



**Queenstown Airport
Siting Study**
April 2017

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SUMMARY AND CONTEXT

This document details the outcomes of a siting study into alternative airport sites undertaken by Arup for QAC in 2017.

During the early stages of development for the Queenstown Airport masterplan it was identified that various factors including social and community, high level conservation area overlays, land use and infrastructure constraints could impact Queenstown Airport's ability to expand to accommodate forecast passenger growth within the current airport land boundary.

As a result QAC requested Arup investigate potential alternative airport sites that could accommodate the full forecasted passenger demand. Options considered included new airport sites which could facilitate either dual operations with the existing Queenstown Airport or provide a new site for all airport operations.

As per scope the study is a high level review of site options. Arup identified potential sites for placement of an airport to support Queenstown Airport

operations shortlisted through a criteria-based analysis and workshop with QAC.

Identified 'indicative' sites represented a range of sites within a prescribed region around Queenstown. By assessing the indicative sites, a particular region was determined to be appropriate for further study at a later stage while still achieving the overall objective of the study within the necessary timeframes.

The siting study was undertaken concurrently with the development of the 2016 Queenstown Airport Master Plan to inform the options being developed as a part of the masterplan.

This document presents the following sections in discussing the process and results of the siting study:

- 1. Objective** – The study's objective
- 2. Approach** – The approach adopted for the study
- 3. Outcomes** – Outcomes of the study

- 4. Impact on the masterplan** – How these outcomes relate back to the overarching Queenstown Airport masterplan

The study concluded that Queenstown Airport operating in a dual airport model was considered the more viable option based on the assessment criteria adopted and sites studied. Wanaka was identified as the preferred second airport site with a recommendation provided to undertake further studies to support this finding.

OBJECTIVE

The objective of the airport siting study was to:

- review a range of existing and new airport site options for commercial jet operations; and
- based on the review, establish if there were any sites within reasonable proximity to Queenstown that could operate as a new stand-alone airport or an airport that could operate in conjunction with Queenstown Airport.

APPROACH

In order to understand the future airport development opportunities, the new airport sites considered as a part of the sitting study fit into the following categories:

- Code E Airport - An airport able to support the full passenger forecasts and Code E aircraft operations.
- Code C Airport - An airport able to support the full passenger airport forecasts and Code C aircraft operations.

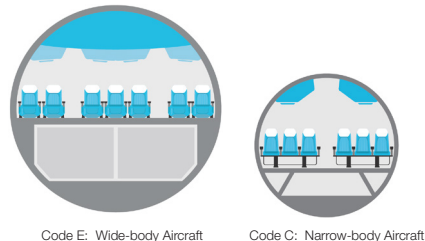


Fig 1. Wide-body vs Narrow-body

Each airport site option identified considered these two operations – that is if the site was able to support full Code E operations then this was the version that was considered and evaluated as a part of the study. Alternatively if the airport could only support Code C operations then this was the option that was evaluated.

The siting study was split into three stages as summarised in the figure on the following page. The study was completed as a desktop exercise drawing on available data relevant to the assessment criteria adopted. Recommendations on further investigations into the recommended site are provided on page 13. Each stage considered a different level of detail for the option (e.g. in Stage 1 sites were evaluated through a high level desktop assessment of the sites and in stage 2 high level/schematic CAD layouts were developed and evaluated).

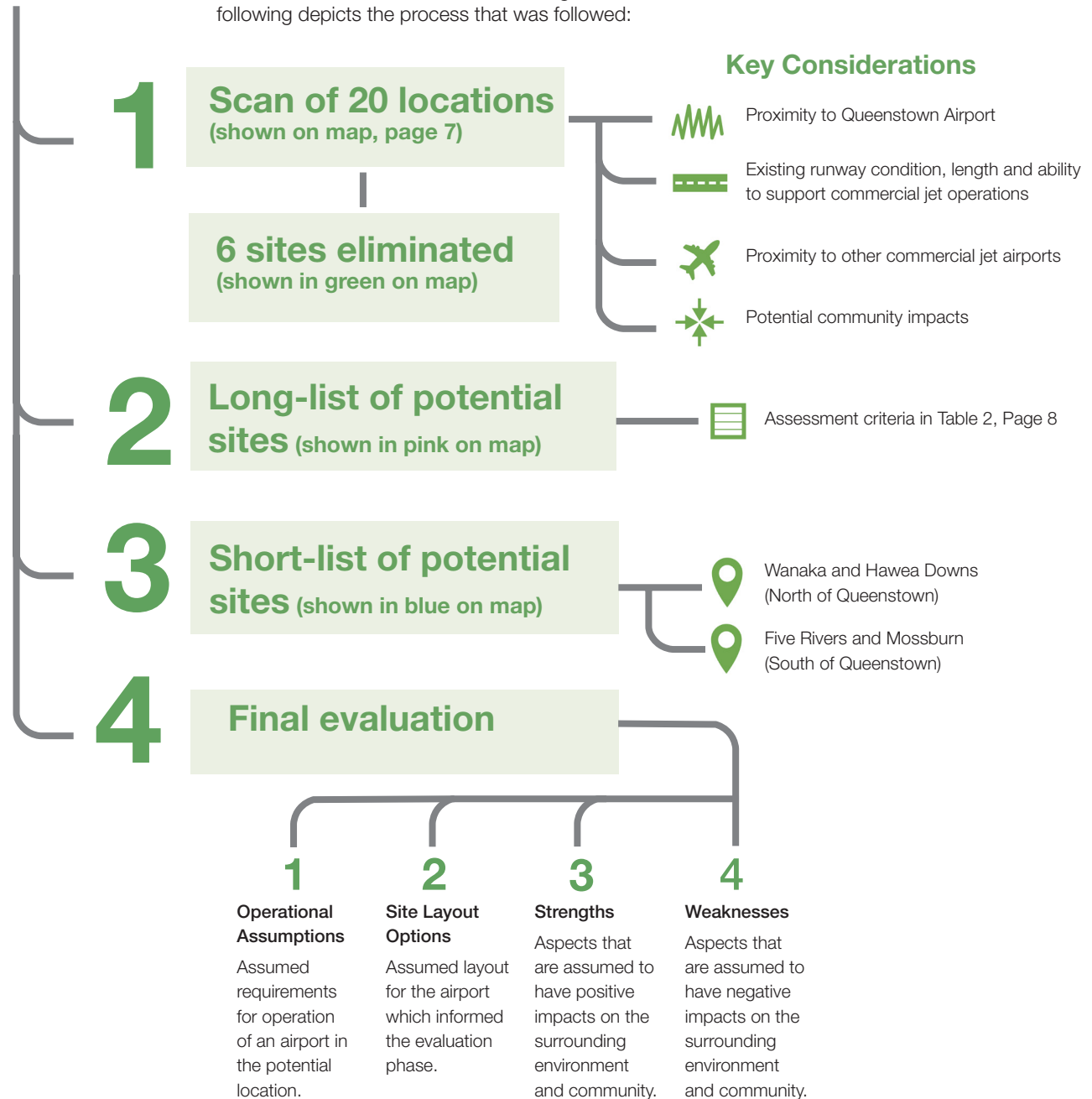
At each stage of the study airport options were evaluated to establish if they should be carried forward to the next stage. The diagram on the following page presents a high level view of the aspects considered at each stage.

Generally assessments focussed on a qualitative review of sites based on the following categories:

- **Airfield Requirements**
- **Surface Transport**
- **Land Availability and Commercial Requirements**
- **High level desktop analysis of conservation areas and heritage zones**

METHODOLOGY

Airports have a number of functional requirements, so these were taken into account when evaluating new sites. The following depicts the process that was followed:



1st STAGE

Stage 1 of the study included a review of:

- Existing airports or aerodromes within a 2 hour journey time from Queenstown Airport;
- Airport sites (including new and existing) considered in previous siting studies provided by QAC; and
- Other identified options for new airport sites not already considered.

This broad list of airport sites options were evaluated based on:



Proximity to Queenstown (i.e. too close or too far);



Existing runway condition and length and ability to support commercial jet operations;



Location within the region and proximity to other commercial jet airports; and



High level review of local community impacts.

2nd STAGE

Stage 2 of the siting study included a detailed review of sites which included the development of indicative layouts of the proposed airstrips. These were produced to allow for high level consideration of local infrastructure (roads, waterways etc), and potential impacts on communities and conservation areas. The study considered available space for aeronautical facilities and non-aeronautical purposes.

As a part of workshopping the evaluation with QAC, it was decided to combine some preferred options for the Stage 3 evaluation. This decision was taken considering the following factors:

- The preferred sites tended to be located in two clear locations relative to Queenstown; and
- The two clear locations tended to have similar characteristics and impacts to be managed.

The outcome of this grouping was that the following two options were carried forward into Stage 3:

1. North (Wanaka/Hawea)
2. South (Mosburn/Five Rivers)

3rd STAGE

The final stage of the Siting Study considered the two short listed airport locations carried forward from Stage 2. Options were introduced back into the masterplan evaluation process. The intention of this was to understand how new site options would work in conjunction with the existing airport.

Key questions asked in this stage were:

- Could either of the sites offer an opportunity for a new (standalone) airport that replaced the existing operation?
- Would the new standalone airport be able to support Code E operations?
- Which of the sites would be well suited to a dual airport operation where forecast growth was accommodated both at the existing Queenstown airport and the new site?

These questions drove the development of three new airport options:

1. Dual Code C airport operation (Queenstown/Wanaka)
2. New Code E airport (Wanaka/Hawea Downs)
3. New Code E airport (Mosburn/Five Rivers)

1st STAGE

Table 1 – Stage 1 siting study findings

Airport	Existing or New	Distance (km)	Journey Time	Runway Condition	Length (m)	Pass Stage 1	Comment
Gore Aerodrome	Existing	169	2:00	Grass	1,240	N	Eliminated as the airstrip is too close to Invercargill and will therefore not represent a good option for a second or relocated airport.
Te Anau-Manapouri Aerodrome	Existing	167	2:00	Sealed	1,523	Y	
Te Anau	Existing	170	2:00	Grass	300	N	Eliminated as close to Te Anau-Manapouri Aerodrome but with reduced infrastructure.
Alexandra Aerodrome	Existing	86	1:10	Sealed	1,125	Y	
Cromwell Racecourse Airport	Existing	50	0:45	Grass	920	Y	
Ranfurly	Existing	164	2:00	Grass	850	N	Eliminated due to distance from Queenstown.
Wanaka	Existing	62	1:00	Sealed	1,125	Y	
Hawea Downs	Existing	75	1:20	Grass	850	Y	
Glenorchy	Existing	55	1:00	Grass	680	N	Eliminated as likely to be restricted due to difficulty accessing the airstrip and also likely to have airspace restrictions making approach and departure challenging.
Omarama Glider Airport	Existing	166	2:00	Grass	1,500	N	Eliminated as at the outer limit of distance and too close to local communities.
Centre Bush Aerodrome	Existing	140	1:45	Grass	640	Y	
Mandeville Aerodrome	Existing	145	1:45	Grass	860	Y	
Roxburgh Aerodrome	Existing	125	1:40	Grass	1,200	Y	
Hollyford Airstrip	Existing	260	3:55	Grass	280	N	Eliminated due to distance from Queenstown
Pukaki Airport	Existing	200	2:25	Sealed	1,010	N	Eliminated due to distance from Queenstown
Queenstown Hill	New	10	0:15	NA	NA	N	Eliminated by previous siting studies. Also too close to Queenstown CBD.
Jardines	Existing	5	0:10	Grass	270	N	Eliminated by previous siting studies. Also too close to Queenstown CBD.
St Patricks (Sth)	New	110	1:20	NA	NA	Y	
Millers Flat (Sth Est)	New	145	1:50	NA	NA	Y	
Lauder (Est)	New	120	1:30	NA	NA	Y	
Mossburn (Sth)	New	106	1:20	NA	NA	Y	

Table 1: Initial 20 Options identified in Stage 1

2nd STAGE

The tables on this page show the assessment criteria (Table 2) and outcomes from the second stage (Table 3).

	Positive impact
	Neutral impact
	Negative impact

Criteria	Description
Runway Length	Runway length considered at the airport: Code E 3.000m and Code C 1.800m
Travel time (to Queenstown airport).	Travel time as measured using GIS mapping resources
Suitability of ILS	Consideration if the site permits the separation distances required to allow for instrumented runway operations
Earthworks required due to OLS	The likely cut/fill requirements to prevent intrusion into the assumed Obstacle Limitation Surfaces
Impacts on road infrastructure	Impacts on any adjacent road infrastructure (e.g. requirement for tunnelling or re-routing roads due to extent of airport or supporting infrastructure)
Impacts on other existing infrastructure	Impacts requiring removal or amendments to any other adjacent infrastructure (e.g. rivers/waterways)
Land for aerodrome facilities	Land available for aerodrome infrastructure and support facilities (e.g. Terminals, GA, fuel, GSE, etc)
Impact on communities	Likelihood that communities would be significantly impacted directly by airport operations (e.g. overflights, noise, air quality etc)
Impact on conservation areas	Likelihood that areas of conservation or environmental/cultural significance would fall within the airport boundary.

Table 2: Assessment criteria for Stage 2 Analysis

Area	Airport	Runway Length	Travel Time to ZQN	Suitability for ILS	Earthworks required due to OLS	Impact on Road Infrastructure	Impact on other existing infrastructure	Land For Aerodrome Facilities	Impact on communities	Conservation areas	Pass Stage 2?
North	Wanaka	1800m	1:00								Y
North	Hawea Downs	3000m	1:20								Y
East	Alexandra Aerodrome	1800m	1:10								N
East	Cromwell Racecourse Airport	1800m	0:45								N
East	Lauder	2000m	1:30								N
Southeast	Roxburgh Aerodrome	1800m	1:40								N
Southeast	Millers Flat	1800m	1:50								N
South	Centre Bush Aerodrome	2000m	1:45								N
South	Mandeville Aerodrome	1800m	1:45								N
South	St Patricks	2600m	1:20								Y
South	Mossburn	3000m	1:20								Y
West	Te Anau-Manapouri Aerodrome	3000m	2:00								N

Table 3: Outcomes of options assessment for Stage 2

OUTCOMES SITING STUDY SUMMARY

Figure 2 presents a map summarising the airports considered during each stage of the siting study.

Sites were assessed on a number of criteria defined on the following pages. Potential noise impacts were assessed on likely impact using the approved Queenstown Air Noise Boundary designation in the Operative District Plan as a reference.

SHORT-LISTED AIRPORT SITES

Mossburn/Five Rivers delivered the lowest noise impact on the community and was assessed as being capable of meeting forecast growth. However, it would require a very high capital investment and significant infrastructural development. The distance and roading infrastructure for the volume of traffic to and from Queenstown were also negative factors.

Wanaka/Hawea Downs also delivered capability to handle forecast growth with lower noise impacts, but required very high capital investments both at the airfield and surrounding infrastructure. Travel time and customer experience were also factors. The Wanaka/Hawea Downs option was not entirely ruled out

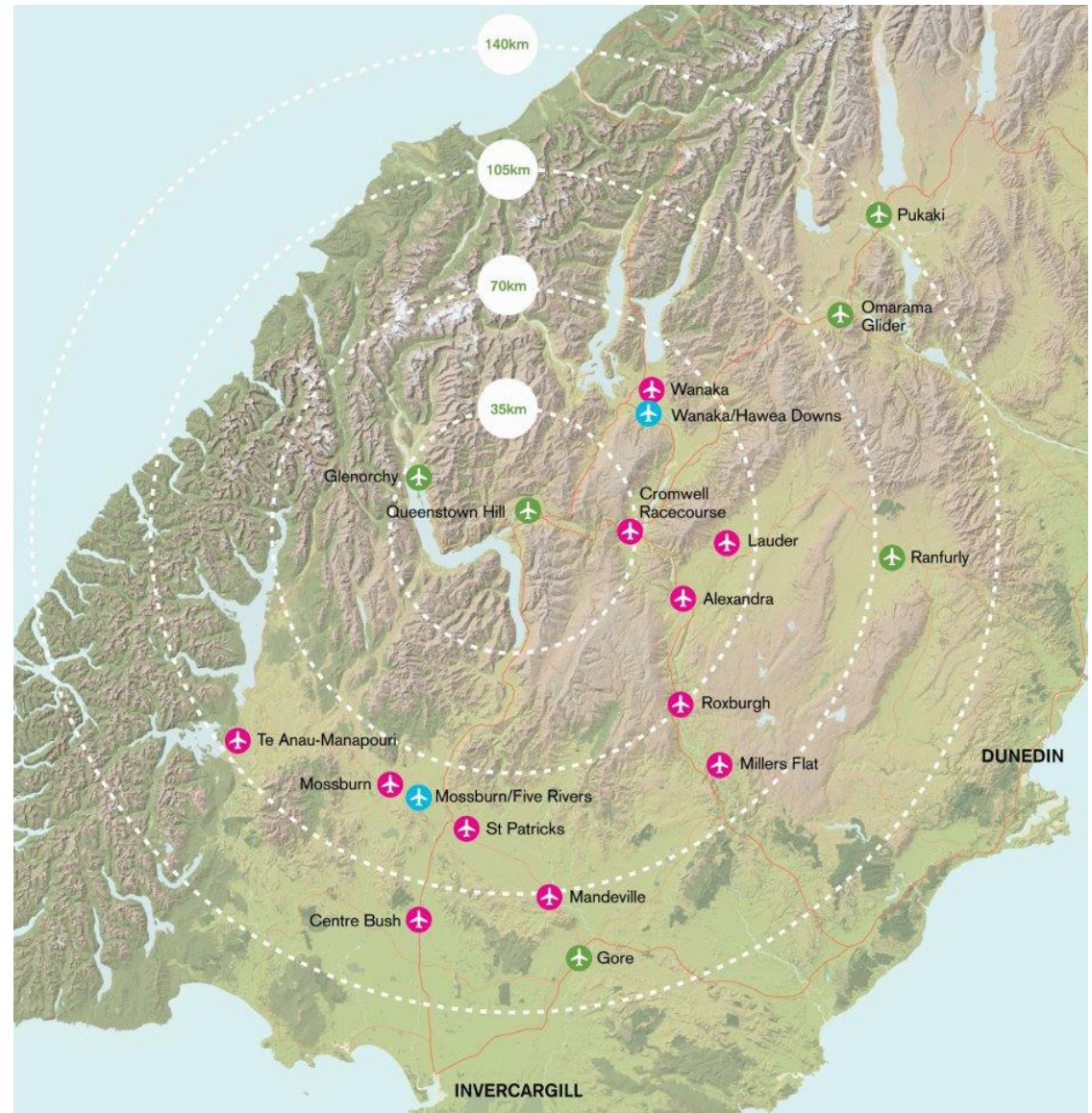


Fig 2. Wide-body vs Narrow-body

but the development of Queenstown Airport and a dual airport model were considered more viable and were taken forward for further consideration.

Legend

- ✈ Stage 1 Airport Sites
- ✈ Stage 2 Airport Sites
- ✈ Stage 3 Airport Sites

DUAL AIRPORT QUEENSTOWN AND WANAKA

Operational Assumptions

The following assumptions were made in order to develop the plans for Wanaka Airport and Queenstown Airport in a dual operations case.

- Narrow body (Code C) aircraft assumed at both airports;
- Regional scheduled flights (ATRs), driven by airline appetite and connection to local community are likely to be the early flights to be accommodated at Wanaka;
- Queenstown Airport could expand existing terminal or invest in new terminal facilities;
- Both locations share the noise impacts, and it is assumed these will be similar to 2025 noise modelling at Queenstown at both locations by 2045;
- Potential split international and domestic operations;
- Fixed wing GA maintained at current level at Queenstown Airport. Growth of GA traffic (fixed wing and heli) occurs at Wanaka; and
- Overspill of corporate jets to Wanaka is also likely.

Site Option Layout

The adjacent diagram presents the indicative layout for the airport at Wanaka which informed the evaluation process.

The layout shown provides for a 1,800m

runway with indicative terminal facilities and support spaces that would support growth in the initial stages of airport development.

Strengths

- Shared noise impacts on Queenstown & Wanaka communities;
- New facilities at Queenstown and Wanaka; and
- Limit redundant spend on existing Queenstown airport.

Weaknesses

- Significant infrastructure investment required to duplicate facilities;
- Dual airport operations less efficient;
 - Less attractive from a passenger perspective; and
 - QAC does not own the Wanaka Airport.

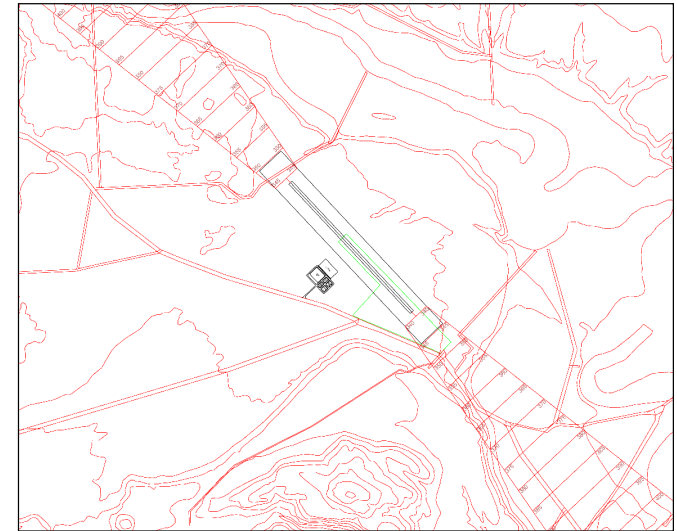


Fig 3. Indicative Wanaka Airport Layout

Recommendation

This option provides an opportunity for alleviating the constraint of environmental factors on the existing airport. The existing Wanaka airport is well suited to expansion to Code C operations. The impacts at Wanaka could be managed with early planning and engagement.

This option should be carried forward.

NEW AIRPORT WANAKA/HAWEA DOWNS

Operational Assumptions

The following assumptions were made in order to develop the plans for the Wanaka/Hawea Downs Airport Code E airport scenario.

- The new airport would need to grow to a level to support Code E operations;
- A 3,000m runway would be required to accommodate wide body aircraft; and
- When fully operational the new airport would allow for the closure of the existing Queenstown Airport.

Airport Layout

The following diagram presents the assumed layout for the airport at Wanaka which informed the evaluation process.

The layout shown provides for a 3,000m runway with indicative terminal facilities and support spaces that would support growth in the initial stages of airport development.

Strengths

- Delivers highest forecast growth as likely to facilitate wide-body aircraft;
- Lowest noise impact on Queenstown community; and
- Potential benefits of sale of Queenstown airport land.

Weaknesses

- Passenger experience may be reduced given passengers do not arrive in Queenstown;
- Highest capital cost and 10 years+ of investment still required at Queenstown; and
- Infrastructure investment required to facilitate movement of large volumes of passengers to/from Wanaka/Hawea Downs.

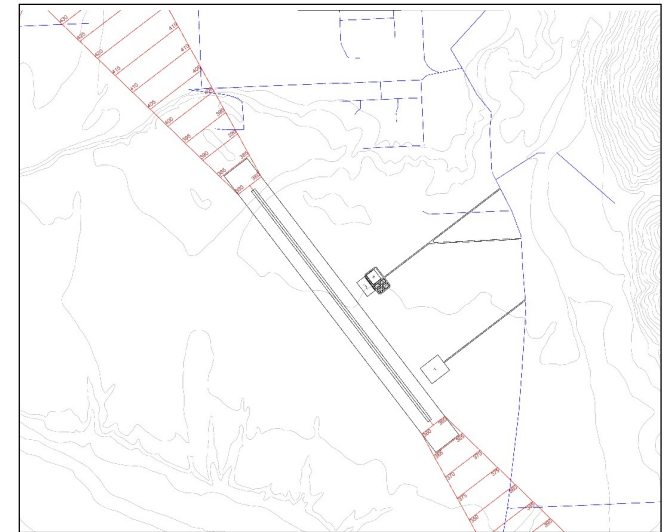


Fig 4. Indicative Wanaka/Hawea Downs Airport

Recommendation

This option provides the best opportunity for a second airport that could support Code E operations. Further refinement of the exact position and alignment of the runway would need to be undertaken and appropriate land-use constraints would need to be considered during this process.

This option should not be carried forward.

NEW AIRPORT MOSSBURN/FIVE RIVERS

Operational Assumptions

The following assumptions were made in order to develop the plans for the Mossburn/Five Rivers airport option.

- The new airport would need to grow to a level to support Code E operations;
- A 3000m runway would be required to accommodate wide body aircraft; and
- When fully operational the new airport would allow for the closure of the existing Queenstown Airport.

Airport Layout

The following diagram presents the assumed layout for the airport at Mossburn/Five Rivers which informed the evaluation process.

The layout shown provides for a 3,000m runway with indicative terminal facilities and support spaces that would support growth in the initial stages of airport development.

Strengths

- Delivers highest forecast growth as likely to facilitate wide-body aircraft;
- Lowest noise impact on Queenstown community; and
- Potential benefits of sale of Queenstown airport land.

Weaknesses

- Passenger experience maybe reduced given passengers do not arrive in Queenstown;
- Highest capital cost and 10 years+ of investment still required at Queenstown;
- Significant infrastructure & physical constraints;
- Investment required to facilitate movement of large volumes of passengers to/from site; and
- Mossburn site less 'memorable' than Queenstown or Wanaka.

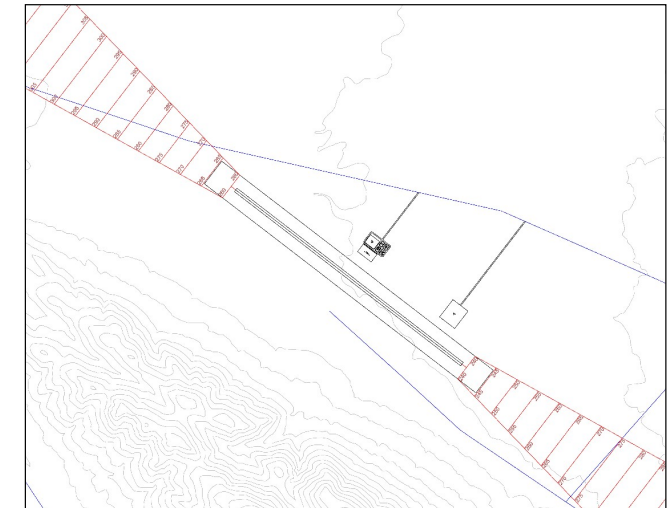


Fig 5. Indicative Mossburn Airport Layout

Recommendation

This option provides similar ability to build new infrastructure to the Wanaka/Hawea Downs option. However it is likely that other factors such as the local environment and proximity to tourist generating areas other than Queenstown would mean that it does not perform as well as the Wanaka/Hawea Downs case.

This option should not be carried forward.