Queenstown Airport Corporation Ltd

Queenstown Airport Master Plan

July 2004

AIRPLAN

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1. Introduction

Background

Queenstown Airport Corporation Limited (QAC) appointed Airplan in October 2003 to prepare a Master Plan for Queenstown Airport. The primary goal of the Master Plan was to provide the airport company with a framework that will allow orderly development of the airport for the next 20 years.

Three main outputs were identified at the commencement of the study as follows:

- Traffic growth projections
- Terminal Area Development Plan
- Airport Master Plan

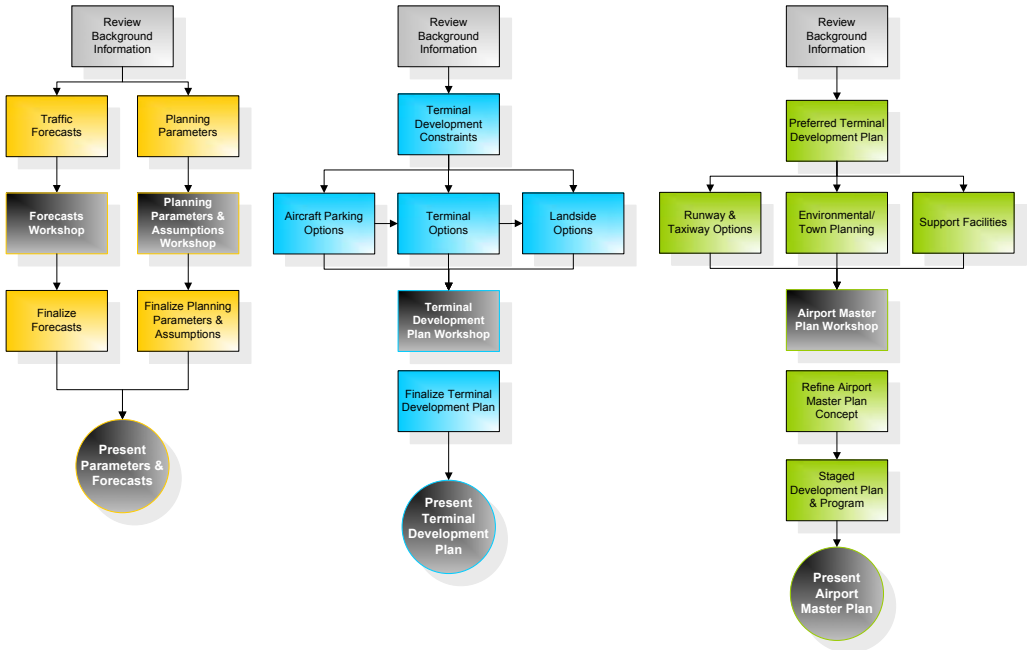
Subsequently, QAC has directed that the Terminal Area Development Plan should be treated as a separate volume, as planning work in the area will need to continue for a period and would delay finalisation of this Master Plan report.

Despite this change, the assessment of existing constraints and issues relating to the terminal, and future area requirements, have been retained in this report to guide the overall scale of the terminal area needing to be provided in the study horizon planning .

In addition, there is another separate volume covering updated aircraft noise contours.

As required by the study brief, the methodology adopted for the preparation of the Master Plan was interactive, with preliminary outputs discussed with the airport management and key stakeholders at appropriate stages, allowing feedback to be incorporated as the study proceeded.

The methodology adopted to undertake the above three key components of the study is illustrated below.



Master Plan Methodology

Role of the Airport

Queenstown and the surrounding district is one of the most scenic areas in New Zealand, with spectacular lakes and mountain scenery. A wide range of outdoor activities is available, with snow skiing during the winter months becoming increasingly popular with both local and overseas skiers.

Queenstown Airport was established in 1935 and scheduled domestic air services commenced in the 1950's. Air New Zealand pioneered trans-Tasman services for the 1995 winter ski season, using B737-200 aircraft. Due to the then limited runway length, which restricted the take-off weight of the aircraft, return trans-Tasman services were via Christchurch in order to take on sufficient fuel.

The runway was extended in 1995 and 1998, allowing direct services from Queenstown to the major trans-Tasman destinations (Brisbane, Sydney and Melbourne).

Today, the airport accommodates trans-Tasman services predominantly in the winter months, domestic trunk and regional services, sightseeing flights and general aviation operations (fixed wing and helicopter).

Planning History

The broad planning history of Queenstown Airport is outlined below:

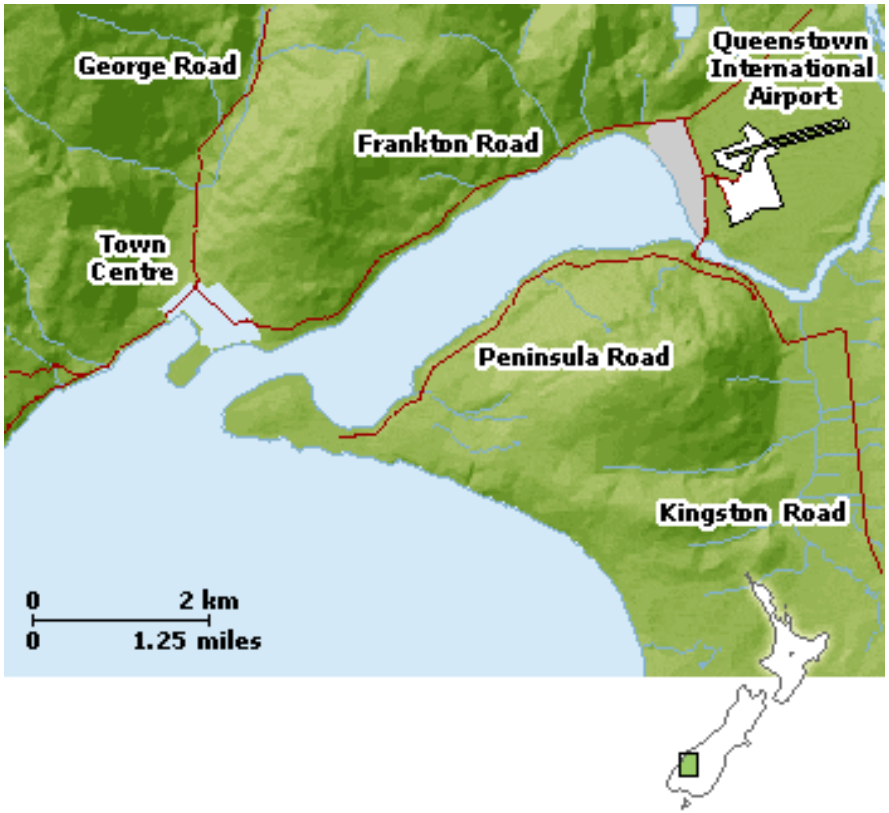
- 1935 Queenstown Airport established
- 1991 Strategic Plan
  - Established business directions, including trans-Tasman services
- 1993 Plan Change 96
  - Proposed zoning and designation changes for orderly expansion of the airport
  - Runway extension, crosswind runway relocation, terminal relocation proposed
  - Change refused, investigation of alternative sites initiated
- 1995 District Plan and Alternative Sites Study
  - Confirmed present site is the only practical site
  - Site now accepted and incorporated in the District Plan
  - Runway extended west and east, RESA implications understood,
  - 30m width retained based on Air New Zealand economic preference (extensions provided at 45m width).
- 2003 Master Plan
  - Master Plan for terminal and airport development to 2023.

Airport Location

Queenstown Airport is located at Frankton, to the east of the Frankton Arm of Lake Wakatipu. The airport is located on the Frankton River terrace flats which are bordered by the Remarkables Mountains to the east, Lake Wakatipu and Peninsular Hill to the west, Queenstown Hill/Sugar Loaf/Ferry Hill to the north-west, Slope Hill to the north-east and the Crown Range to the north.

The airport is approximately 7km by road from the centre of Queenstown.

The following map shows the location of Queenstown Airport relative to the above key features.



Consultation

Three workshops were held in Queenstown during the period of the study to present preliminary findings and to obtain management and key stakeholder feedback at major points in the study program.

The workshops were as follows:

- Workshop No 1, 3 November 2003 - Traffic Projections and Planning parameters
- Workshop No 2, 24 November 2003 - Airfield Layout and Terminal Options
- Workshop No 3, 8 December 2003 - Terminal Development Options

2. Aviation Forecasts

Existing Traffic

Queenstown Airport has two main categories of traffic, scheduled and non-scheduled services, comprising:

Scheduled Services

International	Air New Zealand	B737-300
	Qantas	B737-300
Domestic	Air New Zealand	B737-300, ATR 72
	Qantas	B737-300
	Origin Pacific	ATR 72, J31

Non-Scheduled Services

Flight Seeing	Mainly Milford Sound	BN2, C172/177, C185, C206/207, Nomad, PA32
General Aviation		C172/177, C206
Helicopters		Squirrel AS50, Hughes 500, R22/R44

Scheduled services account for approximately 82% of the overall passenger traffic with non-scheduled services comprising 18%.

Key Drivers

Drivers of airport traffic growth are:

- Regional tourism
- Industry, business
- Regional and national GDP
- World tourism
- Regional tourism marketing
- Local Council planning initiatives
- Airline marketing
- Airline competition
- Airline choices of fleet, aircraft size, schedule and frequency
- Currency competitiveness
- NZ viewed as “safe haven”
- Mode of transport choices – air versus surface
- Drivers are primarily regional and national

Historic Growth Rates

Historic growth rates were analysed for passenger and aircraft movements at Queenstown, as well as at other New Zealand airports to determine trends over recent years.

Table 2.1 depicts the historic aircraft and passenger movement numbers upon which the aircraft and passenger demand forecasts were based.

Table 2.1 Historic Passenger and Aircraft Movements

Aircraft Movements	1998	1999	2000	2001	2002	2003
International	98	116	176	184	188	254
Domestic	6,882	6,258	6,662	6,838	6,610	6,950
Flight Seeing	13,128	13,404	14,282	12,112	13,220	12,766
GA – other	8,554	11,865	10,014	11,396	10,975	10,870
Helicopters	6,741	10,888	11,056	11,618	10,715	11,230

Passenger Movements	1998	1999	2000	2001	2002	2003
International	6,125	8,169	16,144	15,661	15,402	21,330
Domestic	379,058	356,023	397,613	414,670	397,182	458,715
Flight Seeing	59,732	60,988	64,983	55,110	60,151	58,085
GA - other	16,679	23,137	19,528	22,222	21,401	21,197
Helicopters	17,526	28,308	28,745	30,206	27,860	29,197

In addition, other indicators of underlying demand were examined including GDP and population forecasts, international and domestic visitor arrivals, visitor trips and visitor night-stays, for New Zealand as a whole as well as for the Queenstown/Central Otago region.

Table 2.2 outlines the average aircraft seating capacities adopted to translate passenger movement forecasts into the aircraft movement forecasts.

Table 2.2 Average Aircraft Seats

Category	2002	2013	2023
International	120	136	145
Domestic	92	101	108
Flight Seeing	6	12	15
GA Other	2	2	2
Helicopter	3.5	5	6

With an appreciation of recent trends in these demand indicators and the forecasts for visitor activity, the adopted growth rates over the planning horizon are shown in Tables 2.2 and 2.3

Table 2.3 Forecast Passenger Growth Rates

Growth		Scheduled		Non-Scheduled		
		International	Domestic	Flight Seeing	GA/ Other	Helicopter
2004-13	High	7.0%	6.0%	7.0%	1.8%	7.0%
	Median	6.5%	5.4%	6.5%	1.5%	6.5%
	Low	5.5%	4.5%	5.5%	1.1%	5.5%
2014-23	High	6.0%	4.8%	6.0%	1.5%	6.0%
	Median	5.5%	4.3%	5.5%	1.3%	5.5%
	Low	4.7%	3.6%	4.7%	0.9%	4.7%

Table 2.4 Aircraft Movement Growth Rates

Category	2004 - 2013	2014 - 2023
Scheduled	3.1%	2.9%
Non scheduled	1.1%	1.9%
Total	1.3%	2.0%

Annual Passenger and Aircraft Forecasts

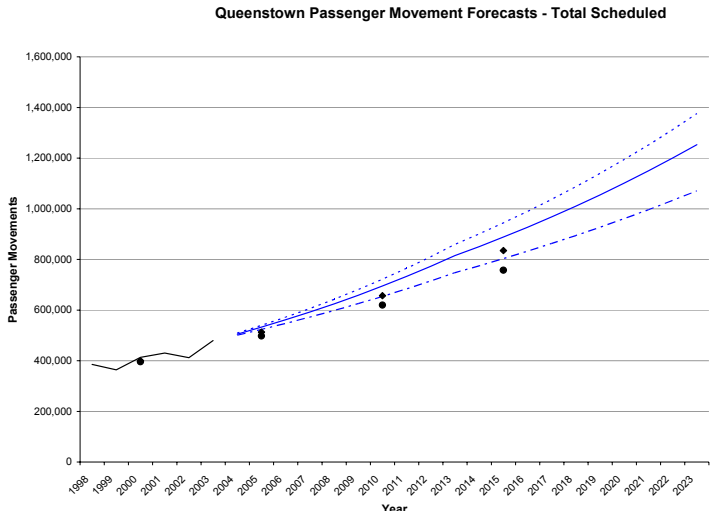


Figure 2.1 Forecast Passenger Movements – Scheduled

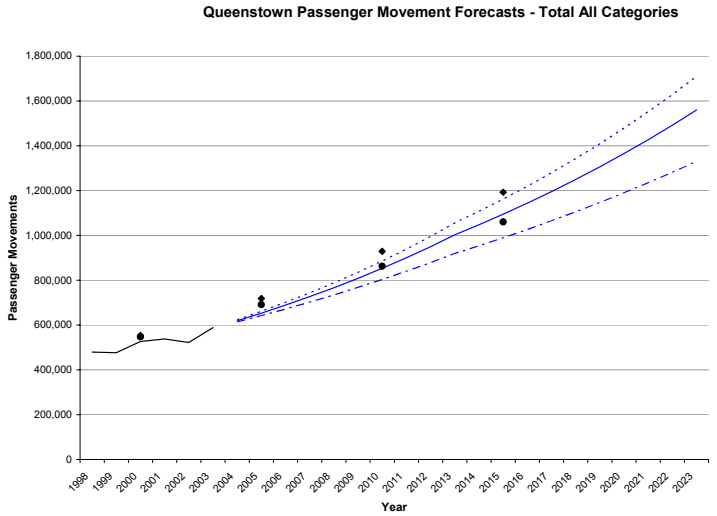


Figure 2.3 Forecast Total Passenger Movements

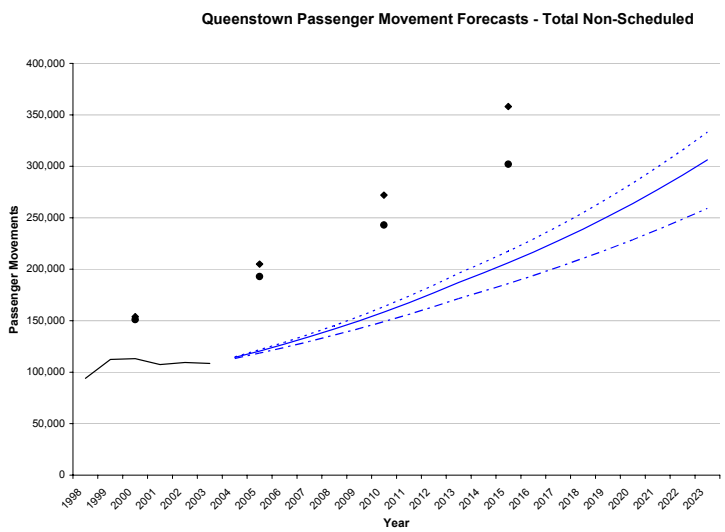


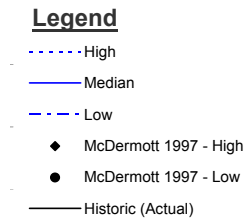
Figure 2.2 Forecast Passenger Movements – Non- Scheduled

Note: *There is an inconsistency between the Airplan non-scheduled movement forecasts and the McDermott (1997) non-scheduled movement forecasts.*

It was found during the course of the study that the QAC landing charge sheets did not match with the data provided by Airways regarding non-scheduled movements.

Analysis by the QAC showed that for non-scheduled movements in late 2003 the Airways data overestimated movements compared with the QAC charge sheets.

The Airplan forecasts were based on actual non-scheduled movements as recorded in the QAC charging sheets, with the average discrepancy from the above analysis applied historically. The McDermott (1997) forecasts used the Airways data as a base



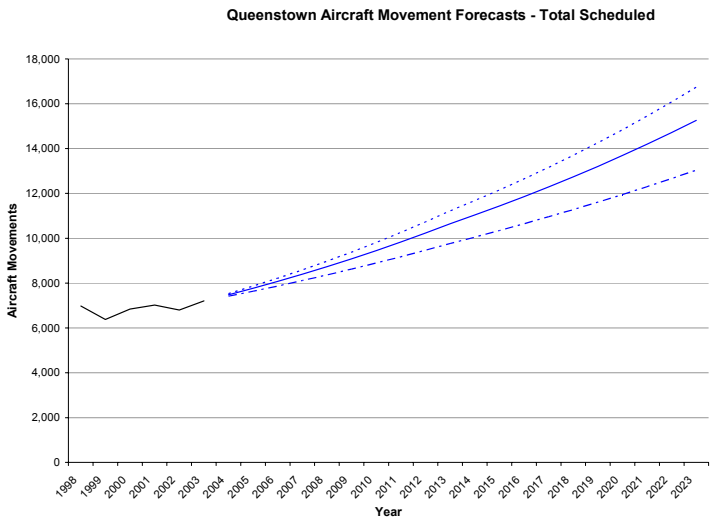


Figure 2.4 Forecast Aircraft Movements - Scheduled

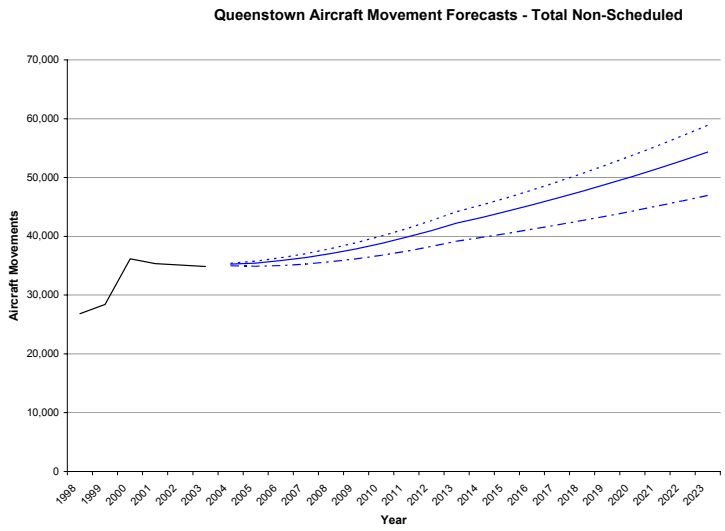


Figure 2.5 Forecast Aircraft Movements – Non- Scheduled

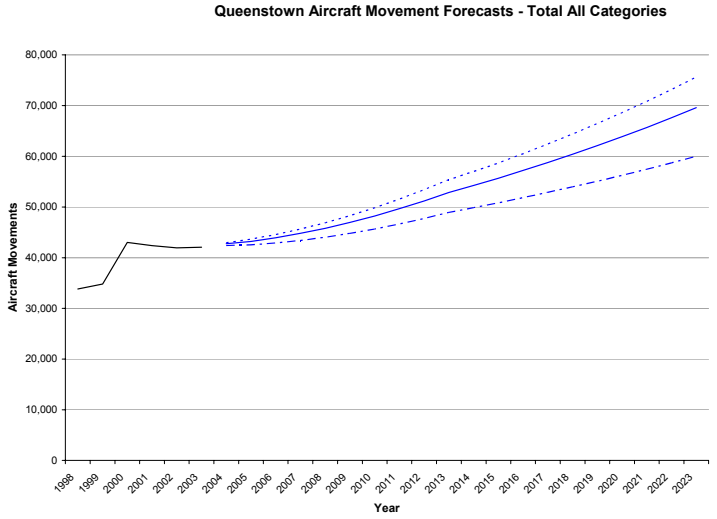
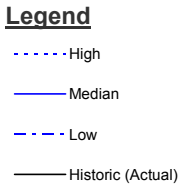


Figure 2.6 Forecast Total Aircraft Movements



Busy Hour Demand

Busy hour passenger and aircraft demand levels were determined from current aircraft scheduled for the representative period 12th to 18th August 2003.

The current peaks were then used as a basis to determine forecast busy hour passenger arrivals and departures up to the design year 2023, summarised in Table 2.4.

Table 2.4 Forecast Busy Hour Passenger Demand

	Domestic		International	
	Arrivals	Departures	Arrivals	Departures
2003	265	361	314	314
2008	330	450	410	410
2013	412	561	536	536
2018	491	669	675	675
2023	586	798	849	849
Average Annual Growth Rates				
2003-2013	4.5%		5.5%	
2014-2023	3.6%		4.7%	

The adopted growth rates were based on the “low” growth annual forecast passenger movements, which assume some spreading of the peak period as a consequence of future pressures to maximise the use of terminal and apron facilities for a greater period of time during each day.

These forecast passenger movements were then translated into busy hour aircraft movements by applying forecast average aircraft seating capacities and a resultant combined aircraft stand demand was established.

Tables 2.5 to 2.7 outline the forecast busy hour aircraft arrivals/departures and aircraft stand demand over the planning horizon.

Table 2.5 Domestic Forecast Busy Hour Aircraft Movements

	2003	2008	2013	2018	2023
Arrivals					
A320/B737	1	2	3	3	4
ATR 72	3	2	2	2	2
Total	**4**	**4**	**5**	**5**	**6**
Departures					
A320/B737	2	3	4	5	6
ATR 72	3	2	2	2	2
Total	**5**	**5**	**6**	**7**	**8**

Table 26 International Forecast Busy Hour Aircraft Movements

	2003	2008	2013	2018	2023
Arrivals					
A320/B737	3	3	4	5	7
Departures					
A320/B737	3	3	4	5	7

Table 2.7 Combined Forecast Aircraft Stand Demand

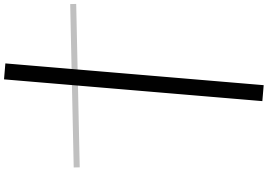
	2003	2008	2013	2018	2023
A320/B737	4	5	6	7	8
ATR 72		1	2	2	2
Total	**4**	**6**	**8**	**9**	**10**

3. Airfield Movement Area

Runways

Queenstown Airport has two runways with the following characteristics:

Main Runway 05/23

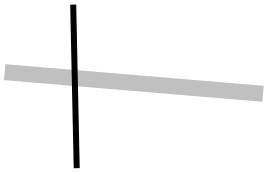


- Length 1921m sealed (displaced threshold)
- 30m wide (central portion)
- Extensions each end 45m wide
- Strip Width 150m
- Visual Approach

Issues:

- The central portion of the runway is 30m wide and does not comply with New Zealand and international rules for runway width.
- Currently, there are no Runway End Safety Areas (RESA) provided, which will be mandatory in New Zealand within 2 to 5 years.
- The runway length, and also provision of RESA's, will impact on the maximum payload for specific aircraft types
- There is no parallel taxiway which contributes to some delays during peak periods
- The aircraft decision height is very high
- A 'straight in" approach is not possible due to surrounding terrain
- Adjacent residential developments at the western end of Runway 23 are impacted by noise

Cross Wind Grass Strip Runway 14/32



- Length 944m
- Limited to aircraft below 5,700 kg (MTOW)
- 60m wide strip
- Visual Approach

Issues:

- The runway is unsealed and therefore not operable in all weather conditions
- Approach and departure splays at the north end are in close proximity to the adjacent Queenstown Events Centre
- The opportunity for possible relocation of the runway to the east of the site has been lost due to the development of a commercial district
- There is no advantage in shortening the runway
- There is no advantage in upgrading the runway to handling jet aircraft due to limitations on length and surrounding terrain.

Figure 3.1 provides an aerial view of Queenstown Airport.

Figure 3.1: Existing Airfield Layout

Following workshop sessions held with QAC, the following recommendations were made for incorporation into the Master Plan:

Runway 05/23

- Widen to 45m (eventually) and implement RESA's
- Provide Code C parallel taxiway to the south and Code B parallel taxiway to the north
- Maintain 150m wide strip

Runway 14/32

- Maintain length and location

Design Aircraft

At present, the largest aircraft size that regularly operates at Queenstown Airport is the B737-300, which is classified as a Code 4C aircraft. These are operated by Qantas and Air New Zealand on domestic and international services with seating capacities varying between 114 and 136.

As it is not possible to safely operate Code D size aircraft (B767/A310) at Queenstown Airport due to terrain and runway length constraints, it has been accepted that the airport will be limited to the operation of Code C type aircraft.

The critical planning dimensions for current and future aircraft types expected to operate at Queenstown Airport are:

Table 3.1 Design Aircraft

Aircraft	Length (m)	Wingspan (m)
A320-1/200	37.57	33.91
B737-300	33.40	28.88
B737-700	33.64	35.80
B737-800	39.48	35.80
ATR72	27.17	27.05

Expected aircraft types to be used in the foreseeable future by the various airlines include:

Air New Zealand		
A320	International	146 seats
	Domestic	136+ seats
Pacific Blue		
B737-700	International	144 seats
	Domestic	144 seats
Qantas, Pacific Blue		
B737-800	International	168 - 180 seats
	Domestic	168 - 180 seats

From the above aircraft types, the B737-800 has the largest wingspan of 35.8m with an overall length of 39.48m and has been adopted as the design aircraft for Queenstown Airport Master Plan.

However, it is important to note that the B737-800 will likely have some payload penalties due to the available runway length. These penalties are currently being assessed for Queenstown Airport by other consultants.

Runway End Safety Areas (RESA)

Runway End Safety Areas (RESA's) are cleared and graded areas extending from the end of a runway strip to reduce the risk of damage to an aeroplane in the event of a runway undershoot or overrun.

The New Zealand standard AC139-06A currently does not require the mandatory provision of RESA's. However, if provided, they should extend from the runway strip for as great a distance as possible, but not less than 90m, and to a width of twice the runway width.

The Civil Aviation Authority of New Zealand is moving towards guidelines outlined by the International Civil Aviation Authority Organisation (ICAO) which also recommends a minimum RESA provision of 90m, and where practical, provision of up to 240m. Similarly, the Australian Civil Aviation Safety Authority (CASA) requires a minimum 90m RESA with a recommendation of 240m at international airports.

It is expected that RESA's will become mandatory requirements in New Zealand within 2 to 4 years in the following applications:

- A length of 90m to 240m by twice the width of the runway
- Required for instrument runways
- Required for any new runway extension or upgrade
- Required for international airports

As it is impractical to provide for a 240m RESA at Queenstown Airport, it is recommended that the Master Plan should be based on the future provisions of a 90m x 90m wide RESA at each runway end (05/23) based on the minimum provision outlined in ICAO Annex 14.

There are no requirements for RESA's on Runway 14/32.

Impact of RESA's on Declared Distances

The provision of RESA's at Queenstown Airport will affect the overall runway declared distances.

QAC is currently preparing proposals for the provision of RESA's, which, in principle, utilise existing runway length and possibly some extension to Runway 05/23.

The anticipated impact on the runway declared distances is outlined as follows:

Table 3.2 Critical Declared Distances

Critical Runway Lengths	Runway 05	Runway 23
Landing Distance Available (LDA)	1701m (-78)	1701m (-78)
Take of Run Available (TORA)	1826m (-13)	1831m (0)
Take of Distance Available (TODA)	1886m (-25)	1891m (0)

Table 3.2 highlights that the greatest impact occurs to the Landing Distance Available which is reduced by 78m. QAC is considering several options which include the provision of a RESA at one end only and also the possibility of bridging over the road at the Runway 05 end.

For the purposes of this study, it has been assumed that the RESA's will be provided within the existing airport land which assumes a worst case scenario. The end result and specific requirements for RESA's at Queenstown Airport will be dictated by the outcomes of the Technical Study Group formed to investigate this issue, and the regulator, the New Zealand Civil Aviation Authority.

Figures 3.2 and 3.3 outline the anticipated provision of RESA's for each runway end.

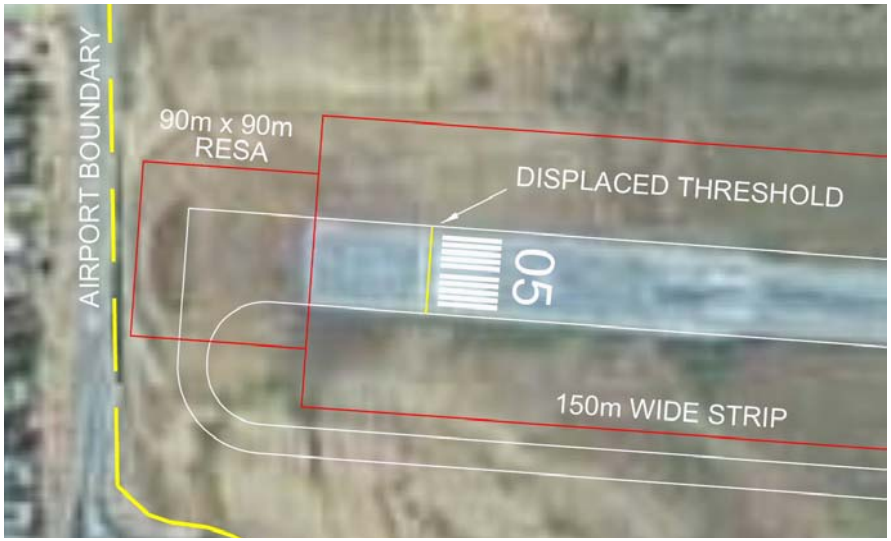


Figure 3.2 Runway 05 - RESA Provision

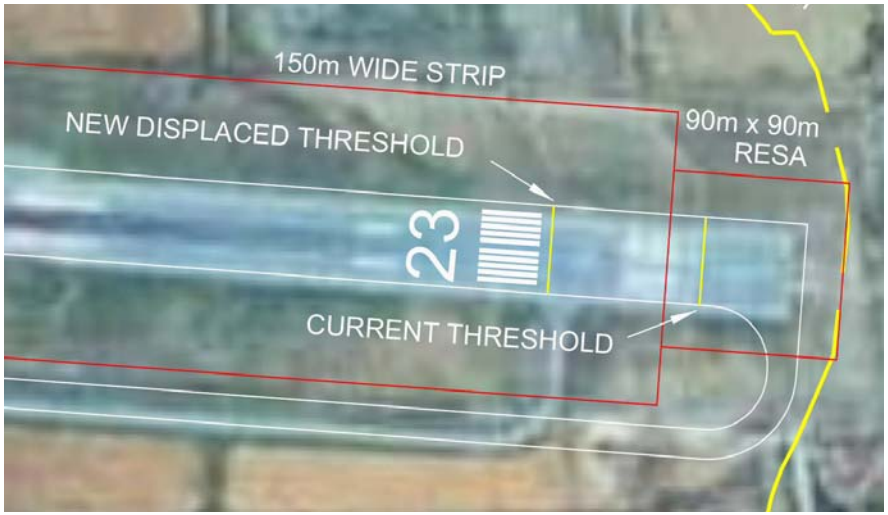


Figure 3.3 Runway 23 - RESA Provision

RESA Impact on Aircraft Payload

The impact of RESA's on aircraft payload varies according to the aircraft type, port serviced (international/domestic) and the surface condition of the runway (wet/dry).

QAC has undertaken an analysis of various Code C aircraft types which currently operate, or are soon expected to be introduced to Queenstown Airport.

Table 3.3 outlines the payload restriction as a "worst case" scenario based on the port being served.

Table 3.3 Passenger Payload Reductions due to Implementing 90m RESA

Sector	Runway	B737-300	B737-700	B737-800	A320
From Queenstown to					
Auckland	05	0-2		0-3	
	23				
Christchurch	05				
	23				
Rotorua	05				
	23				
Brisbane	05	1	0-2	2	4
	23				
Melbourne	05	1	0-2	2-3	4
	23				
Sydney	05	1	0-2	2	3
	23				
Any Other Port to Queenstown					
	05/23 Dry			24	
	05/23 Wet			24	

Source: Austral

From the above table, it is evident that that B737-800 incurs the greatest impact of up to 24 passengers due to restrictions on landing distance. There is little effect on domestic operations. The majority of the penalties are associated with Runway 05 which constitutes only approximately 20% of the operations at Queenstown Airport.

As the analysis is based on the "worst case" scenario, the load penalties may no ultimately be too onerous.

It is important to note, that although this preliminary analysis implies that the B737-800 may not be commercially feasible for operations into Queenstown, it should not be discarded as a critical design aircraft as there are a number of options/configurations of RESA's to be further investigated.

Runway Strip Width

Runway 05/23 currently operates with a 150m wide strip. The strip extends 75m laterally on each side of the runway centreline and 60m longitudinally from the runway thresholds. Runway 05/23 has instrument approach procedures with a decision height of 2629ft (above aerodrome) and 5km horizontal visibility. The approach procedures are classified as "circling" and are hence considered a "visual" approach as the current navigation aids (VOR/DME) located on Slope Hill are not aligned to allow for a straight-in approach. Under the definitions outlined in AC139-06A and ICAO Annex 14, Runway 05/23 cannot be considered as an instrument runway.

CAA has indicated that with the use of "new technology" and aircraft equipped with a "very high redundancy, including GPS and Flight Management Systems", that the decision height could be reduced to 2200ft (1100ft above airport level) which is still well above the current usual decision height for a precision runway.

CAA has also acknowledged that "the significant terrain infringements to the airport's Obstacle Limitation Surfaces (OLS) mean that the airport will never be able to comply with the requirements of ICAO Annex 14 for having an instrument runway".

As a result, the retention of a 150m strip is considered appropriate for Queenstown Airport as terrain will always be a limiting factor in the decision height. This does not suggest that precision approaches could not be achieved in the future with new technologies; rather curved approaches may be possible with GPS technologies but at a higher minima than current "precision runways".

Figure 3.4 illustrates the transitional surfaces and runway grading based on a 150m wide runway strip

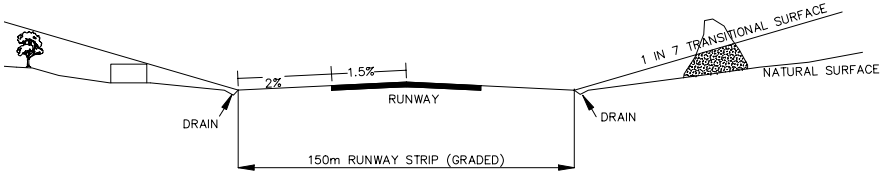


Figure 3.4 Transitional Surfaces

Taxiways

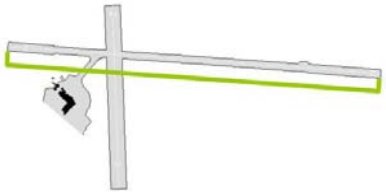
Runway 05/23 currently has a single stub taxiway which provides the main access to the apron area. A chip seal parallel taxiway is also provided on the southern side of Runway 05/23 suitable for aircraft below 5,700kg.

Jet aircraft currently undergo a turning procedure for arrivals and departures at each runway end which can at times create delays for arriving and departing aircraft. Whilst the delays at present are not significant compared with other domestic and international airports, provision should be made for a parallel taxiway as demand levels increase in the future.

Several options were considered for the location of a parallel taxiway which are illustrated.

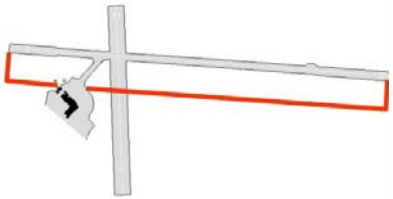
(A) 150m Wide Strip

- Reduced impact to terminal area
- Runway may be restricted to non instrument, visual conditions



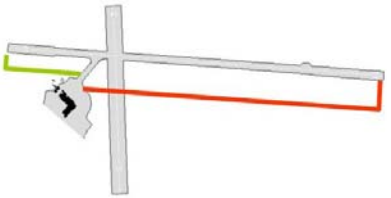
(B) 300m Wide Strip

- Major impact on terminal area
- Requires relocation of facilities (tower, fire station etc)
- Runway operates under instrument conditions



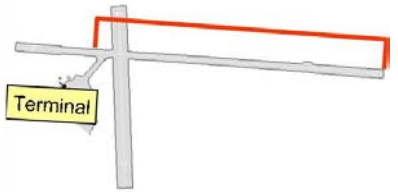
(C) 300m Wide Strip & Partial Visual Taxiway

- Reduced impact to terminal
- Partial taxiway provision during visual conditions
- Confirm height of buildings eg control tower etc for 1:7 transitional surfaces



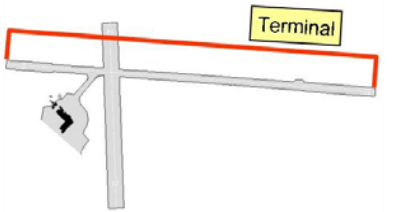
(D) 300m wide strip, north side

- E.g. Canberra and Darwin Airports
- Requires runway crossing



(E) 300m wide strip, north side Terminal Relocation

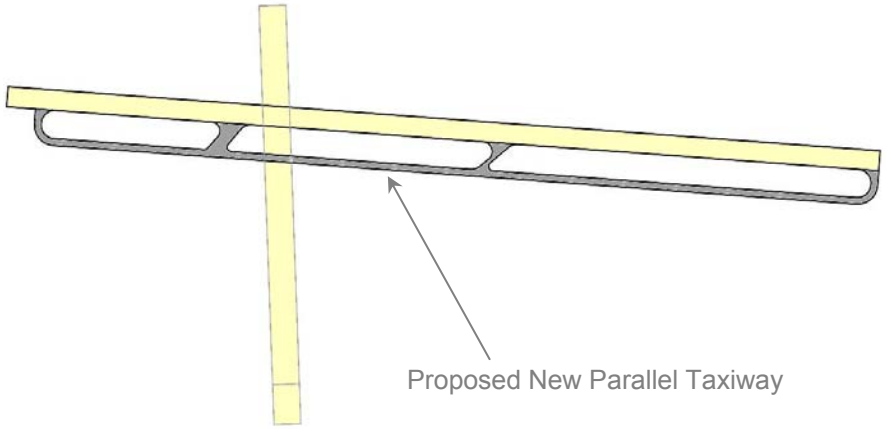
- Impact on available land area for terminal and other facilities development
- Justification needed for terminal relocation



Following a workshop session with QAC, Option A was considered to be the best option for Queenstown Airport based on the following criteria:

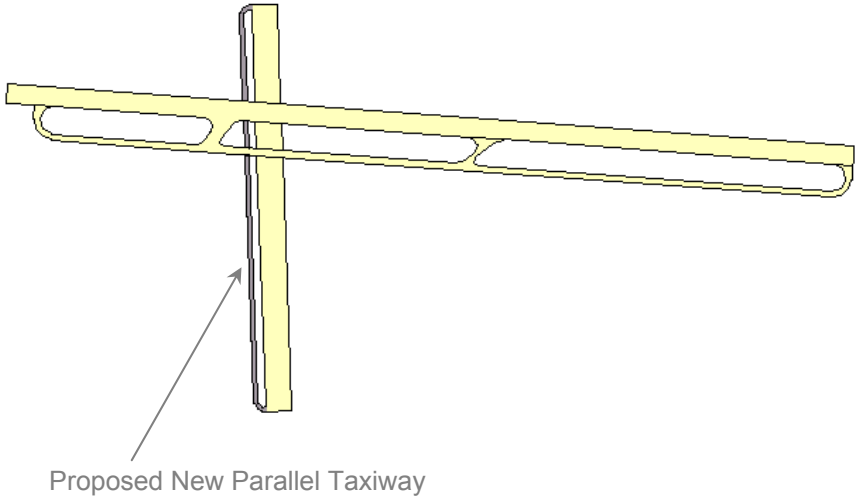
- In accordance with 150m wide strip and a centreline to centreline offset of 93m.
- Can be accommodated within existing airport land, does not require the purchase of land particularly in the south east sector
- Minimises the impact to the existing terminal and apron area
- Allows a balanced terminal and apron expansion to the south and west
- Retains existing alignment of parallel taxiway

The following illustration outlines the proposed provision for a future parallel taxiway for Runway 05/23.



In addition to the parallel taxiway provided for Runway 05/23, provision for a parallel grass strip taxiway has also been made for Runway 14/32. This taxiway connects the southern end of the airport to the north for GA aircraft which depart on Runway 14.

The following illustration outlines the proposed provision for a future parallel taxiway for Runway 14/32.



4. Terminal and Apron Areas

Aircraft Parking

The combined forecast parking demand for the 2023 Master Plan is 2 x ATR's and 8 x B7373-800 size aircraft as depicted in Table 2.7. Four aircraft parking options were developed based on various terminal configurations. These are outlined in the following options with under utilised areas highlighted in red.

Expansion to the South (Option 1)

- Apron parallel to cross runway
- Domestic parking to the north, International parking to the south
- Under utilised parking area to the west adjacent 05 threshold

Expansion to the South (Option 2)

- Maintains existing terminal face alignment
- Domestic parking to the south, International parking to the north
- Maintains location of control tower and fire station
- Under utilised parking area to the west adjacent 05 threshold and grass strip runway

Expansion to the south (Option 3)

- Apron parallel to cross runway
- Domestic parking to the north, International parking to the south
- Push back zone provided to the southern bays
- Under utilised parking area to the west adjacent 05 threshold

Expansion to the south and west (Option 4)

- Concentrates aircraft parking around terminal
- Minimises land take-up to the south, available for other facilities
- Balanced apron layout
- Impacts control tower and RFS

Based on the provision of a 150m wide strip, Option 4 was determined to be the best option for aircraft parking due to the centralisation of aircraft stands around the passenger terminal. Option 4 also maximises the available land to the west and minimises the extent of apron development to the south, thus reducing passenger walking distances and minimising the extent of development at the adjacent flight seeing apron area.

Passing Loop Taxiway

The existing apron area is serviced by a single loop taxiway which, during busy times, potentially limits aircraft movements around the apron area. It is proposed to provide for a passing loop taxiway based on Code C clearance requirements which would allow aircraft to pass whilst minimising delays caused by aircraft pushbacks and head to head operations.

Figure 4.1 illustrates the passing loop taxiway arrangement.

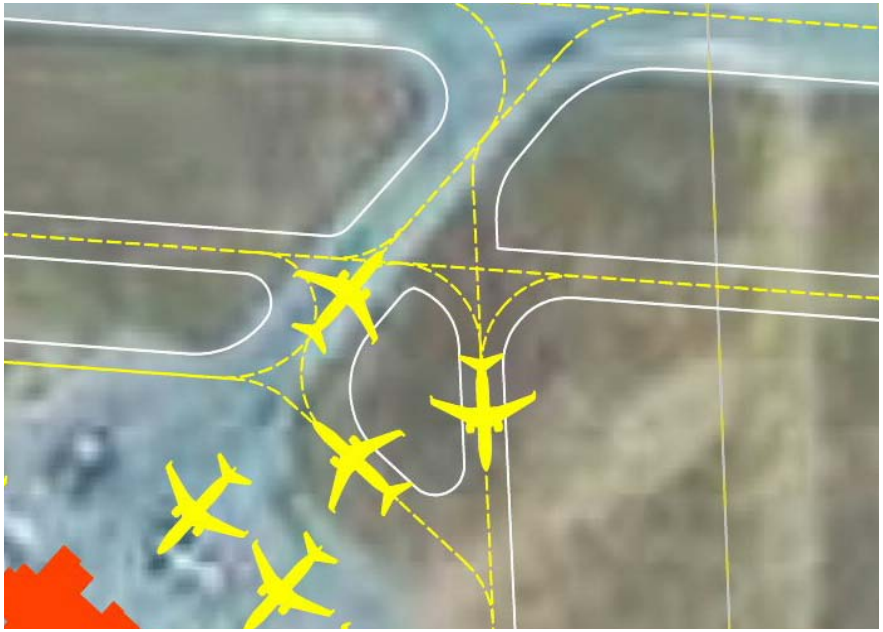


Figure 4.1 Passing Loop Taxiway

GSE Storage

Storage and staging of Ground Service Equipment (GSE) at convenient locations relative to the aprons where this equipment is required is essential for efficient turnaround of aircraft.

The actual area required for GSE storage and staging is dependent on the number of each aircraft type served during peak periods, the number of ground handling agents operating at the airport and the airport policy with respect to GSE storage.

A typical GSE area provision for Code C aircraft (B737) is as follows:

GSE Parking/Storage and staging	300m^2
Line maintenance Equipment storage	85m^2
On-stand vehicle parking	30m^2
Total	415m^2

This can vary depending upon the ability to share equipment between aircraft. Therefore, provision should be made for approximately 2,500m^2 based on a utilisation of 75% of equipment at any one time.

GSE should be located in close proximity to the aircraft and in some cases is left at the aircraft bays. Additional GSE storage is also made available at each aircraft parking bay and at the head of new aircraft parking bays.

Options for GSE Storage areas are shown in Figure 4.2.

Figure 4.2 GSE Parking Options

Passenger Level of Service

The derivation of terminal spatial requirements is typically governed by peak passenger throughput and the ease of which passengers are processed through specific zones within the terminal building. Hence, it is important to ensure that each zone can accommodate design passenger loads and that the passenger processing facilities provided can maintain an acceptable level of service.

The International Air Transport Association (IATA) and the Airport Association Co-ordinating Council (AACC) published the third edition of Level of Service Guidelines in 1996. These guidelines establish six level of service standard categories with corresponding spatial area requirements for each terminal occupant in each functional zone.

The following is a description of the Level of Service Standard Categories.

A	Excellent level of service, condition of free flow, no delays, excellent level of comfort.
B	High level of service, condition of stable flow, very few delays, high level of comfort.
C	Good level of service, condition of stable flow, acceptable delays, good level of comfort.
D	Adequate level of service, condition of unstable flow, acceptable delays for short periods of time, adequate level of comfort.
E	Inadequate level of service, condition of unstable flow, unacceptable delays, inadequate level of comfort.
F	Unacceptable level of service, condition of cross-flows, system breakdown and unacceptable delays, unacceptable level of comfort.

Table 4.1 provides a guideline for corresponding spatial requirements per terminal occupant for each level of service category.

Table 4.1 IATA Level of Service Standards (m^2 per terminal occupant)

Sub-System	A	B	C	D	E	F
Check-in queue area	1.8	1.6	1.4	1.2	1.0	
Wait/Circulate	2.7	2.3	1.9	1.5	1.0	**System**
Hold Room	1.4	1.2	1.0	0.8	0.6	**Breakdown**
Bag Claim Area	2.0	1.8	1.6	1.4	1.2	
(Excluding claim device)						
Government Inspection Service	1.4	1.2	1.0	0.8	0.6	

IATA Level of Service C was agreed to be the design level of service for Queenstown Airport. Coupled with passenger level of service standards agreed with QAC, these together form the basis of reviewing the adequacy of the existing terminal facilities and future areas provisions required to satisfy demand.

Functional Area Assumptions and Principles

Check-in

- Common domestic and international check-in
- Common user counter allocation
- Partial self service and express kiosk check-in
- Indicative area based on linear check-in approach

Security

- Separate domestic and international security screening zones for design year 2008.
- No friends allowed past security.
- Combined international and domestic security for design year 2023 with security located as close as possible to check-In
- Space allowance for farewellers allowed through security to domestic departure areas

Departure Lounges

- Areas based on common international and domestic facilities pre-security with farewellers being allowed into departure lounge retail areas.
- Allowance also included for separate boarding lounges for international and domestic passengers post security
- Area allowance does not include concourse circulation associated with retail or concourse to aircraft gates.

Retail

- Retail areas initially based on common landside retail precinct
- All retail located past security for design year 2023
- Retain future opportunities to increase retail provision with integration of all domestic and international departure areas, for design year 2023.

Baggage Claim

- Areas based on flat bed baggage reclaim units similar to existing.
- Dedicated (separate) areas for domestic and international baggage reclaim halls but maximise utilisation by providing “swing” claim provision

Baggage Handling

- Provision for Hold Baggage Screening (HBS) and common use baggage handling facilities.
- Provision for flat bed racetrack make-up units

Baggage Examination

- Area based on operation of existing facility and passenger processing arrangements

Area Rationalisation

Busy Hour Demand

- The international and domestic busy hours occur at separate times of the day allowing partial rationalisation of the minimum functional areas
- Area assumptions based on international arrivals and departures busy hour (Saturday afternoon peak) overlapping with 50% domestic peak.

Rationalisation Opportunities

- Check-in based on common user counters and the ability for international and domestic passengers to check-in at any counter or with counter ramping to suit demand should airlines wish to allocate counters to specific flights or international or domestic services. Alternative also provided for dedicated counters should current allocation procedures remain.
- Common baggage handling facility with ability to process any flight from racetrack make-up units. Separate domestic and international operations would require additional area and increased operational costs.
- “Swing” baggage reclaim units to suit demand
- “Swing” departure lounge/boarding facilities with the use of operable walls to allocate lounge area to suite demand. The concentration of retail landside of security assists in providing flexibility to meet future departure lounge demand
- Future combined security for design year 2023 for all domestic and international passengers to reduce operational costs and maximise use of screening facilities

Existing Terminal Review

The existing terminal has full facilities to co-jointly process international and domestic departing and arriving passengers with common facilities for:

- Check-in
- Baggage handling (make-up and breakdown)
- Landside retail before passenger security
- Airline offices

A comparison between existing area and facilities allocation and the requirements to meet the Year 2003 demand indicates the following for the main functional elements:

Check-in

- Requirements to meet combined international and domestic peak are 14 counters. There are 12 currently. The existing configuration does not allow for full common use and flexibility of operations
- Small area increase necessary for additional counters and new product initiatives such as self check-in including baggage acceptance

Baggage Handling

- Limited sort capacity on the existing laterals
- Congested hall with limited capacity to meet additional demand requirements or new entrant airlines
- No space for HBS installation
- Breakdown (inbound) area is adequate but has limited expansion
- Substantial area and facility increase required to meet imminent demand (Double existing area).

Security Screening

- Domestic passenger screening retrofitted to the existing terminal, limited area available for queuing
- International screening area is tight with limited queuing
- Substantial area increase required. Co-location of international with domestic screening would provide operational efficiencies.

Outwards Immigration

- Limited queue area, concourse is congested by overflow
- Area increase required, approximately double

Departure Lounges

- Reasonable area provision, introduction of domestic security impacts on domestic lounge area and operation
- Increase required for imminent demand. Existing 530m^2 to 930m^2 including boarding lounge area.

Airline Lounges

- Possible area increase subject to airline requirements but there is limited demand and growth for these facilities

Retail

- Reasonable area allocation
- Future retail study recommended

International Arrivals Processing

- Existing areas are tight particularly baggage reclaim, baggage examination and arrivals hall
- Increases required to meet imminent demand

Domestic Baggage Reclaim

- Access to reclaim unit not available when international arriving passengers are being processed
- Dedicated domestic unit required

A functional area analysis based on the existing terminal configuration is provided in Table 4.2

Table 4.2 Existing Functional Areas Yr 2003

Element	Domestic	International	Comments
Check-in	560		Combined check-in.
Security	40	50	International includes 10m^2 office
Outwards Immigration		40	
Departure Lounges	330	200	Separate facilities
Airline Lounges	200	-	
Retail	790		Includes: car rental = 65m^2 flight seeing = 60m^2 information = 25m^2
Primary Check	-	185	Includes new extension
Baggage Claim	190	230	Includes additional international area
Baggage Handling			
- Make Up	385		
- Break Down	125		
Baggage Examination	-	100	Excludes offices
Arrivals Hall	-	115	Domestic combined with baggage reclaim

Note: All areas are measured from existing as built drawings.

A schematic outline review of the existing terminal highlighting the constraints and opportunities is provided on Figure 4.3. Functional Area requirements for 2003, 2008 and 2023 are provided in Tables 4.3 and 4.4.

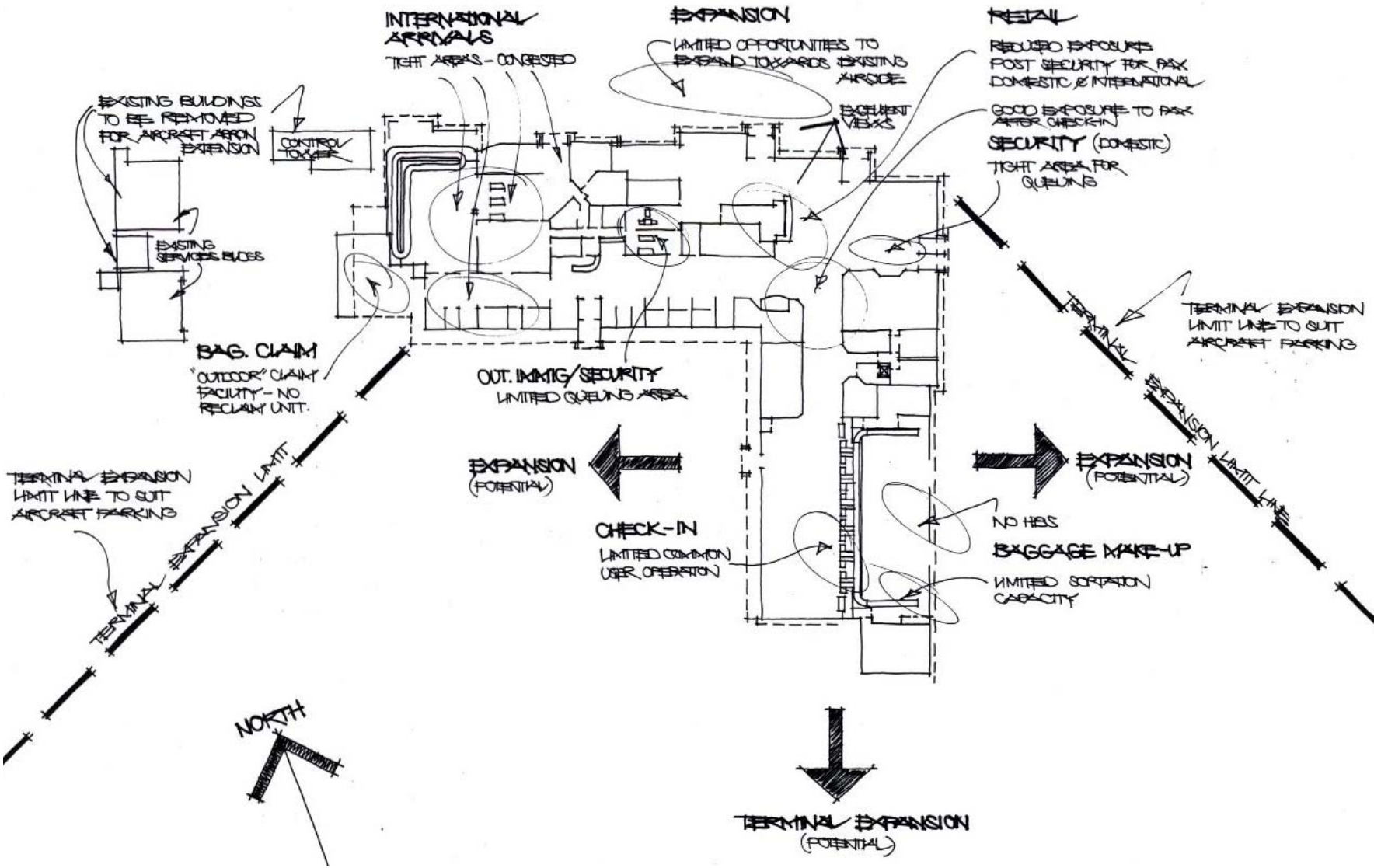


Figure 4.3 Existing Terminal - Constraints and Opportunities

Table 4.3 Forecast Minimum Functional Area Requirements

	2003		2008		2023		
Element	Domestic	International	Domestic	International	Domestic	International	**Comments**
Check-in – Common User	700		750		1500		Based on linear check-in and e-ticket/self check-in product initiatives
Check-in – Dedication	750		1000		2000		Based on linear check-in
Security	90	90	90	170	440		Combined security assumed for year 2023. Separate for 2003/2008
Outwards Immigration	-	100	-	130	-	225	Located post security
Departure Lounges	930		1095		1670		Includes boarding lounges
Airline Lounges	275		275	-	400	-	Allowance included for domestic guests/ farewellers.
Retail	930		1050		1800		Includes car rentals, flight seeing and information
Primary Check	-	240	-	330	-	660	
Baggage Claim	310	620	310	620	620	620	Assumes swing claim units
Baggage – Make Up	1000		1120		1920		Combined make-up
– Break down	120	240	120	240	240	240	
Baggage Examination	-	250	-	300	-	400	
Arrivals Hall	-	250	-	280	-	600	Domestic combined with baggage reclaim

Note: All areas are minimum functional indicative only

Table 4.4 Forecast Minimum Facilities Requirements

Element	Existing		Year 2003		Year 2008		Year 2023	
	Dom	Intl	Dom	Intl	Dom	Intl	Dom	Intl
Check-in – Common User	12		14		15		30	
Check-in – Dedication	-		15		20		40	
Security	1	1	1	1	1	2	5	
Outwards Immigration	-	2	-	3	-	3	-	7
Primary Check	-	3	-	4	-	4	-	12
Baggage Claim	1		3		3		4	

Note: Future check-in facilities based on the use of e-ticket/self check-in product initiatives.
Baggage claim unit numbers assumed swing units between domestic and international.

Terminal Location Options

Five options were considered for the location of the passenger terminal. These ranged from maintaining the terminal in its current location to the possible relocation to either north or south of Runway 05/23.

The key characteristics for each terminal location are outlined as follows:

Option 1 - Current location

- Sufficient area available if helicopters are relocated to north of Runway 05/23
- Operationally preferred based on predominant arrivals on Runway 23.
- Substantial investment currently exists
- Designation exists for current terminal uses

Option 2A and 2B

- Most land held by QAC
- No strong operational benefits

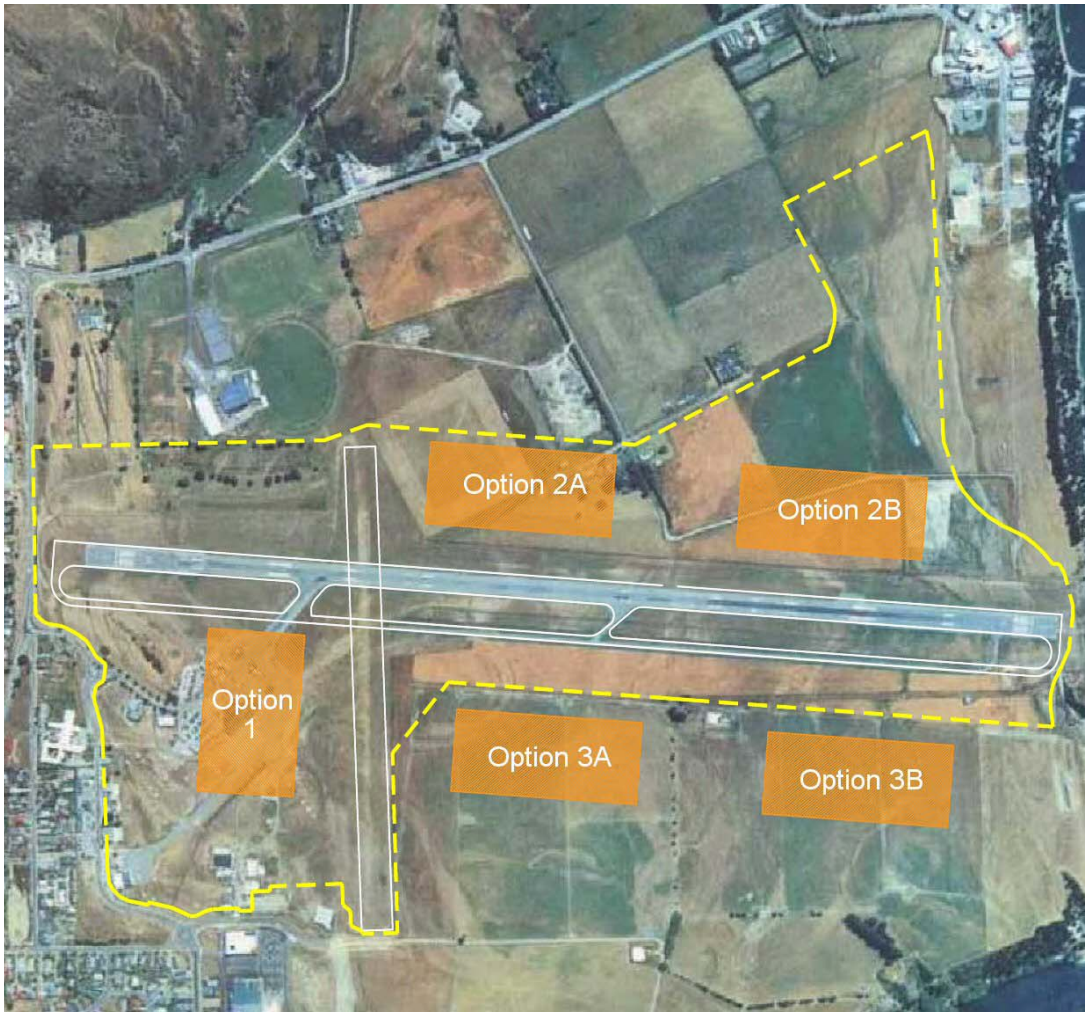
Option 3A and 3B

- Requires protracted negotiations and change of designations without guarantee of outcome
- No significant operational benefits
- Highly distracting to QAC management

Following a workshop session held with QAC management, it was determined to maintain the current location of the terminal (i.e. Option 1).

Terminal Development Options

Further work by QAC covering the investigation of options for future development of the passenger terminal and landside facilities (car parking and roading etc) are reported in a separate volume.



5. Support Facilities

Control Tower

The existing control tower is located west of, and immediately adjacent to, the passenger terminal building. It, therefore, inhibits terminal expansion to the west.

The height of the tower is satisfactory to provide views over the movement area, with the current levels of development at the airport. Future developments, e.g. expansion of the passenger terminal, would need to take account of control tower line of sight.

The current location of the control tower does not, however, provide satisfactory response times for controllers to detect the commencement of an aircraft take-off run on Runway 23. Typically, a control tower should be sited to allow a maximum response time of four (4) seconds, with an upper limit of five (5) seconds. The response times from the current control tower are:

- Runway 23 5.9 seconds
- All other runway ends <2 seconds.

Being on the south side of the main runway, controllers face the direction of the sun, with the potential to be temporarily affected by the sun, particularly in winter when the sun is low to the horizon.

In order to overcome the identified deficiencies of the existing control tower, as well as to provide for future terminal expansion onto its site, a new location is recommended and identified north of Runway 05/23, close to its mid point.

Rescue Fire Fighting Services (RFFS)

The existing RFFS facility is located adjacent to the control tower.

The maximum sized aircraft type that will operate at Queenstown Airport (design aircraft) is the B737-800 (Code C). Critical dimensions of the B737-800 aircraft are:

- Overall length 39.48m
- Fuselage width 3.76m.

The assessed ICAO Annex 14 rescue fire fighting aerodrome category is Category 7.

It is anticipated (from the forecasts) that less than 700 movements of the design aircraft would be accommodated in the busiest three months of the year. Annex 14 allows the rescue fire fighting category to be reduced by one when less than 700 movements are accommodated in the busiest three months of the year. Thus, the rescue fire fighting aerodrome category could be taken as being Category 6.

Aerodrome rescue fire fighting Category 6 requires that 2 vehicles be provided.

Annex 14 requires that vehicles should respond to an emergency, from the time of the initial call until the first vehicle is in position and applying foam at a rate of 50% of the required discharge rate, within 2 minutes (maximum 3 minutes). The current location of the RFFS facility is satisfactory for response time.

However, in order to clear the site of the present RFFS facility to allow for future expansion of the passenger terminal, a new site is recommended and identified, adjacent to the new control tower site on the north side of Runway 05/23. Being located close to the centre point of this runway, response times would be improved to all parts of the airport.

Navigation Aids

There are no navigation aids sited on Queenstown Airport. However, Runway 05/23 is equipped with PAPI approach lighting aids. Non-Directional Beacon (NDB) antenna are located adjacent to and south-west of the control tower.

The main approach aid for aircraft arriving at Queenstown Airport is a VOR/DME installation on the top of Slope Hill, to the north east of the airport. Due to terrain, aircraft make a visual circling approach.

In the future, current procedures are likely to remain due to terrain, with no on-airport navigation aids installed. An Instrument Landing System (ILS) would not provide any benefits as a high minimum decision height would need to be maintained due to the surrounding terrain. New Global Positioning System (GPS) technologies, along with improved on-board navigation systems could perhaps provide a reduced minima, but these are unlikely to achieve a full straight-in precision approach situation.

The existing NDB is recommended to be relocated to the eastern end of the airport, to make way for future terminal area expansion.

Flight Seeing

Flight seeing operations are provided by fixed wing aircraft based at Queenstown Airport. There are currently 21 aircraft involved in flight seeing operations, run by five operators. Flight seeing aircraft range from four seat single piston types (e.g. C172) to 19 seat twin turboprops (e.g. Nomad, Twin Otter).

Flight seeing operations account for 30% of aircraft movements but only 12% of passenger movements.

Currently most operators handle passengers to and from aircraft through their hangar facilities remote from the passenger terminal, although there are some passenger disembarked through the terminal.

In future it will be preferable to have all flight seeing passenger handling through the main passenger terminal, as this expose more people to the retail offering within the terminal. The apron for flight seeing aircraft, however, is recommended to be separate from the main apron although accessible from the terminal by a covered walkway.

Current and future flight seeing facility requirements are shown in Table 5.1.

Table 5.1 Current and Future Flight seeing Facilities Requirements

Facility	Current	Projected
Requirements	2003	2023
Apron (load/unload passengers)	3,000 m^2	15,000 m^2
Aircraft Parking	10,000 m^2	20,000 m^2
Available	15,000 m^2	
Maintenance Facilities/hangars		20,000 m^2

Although flight seeing operations are to remain on an apron associated with the terminal building, storage/maintenance hangars for aircraft associated with this activity would be best co-located with the GA area away from the terminal area. Aircraft would taxi between the storage/maintenance facilities and the terminal apron as required.

General Aviation (GA)

GA activities at Queenstown Airport are presently located in a zone to the south of the passenger terminal. The GA area also contains the present flight seeing and helicopter operations. However, planning should provide for helicopters to operate from an area separate from fixed wing aircraft operations.

GA activities include:

- Permanent operators – aircraft based at the airport (used for private flying, training, etc.). Typically park on grass apron.
- Charter/executive – usually larger aircraft types that visit the airport (twin turboprop, executive jets). Require paved parking areas.
- Special events – visiting small aircraft types.

Current and forecast GA facility areas are shown in the following Table 5.2.

Table 5.2 GA Facilities Requirements

Facility	Current	Projected 2023
Grass Parking (permanent)	3,000 m^2	11,000 m^2
Paved Parking (charter/executive)	2,000 m^2	8,000 m^2
Special Events	40,000 m^2	75,000 m^2
Building (Hangars, etc)	3,250 m^2	12,000 $m^{2(1)}$

Notes: (1) Assume hangar requirements grow at same rate as apron demand

From the above table, the following areas will be required in 2023:

- Permanent GA (grass and paved apron, hangars) 31,000 m^2
- Flight seeing aircraft parking and hangars 40,000 m^2

Thus a GA and flight seeing reserve of some 7 hectares is required. In addition, some 7.5 hectares for "itinerant" special events aircraft parking should be provided (an alternative to locating this on Queenstown Airport may be to locate at an alternative airport, e.g. Wanaka).

Location options for the GA (and flight seeing) reserve are illustrated and their advantages and disadvantages provided in Table 5.3.

Table 5.3 GA Option Locations (Advantages/Disadvantages)

Option	Advantages	Disadvantages
1	Close to passenger terminal	Expansion would impact on passenger terminal area and other facilities in this sector
2	Within 14.7 Ha site owned by Queenstown Airport	Retail revenue (in terminal) lost from GA patrons
	Remote from residential areas	
	Existing landside access	
3	Remote from residential areas	Requires land acquisition

Figure 5.1 GA Location Options

Option 2 was confirmed as the preferred site for a future GA and flight seeing operations area. Therefore, in order to maintain access to the terminal area and each runway, Option 2 should be supported by a Code B parallel taxiway which extends up to Runway 14/32.

The Master Plan provides for a GA and Flightseeing parking area of approximately 10.6 hectares located to the north of the main runway (Option 2), co-located with a hangar reserve of approximately 2.3 hectares.

Aviation Business / Industrial Park

An area of approximately 17.7 hectares has been provided to the north of the GA and Flightseeing parking and hangar reserves for a general use aviation business or industrial park.

Helicopters

Helicopter operations comprise an integral segment of the region's tourism product. They total some 27% of aircraft movements at Queenstown Airport but carry only 5% of passengers.

Current helicopter operations are predominantly based within the GA area, south of the passenger terminal, with take-offs and landings occurring at each operator's base. Of total helicopter movements, 85% are to the north and 15% to the south. The cuurent location of the helicopter bases inhibits expansion of the passenger terminal to the south. The current helicopter bases and operations also do not allow for international operational clearance standards contained in Annex 14.

Currently there are four helicopter operators based at the airport, operating a total of 15 helicopters.

Discussions with the control tower indicated that there is currently no impact from helicopter operations on fixed wing operations, however, as the majority of movements are to/from the north, most helicopter operations involve crossing Runway 05/23.

Future helicopter operations are expected to grow strongly, to cater for the demand for sightseeing helicopter flights. The number of operators is forecast to grow to 8, operating 30 helicopters, and the potential exists for increasing levels of conflicts with fixed wing operations.

In order to provide for this level of operators and the commensurate increase in movements, a dedicated helicopter operations area is proposed, possibly with each operator having their own apron, terminal and storage/maintenance hangar. Final Approach and Take-Off (FATO) pads would be provided, with helicopters hover-taxiing between the terminal pads and the FATO's.

Options for the location of a helicopter base are shown in Figure 5.2. The base would need to comprise some 360m x 140m (5 hectares).

Figure 5.3 gives an indicative layout for the helicopter site. Additional vehicular and shuttle bus parking to service the helicopter area would be required, however this can be integrated with similar requirements for the GA area, if they are located adjacent to each other and should be resolved during detailed planning development.

Figure 5.2 Proposed Helicopter Locations

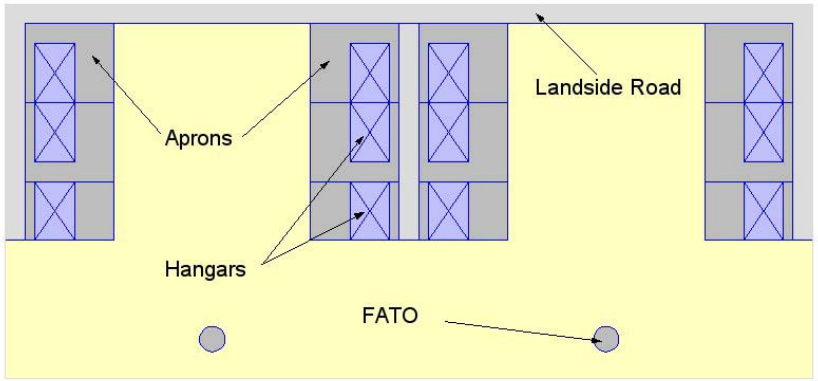


Figure 5.3 Indicative Helicopter Base

Four location options for a future dedicated helicopter operations area and the relative advantages and disadvantages of each are outlined in Table 5.4:

Table 5.4 Helicopter Location options

Option	Advantages	Disadvantages
1	Close to passenger terminal	Helicopter facility impacts on other GA operations
		Maintains current flight paths
2	Within 14.7 Ha site owned by Queenstown Airport	Remote from passenger terminal
	Remote from residential areas	
	Existing landside access	
3	Remote from residential areas	Requires land acquisition to provide rectangular site
	Existing landside access	Remote from passenger terminal
4	Remote from residential areas	Furthest from passenger terminal
		No existing landside access
		Irregular shaped site (requires land acquisition for rectangular site)

Option 3 was confirmed as the preferred site for a future helicopter operations area.

Catering

There is currently a single flight catering facility on a site of some 1,000m^2, located at the south-east end of the GA area. It is understood that this facility mainly provides for Air New Zealand domestic operations, with other domestic and trans-Tasman operations back-catering from their origin airports. This, coupled with the increase in "no-frills" operations, is likely to result in future growth in catering requirements being less than the growth in passenger traffic.2

As a consequence, the existing catering facility is shown retained in the short term planning. It is assumed that should demand for one or more additional catering facilities eventuate, these would be located either within a commercial zone on the airport, or off-airport.

Fuel

Existing fuel storage is provided in separate facilities owned by individual oil companies, in the airside area between the passenger terminal and the GA area. Both Avgas and Avtur (piston engined and jet fuel respectively) are stored in each facility are shown in Table 5.5

Table 5.5 Current Fuel Storage Facilities:

Company	Size of Lease	Avgas Capacity	Avtur Capacity
BP	241 m^2	54,000 litres	54,000 litres
Mobil	241 m^2	50,000 litres	140,000 litres

Currently, aircraft refuelling is provided for GA (fixed wing and helicopters) and trans-Tasman operations. In general, there is no refuelling of domestic jet aircraft at Queenstown Airport. There is, however, the occasional refuelling of aircraft which have arrived from Auckland Airport. Typically, aircraft carry enough fuel to allow for return trips.

Self serve bowsers located at the airside boundary of each storage facility provides Avgas for GA aircraft. Avgas and Avtur refuelling of larger aircraft types and helicopters is provided from tankers. Fuel deliveries to Queenstown Airport are currently undertaken by road.

In the future, it is proposed that a single, joint user, fuel storage facility be provided. In order to maintain flexibility, and due to the relatively low volumes of fuel that will be required, it is proposed that refuelling by

tankers be retained but with Avgas being also available from self serve bowsers. Assuming that all aircraft will be refuelled at Queenstown in the future and based on a capacity for seven days supply, fuel storage requirements would be:

- Avtur 750,000 litres
- Avgas 150,000 litres.

Fuel deliveries to Queenstown Airport would continue to be by road tanker.

Fuel storage facilities should be located adjacent to a landside road, with good access to the airside areas – possibly with airside frontage. Self serve Avgas bowsers would be located at the airside boundary of the fuel storage facility (if appropriate) or at a convenient location within the GA area. If self serve bowsers are provided in the GA area, which is remote from the main storage facility, tanks serving the bowsers would be refilled by tanker from the main storage facility as required.

It is proposed to provide for a fuel storage area on the southern side of the airport adjacent to Hawthorn Drive opposite Riverside Road.

Landside Car Parking

Two main car parks are currently provided, as follows:

- Main car park, located south of the passenger terminal, accommodating:
  - Shuttles
  - Car rental pick-up and return
  - Public (both short and long stay are within the same car park)
  - Campervan storage
- Staff (gravel) car park. Not currently used (it is understood that staff park within the sealed public car park).

In addition to the above parking areas, there are 13 parking spaces at the terminal kerb for pick-up and set down of passengers.

Car rental valet and storage facilities are located along the main access road into the airport and adjacent to the public car park.

Existing and projected car parking demand is provided in Table 5.6.

Table 5.6 Landside Parking Demand

Parking Provision	2003	2008	2023
Double length shuttle bays	4	5	9
Limo Parks	6	7	14
Disabled	1	1	2
Airport Staff	6	7	14
Rentals	69	81	164
Taxi	7	8	17
Bus	6	7	14
Kerb	13	15	31
Pay Area (includes staff)	350	410	830
Total	462	541	1096
Current Area provision	12,900 m^2		
Forecast Area		13,500 m^2	27,400 m^2
Car Rental (separate area)	150	176	356
	3,800 m^2	4,400 m^2	8,900 m^2

From the above table, it is noted that the car parking demand at the end of the 20 year planning horizon will be approximately double the existing for all vehicle categories. This will require a doubling of the current area provided for car parking.

Similar to car parking demand, terminal kerb demand is projected to grow from the present 13 spaces to some 31 spaces by 2023. It is noted that the dedicated rental and limo parks in the future will likely be incorporated into the paid area.

Landside Access Road

Access to the passenger terminal and car parks is provided by Terminal Road, which links with the Western Access Road at a roundabout at the entrance to the airport.

Terminal Road is a two way single carriageway road. The terminal kerb road is one way, with the return from the terminal front to Terminal Road being through the car rental pick-up and return car park.

In the future, the terminal face kerbside road should be developed into a clear one way system, to/from Terminal Road. As traffic increases, it may be desirable to provide a service road, to allow access to the various facilities that front Terminal Road.

Corporate Aircraft Parking

Provision for corporate aircraft parking is made to the west of the existing apron opposite Terminal Road. The apron is serviced by a parallel Code C taxilane through to the Runway 05 threshold. Passenger facilitation is via the main terminal building. It is important to note that corporate aircraft also have access to the international and domestic aprons outside the busy hour peak period.

6. Master Plan to 2023

The Master Plan for Queenstown Airport incorporates practical responses to the issues and facilities requirements described in the previous sections of this report. Figure 6.1 depicts the Master Plan (to 2023) for Queenstown Airport.

The key features of the Master Plan are summarised as follows:

Airfield

- Provision of RESA's at each end for the main Runway 05/23
- Small western extension to Runway 05/23 to accommodate RESA and increase declared distances affected by the provision of RESA's
- Maintaining provision for the 150m wide runway strip
- Provision for a full length Code C parallel taxiway south of Runway 05/23
- Provision for a Code B parallel taxiway north of Runway 05/23 to service the proposed new GA and maintenance areas
- Provision for a Code B parallel taxiway on the western side of Runway 14/32
- Maintaining the existing location and length of Runway 14/32

Terminal Area

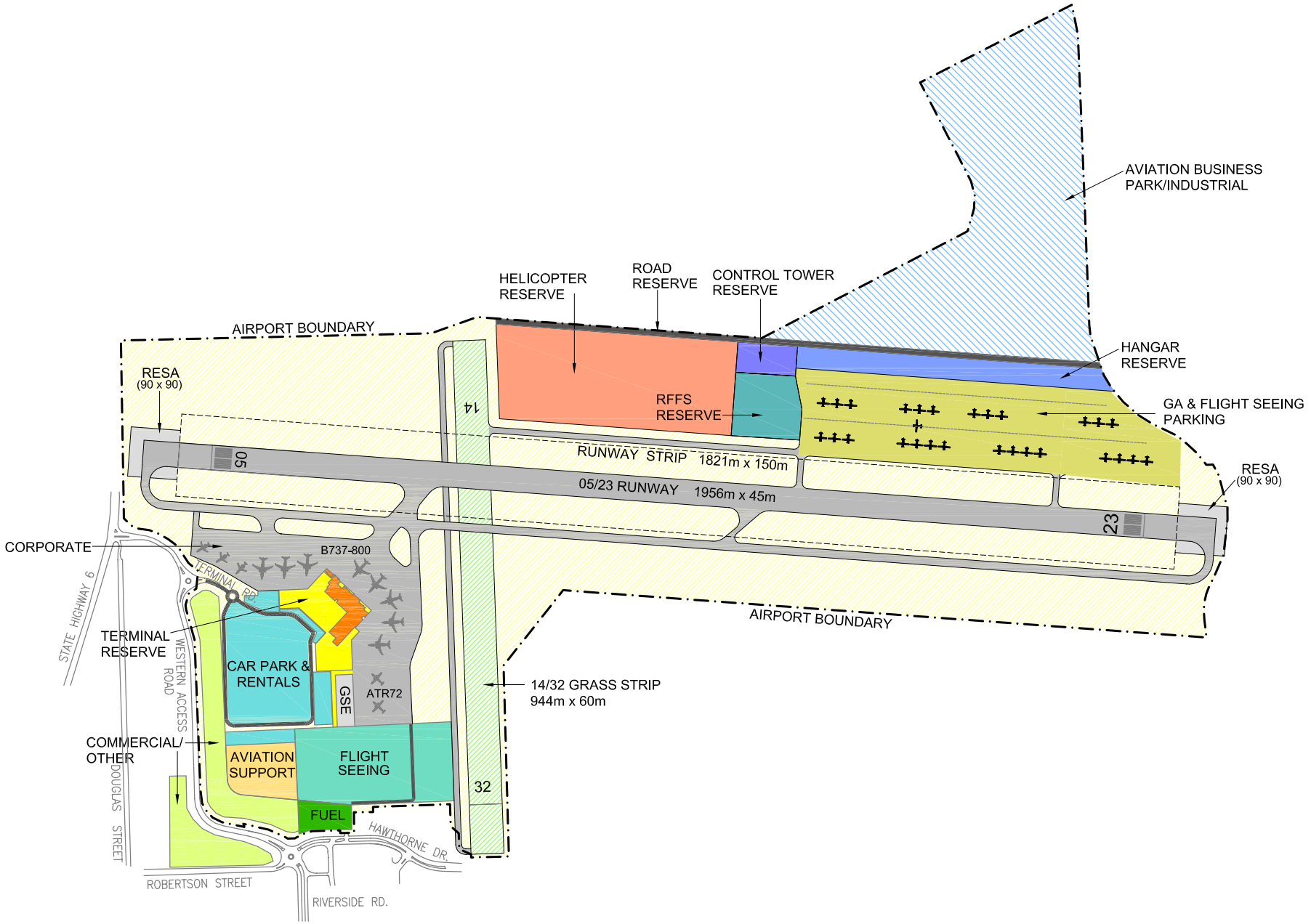
- Maintaining the existing location of the terminal building
- Expansion of the terminal building to the west and south
- Expansion of apron areas to the west and south, maintaining regional aircraft operations to the south, international operations to the west and domestic operations centrally between.
- Expansion of the Flight Seeing apron area to the south of the main jet apron area, with adjacent terminal access
- Provision of a loop taxiway arrangement for the apron area
- Provision of expanded baggage claim, check-in, security and international processing facilities

Aviation Support Facilities

- Relocation of the control tower and RFFS to new central locations north of Runway 05/23
- Relocation of helicopter operations north of Runway 05/23 to a centralized base adjacent to Runway 14/32
- Relocation of GA and flight seeing facilities to the north east sector of the airport
- Provision for a centralized fuel farm facility opposite Riverside Road on Hawthorne Drive
- Provision for an general use Aviation Business/Industrial Park in the area to the north of the new hangar reserves.

Landside Precinct

- Expansion of the airport car park and rental vehicle parking areas
- Provision for a dedicated aviation support facilities area
- Commercial expansion along Western Access Road



QUEENSTOWN AIRPORT MASTER PLAN

100 0 100 200 300 400
SCALE IN METRES 1:10,000 @ A4

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Figure 1
MASTER PLAN

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