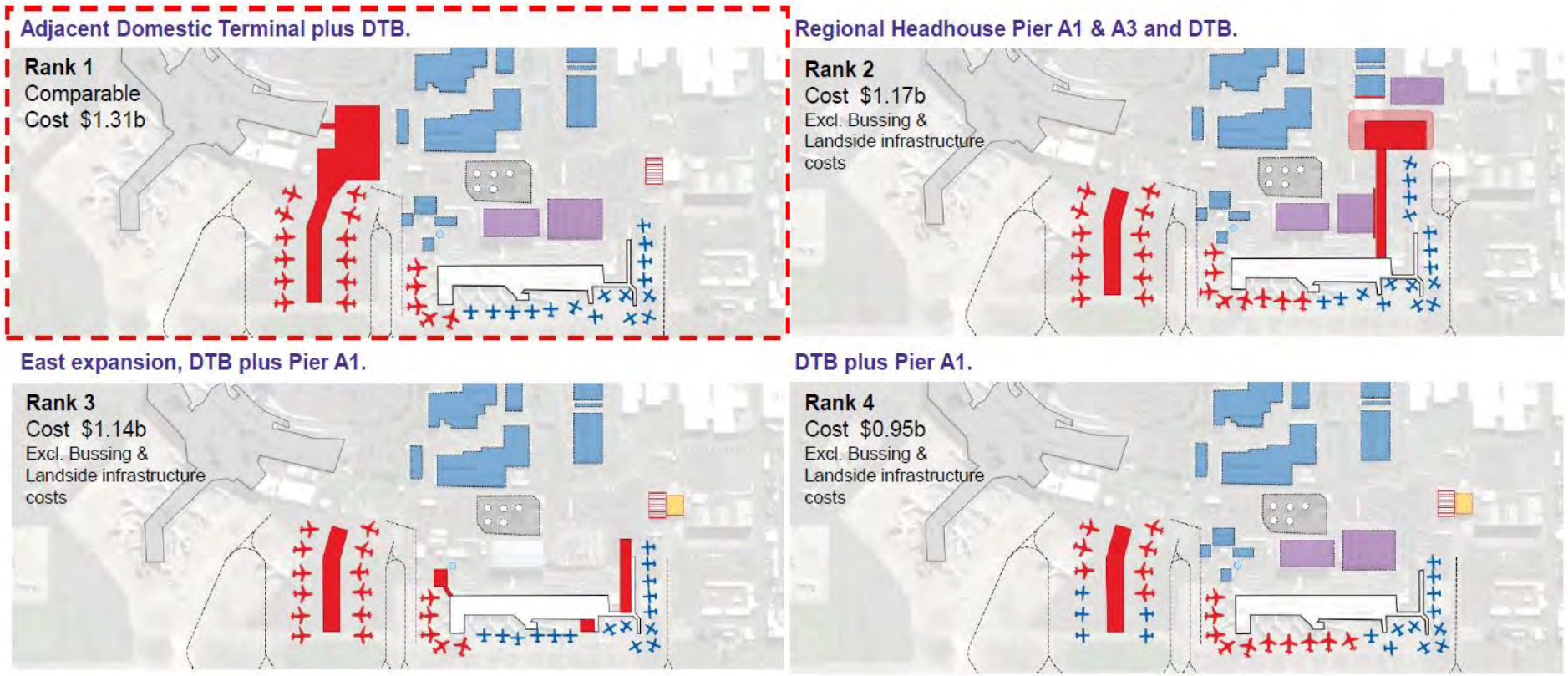
Term (in order of use)	Definition
ADT	Adjacent Domestic Terminal plus DTB proposed by ARUP Study
DP	Domestic Processor
DTB	Domestic Terminal Building
PBB	Passengers Boarding Bridges
ATC	Air Traffic Control
LOS	Level of Service
OOG	Out-of-gauge
DOM	Domestic flights
Avsec	Aviation Security – Border Agency
D-I	Domestic to International
VT	Vertical circulation
GFA	Gross Floor Area
INT	International flights
REG	Regional flights
BHS	Baggage handling systems
NPS	Non-passenger screening
SEA	Security Enhanced Area

Auckland Airport

Section 1: Master Plan and Airfield layout

Overview of feasibility study

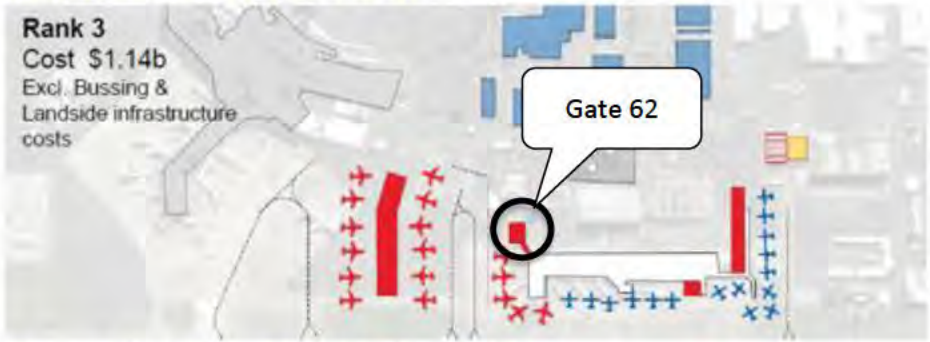
- The feasibility study completed by Arup for Air New Zealand included four alternative terminal development options for Auckland Airport
- Option 1, the 'Adjacent Domestic Terminal plus DTB' option ("**ADT**"), ranked first – we have assessed this option in detail based on the information provided by Air New Zealand, as set out in this pack.
- ADT has been therefore compared to the Domestic Processor design ("**DP**"), to consider whether this feasibility study and its findings provide any new or alternative information that would cause Auckland Airport to change its decision to deliver the Terminal Integration Programme.



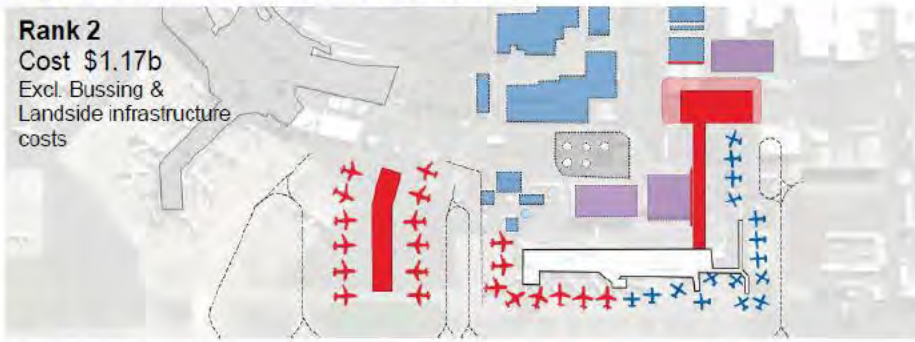
Shortlisted Options 2, 3 and 4

- Options ranked 2-4 all included the construction of a remote Pier A1 – a solution that was not favoured in the study
- The three options would require bussing operations from/ to the Domestic Terminal Building ("**DTB**"). According to the study, Gate 62 might be used as a bus lounge. This facility was previously utilised as a JQ regional lounge, and it is currently a landside space that the ADT is proposing to change into an airside area.
- The details of the final layout have not been made available but significant work would be required to provide the bussing environment required for jet operations.
- The use of the pier as a satellite for the majority of domestic operations would degrade customer experience and would challenge operations due to the high number of buses required to run the operations.
- Consistent with Air New Zealand's assessment of Options 2-4, we consider that a remote pier for the majority of domestic jet operations is not a feasible option when considering the required further extension of life of the DTB (from both a cost and feasibility perspective), the impacts on customer experience and the necessary operational requirements to make it work (bus operations would be operationally very hard to deliver, and have a capacity impact). In addition to the limitations of the existing infrastructure to operate a remote pier; this would not be an acceptable medium to long-term solution for Auckland or New Zealand.
- Based on Air New Zealand's assessment as well as Auckland Airports own review, these options have therefore not been assessed in any further detail

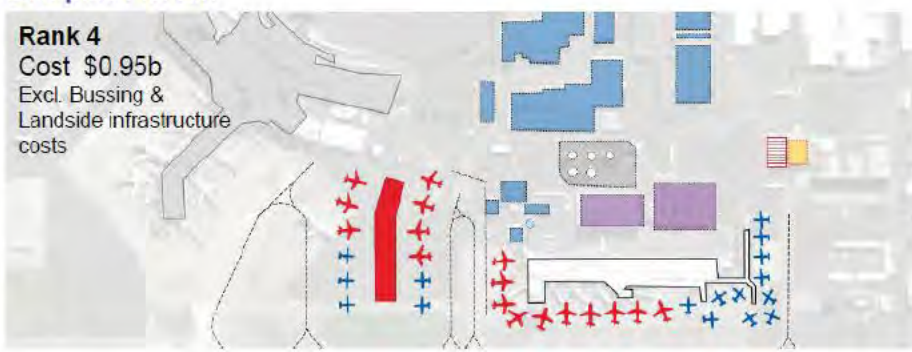
East expansion, DTB plus Pier A1.



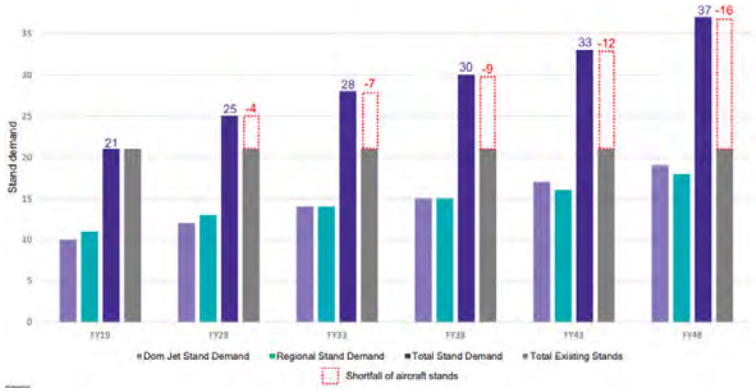
Regional Headhouse Pier A1 & A3 and DTB.

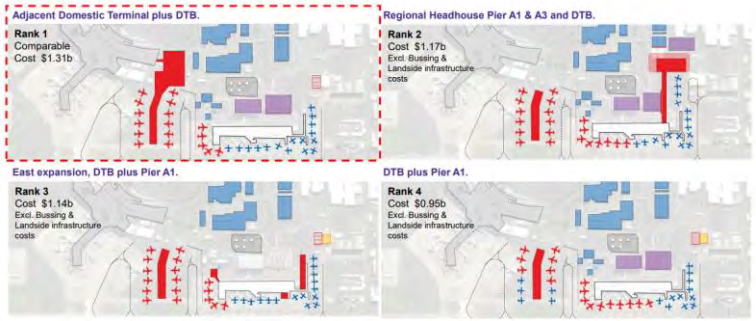


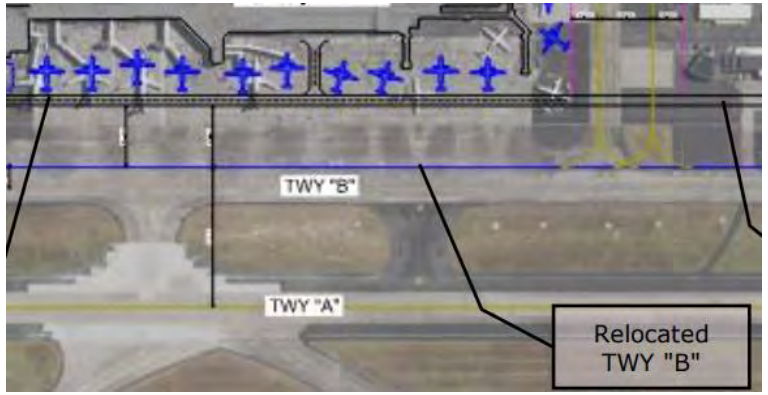
DTB plus Pier A1.



Areas of alignment | Option 1







Need for additional stand capacity

- A significant driver for Auckland Airport is the need to increase the capacity of domestic stands from 10 to 15 (12 contact + 3 remote)
- Air New Zealand is aligned in adding stand capacity to meet future demand. All proposed options provide for the delivery of 12 new jet stands in Pier A1– aligned with the DP design, and retain the 3 existing stands on the western side of DTB

[redacted]

Location of domestic jet pier

- All four of the options presented include the development of a new domestic jet pier located in largely (but not exactly) the same location of the airfield – the Pier A1 alignment
- This is consistent with the Auckland Airport Master Plan and the Terminal Integration Programme
- We have considered the change to the Pier A1 alignment proposed by Air New Zealand with its new “offset” design (slide 10)

Re-alignment of Taxiway Bravo

- All four of the options presented by Air New Zealand acknowledge the realignment of Taxiway Bravo is required, with turboprop stands * only able to meet the clearance required
- This is consistent with the assumptions that have underpinned the Auckland Airport Capital Plan, including the Terminal Integration Programme

* Even with turboprops there remain limitations on the capacity to operate in this location pushing back onto the taxiway

Airfield layout

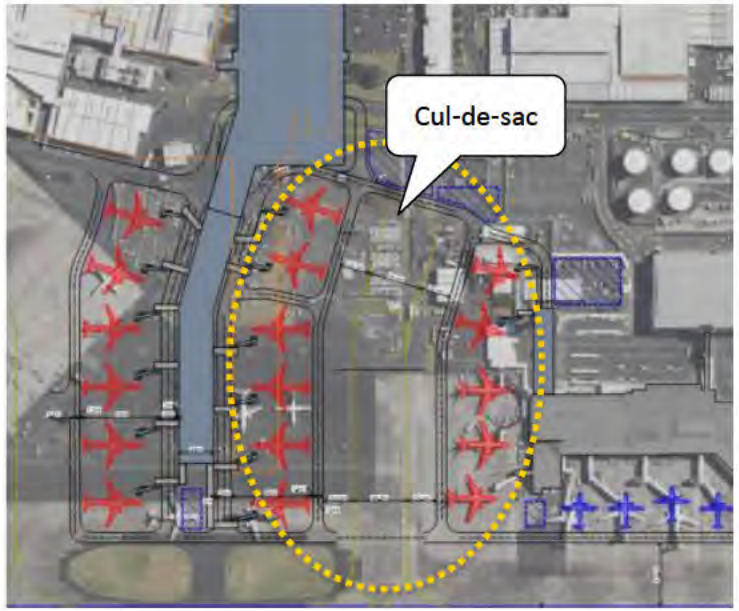
The ADT proposes 12 code C stands operated from Pier A1, 6 per side. Passenger Boarding Bridges (“**PBB”**) are available at each stand. The design is also proposing that rear boarding would be available for each stand. This is in line with the DP design.

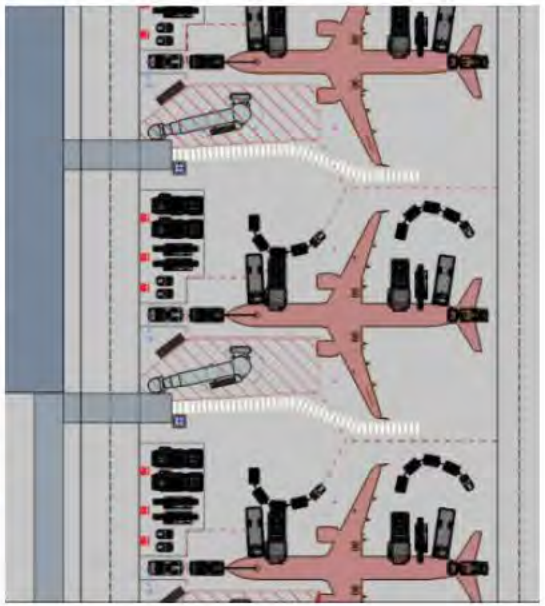
The ADT “offset” design is proposing a dual taxi lane between Pier A1 and DTB. This has been explained as required to minimise delays on the cul-de-sac . The DP Design is delivering one taxilane.

To allow for a dual taxilane, the Air New Zealand Pier A1 layout shifts part of the pier closer to Pier A, in a similar position to the design for the Pier proposed in 2018.

The single taxiway approach on the eastern side of Pier A1 was presented for the first time in the 2014 Master Plan (staging pathway) and has been part of the design ever since.

In 2018 Mott MacDonald shared a benchmark of international airports running cul-de-sac operations with a single taxiway/taxilane, showing that up to 14 stands were managed in a cul-de-sac. The main challenges this operation presented was around jet blast impact on GSE and passengers (in case of rear boarding procedures).





Air New Zealand/ARUP study - “Findings of Feasibility Study – AKL Domestic Terminal Options” – 31st Oct 2023

	MEL	AMS	JFK	NRT	FRA	LHR	AKL
Total Stands	9	8	7	8	14	9	7
Narrow-body (Code C)	6	0	0	0	6	0	1
Wide-body (Code D&E)	3	8	7	8	8	9	6
Taxiway/lane	Single	Dual to Single	2 Overlapping	Single	Single	Single	Dual to Single
Taxiway/lane Dimension	Code E	Code E	Code E	Code E	Code E	Code E	Code E

Mott MacDonald - Summary Cul-de-sac Operation (2018)

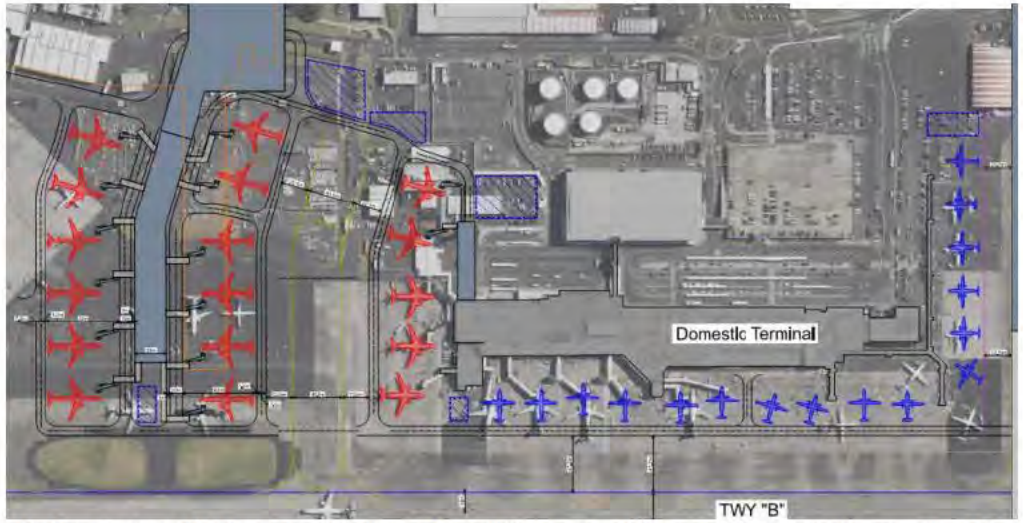
Long-term alignment to Master Plan

Auckland Airport Master Plan (2014) proposes new piers to accommodate domestic and regional demand and the demolition of the existing DTB was envisaged by 2022. The Master Plan was designed to optimise the use of scarce land proximate to the airfield. The Master Plan was supported by Air New Zealand.

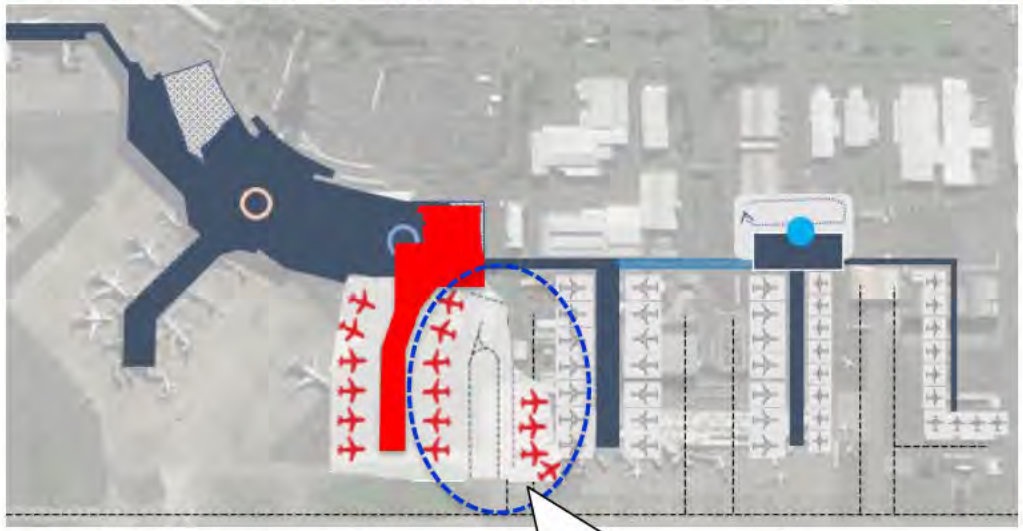
The geometry of the proposed piers is dictated by existing infrastructure, such as runway and taxiway location, the existing international Pier A to the west and Air New Zealand base to the east. The construction stages of the piers are triggered by demand and by existing infrastructure that acts as constraints.

MAIN FINDINGS

- The ADT solution is proposing to **retain the existing DTB** until at least 2043 with the domestic demand being split between the ADT and the DTB.
- The ADT also moves away from the **concept of "integration"** since it proposes a dedicated domestic check-in zone located on the ground floor of the ADT for some domestic flights.
- The **split domestic demand (ADT+ DTB)** is a further step away from the "integration" concept. The "single-front-door" idea was central to Auckland Airport's 2014 Master Plan, with all segments (DOM, INT, REG) using the same check-in hall once integration was complete. [redacted] ADT, however, is based on a "**four-doors" concept**, with DOM travellers being split between two terminals: the study provided by Air New Zealand does not specify how the system would function in practice.
- The **offset design** proposed for Pier A1 would shift the dual taxilane between A1 and A2 to the east. The construction of the Piers is triggered by demand and by constraints. Based on today's studies on stand demand/supply, Pier A3 apron is required ahead of Pier A2. The ADT layout would therefore not maximise the use of the apron, since the space left between A1 and A2 would be larger than required



Air New Zealand /ARUP study - "Findings of Feasibility Study – AKL Domestic Terminal Options" – 31st Oct 2023



Auckland Airport Masterplan: in red ADT

Airfield layout

CUL-DE-SAC OPERATIONS TWY D-D1 (PIER A1 – DTB)

Air New Zealand presented results from a CAST model prepared by ARUP on TWY D cul-de-sac operations. The model is limited to the cul-de-sac only.

It is noted that the scenario modelled considered 11 stands served by one taxilane. Auckland Airport proposed DP would serve a maximum of 9 code C from a single taxilane. It is envisaged that additional stands on the Pier A2 alignment would be built only when a dual taxi-lane is in place. This means that:

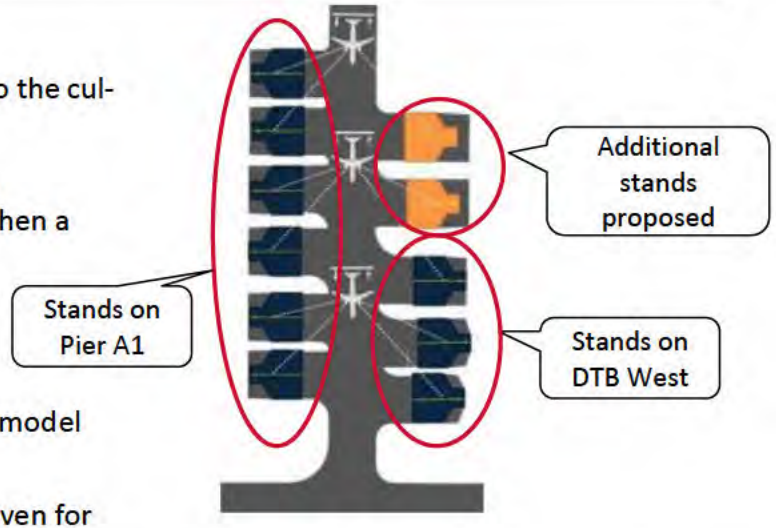
- In 2033 only 9 stands are served by a single taxilane (TWYD1)
- in 2043 a dual-taxilane (TWYD2) would be in place.

Auckland Airport modelled the TWY D cul-de-sac in 2018 and again in 2023 when the updated set of forecasts was released. The model takes into consideration the totality of airfield operations, it is therefore not limited to the cul-de-sac only.

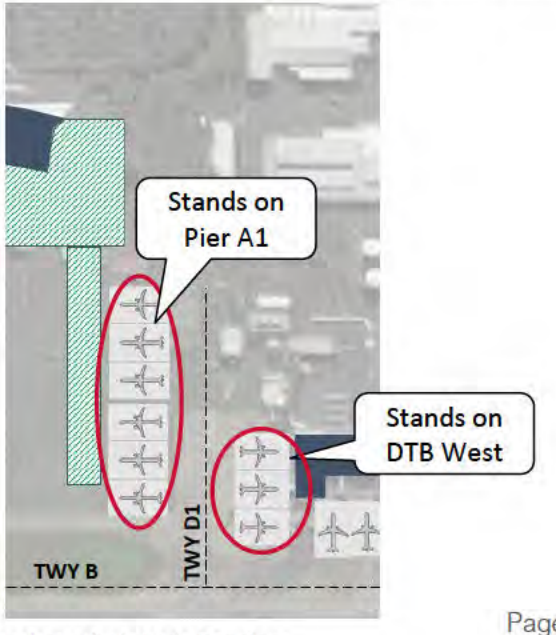
The outcomes from the latest modelling suggest that TWY D1 cul-de-sac will not compromise operations (for the 9 stands), and even for the stress case demand (FY33), delay figures are acceptable. In particular:

- Delays at the cul-de-sac show negligible values in FY28 with an average of 2min in the peak hour. Per-minute observations show a cumulative delay of 2min, experienced by a total of 3 aircraft. This leads to an average wait of 40 sec.
- The values increase for FY33 to an average of 4min in the rolling hour. Per-minute observations show a cumulative delay of 2min, experienced by a total of 4 aircraft. This leads to an average wait of 30 sec.
- The conflicts observed follow a similar pattern, with a departing aircraft generating congestion following engine start processes at the entrance of TWY D1, blocking arriving aircraft, leading to queue building up on TWYB. Operations mitigation could be considered on a case-by-case basis.
- The area therefore does not flag up as a key congestion location in the airfield, with most delays occurring along TWY A & B and at runway entry locations.

The cumulative delays Air New Zealand is referring to in the document provided to Auckland Airport are related to **overall ground delays**. It is observed that the scheduled forecasted for FY33 shows off-peak period demand very close to the observed runway capacity. This leads to a high utilisation of some of the taxiways (in particular TWY A and TWYB to access the runway). Pushbacks from DTB onto Bravo contribute to the congestion.



Air New Zealand/Arup: Scenario 1 for single Code C taxilane



DP project : single Code C taxilane

Airfield layout

CUL-DE-SAC OPERATIONS TWY J-J1 (PIER A – PIER A1)

The layout proposed by Air New Zealand is re-shifting Pier A1 to a very similar location to the original 2018 design. This would therefore propose the same challenges identified in 2018.

In 2018, with the commencement of the Terminal Development Programme (TDP) Design Auckland Airport commissioned a study to Mott MacDonald to determine jet blast constraints for aircraft manoeuvering between the east side of Pier A and the east side of Pier A1, and between the east side of Pier A1 and the DTB.

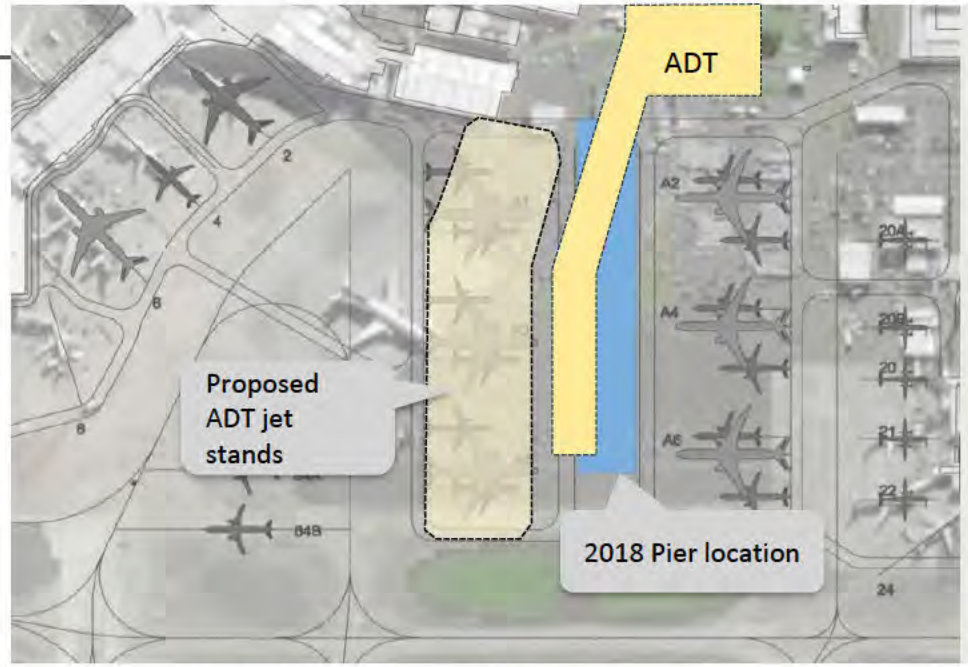
The study identified challenges in some operations between Pier A and A1 due to jet blasts on arrival and concluded that procedures were required to mitigate the jet blast issues on arrival, including restricting stands on Pier A, use of jet blast barriers and possible restriction on rear boarding operations for some of the stands.

Challenges were identified on departure as well, with long pushback and long operations from some of the Pier A west and Pier A1 eastern stands.

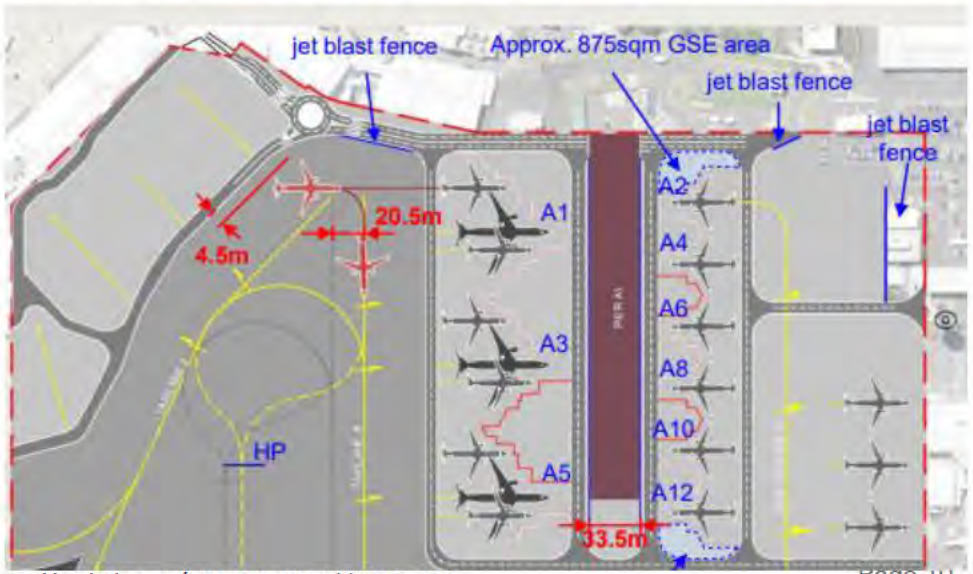
Due to the concerns around the number of mitigations required to safely operate the cul-de-sac between Pier A and Pier A1, a Key Decision Memorandum (KDM) exercise was undertaken and subsequentially a number of changes have been implemented to the design, such as:

- the reduction in pier width, (from 40m to 33.5m) and subsequent changes to the stand location
- the shift of Pier A1 c.ca 20m to the east to allow for straight pushback from stands A1, reducing the impact of the jet blast on the stands located on the eastern side of A1 and allowing for rear boarding operations
- the implementation of a code E capable holding point (HP) in the cul-de-sac J-J1 to enhance ground movement e.g. freeing circulation space on TWY B.
- change in depth from Code E to C stands on the western side of Pier A1
- additional GSE staging/parking areas on Pier A1 eastern apron

This analysis was presented to the airlines in November 2018.



TDP layout (2018) and ADT proposed layout (2023)

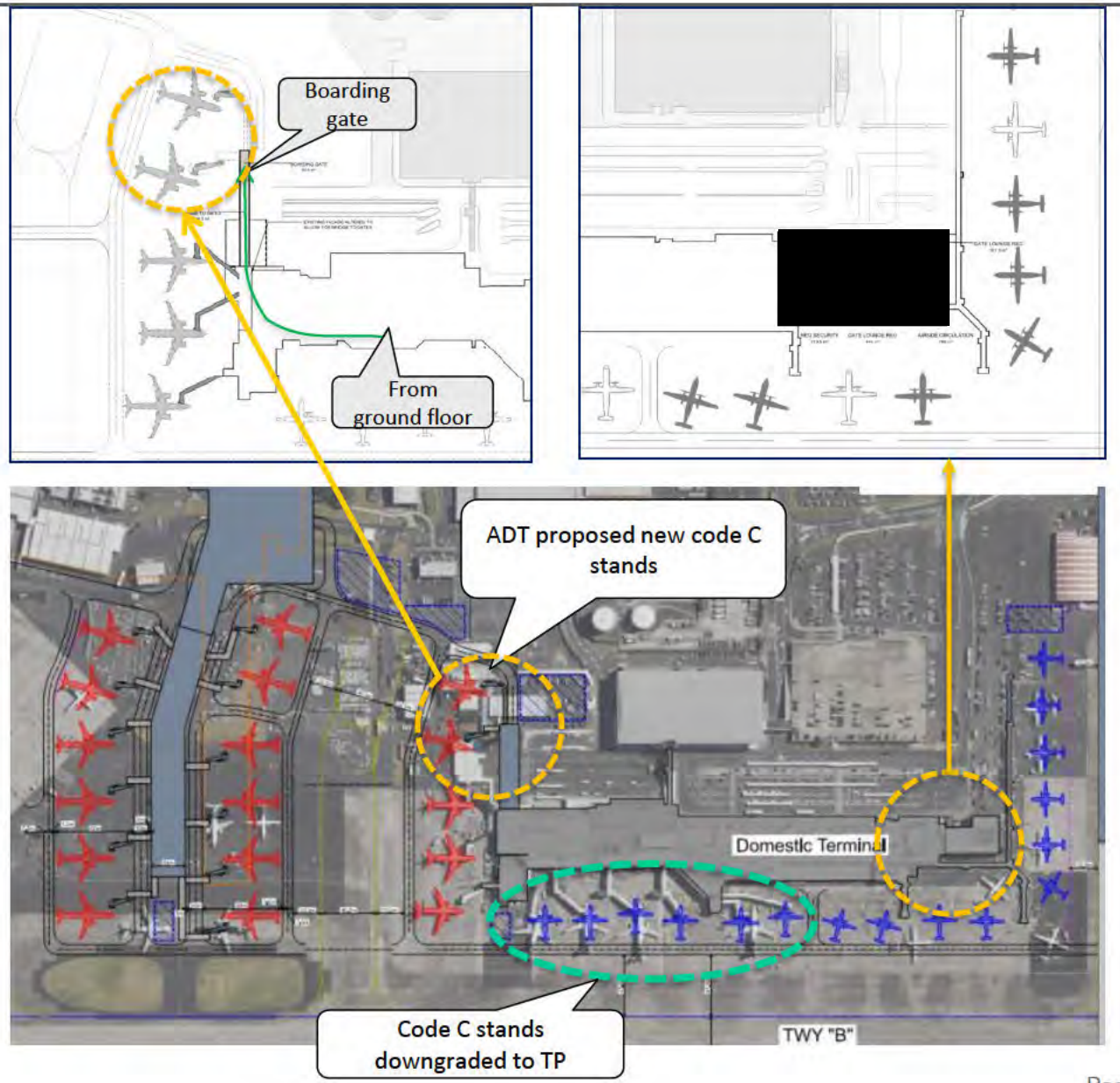


Auckland Airport */Mott MacDonald KDM- 2018*

Airfield layout

ADDITIONAL STANDS ON DTB WESTERN SIDE

- ADT proposes 2 new code C stands located north of the current DTB western stands. A walkway from DTL level 1 would connect the existing terminal to the stands.
- The current terminal would be linked to the stands via a walkway from DTB level 1. A boarding gate of 93m2 is proposed at the end of the walkway to service both stands. It is assumed that pax will keep using the existing airside dwell area.
- The stands and the walkway sit on top of existing infrastructure such us PUDO, Air Traffic Control ("**ATC**") tower and Oceanic Building.
- ADT suggests locating the future regional screening on the eastern side of DTB and proposes downgrading the code C stands to turboprop stands. Walk-out stands are required for turboprop since the use of PBB is not possible. According to the proposed design both PBB and fixed links are removed from the existing domestic stands.
- There is no mention of how the downgraded code C stands are going to be served. Major work would be necessary to allow passengers to board/disembark since DTB was not designed to service aircraft via walk-out stands.



Auckland Airport

Section 2: Floorplate analysis

Planning assumptions for the ADT

- The ADT design notes that the low-end of the optimal boundary was chosen, except for the gate lounges
- The assumption sheet provided by Air New Zealand does not clarify the design year used to size the ADT
- Auckland Airport is assuming FY2033 for the comparison
- Auckland Airport has targeted the middle of the optimal range, for a design year of 2033 – approximately 4 years after opening of the DP facility – we consider this to be the appropriate design parameter for a full-service terminal
- This table compares the Level of Service ("**LOS"**) used to size ADT and to size DP

Item		ADT (IATA LOS lower end)	IATA LOS medium range
Check-in			
	sqm/pax	Not available	1.55 sqm
	Waiting time	20 min (conventional desk) 2 min (kiosk)	3 min (ABDs) 1.5min (kiosk)
Security			
	sqm/pax	Not available	1.1 sqm
	Waiting time	10 min	7.5 min
Dwell			
		Air New Zealand approach does not assume specific dwell time	60min (Auckland Airport Assumption)
Gate lounge			
		2.2 sqm/pax (seated pax)* 1.5 sqm/pax (standing)*	2.0 sqm (seated pax) 1.4 sqm (standing)
Arrivals Hall			
		1.8sqm/pax	2.1sqm/pax
Reclaim			
		Sqm/pax: not available Waiting time code C: 20 min Waiting time ATR :10min	Sqm/pax: 1.6 Waiting time code C: 10 min Waiting time ATR : not used in DP

**Optimum high-end*

Design horizons inform the design of the ADT

The ADT requires use of both the new ADT and the DTB out to at least 2043

In the materials provided, no demand split was provided in terms of passenger volumes

To assess the ADT – Auckland Airport has used the DKMA forecasts and made the following assumptions:

- The forecast of annual passenger volumes for Domestic Trunk passengers split by Air New Zealand and other airlines; and
- pro-rated peak hour passengers based on this split;
- used this split to generate peak hour passenger volumes to assess the floorplate of the ADT

These are considered to be reasonable assumptions to analyse the ADT, as the operation of the ADT solution presented would require two domestic jet terminals to be operational on an ongoing basis

These are assumptions used for this analysis – they do not provide an indication of how the terminals are proposed to be operated in the future

DKMA passenger forecasts	2033	2043
Peak hour - departing passengers		
Air New Zealand (ADT)	[redacted]	[redacted]
Other (DTB)	[redacted]	[redacted]
Total	[redacted]	[redacted]
Peak hour – arriving passengers		
Air New Zealand (ADT)	[redacted]	[redacted]
Other (DTB)	[redacted]	[redacted]
Total	[redacted]	[redacted]
Total annual passengers (million)		
Air New Zealand (ADT)	[redacted]	[redacted]
Other (DTB)	[redacted]	[redacted]
Total	[redacted]	[redacted]

Comparison of total floor area enabled by normalised view of ADT

To compare the ADT with the DP, we have:

- Identified the ADT floor area by function, excluding 'unenclosed areas*' from the analysis – this brings the ADT floorplate to ~30,000m2
- Then applied a normalisation factor to the ADT design – reflecting the high-level difference in demand to reflect the difference between:
  - peak hour departing passenger demand assumptions for the ADT (assumed to be Air New Zealand pax only given DTB remains in operation) and;
  - the DP (all domestic jet pax) as per the DKMA forecasts.
  - i.e. [redacted] = normalisation factor of 1.34

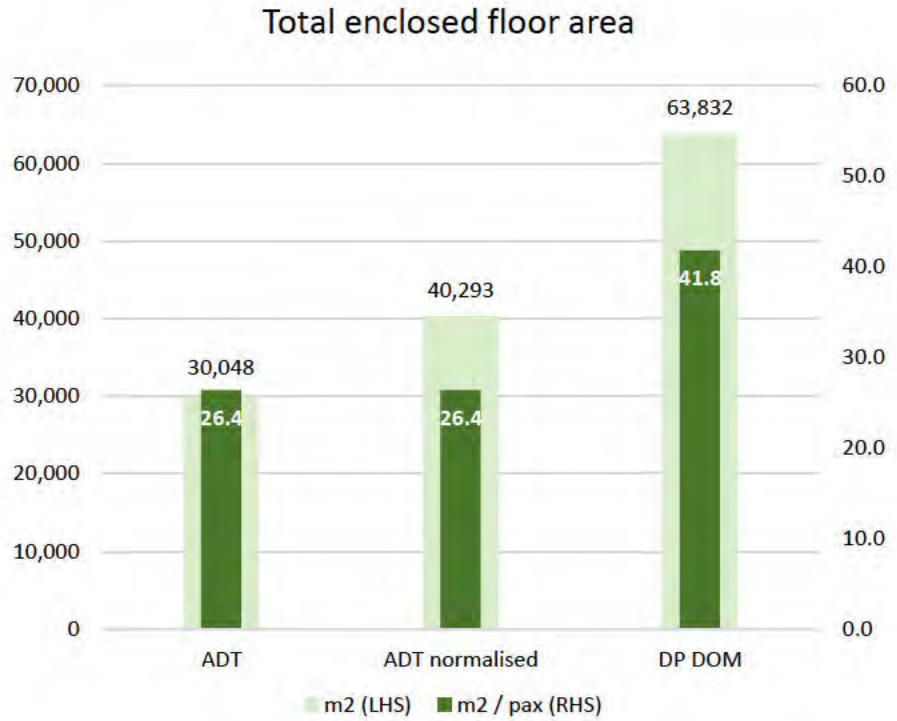
This step of normalising the ADT design to align demand horizons is important to make a like-for-like comparison between the two designs. Key points include:

- it increases the floorplate of the ADT by around 10,000m2
- shows that there is around a 24,000m2 difference between the normalised ADT and the Domestic Processor

We have also pro-rated areas of the Integrated Terminal that are shared between international and domestic services – e.g. check-in. The ~64k m2 reflects domestic services only

Subsequent analysis by function seeks to explain this difference to identify the drivers for this difference.

These assumptions have been used to explain the differences in floorplate only, they have not been used to estimate any cost impacts



** Identified in the ADT drawings as the area used for BHS logistics and movements*

Services not provided in the ADT | Slide 1/2

Services / Plant rooms ~10,600m2 – services and plant facilities are fundamental to the operation of an airport terminal.

- The Domestic Processor project provisions for around 10,600m2 of footprint for these facilities for domestic services - at 16% of gross floor area this falls within the benchmarks indicated by AirBiz and Mott MacDonald
- During the consultation process on design, we identified that the space for plant rooms appeared high – this triggered further work which resulted in a reduction of the footprint provided for services and plant that was adopted

Space benchmarks - Plant

	Plant
AIRBIZ	14%
MOTT MACDONALD	15%-20%, factors include local conditions, level of central services, terminal volume and the adoption of more sustainable solutions

ADT – 0% of GFA

DP – 16% of GFA

Truck dock ~800m2 – required to support all inbound and outbound flow of goods.

- The expected growth in passenger volumes will drive a corresponding increase in delivered goods to the airside for retail activities, and airline lounges activities. This is a necessary facility for the operation of the terminal

Bus Lounge ~1250m2 - required to support bussing operations and to enable fully flexible use of the pier and the stands. It is sized to serve 2 code C operations.

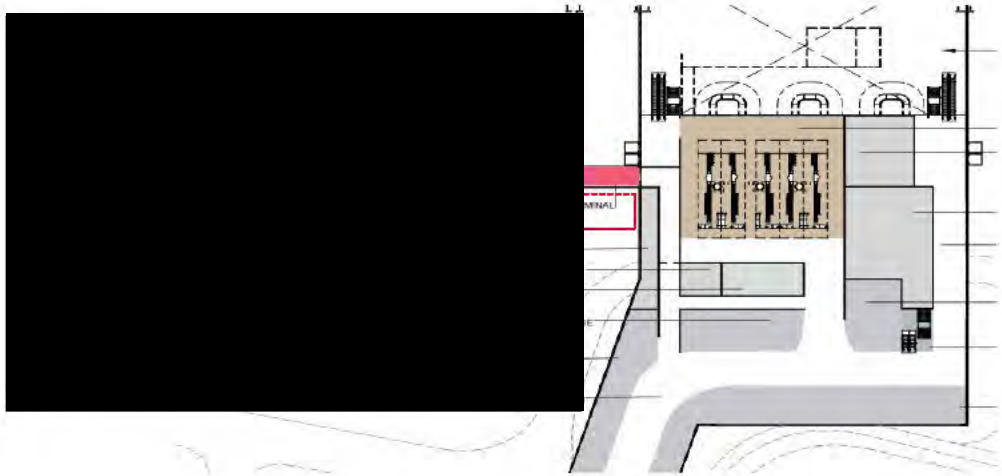
- The bus lounge has also the potential to unlock airside REG-DOM and DOM-REG transfer operations and also meets the resilience criteria: in case of technical failure (i.e. PBB not operating, aircraft blocked on stand), or during maintenance works (e.g. pavement renewals) passengers would be bussed to a remote stands

[redacted]

Services not provided | Slide 2/2

D-I screening point ~550m2 – additional screening point provided to allow for a separate D-I screening point - allows straight-forward transfers between domestic and international services.

- The ADT proposes a bridge from the domestic headhouse to the ITB of ~100m2, with domestic transfers screened at INT security.
- The proposed bridge connects to the Zone E of the International Terminal Building. This part of the international terminal has no first floor and the ADT proposal would require extensive work in a complex operational area of the existing building.



Non-passenger screening (“**NPS**”): The DP provides ~500m2 solution for NPS within the truck dock facility.

- The DP solution would be used to access both the INT and DOM Security Enhanced Area (“**SEA**”).
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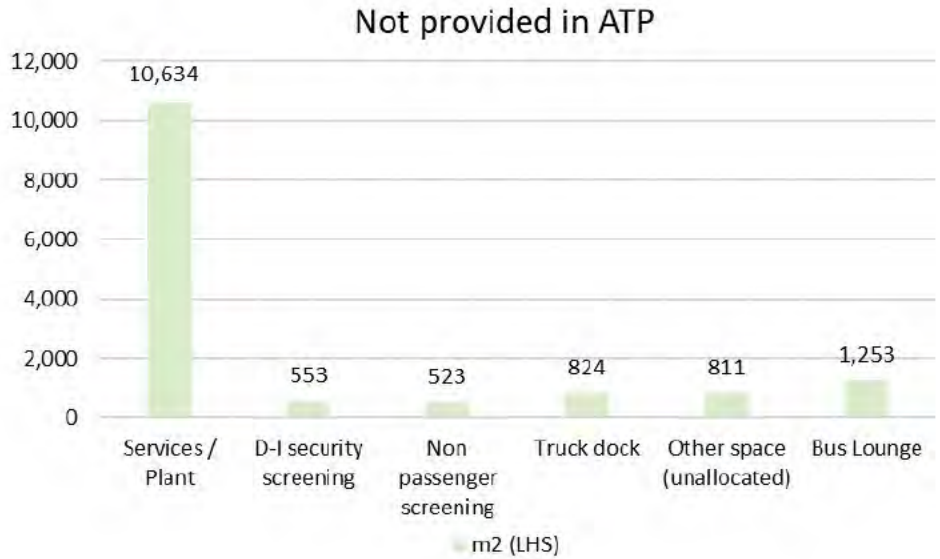
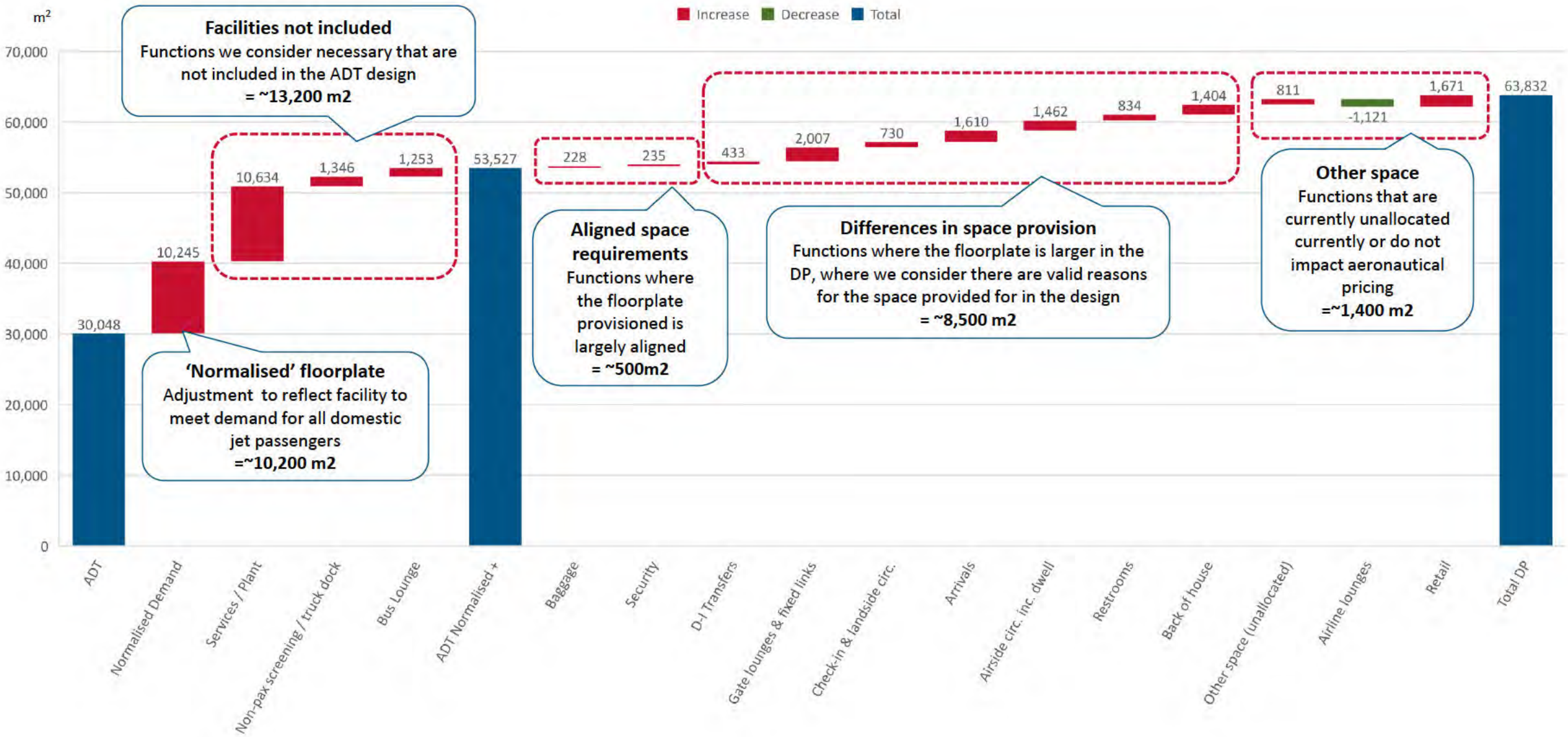
- Having an NPS screening point within the new DP is therefore required



Overall floorplate analysis – ADT and DP



Development of Work Package 3 – combined check-in hall

During consultation for design on the combined international and domestic check-in hall, we are working to meet the following requests from Air New Zealand:

- Two OOG belts for Air New Zealand check-in, including dedicated OOG facilities for premium travellers
- A dedicated pet facility for domestic pet transportation
- Dedicated facilities and pathways for premium, priority and special assist travellers
- A dedicated customer care hub of 200m2 for facilitating special handling and unaccompanied minors, with the option for future expansion to 250m2 beyond 2033.

The cost of additional facilities requested by Air New Zealand for premium check-in has been estimated at an additional $17 million in cost

We have also received the following requests, which we are not progressing due to the cost implications and space constraints, these include:

- Request for two dedicated check-in zones – following work on collaborative capacity modelling we have aligned on a single check-in zone with flex into common-use facilities
- An escalator dedicated to the premium check-in facility to provide access to level 1 – this was considered but removed from the design due to the cost and complexity. Current design is a new lift will be installed and the existing lift upgraded

Based on the designs provided in the ADT, many of the features that have been requested for check-in by Air New Zealand in this other stream of work could not be delivered within the footprint proposed in the ADT.

We are still working on the design of the check-in hall expansion and looking for opportunities to reduce cost. However, many of the requests received from Air New Zealand through this process are driving increased cost and complexity.

The proposed check-in solution of the ADT implies that Air New Zealand is accepting of a scaled down check-in solution that does not include many of the features requested through recent engagement on the check-in project.

Note: Air New Zealand in its engagement on design of the Check-in Hall has requested additional back of house requirements which are not contemplated by the Arup proposal. Using the Arup specs could help us control the scope of the check-in expansion which is in earlier stages of design than the DP.

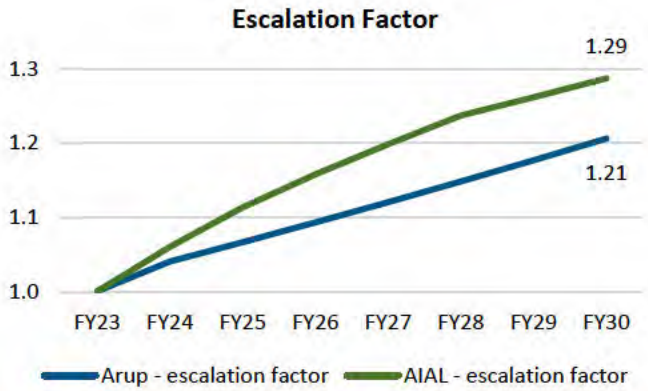
Auckland Airport

Section 3: Cost comparisons

Alignment of cost estimate assumptions

Construction cost escalation

- Arup adopted more conservative construction cost escalation forecasts than Auckland Airport in the capital plan
- Auckland Airport escalation forecasts were based on independent forecasts provided by RLB, global quantity surveyor, construction and property consultancy
- Auckland Airport believes the construction cost escalation forecasts adopted remain reasonable given the current construction cost environment



Escalation Fcst	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Arup	4.0%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
AIAL	6.0%	5.0%	4.0%	3.5%	3.3%	2.0%	2.0%

Financing costs

- Financing costs were excluded in the Arup cost estimates – these costs are included in Auckland Airport project cost estimates
- We have estimated the expected financing costs, aligned to the rate used for the PSE4 capital plan of 5% (current interest costs are higher), and assumed the same commissioning profile over the life of the project
- Note that for pricing, financing costs are capitalised at the rate of target return (not interest) – however for the purpose of this exercise financing costs at the cost of interest have been used

Timeline

- If Auckland Airport were to adopt the ADT as proposed by Air New Zealand – this would require the programme to re-set in order to re-design the ADT solution, taking significant time
- This would result in the write-off of sunk costs incurred on the Domestic Processor design, demobilisation of teams established to deliver the project
- The current domestic processor design has matured and been consulted on over a period of 5 years. If the ADT were to be adopted this would require at least an additional 2 years to design the new ADT solution, de-mobilise and then re-mobilise the relevant teams – these factors would all add to the overall cost incurred to develop the ADT, and impact on when it could practically be delivered
- The risk of delay to the overall build by adopting the ADT has other implications including risking reaching capacity constraints sooner, reducing airport resilience, requiring delay to efficient contingent runway operations that enable main runway pavement renewals, and impacting other critical resilience projects such as the Contingent Runway work
- While construction cost forecasts currently assume low rates of escalation toward the end of the decade (when this delay drives additional cost) these forecasts are highly uncertain therefore the cost impacts of delay are considered conservative and could plausibly be much higher

Estimated cost impacts

- *Alignment of escalation: $92 million*
- *Capitalised interest: $62 million*
- *Delay costs (escalation, capitalised interest): $92 million*

Alignment of infrastructure requirements

- **Missing facilities –** as identified through the floorplate analysis, there are a number of facilities that have not had space provisioned in the ADT design.
- The facilities that are not considered optional have been incorporated into the **ADT – Minimum Technical Solution**, based on the expected floorplate required.
    - Note **this does not reflect the 'normalised ADT' floorplate, or provide for a facility that Auckland Airport considers satisfactory**, it reflects the absolute minimum facilities that Auckland Airport considers are necessary to be included in an operational ADT
- **Additional DTB spend –** the ADT solution proposed requires additional investment in the DTB. The capital costs of these facilities are included in the cost comparison as the reconfigured DTB continues to be operated
- **Jet Fuel Infrastructure –** the Arup proposal includes the provision of jet fuel infrastructure. This project is accounted for separately in the Auckland Airport Capital Plan – therefore the cost of this separate project ($35 million) has been included in the overall DP cost

Accounting for the above factors gives an appropriate cost comparison between the two solutions.

ADT – Minimum Technical Solution (MTS)

ADT - MTS	m2	% of ADT floorplate	Notes
Back of house	702	2.3%	50% of DP difference
Plant and services	6,007	20.0%	Same % of DP floorplate
Non-passenger screening	523	1.7%	Same m2 as DP
Truck-dock	824	2.7%	Same m2 as DP
Bus Lounge	1,253	4.2%	Same m2 as DP
Check-in: Out of Gauge	150	0.5%	Estimated size
Additional floorplate	**9,458**	**31.5%**	

Note this is less than the 'facilities not included' that were identified in the floorplate analysis

Increase in floorplate for ADT – MTS = 31.5%

This has been pro-rated to cost to get cost estimate of ***$246 million***

Other cost implications

Baggage system for international and domestic services

- A new baggage system is a key project included in the Domestic Processor project cost at a total of $327 million
- This is a service that is shared between international and domestic services
- Forecast peak demand indicates that 67% of the baggage system requirements is driven by international services, and 33% by domestic
- To estimate the potential cost that could be avoided under the ADT, a conservative assumption for apportioning this cost of 60% international, 40% domestic has been adopted
- This gives an indicative (but conservative) cost estimate of $196 million of the baggage system cost that could not be avoided under the ADT, as it remains required for international services. This does not account for economies of scale, so the actual cost to deliver the same service could be higher.

Other international services

- The Terminal Integration Programme also provides for other international services, such as international security upgrades and plant facilities
- To ensure the estimates of avoidable costs are conservative, the costs of these upgrades for international services have not been included in this analysis, but would also likely be incurred under the ADT

Back-out costs also likely to be incurred

- Back-out costs for existing contracts and commitments such as contracts for the baggage system, as well as risk premium for future work (assumed ~$30 million)

International floorplate estimates	m²	Notes
Baggage Handling	6,954	Baggage system combined with domestic and international services - apportioned based on peak demand (this is the international portion)
Services / Plant	700	Plant and services for international facilities is included in the overall cost
International Security	4,152	Works for the international security area are also included in the overall cost
Other	355	
Total INT Components	**12,162**	

Assumed cost estimate for international services = $196 million

This is considered to be a conservative estimate, as it excludes the cost of works on international security, plant and other facilities.

Indicative estimate of back out costs = $30 million

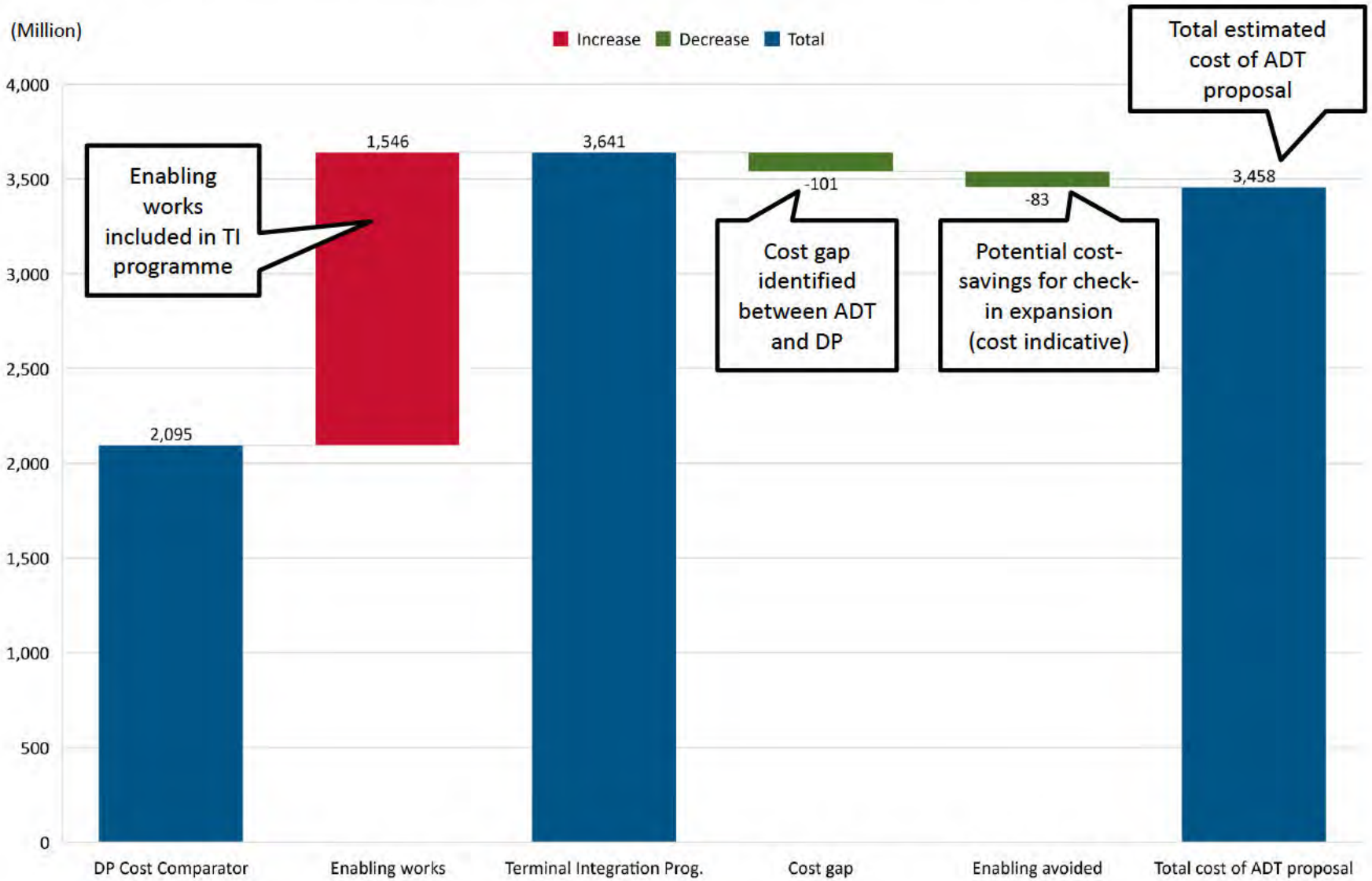
Adopting ADT will not avoid cost of enabling works projects

Projects	10 year forecast ($m)[1]	Impact of ADT on project	Cost avoided under ADT solution ($m)
Automated Bag Drops (ABD's)	24.2	• ABD and kiosk upgrades will improve check-in technology to make more efficient use of the existing space. • Upgrades for international check-in would be needed, even with a separate domestic check-in facility	0.0
Baggage Enabling Project	58.8	• Project already in delivery to extend the life of the existing international baggage system through to commissioning of new ICS system	0.0
Façade and Check-in Extension	**248.5**	• **Check-in expansion will still be required to provide the required circulation space for international check-in, premium check-in offering for Air New Zealand** • **Potential reduction in floorplate could be investigated further if the ADT were adopted – for cost estimation this is assumed to reduce project cost by one-third, but this is highly indicative**	**83**
High Street Reconfiguration to accommodate customs after security	6.3	• Moves customs processing to follow AvSec security screening – this change is being sought by border agencies, regardless of integration	0.0
Taxiway Mike and Pier B North Stands	420.9	• Project already underway, this would be required to deliver the ADT as is in the same location and has the same impact on aircraft stands as the DP project	0.0
Operations Control Centre	9.7	• Project completed	0.0
Programme Logistics	27.1	• Many of the logistics required for the DP build would likely be required under the ADT	0.0
DJF Eastern Approach	32.7	• Roading upgrades and services likely to be agnostic between the DP and ADT solutions	0.0
East Terminal Enabling	309.6	• This project is already underway and in construction and the cost cannot be avoided. The project provides a significant component of international works (for example decarbonisation) which are agnostic to the domestic solution.	0.0
East Airfield Relocations	46.9	• This project is underway and largely completed, therefore this cost cannot be avoided. In any case, many of these works would be required to enable the ADT	0.0
West Terminal Enabling	214.3	• Arrivals elements of the project are driven by international demand – this is agnostic to ADT solution and required regardless. • New truck dock would be required to deliver the ADT solution	0.0
Inner Terminal Road East & West and Common Service Trench	125.1	• Roading and services works would be required to deliver international check-in expansion noted above and the proposed ADT solution	0.0
Western Forecourt Stage 2	106.4	• Longer-term project delivered in PSE5. Triggers agnostic to ADT or DP pathways.	0.0
Disaster Recovery Centre (OCC + EOC)	40.3	• Need agnostic to DP or ADT	0.0
Other Terminal Integration projects < $5m	7.6		
Transport Hub PUDO	53.2	• Project already underway, need agnostic to DP or ADT given both will require landside access capacity to serve domestic jet passengers	0.0
Transport Hub – APOC	53.2	• Agnostic to DP or ADT	0.0
Transport Hub – Bridge West	17.1	• Agnostic to DP or ADT	0.0
Total			**83**

Auckland Airport

1. Source Auckland Airport PSE4 pricing disclosures, costs reflect total regulated cost of the project

Estimated and quantified impact ~5% of programme capital costs



- Total estimated total cost of the ADT proposal including enabling works is $3.5 billion
- This is $184 million lower than the cost estimate of the Terminal Integration Programme, comprising of a $101m cost gap for DP, and $83m for check-in expansion
- This is equivalent to a 5% reduction of capital costs across the overall Terminal Integration Programme

Other capital costs that have not been quantified

Sunk costs on Domestic Processor design

- Significant resources have been dedicated to the progression of the Domestic Processor design, which is now in the detailed design phase
- The cost incurred to date on design, management and financing costs is around $100 million, the majority of which would be written-off if the Domestic Processor design were to be abandoned

Other capital costs not identified:

- Increased risk margin for future projects due to market perception of uncertainty for the development proceeding, as it would have now been cancelled twice
- Any ongoing investment to maintain operations and building system compliance DTB till 2043
- Any cost related to the demolition of existing buildings and relocation of impacted activities (e.g. the ATC as explained on page 11)
- Any additional terminal/airfield capacity to process jet passengers which might be triggered by the reduced capacity of the ADT relative to the Domestic Processor

Other implications

- Risk of cost estimates – the ADT is at a far earlier stage of design than the DP, meaning that the cost estimates would be more uncertain as this earlier stage of development
- The Master Plan staging would be delayed, exposing the system to the risk of becoming less robust and unable to adapt to potential technological advances (e.g., electric/hydrogen aircraft)

Operational costs and impacts on customer experience

Operational costs and impacts – Terminal operations:

The "four-doors" concept would require Auckland Airport to have out to 2043:

- 4 check-in hall areas (1 for INT, 2 for DOM and 1 for REG)
- 4 baggage systems (1 for INT, 2 for DOM and 1 for REG) with no integration proposed till at least 2043
- 3 security screening areas (1 for INT, 2 for DOM), plus 1 for REG if required

This could be expected to increase operational costs for:

- Auckland Airport operations, which would be passed through into higher aeronautical charges as per the building blocks model;
- Airlines, potentially with operations spread over more terminal facilities; and
- Additional AvSec screening points would increase AvSec costs, which are ultimately recovered from airlines.
- Additional building operation and maintenance costs due to the inefficiencies of running separate systems and spaces in parallel.
- Potentially significant costs to a broad mix of airlines and the wider NZ economy due to more constrained operation of the contingent runway during 2028 - 2029 when main runway repairs are required and the ADT has not been delivered (due to an expected 2-year delay necessary for re-design).

Operational costs and impacts – Apron operations:

The "four-doors" concept with the proposed Pier A1 layout would require Auckland Airport to:

- Use mitigations on Pier A (international) Eastern Apron such as restricting aircraft type on Taxilane J and stands to allow pax rear boarding and safe GSE circulation on stands and on the back of stand road
- Implement additional jet blast fences to protect GSE operations
- Limit the use of Pier A1 to aircraft departing from the pier and consider an airside transfer alternative (REG to DOM) as no bus lounge would be available.

Other implications

- Domestic passengers in DTB would have a poorer experience due to the age of the terminal facility which makes it less adaptable to changes and growth

Auckland Airport

Section 4: Next steps

Next steps

- Air New Zealand feedback on analysis and view on operational assumptions of ADT

Auckland Airport

Appendix – Detailed floorplate analysis

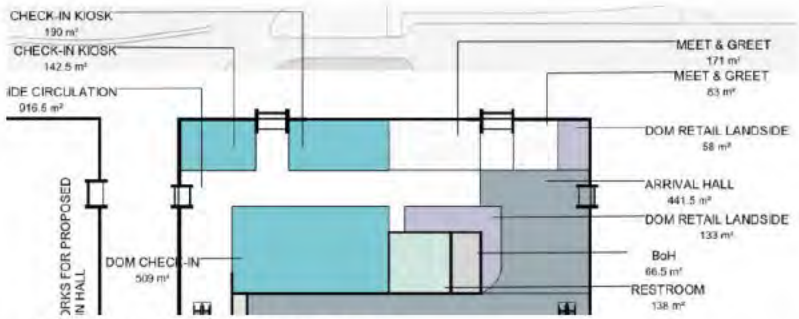
Check-in and landside circulation

Key Points:

- ADT proposes a dedicated check-in area for Domestic ("**DOM**"), compared to a combined domestic international check-in hall delivered through the Terminal Integration Programme
- It is observed that a LOS Optimum lower range has been utilised to size the area
- The area reserved for check-in + kiosks (841sqm) is similar in size to the existing Air New Zealand check-in hall in DTB (c.ca 770sqm – circulation is part of the area)
- The area is boxed between the vertical circulation to level 1 and the arrivals facilities leaving no possibility to accommodate growth without triggering a building expansion.

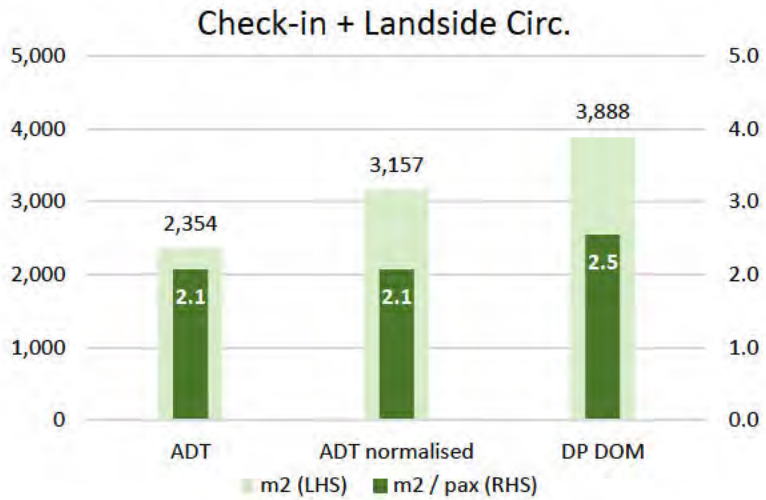
Required facilities not identified in the design:

- Out-of-gauge ("**OOG**") facilities not identified
- The kiosks are proposed to be located by the façade line. How the kiosks will be distributed is not specified.
- It appears there is no space for pax services i.e. repacking stations, trolley bays, pet storage
- It appears there is no space for Back of House operations
- Very limited space for landside retail is provided
- There is one bathroom block – assumed to be shared by both the check-in and baggage reclaim hall



ADT Proposed Layout (not at scale)

[redacted]

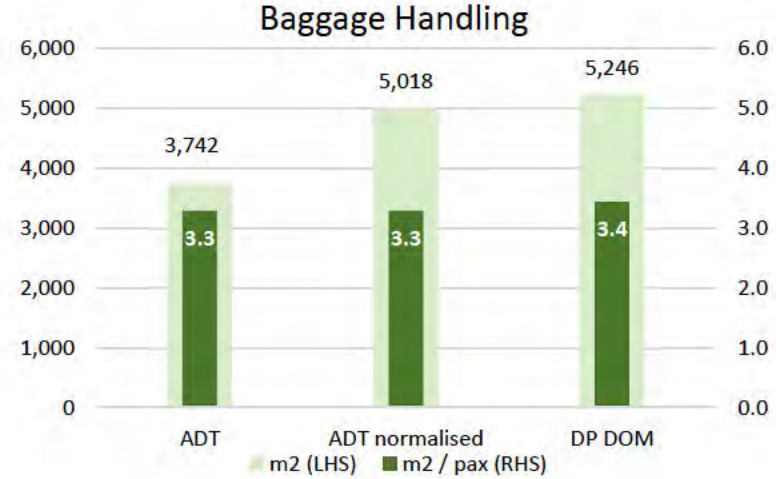


DP DOM represents domestic portion of integrated check-in hall

Baggage Handling System

Key points:

- In terms of floorplate, the baggage handling systems ("**BHS**") for both designs are comparable
- Both designs provide for 3.3m2/pax for baggage handling systems. The DP space is based on a portion of the overall baggage system, which is integrated between domestic and international services.
- The ADT floorplate analysed here does not include the additional unenclosed space for BHS logistics and movement of 2,648m2. Including this space would drive a larger floorplate for the ADT BHS when normalised for demand.
- The DP design by integrating domestic and international services into a single baggage system creates efficiencies and reduces the overall floorplate required relative to two stand-alone baggage systems required under the ADT.
- The construction of the East Bag Hall is already underway, with some elements of the project already open and operational including baggage systems. Air New Zealand provided its support for proceeding with this project in August 2022 as part of the enabling works packages.
- Given the status of this project, there is not an opportunity to reduce the footprint of the baggage system due to domestic jet baggage being provided in the ADT. Under the ADT concept there would be duplication, with the footprint designed to service domestic, with international services serving international only.



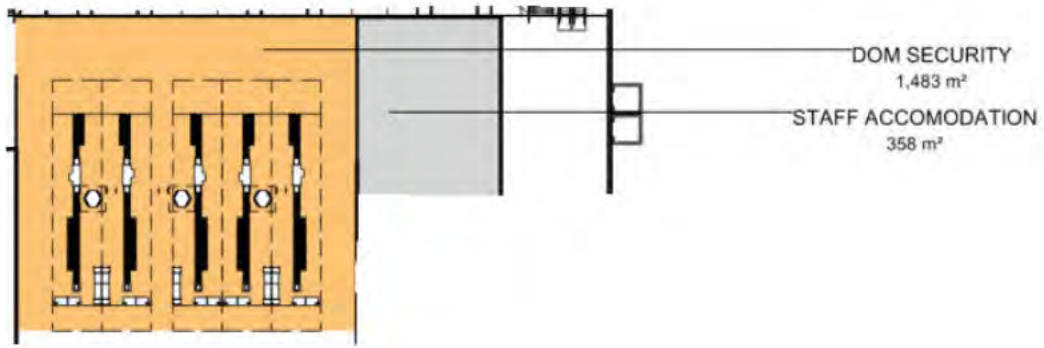
Security screening

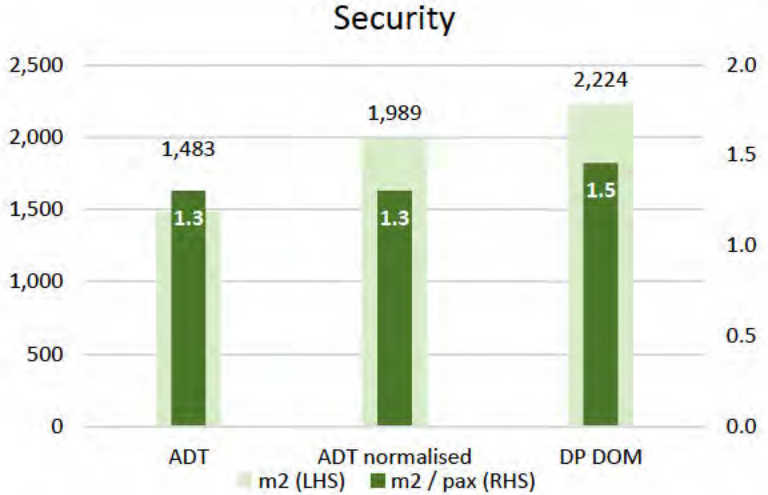
The ADT allows space of ~1,500m2 increasing to ~2,000 when normalised – this includes space for the queuing area. The normalised floorplate is slightly smaller than the ~2,200m2 for the domestic screening point for the integrated terminal.

Key drivers of the larger floorplate in the Integrated Terminal design include:

- The ADT provides for five screening lanes, whereas the Domestic Processor provides for six lanes combined with the space needed to meet [redacted] DP also reflects the higher peak hour passenger volumes that have been designed for. The security screening area has therefore been designed to meet Avsec requirements and the constraints imposed by Terminal Integration and the space has been optimised through the design process
- Additional circulation space is included in the DP design to provide a corridor into the security screening area. The ADT does not include this which can be explained by the brownfield nature of the development and designing within the existing constraints to deliver an integrated facility

Other security screening facilities are also provided in the DP such as non-passenger screening and the dedicated Domestic to International ("**D-I**") screening point – these facilities are not included in the ADT design (there is further detail on slide 30)





[redacted]

DP
DOM security, including corridor from the departure landside area

Not at scale

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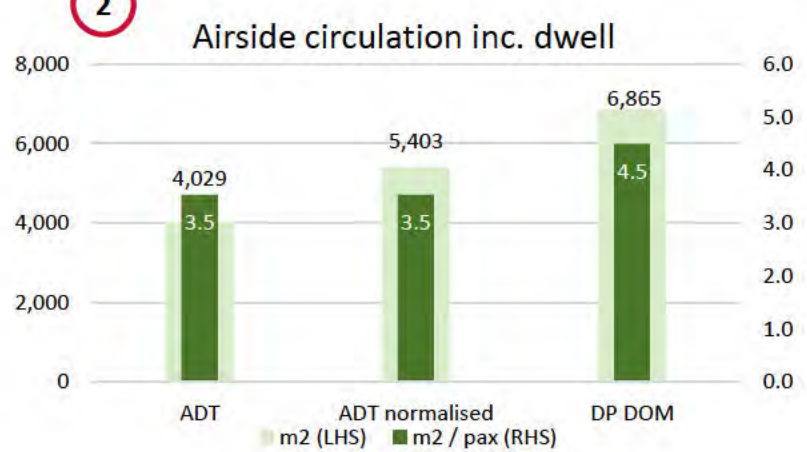
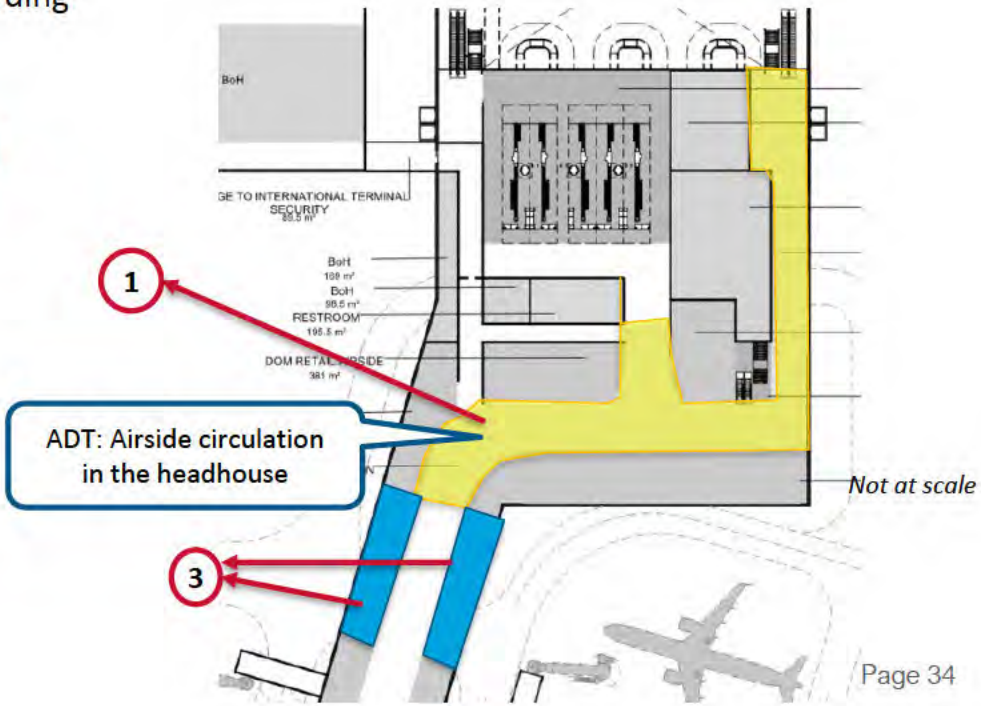
Airside circulation, dwell and gate lounges

1. Additional airside circulation in the DP is explained by the principle of terminal integration embedded in the design. A combined DOM/INT security screening point and master-planned pier alignment dictate the length of the passenger journey.
2. The ADT appears to provide airside dwell space in the gate lounges only. The DP has dwell space in both the headhouse and gate lounges located in the pier, to allow pax to relax while waiting for the gate number to appear on the screens. The ADT design does not consider the dwell time to size an airside dwelling area. A 50% call-to-gate strategy (similar to DP) has been applied, but with no dwell area, pax would be required to wait in retail/F&B/airline lounge for the boarding to be called.
3. Because of the reduced headhouse area, the ADT design proposes retail space in the pier to the first gate line. This is reducing further the area provided for gate lounge purposes. It also should be noted that the gate lounge areas provided include the boarding gate space reserved to boarding gate infrastructure such as desks

2



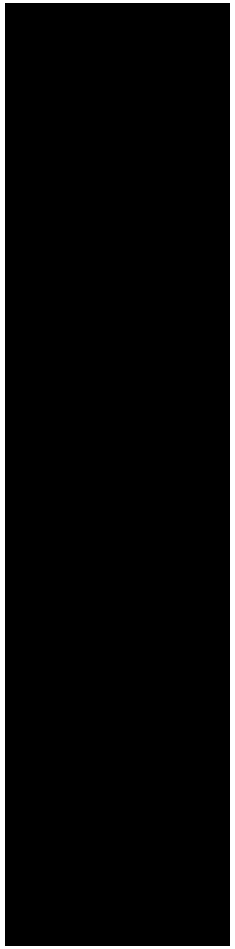
Not at scale



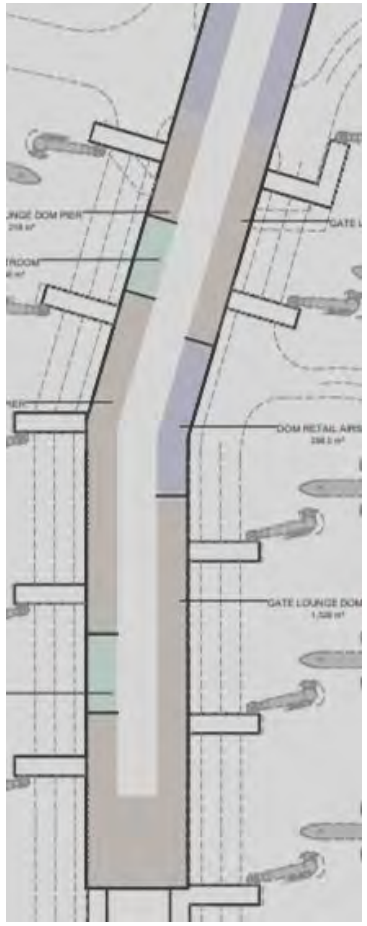
Not at scale

Pier footprint & fixed links

- The Pier footprint adopted for the Domestic Processor is relatively standard for a modern airport pier design
- At 33.5 metres wide, the design is comparable to other domestic piers for full-service carriers in the region, slightly smaller than Perth T1, but slightly wider than the Sydney T2 pier
- Air New Zealand has confirmed that the width of the circulation in the pier is 10m (same as DP), the total width of the pier is assumed to be 26m
- The DP fixed links are slightly larger than what is proposed in the ADT, this allows for 1 lift and 1 stair to the ground floor for rear boarding operations. The design considers airline requests for a specific slope to be maintained due to the use of wheelchairs to transport passengers. The slope adopted is also compliant with the New Zealand building code
- ADT design does not clarify the slope assigned to the fixed links ramp to the rotunda level nor vertical circulation ("**VT**") availability. The layout provided for the ground floor shows no fixed link footprint, making it unclear how rear-boarding operations would be managed.



DP – Pier A1
(not at scale)

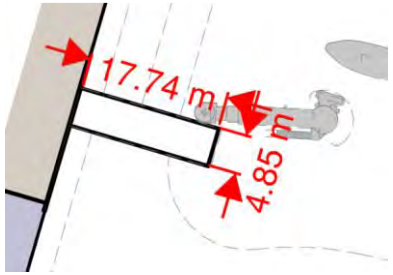


ADT- Pier A1
(not at scale)

Airport Terminal	Circulation width	Pier width
Melbourne T4 (Jetstar low-cost Pier)	6m (7.5m link corridor)	13m
ADT	**10m**	**26m***
Melbourne T3 (Virgin)	7.5m	30.5m
Sydney T2 (Virgin)	8m	32m
Domestic Processor	**10m**	**33.5m**
Perth T1 (Virgin)	8m	35m
Melbourne T1 (Qantas Pier C)	12m	40m

Benchmarking Source: Airbiz
**Measured from the drawing provided by Air New Zealand*

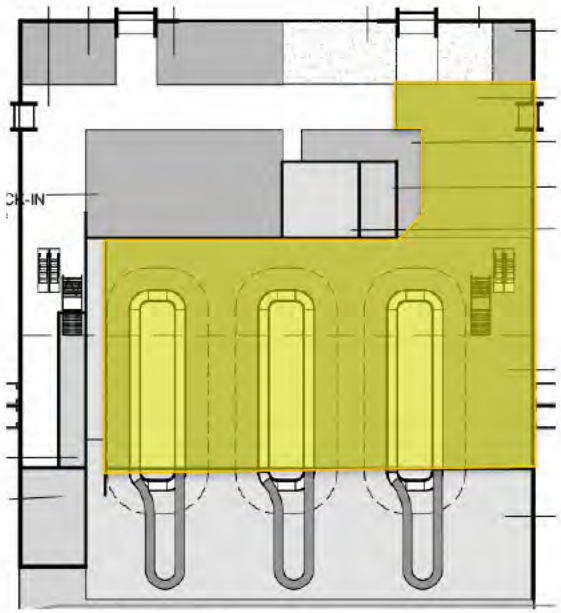
DP – fixed link, with ramps to rotunda levels and VT to GF
(not at scale)



ADT – fixed links. Ramp details (length/slopes) and VT not provided
(not at scale)

Reclaim Hall and Arrivals Hall

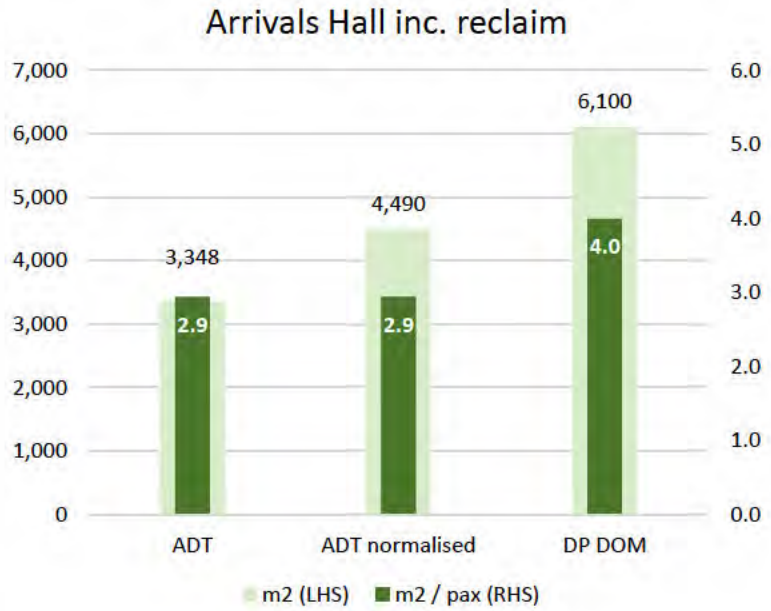
- Both in ADT and DP the arrivals hall space, reclaim hall and meet and greet areas are combined
- DP hall includes pax services such as lost bags offices for the different ground handlers, pets and a dedicated lane for OOG. These services seem to not be available in the ADT design.
- The DP design is proposing baggage carousels fed from above, providing 100% of reclaim frontage. ADT is suggesting back-to-wall belts with an inbound baggage area: it is unclear how unloading for three belts, plus BHS operations rooms and, eventually, plant, would share space in the baggage handling area.
- DP includes a space for three carousels, with two to be installed on day 1. The third carousel will be installed if additional system resiliency is required, or when the demand date for additional capacity is required (currently expected to be before 2037). This future-proofs the space for resilience and expansion without disruption to operations. Removing this space was considered as a potential cost saving as part of the Capital Plan Review in late 2022 consulted with airlines. This cost saving was not supported by Air New Zealand and was not adopted in the final design.
- The provision of space for the third reclaim belt largely explains the c. 1,600m2 difference between the DP design and the normalised ADT floorplate



ADT - Not at scale

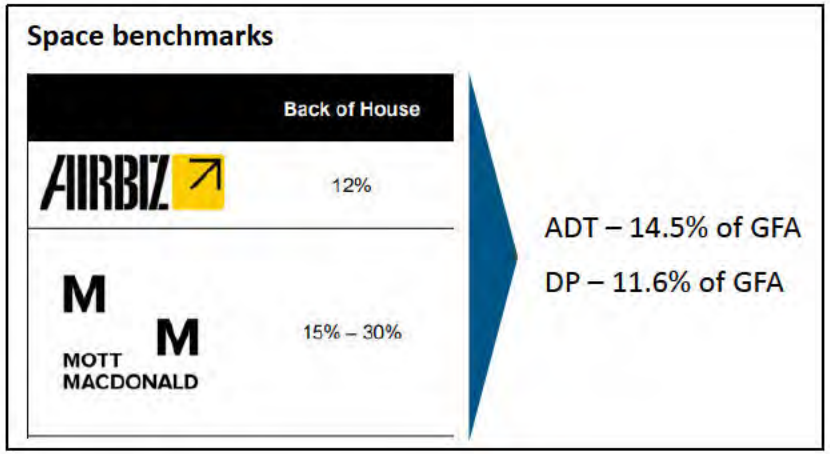
[redacted]

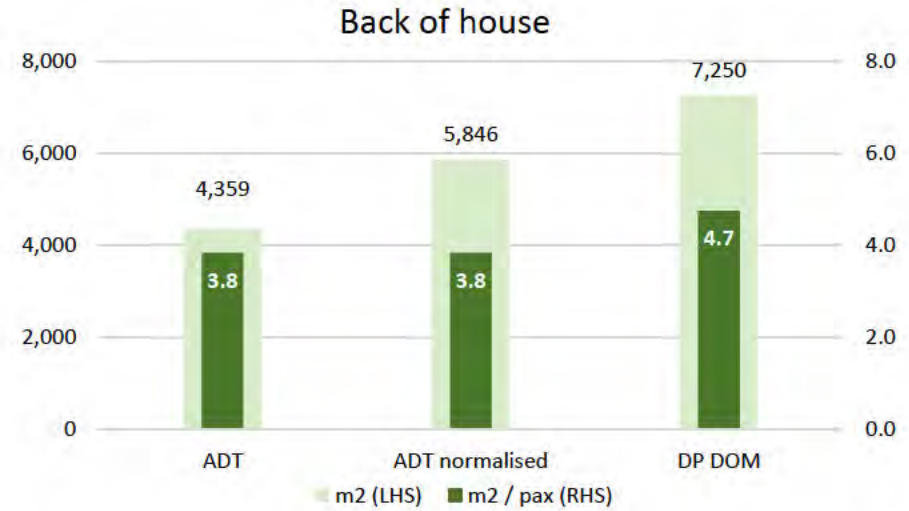
DP - Not at scale



Back of House

- The ADT provides for around 60% of the back-of-house space that is provided in the Domestic Processor (7,250sqm v 4,400 sqm)
- Finding the back-of-house space to meet the needs for all users has been a challenge in the Domestic Processor design, with not all requests for space from airlines having been met including:
  - Air New Zealand requests for separate back-of-house crew facilities for each airline in the Pier
  - Air New Zealand requests for additional space for crew briefing areas
- External advisers indicated that back-of-house functions can reflect between 12% (AirBiz) and 15-30% (Mott MacDonald) of floorplate – both designs sit within these benchmarks
- Based on this analysis, combined with the challenges of finding sufficient space for BOH in the current design, we consider the back-of-house services have been appropriately provisioned in the DP, and that the proposed back-of-house space provided in the ADT is unlikely to be sufficient





Restrooms

- The ADT provides for around one-third of the floor area for restroom facilities that were included in the DP design.
  - Landside restrooms are provided at 0.1 m2/pax in the ADT, the DP provides 0.3m2/pax
  - Airside restrooms in the ADT are provided for at 0.4m2/pax, compared to 0.9m2/pax in the DP
- DP restrooms facilities include services such as gender-neutral bathrooms, family rooms, and changing facilities room which Auckland Airport consider fundamental to enhance customer experience. We know that customers place a high value on restroom facilities, and customer expectations are also changing over time
- The provision of space for restrooms was given significant consideration during the progression of the DP design. Auckland Airport considers that the customer benefits of providing high-quality restroom facilities for passengers outweigh the additional incremental cost

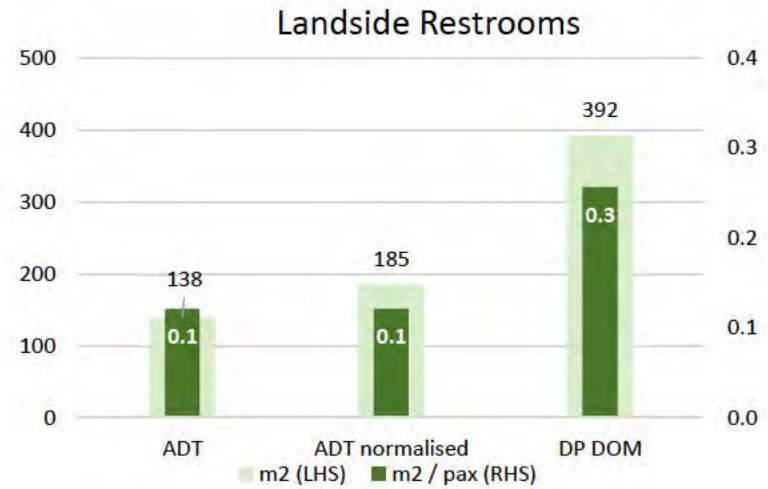
Space benchmarks

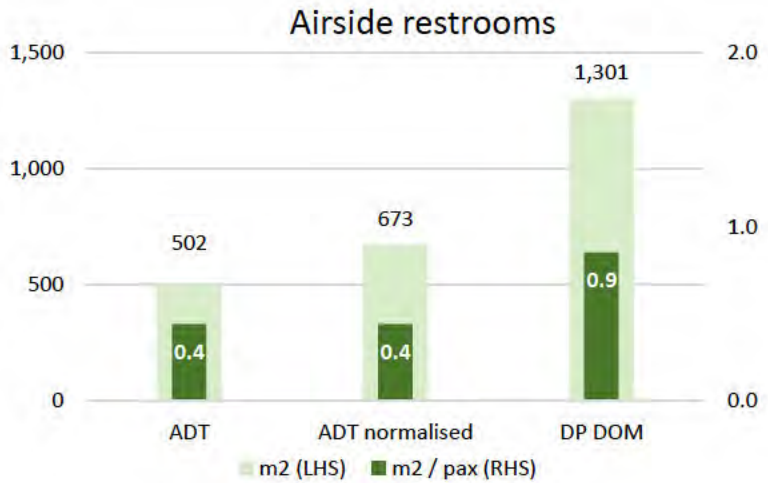
	Amenities
AIRBIZ	1.5% toilets
MOTT MACDONALD	Not reported

ADT – 2.1% of GFA

DP – 2.7% of GFA

New female bathrooms in DTB





Retail and airline lounge space

Lounges

- The ADT provides for largely the same footprint of airline lounge space as the Domestic Processor design – making it a larger footprint on a m2/pax basis for overall lounge space than is currently provided for in the DP
- Based on AirBiz benchmarks of 4-8m2 per passenger, the ADT lounge could serve between 36%-71% of peak hour departing passengers, relative to 27-55% of departing passengers in the DP

Retail

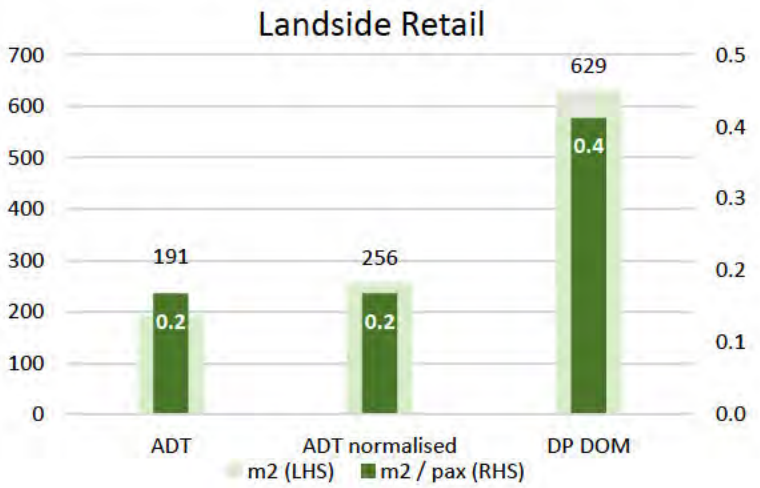
- The ADT provides less retail space per passenger than the DP
- The cost of providing retail space is not allocated to airline charges – the space provided for retail in the DP is non-regulated and the costs are covered by Auckland Airport
- ADT list of assumptions for domestic gate lounges states that 50% of the passengers would be seated in concessions

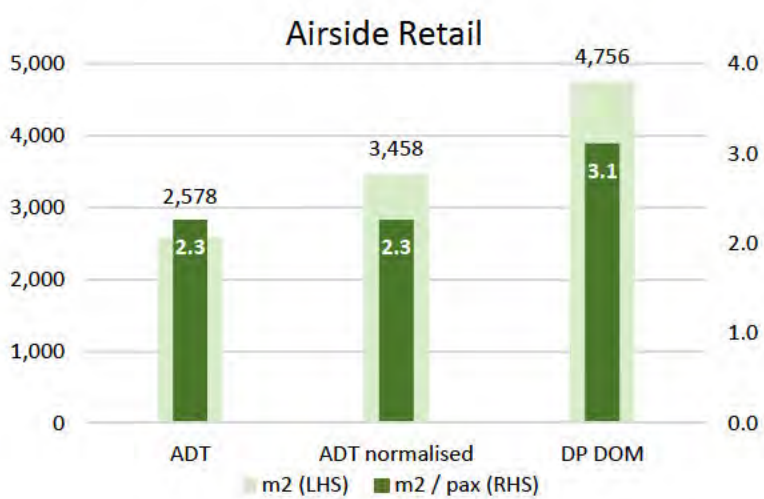
Space benchmarks

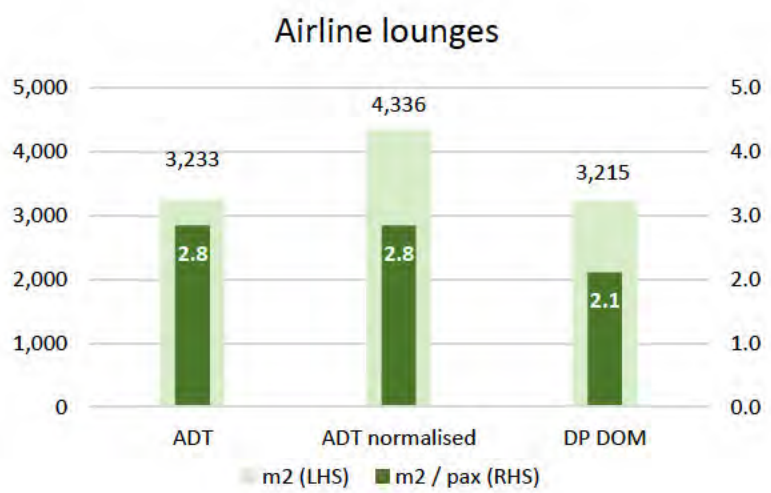
Airline lounges	
AIRBIZ	4sqm / person – 8sqm person
MOTT MACDONALD	Requirements usually determined by airlines / third-party providers

ADT – 36-71% of departing p/h pax

DP – 29-57% of departing p/h pax







Auckland Airport

Ngā Mihi