BEFORE THE QUEENSTOWN LAKES DISTRICT COUNCIL HEARINGS PANEL

UNDER	the Resource Management Act 1991
IN THE MATTER	of the review of parts of the Queenstown Lakes District Council's District Plan under the First Schedule of the Act
AND	
IN THE MATTER	of submissions and further submissions by **REMARKABLES PARK LIMITED AND QUEENSTOWN PARK LIMITED**

STATEMENT OF EVIDENCE OF RICK SPEAR ON BEHALF OF REMARKABLES PARK LIMITED AND QUEENSTOWN PARK LIMITED

(GONDOLA CONSTRUCTION)

STREAM 13 REZONING HEARINGS

9 June 2017

BROOKFIELDS
LAWYERS
J D Young / M Broekman
Telephone No. 09 379 2155
Fax No. 09 379 3224
P O Box 240
DX CP24134
AUCKLAND

CONTENTS

1. QUALIFICATIONS AND EXPERIENCE

1.1 My name is Rick Spear. I have a Bachelor of Science from the East Stroudsburg University, PA. In 1977 I worked for Leitner-Poma of America Incorporated (**LPOA**) in the aerial tramways department as a welders apprentice and later participated in field installations.

1.2 In 1986 I worked for LPOA East as Director of Eastern Operations responsible for sales and marketing.

1.3 In 1993 I became the Director of Sales at LPOA in charge of coordinating and supervising sales teams covering all cable transport projects (ski lifts, funiculars, trams, light rail, amusement parks) in North America, Australia and New Zealand.

1.4 In 2001 I moved into my current role as President at LPOA in charge of coordinating and supervising all departments covering all cable transport systems.

2. CODE OF CONDUCT

2.1 I have read and am familiar with the Code of Conduct for Expert Witnesses in the current Environment Court Practice Note (2014), have complied with it, and will follow the Code when presenting evidence to the Council. I also confirm that the matters addressed in this statement of evidence are within my area of expertise, except when relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

3. ATTRIBUTES OF A GOOD GONDOLA LINE

3.1 A desirable gondola route must consider the best possible options for the combination of:

(a) Slope stability;

(b) Wind conditions;

(c) Visual impact;

(d) Uphill carrying capacity;

(e) Construction accessibility;

(f) Cabin rider evacuation on the line;

(g) Maintenance/cost of operation; and

(h) Proximity to communities and/or transport networks (passenger benefits/convenience).

3.2 The selected Queenstown Gondola route is the best combination of the above criteria, for reasons that will be addressed in detail below.

4. GONDOLA ANALYSIS AND ROUTE SELECTION

4.1 From the beginning, LPOA has been working with Queenstown Park Limited (**QPL**) on this project to investigate and analyse various gondola route options. The first set of routes ran from Remarkables Park near the original Conference Center site, straight across the river and up the western face of The Remarkables. The first option crossed the northern end of the Remarkables Range with an angle station below the ridge at 1,210MASL. This route proved to be not feasible because of a geotechnical issue. Two further western face routes were considered. Both of these options crossed the Remarkables Ridge, with angle stations behind the ridge at 1,450MASL and 1,380MASL. All of these gondola lines then travelled from these angle stations straight up the valley to the Remarkables Ski Area new base lodge location. We scrutinised and explored alternate routes including considering the geologists' analysis of a route going up the steepest part of the slope facing Remarkables Park. The ultimate design capacity arrived at for these routes were 1,000 passengers per hour (**PPH**). The alignments of the three routes initially considered are shown on the plan **attached** and marked "**A**".

4.2 Whilst two of the originally proposed western face routes could be built, the following facts factors, aside from the obvious western face visibility issue, made them less than optimal:

(a) Challenging installation because of very steep and unstable terrain, and the need for substantial pylon structures to support the line up and over the ridge;

(b) Difficulty in locating a feasible site to add a mid-station to provide extra motor power to increase line capacity;

(c) Safety management access issues to evacuate passengers from such steep lines;

(d) Use constraints due to exposure to strong southerly cross winds; and

(e) More expensive maintenance as a result of specialty equipment.

4.3 After investigation of several routes, it was decided that a less visible and less wind exposed route along the river and up a valley area would be the best possible gondola corridor. Two more suitable routes have been evaluated. Approximately 85% of these two route options are on identical alignments. Both options originate in the Remarkables Park Town Centre (**RPTC**) beside a public plaza shared with the proposed Conference Center. The line crosses the Kawarau River and travels east down the river for five kilometres to the proposed Queenstown Park Village site where there is a right angle turn station. The gondola then travels a further five kilometres southwards up the Rastus Burn Valley towards the Remarkables Ski Area, where it connects directly into NZSki's new ski field base building. A mid-station for sightseeing and unloading/loading of passengers is located at a site within Queenstown Park land, just below the boundary with the Department of Conservation recreation reserve. The two gondola routes and the location of the various stations are shown on the **attached** plans and marked "**B**" and "**C**".

4.4 This most recent route has been arrived upon for six basic reasons:

(a) Less visibility from Queenstown and viewing points within the Wakatipu Basin;

(b) Less exposure to the wind;

(c) No slope stability issues which were apparent with the original routes on the western face of the mountain;

(d) Better construction access (than routes that crossed The Remarkables ridge);

(e) Minimal additional maintenance/operating cost for the ability to increase hourly carrying capacity;

(f) Easier safety management. In the unlikely event of a ground based lift evacuation these new alignments are much improved over the previous options;

(g) Having identified this route we were then able to include a mid-station on the uphill section that will increase ultimate design capacity. There is also the option of a commuter transit station on the lower line. The major limiting factor for maximum uphill hourly carrying capacity is the vertical rise of the line. By separating the uphill line into 2 sections and adding a drive station for the lower part of the upper section the lift is able to transport 2000PPH instead of the previous maximum of 1000PPH; and

(h) The mid station part way up the upper section further ensures that a ground based lift evacuation will affect a minimum number of passengers.

4.5 The lower gondola line could have been designed to travel the five kilometres between the RPTC base station and the Queenstown Park Village Station following a straight line without an angle station. This line would be shorter (4.778km) and less expensive to construct but almost 50% of this line would be constructed above 500MASL and 30% of the line would be above 550MASL.

4.6 However, RPL requested LPOA to design a lower alignment. Keeping the line at a lower contour can only be achieved by putting a bend in the line, and this requires the construction of either a 'mid-station' (where passengers can get on or off the gondola) or a 'bend station' (where no getting on or off is possible). In the case of RPL's Queenstown Gondola, a bend station could be constructed on RPL's own land (**Option 1**) or a mid station could be constructed on the Queenstown Lakes District Council (**QLDC**) land below Lake Hayes Estate, (**Option 2**).

4.7 The construction of a bend or mid station incurs considerable additional cost but it means that the lower line is much further down the mountain. Bend stations are typically located for geographical reasons and do not allow embarking or disembarking. The average ground height along the lower line when a bend station or mid station is included is 334MASL or only 24 metres above the height of the river.

85% of such a line would be below 350MASL and none of the line would be constructed on ground that exceeds a height of 384MASL. This results in much reduced visibility.

4.8 The other key benefit of introducing a mid station in the lower alignment is that it enables the possibility of a station being constructed on the north (true left) side of the Kawarau River close to the residential communities at Lake Hayes Estate, Shotover Country and Bridesdale. This addition would allow the lower gondola line to also function as a commuter gondola in addition to providing a connection from Queenstown to the Remarkables Ski field and its role as a significant new part of Queenstown's tourism infrastructure. This potential commuter function assumes greater significance when it is noted that the new Wakatipu High School is being constructed within 300 metres of the proposed RPTC base station. The gondola could transport students between the new High School and one of Queenstown's largest residential areas. It would also allow residents of these communities to more easily access RPTC (for shopping or work), Queenstown Airport or, in the future, link to ferry connections to Queenstown Bay.

4.9 If the bend station was not constructed as a commuter station on the north side of the Kawarau River and a footbridge was to be constructed in one of the two locations indicated, then residents from Lake Hayes Estate would be able to access the QPL village gondola station by using the footbridge. The walking distance to the QPL village station via the footbridges would be an estimated distance of 1.3km or 1.6km from the end of the paper road.

5. GONDOLA GENERAL LIMITATIONS

5.1 Ropeways must travel in almost perfect straight lines. When a bend is required, the design requires a turn station where the cabins detach from the rope, slow, turn, speed up and reattach to the rope. These are sizeable structures in length (not height) and add considerable additional cost, so typically the number is minimised.

5.2 Ropeways can reach carrying capacities in excess of 4000PPH, but this maximum is often limited by the steepness and length of the slope (significant elevation change). This decrease in ultimate uphill capacity can be changed and increased by the addition of a mid or turn station (to be cost effective it's best for the station and turn to

be done at the same point) such as the proposed Queenstown Park upper line mid-station.

5.3 Ultimate uphill capacity has been increased from 1,000PPH to 2,000PPH by adding the mid-station and an optimal geotechnical alignment could also be selected as this mid station enabled a turning point in the gondola line. In addition, this mid station enables a mid line loading/discharge point on the 5km line if required.

6. PYLON DESIGN AND HEIGHTS

6.1 Pylon basic design (length of pipe and span from pylon to pylon) is determined by the lay of the land. Vast gorges can be spanned of course, but this is not the normal application. The typical distance from pylon to pylon is 125-175 meters. Higher pylons are typically required in low areas on the line and conversely shorter pylons will be located on high ground. Taller pylons will require larger diameter pipe at the base and smaller (24-30 inch) for the top 8-10 meters. This is required for code clearance from pylon to cabin, but also assists greatly in reducing the visual impact of the entire gondola system.

6.2 The proposed gondola route would comprise 31 (pipe) pylons on the lower line for Option 1 or 30 with Option 2. The average pylon height on this line is 11.9 metres for Option 1 and 13.42 metres for Option 2. The upper line is comprised of 32 (pipe) pylons with an average pylon height of 13.35 metres for Option 1, and 32 pipe pylons with an average pylon height of 13.46 metres for Option 2. The maximum height of any pylon is 25 metres (Upper Section). Gondola support structures are typically pylons built out of pipe or lattice steel structures for taller structures, more commonly associated in NZ with high tension power lines. All of the Queenstown Gondola support structures have been designed so that they are built using only pipe pylon vertical supports. Pipe pylons are obviously much less visible than steel structures.

7. NZSKI CAPACITY REQUIREMENTS

7.1 NZSki's requirements for uphill and downhill capacity are roughly met with this new capacity of 2,000PPH, whereas 1,000PPH was not adequate to significantly decrease Remarks access road traffic.

8. CONSTRUCTION ISSUE AND OPTIONS

8.1 Construction of this gondola route is well within the realm of standard lift construction. The sheer size (length and vertical rise) of the system is special but the construction tasks and related methodology are not special to the lift construction business. The easy access to helicopters in the surrounding area is a big advantage for both construction time and environmental sensitivity.

8.2 The lower section of the gondola roughly follows the farm track for a good distance and construction access will be quite easily attained using truck delivered concrete and all terrain crane for most pylon placements. Both the RPTC and Queenstown Park Village gondola stations have great truck and crane access for ease of installation. Helicopters will be used where necessary to avoid construction of special access roads along the line.

8.3 The upper section has several challenging access points. However, this is normal gondola lift construction for LPOA. For excavation of steep and difficult access pylon foundation sites, we use either a rubber tire Spider Hoe or we walk in and hand dig the hole. Small helicopters will be utilised to deliver anchor bolts, re-bar, compressors (temporary), any other construction tools and materials and concrete to the site. The same helicopters will be used to remove materials from the pylon sites as well. A large helicopter will be brought in to deliver and set pylons on the anchor bolts after placement of concrete.

8.4 The mid station on the upper section is located close to Remarkables Road and easily accessible.

9. OPERATIONAL MATTERS

9.1 **Garaging**: Typical of large mixed use gondola systems (skier and tourism), the gondola cabins are often housed inside when not in use. The garage facility will be located at the Queenstown Park Village station for Option 1, and at the Commuter Transit Station for Option 2.

9.2 **Drive stations**: There will be 3 drive stations each equipped with electric motors, diesel auxiliary and evacuation engines. Each will also have an electric generator set back up in case of loss of the grid power source. The drive stations will be located at

the Queenstown Park Village Station, the Queenstown Park upper mid station and at the NZSki Remarkables base station.

9.3 **Noise**: Along the gondola line there is very little noise because the cable is supported by neoprene sheave wheel liners, which are attached to rubber, bushed sheave mounted assemblies (two per pylon). Noise at the drive stations is muffled by the external terminal enclosures with specially insulated glass, insulated station siding, and insulated station roof plus a 50mm thick tongue and groove wooden under floor for the entire length of each station.

9.4 **Redundancy**: In order to ensure that cabin on line passenger evacuation is not required, several redundancies have been specially included and designed into this gondola system:

(a) Full diesel engine auxiliary power connected directly to the gearbox (in the event of loss of the electric drive). This will not disrupt normal passenger service;

(b) Internal combustion evacuation engine connected directly to the gearbox (in the event of loss of auxiliary power). This engine is used to evacuate the lift at slow speed;

(c) Ring and pinion mounted on the drive bullwheel (in the event of loss of the main gearbox). This device will also evacuate the lift at slow speed; and

(d) Gen-set at each drive station (to compensate for loss of the power grid); The Gen-Set, which is a diesel powered generator that produces enough electricity to power the gondola electric motors, allows for normal full speed, full capacity operation to the public.

9.5 **Safety**: The entire system is constantly monitored by a 24 Volt safety system including Cable Position Monitors on each sheave train and cabin position monitoring at all stations to prevent any possibility of collision. Any interruption of the 24 Volt system causes a lift stoppage and locates the problem to allow for rapid manual correction and reactivation of passenger service.

10. GENERAL AND SPECIFIC SITE ASPECTS

10.1 The final route (Option 1 or Option 2) chosen is much less direct than the earlier western face options. However, the final site has several advantages:

(a) Each of the lower line base stations and turn stations are on flat areas requiring minimal ground disturbance;

(b) The new Remarkables Ski area base building is perfectly positioned to accept the gondola top station;

(c) The Remarkables access road comes to within relatively close proximity of the gondola line in several locations, which is beneficial for lift construction and future service or evacuation;

(d) The lower visual impact and less wind exposure are advantages for residents and users;

(e) Beautiful vistas along the river with low visual impact; and

(f) There is good snowmobile and foot access to the gondola towers from the Remarkables Ski Area lodge down past the holding ponds and to the crest of the hill. This is a far improved access situation compared to the originally considered direct routes.

11. GONDOLA ROPEWAYS FOR URBAN AND TOURISM TRANSPORT TODAY

11.1 The use of ropeways for non-ski transport is growing rapidly. LPOA have designed, installed and commissioned recent urban systems in Medillen, Columbia (seven systems for daily use by shoppers, students, workers, etc.), Hong Kong (tourism to Buddah site on mountaintop), Rio de Janeiro (transport to work and school from/to the Flavelas), Mexico City (for workers, students and shoppers commissioned September 2016), Ankara, Turkey (public transport) and many more. The main advantages to gondola ropeways over trains, subways, busses and cars are:

(a) They take up minimal space on the ground;

(b) They are quieter than all other transport systems; and

(c) Headways (time between vehicles arriving to pick up or drop off passengers) are less than 30 seconds. One trend we have seen recently is the increase in tourist traffic on urban gondolas. Ridership on the Roosevelt Island Tramway in NYC (operated and maintained by LPOA) has risen from 1.6M to 2.5M in five years and the commuter population of Roosevelt Island has remained steady. That is 900,000 tourists/year.

11.2 Because one, two or three electric motors drive the entire system of 100-200 gondola cabins and removes countless cars and buses that would otherwise be on the road, the ”green” aspect of ropeways is a true advantage that is obvious to even the untrained environmentalist. Multiple arrangements of Internal Combustion (**IC**) engines are available to be connected to the gondola drive system (see options in 9.4 above), which are used in the case of a loss of electric service from the grid or gen set. The electric motors will have a smaller carbon footprint than the IC engine of the same horsepower. Total travel time from RPTC to the Remarkables Ski Area Base Building for Option 1 is 28.74 minutes and for Option 2 total trip time is 28.97 minutes. This is assuming the passenger maintains their position in the same cabin from bottom to top (or top to bottom).

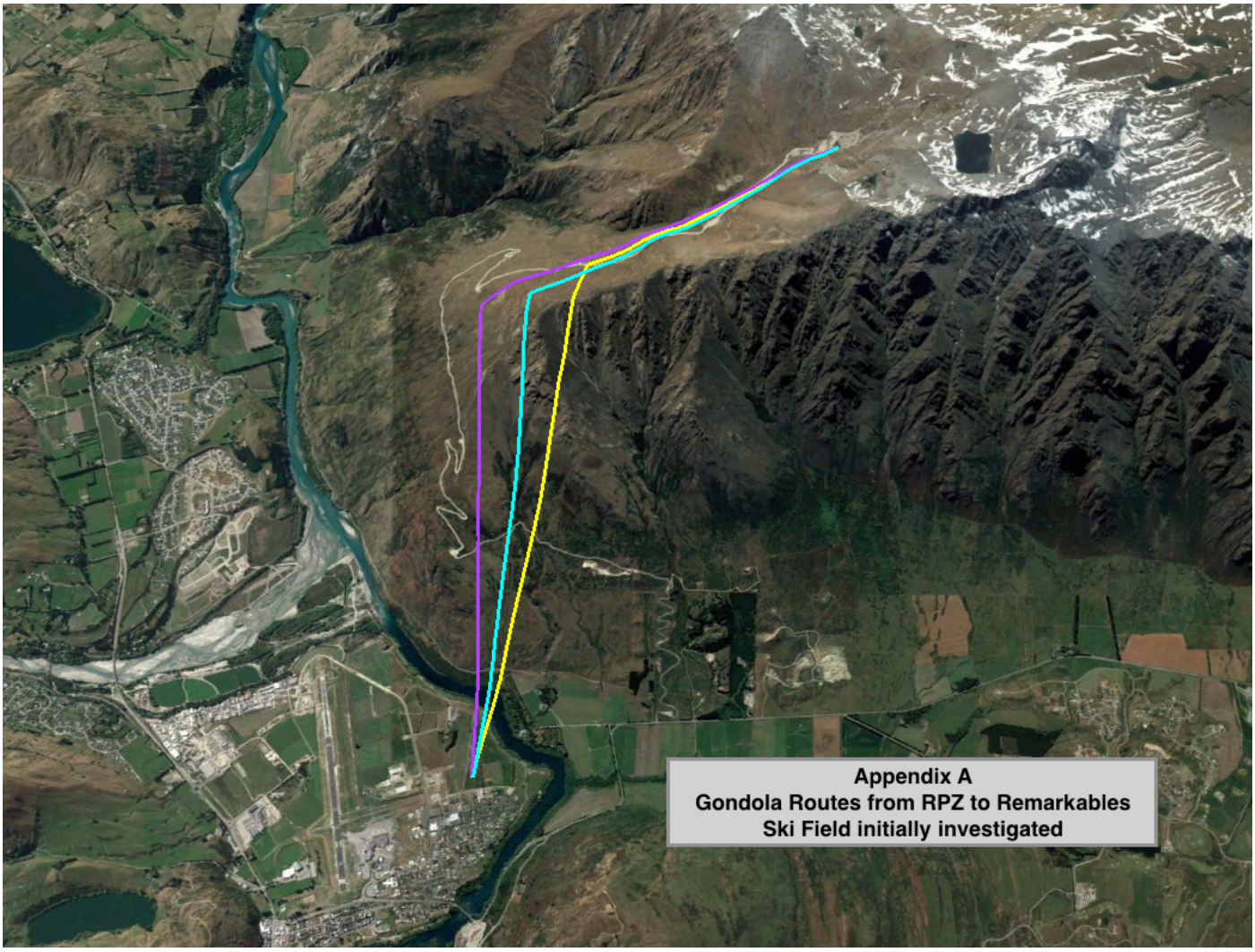
12. SYSTEM CHOICE PERSPECTIVE BY THE OWNER

12.1 There is no doubt that the final route chosen by RPL is much more expensive than the original route options. The final proposed route is longer (10km compared to 7km) and has more mid stations than the previous routes. However, the final route is less visible and does not come near the iconic Remarkables western face and peaks. It will be easier to construct than the options considered earlier and operationally it will benefit from being in a much more benign wind environment. The community also gains the added benefit of the lower line being able to be used as a commuter transport option.

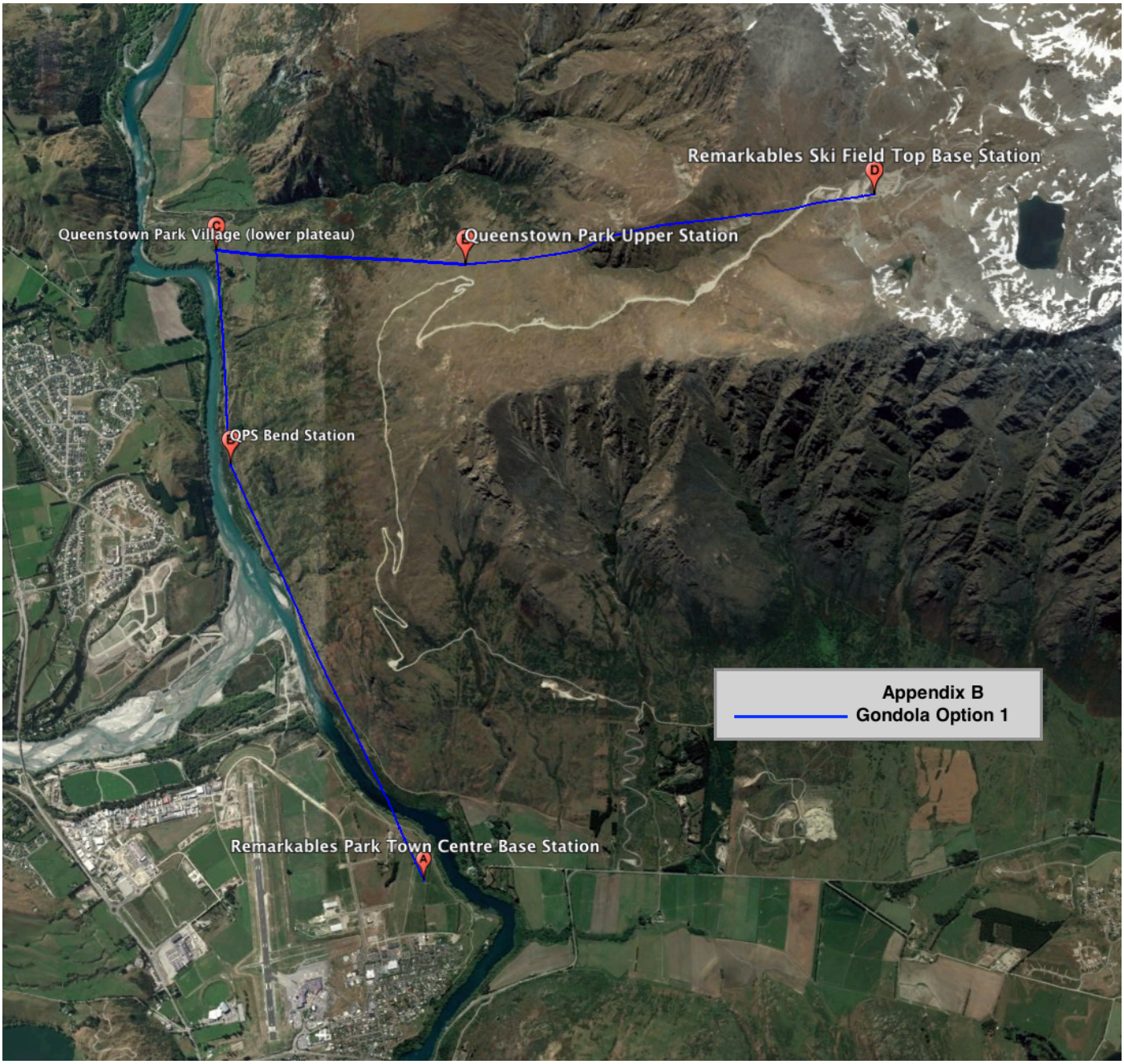
12.2 Adding the mid-station and an optimal geotechnical alignment could also be selected as this mid station enabled a turning point in the gondola line. In addition, this mid station enables a mid line loading/discharge point on the 5km line if required.

9 June 2017
Rick Spear

APPENDIX A: PLAN SHOWING ALIGNMENT OF THE THREE ROUTES INITIALLY CONSIDERED


Appendix A
Gondola Routes from RPZ to Remarkables
Ski Field initially investigated

APPENDIX B: PLAN SHOWING GONDOLA ROUTE OPTION 1


Remarkables Ski Field Top Base Station
D
Queenstown Park Village (lower plateau)
C
Queenstown Park Upper Station
E
OPS Bend Station
B
Remarkables Park Town Centre Base Station
A
Appendix B
Gondola Option 1

APPENDIX C: PLAN SHOWING GONDOLA ROUTE OPTION 2


Remarkables Ski Field Top Base Station
D
Queenstown Park Village (upper plateau)
H
Queenstown Park Upper Station
Lake Hayes Estate Residential Transit Station
G
Appendix C
Gondola Option 2
Remarkables Park Town Centre Base Station
A