



**Feasibility of Fringed Hill Gondola  
April 2014**

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Nelson Cycle Lift Society Inc

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## CONTENTS

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1. Executive Summary
2. Geotechnical engineering
3. Engineering
4. Visitor numbers
5. Business Case

### Appendices

1. Geotechnical report (Nelson Consulting Engineers)
2. Lyttelton Engineering letter
3. LPOA Proposal
4. NCLS committee

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## 1. Executive Summary

### Purpose:

The purpose of this report is to analyse and communicate the technical and financial feasibility of the Fringed Hill Gondola proposed by Nelson Cycle Lift Society (NCLS). The NCLS committee has prepared the report, with external expert advice.

The intended audience is the Mayor and CEO of Nelson City Council.

The information contained is provided as Commercial-in-Confidence, and Nelson Cycle Lift Society reserves all rights.

### Scope

The report presents findings relating to the gondola operation, specifically geotechnical engineering, lift engineering, visitor numbers, and preliminary business case; to gain support for the next steps leading to a resource consent application.

This report is not a business plan for the complete project, and does not analyse economic impact; further analysis will be required to determine the viability of the proposed adventure park and café-restaurant at the top station.

The report does not analyse the recreational or well-being benefits resulting from growth in mountain biking or walking activity as a result of the proposal.

### Background

NCLS comprises a group of Nelson business people with a management committee of 5. The group's objective is to gain resource consent for an all-weather gondola and adventure park on Nelson City Council land on the north-west face of Fringed Hill, north of Brook Waimarama Sanctuary (refer site plan page 20).

The proposed gondola line will lift 600m from the Brook Camp to a road-accessed point near the top of Fringed Hill where a café-restaurant-viewing deck can be located, affording 270° views from Mt Owen to D'Urville Island. The gondola lift height will be 58% greater than Queenstown gondola, and will be the highest passenger lift in New Zealand.

Visitors will experience the panorama from 720m above Nelson City. Walking access through Brook Waimarama Reserve could be offered if biosecurity criteria can be achieved.

Graded mountain bike tracks to international standard could be added to the existing network on NCC and adjacent land to cater for all ages and skill levels. A network of international standard downhill race tracks should attract national and international events. A new access track could offer bikers connection to the Coppermine Saddle and Dun Mountain trail .

Target markets will be local walkers and bikers, NZ, Australian and international tourists and family groups including recreational and serious mountain bikers.

The gondola / café restaurant / mountain bike park facility will require between \$12-14m to complete. The indicative timeline shows opening of the gondola component and mountain bike park in the summer of 2015/16.

#### Progress to date

- Project commenced 2010
- Site feasibility completed looking at multiple sites
- Initial economic feasibility completed
- Gondola route selected
- Key stakeholder consultation (on-going)
- Nelson City Council resolution to support May 2011
- Discussion with funding partners (on-going)
- Draft resource consent application is being prepared for gondola incorporating base building, mountain bike transport & hill-top café/restaurant
- Feasibility study funding approved by NCC June 2013 (\$15,000)

#### Timeline

2014	Obtain resource consent, form commercial entity, raise investment for Stage 1
2015	Planning, purchase gondola machinery, installation. Track building Café-restaurant build
2015/16	Commission and commence operation of Gondola, café-restaurant
2016>	On-going development of tracks, alpine activities, walking tracks, and Alpine Coaster



**View north overlooking gondola site**



**View south showing gondola line, Fringed Hill and Brook Valley**



**View showing possible tower locations and access tracks (Brook Camp entrance bottom centre)**



**Gondola location in relation to existing tracks**



## Summary Conclusions

### Geotech

Initial investigation of the proposed route and tower locations appear feasible from a geotechnical perspective. Further geotechnical assessment will be required to confirm access routes during the design of specific tower locations, which will also require more detailed survey information.

### Engineering

A preliminary assessment is that the proposed station locations and lift line look suitable for installation of gondola. Equipment access to the top station during installation may require some upgrading of the access track. There will need to be a further survey undertaken to obtain an accurate ground profile so that a full engineering study can be completed. Ground pressure tests will be required for detailed design and construction. Poorer than expected conditions would result in additional foundation costs.

### Capital Cost

NCLS has concluded that a second-hand gondola system is not cost-effective in comparison to new equipment.

Leitner-Poma of America (through agents Lyttelton Engineering) has estimated cost of \$8.7m for manufacturing and installing an 8 passenger detachable gondola on the site (subject to full site investigation and quotation).

The costs of café restaurant and mountain bike track network has not been analysed in detail, but for the purpose of this report the following estimates are used:

- Café-restaurant: \$2-2.5m
- Track network: \$500k - \$1m

### Visitor numbers (Domestic and International)

Visitor data from Queenstown, Rotorua and Christchurch has been used for comparison with Nelson regional visitor data, to derive a gondola visitor projection. Two models have been analysed:

- Model 1 shows 33,893 in the first year of operation with a growth rate of 10% per year.
- Model 2 shows 67,786 in the first year of operation with a growth rate of 10% per year.

These numbers represent to 6% or 12% of visitors to the region, plus local visitors of 6300 and 11,000 respectively. By comparison over 40% of visitors to Rotorua and Queenstown use the gondolas in those centres.

### Business case

Using the two models, the visitor numbers have been segmented into the different types of services to be offered, with take-up varying depending on whether the customers are Local, Domestic, or International users.

- Service pricing is based on competing Queenstown, Rotorua and Christchurch gondola operations.

- Operating costs have been derived from similar gondola operations, taking into account the projected local operation scale
- Depreciation is over 20 years, the projected life of the equipment.

The resulting analysis shows that with extremely conservative visitor numbers (model 1) a gondola operation can achieve a positive EBITDA result in the first year of operation, but would not give sufficient return on investment for a fully commercially funded entity.

Model 2 shows that after-tax profit should sustain a 20% return on a \$10m commercial investment.

Growth in visitor numbers to 20% of total visitors would result in a very profitable, growing business with sufficient resources to actively market nationally and internationally. At this level, the penetration is only 1/3 of that achieved by similar gondola operations in Queenstown and Rotorua.

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## 2. Geotechnical Investigation

### Refer report Appendix 1.

Nelson Consulting Engineers Ltd (NCE) was commissioned to undertake a preliminary geotechnical appraisal for the proposed gondola lift. The work comprised an assessment of the proposed route, top and bottom gondola stations and the intermediate cable support towers, to provide an opinion as to the geotechnical constraints with respect to general stability of land and seismic risk relating to nearby fault locations. In addition, NCE provided comment about existing access to the top station and tower locations and / or feasibility of providing new access to the proposed tower locations.

The report assessed the preferred concept, with a possible alternate route.

### Summary findings

#### General Slope Stability and Ground Conditions

Based on review of the stereo aerial photographs and site walkover, no evidence of significant deep-seated instability was observed within the vicinity of the lift route.

During the walkover of the proposed cycle lift route, exposed bedrock was observed at numerous locations in the near level area of the proposed top station and within sections of the existing access tracks. These are general observations, however they suggest foundation ground conditions for tower construction are likely to be within bedrock at or near the ground surface, but will need to be confirmed prior to design.

#### Access

Vehicle access to the top station is currently provided via the Tantragee Saddle – Fringed Hill four wheel drive track. With the exception of the main access track from Tantragee Saddle, current four wheel drive tracks have moderately steep sections up to 27°, suitable only for experienced four wheel drive users and specifically equipped off road vehicles. The tracks are suitable for track-mounted diggers.

Further geotechnical assessment and topographic survey is required to determine feasible vehicle access to off track tower locations exists.

#### Conclusion

*The proposed gondola as shown comprises of the top and base stations and seven intermediate towers. The proposed route and tower locations appears feasible from a geotechnical perspective. Given the constraints of a single cable gondola and straight-line route, the exact tower locations are mainly influenced by maximum cable span and the required ground clearance provided by the proposed maximum 20m tower height. The cableway route is generally steep, however no evidence of deep-seated instability within bedrock was observed.*

*Some tower locations are on relatively level ground (top and bottom stations, tower 1 and tower 4, however five proposed tower locations are on steep to very steep ground where construction of access will be more difficult and require specific engineered design. Further geotechnical assessment will be required to confirm access routes during the design of specific tower locations, which will also require more detailed survey information.*

### 3. Engineering

Refer Lyttelton Engineering Ltd letter, Appendix 2.

Lyttelton Engineering Ltd is experienced in the design and construction of aerial ropeways, chairlifts and gondolas. They are New Zealand representatives of Leitner-Poma of America (LPOA), a subsidiary of the Italian/French Leitner Group that manufactures ski lifts, gondolas, aerial trams and industrial ropeways. Recent projects have included two 4-seater detachable chair lifts at Cardrona and two 6-seater detachable chair lifts at Coronet Peak and Mt Hutt. In 2013 they were awarded the contract to supply a 6-seater detachable grip Leitner-Poma chair lift to the Remarkables ski field.

#### Scope

Lyttelton Engineering inspected the site in September 2013. The key factors to be considered were:

1. Physical factors:
  - a. Road access, electricity supply, wind
2. Feasibility of proposed line for gondola
3. Feasibility of purchasing a used or new machine
4. Cost estimates

The geotech feasibility report including proposed line profiles was provided to Lyttelton Engineering, and LPOA.

#### Physical factors

Road access is provided to both top and bottom stations of the proposed gondola line, to facilitate construction. Tower location has not yet been finalised, but access exists to likely tower sites, and is not seen as being difficult.

Electricity is available at both top and bottom sites. Upgrading capacity to the top site would be required.

According to LPOA, the proposed gondola will operate in wind speeds of up to 55kph, and at 80kph, the lift speed must be reduced. These figures are based on crosswind to the system. If wind is coming from the top/bottom and flowing along the line, then wind speed is not as much of an issue. The proposed line is aligned to one of the two main prevailing wind directions (SW), but may be closed in northerly winds (which typically coincide with low cloud conditions). Analysis during the summer of 2014 showed 2 closed days in the period January 1-April 1.

#### Feasibility of purchasing a used or new machine

NCLS at first considered used machinery options ex Europe. A preferred 8-person machine has a total installed cost of \$6.0m. This price would not include warranty backup.

LPOA do not recommend a used lift, and after consideration, the NCLS committee supports this view. The LPOA Design Engineer advised:

*When a lift is designed, it is very specific to the location in which it is to be placed. Horsepower and motor requirements follow this same point and more/less may be necessary for the new location. Transportation is major issue. When all components are disassembled (by another party), shipped,*

*and reassembled, there can be many items missing or broken. Certification is another primary concern because an engineer would be much more hesitant to stamp and certify a used, relocated lift system rather than a new one that was designed and built for its specific location. When all is said and done, a purchaser will get to around 65-80% of the cost of a new lift system and significantly less lifespan as well.*

#### **Cost estimates**

NCLS submitted a Request for Proposal to LPOA, via Lyttelton Engineering. The line data was based on the NCE report, with a lift specification agreed by discussion with Lyttelton Engineering. A full proposal was received from LPOA, and is summarized in Appendix 3.

The estimated cost of designing, building and installing the proposed fully detachable gondola is NZ\$8.7m.

A more economical "pulsed" system is also proposed, with an estimated cost of \$6.7m. This will have reduced uphill capacity, and slightly longer lift duration.

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## 4. Visitor numbers (from outside region)

Analysis prepared by Martin Mongan (refer Appendix 4), from information provided by Nelson Tasman Tourism, NZ Govt Accommodation Monitor, and Skyline Enterprises Ltd Annual reports.

**Nelson Region:** 12-month period 2012/13 (NZ Govt, Accommodation Monitor):

- Nelson region total guest nights were 1,188,556
- The average length of stay was 2.17 nights, equals 547,721 visitors
- International visitor numbers were 186,642 (34%)
- Domestic visitor numbers were 361,079 (66%)

**Queenstown:** 12-month period 2012/13:

- Total guest nights were 2,790,774
- The average length of stay was 2.59 nights, equals 1,077,518 visitors
- International visitor numbers were 708,632 (66%)
- Domestic visitor numbers were 368,886 (34%)

**Rotorua:** 12-month period 2012/13:

- Total guest nights were 1,750,662
- The average length of stay was 1.73 nights, equals 1,011,943 visitors
- International visitor numbers were 275,989 (27%)
- Domestic visitor numbers were 735,954 (73%)

The Gondola operations in Queenstown and Rotorua (both owned by Skyline Enterprises Ltd) had average cableway passengers over the period 2009–2013 of 519,257 and 402,884 per annum respectively. As such, 48% of visitors to Queenstown and 40% of visitors to Rotorua used the Gondolas.

Historically, the Christchurch Gondola averaged just over 100,000 passengers per annum, with the absence of a luge / mountain bike/walking trails being the point of difference.

Two financial models are proposed in this report. Model 1 shows visitor numbers of 33,893 (including local users) in the first year of operation with a growth rate of 10% per year. Model 2 shows visitor numbers of 67,786 (including local users) in the first of operation with a growth rate of 10% per year. This equates to just over 5% or 11% of visitors to the region.

Region	Total Guest Nights	Average length of stay	International Visitors	%	Domestic Visitors	%	Total Visitors	Cableway Passengers (visitors to region only)	% of visitors to the regions
Nelson	1,188,556	2.17	186,642	34%	361,079	66%	547,721	28417	5%
								56834	11%
Rotorua	1,750,662	1.73	275,989	27%	735,954	73%	1,011,943	402,884	40%
Queenstown	2,790,774	2.59	708,632	66%	368,886	34%	1,077,518	519,257	48%

## 5. Business case

**Prepared by Gilbert Robertson, Robertson CA, reviewed by John Rollston, Crowe Horwath.**

Two financial models have been prepared projecting cash flow to March 2020 for a gondola operation offering various personal and bike lift options.

The visitor numbers have been based on various sources supplied by Nelson Tasman Tourism and others, then segmented into different types of products to be offered, with take-up varying depending on whether the customers are Local, Domestic, or International users.

Product pricing is based on competing Queenstown, Rotorua and Christchurch gondola operations.

Operating costs have been derived from similar gondola operations, with information supplied by Leitner Poma, Lyttelton Engineering, and reviewed by Martin Mongan (former part-owner Christchurch Gondola).

The model does not analyse the mountain bike park operation (but does include a contribution for track maintenance), café-restaurant, or other associated facilities, which will be stand-alone profit centres deriving additional revenue from the customer base.

### Conclusions

The resulting analysis shows that with extremely conservative visitor numbers (Model 1), a gondola operation should be profitable from the first year of operation, but would not give sufficient return on investment for a fully commercially funded entity. To achieve this model, about 50% of the equity would need to be non-commercial (i.e. not seeking a financial return).

Model 2 shows that after-tax profit should sustain a 20% return on a \$10m commercial investment.

Growth in visitor numbers to 20% of total visitors would result in a very profitable, growing business with sufficient resources to actively market nationally and internationally. At this level, the penetration is only ¼ of that achieved by similar gondola operations in Queenstown and Rotorua.

This model does not factor in any local or national government funding, and will be subject to a more in-depth analysis.

**Model One:** Visitor numbers starting at 33,893 in year one of operation

**Model Two:** Visitor numbers starting at 67,898 in year one of operation

Income Scenarios	Assumption	Model One		Model Two	
		Local	Local	Local	Local
		Visitors	Income	Visitors	Income
Trip ticket (Ride only)	20%	1,106	21,486	2,213	42,972
Family Trip Ticket (Ride only)	5%	277	18,039	553	36,077
Day Pass (incl bike)	15%	830	51,711	1,660	103,422
1/2 Day Pass (incl bike)	45%	2,489	111,840	4,979	223,679
Season Ticket (incl bike)	7%	387	193,839	774	387,678
1/2 Season Ticket (incl bike)	7%	387	156,800	774	313,600
<b>Total</b>	<b>100%</b>	<b>5,477</b>	<b>553,714</b>	<b>10,953</b>	<b>1,107,428</b>
<b>Possible Income Scenarios</b>					
	Assumption	Domestic		Domestic	
		Visitors	Income	Visitors	Income
Trip ticket (Ride only)	20%	3,694	71,742	7,388	143,483
Family Trip Ticket (Ride only)	5%	924	60,231	1,847	120,462
Day Pass (incl bike)	15%	2,771	172,662	5,541	345,324
1/2 Day Pass (incl bike)	60%	11,082	497,909	22,165	995,817
Season Ticket (incl bike)	0%	0	0	0	0
1/2 Season Ticket (MTB)	0%	0	0	0	0
<b>Total</b>	<b>100%</b>	<b>18,471</b>	<b>802,543</b>	<b>36,942</b>	<b>1,605,086</b>
<b>Possible Income Scenarios</b>					
	Assumption	International		International	
		Visitors	Income	Visitors	Income
Trip ticket (Ride only)	20%	1,989	38,630	3,978	77,261
Family Trip Ticket (Ride only)	5%	497	32,432	995	64,864
Day Pass (incl bike)	15%	1,492	92,972	2,984	185,944
1/2 Day Pass (incl bike)	60%	5,968	268,106	11,935	536,211
Season Ticket (incl bike)	0%	0	0	0	0
1/2 Season Ticket (incl bike)	0%	0	0	0	0
<b>Total</b>	<b>100%</b>	<b>9,946</b>	<b>432,140</b>	<b>19,892</b>	<b>864,280</b>
<b>Total</b>		<b>33,893</b>	<b>1,788,397</b>	<b>67,786</b>	<b>3,576,794</b>



**Summary of the financial forecasts:****Model One:** Visitor numbers starting at 33,893 in year one of operation

<b>Low Visitor Scenario</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
<b>Visitor numbers</b>	33,893	37,282	41,011	45,111	49,662
<b>Turnover</b>	1,782,979	1,961,177	2,157,407	2,373,156	2,610,515
<b>Operating expenses</b>	1,331,927	1,380,816	1,451,294	1,516,528	1,595,376
<b>Operating profit/(loss)</b>	451,052	580,361	706,113	856,628	1,015,139
<b>Depreciation</b>	428,400	428,401	428,402	428,403	428,404
<b>Net Profit before tax</b>	<b>22,652</b>	<b>151,960</b>	<b>277,711</b>	<b>428,225</b>	<b>586,735</b>

**Model Two:** Visitor numbers starting at 67,898 in year one of operation

<b>Expected Visitor Scenario</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
<b>Visitor numbers</b>	67,898	74,687	82,156	90,371	99,408
<b>Turnover</b>	3,576,970	3,628,201	3,990,990	4,390,115	4,829,101
<b>Operating expenses</b>	1,401,932	1,578,700	1,533,856	1,615,941	1,702,787
<b>Operating profit/(loss)</b>	2,175,038	2,049,501	2,457,134	2,774,174	3,126,314
<b>Depreciation</b>	428,400	428,401	428,402	428,403	428,404
<b>Net Profit before tax</b>	<b>1,746,638</b>	<b>1,621,100</b>	<b>2,028,732</b>	<b>2,345,771</b>	<b>2,697,910</b>

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## Appendix 1 Geotech report



5 July 2013

Job No: 12437

Nelson Cycle Lift Society  
Box 4049  
South Nelson  
NELSON 7045

Attention: Jo Rainey

Dear Jo,

**Re: Preliminary Geotechnical Appraisal for Proposed Cycle Lift, Fringed Hill to Brook Valley, Nelson**

### 1. Introduction

You have requested Nelson Consulting Engineers Ltd (NCE) to undertake a preliminary geotechnical appraisal for the proposed cycle lift shown on concept plans to run from the Brook Valley Motor Camp to a location just below the summit of Fringed Hill. Our work comprises an assessment of the proposed route, top and bottom gondola stations and the intermediate cable support towers, to provide an opinion as to the geotechnical constraints with respect to general stability of land and seismic risk relating to nearby fault locations. In addition, we also provide general comment as to the existing access to the top station and tower locations and / or feasibility of providing new access to the proposed tower locations.

Other route options exist, however this report assesses the preferred concept, with a possible alternate route shown on the *Geotechnical Site Plan*, dated 5 July 2013, which is appended to this report.

We have reviewed the *Nelson Gondola and Adventure Park Concept Overview* and the *Nelson Gondola Proposal – Summary Overview* provided by the client. Based on the conceptual specifications for the single cable gondola system provided in these overviews, we have illustrated the proposed conceptual location of top and bottom stations and the intermediate tower locations on the site plan. The elevation contours shown on the site plan are derived from the currently available NCC GIS, which are adequate for this preliminary geotechnical appraisal, however, we have no knowledge of the vegetation height or the height of existing power transmission lines in the area which may influence the cycle lift design.

### 2. Scope

Our agreed scope covered on this assessment is as follows:

- Review Nelson City Council (NCC) GIS aerial photograph of the cycle lift route and vicinity as well as the topographic elevation contours and stream locations.

140 Collingwood Street, Nelson, New Zealand    phone: 64-3-539-4145    fax: 64-3-539-4146  
cellular: 0274-555-720    email: [info@nce.co.nz](mailto:info@nce.co.nz)    web: [www.nce.co.nz](http://www.nce.co.nz)

**Nelson Cycle Lift Society  
Preliminary Geotechnical Appraisal  
for Proposed Cycle Lift  
Fringed Hill to Brook Valley, Nelson**

- Review the NCC Resource Management Plan (RMP) Area Map 55, which shows the proposed base station location is within a heritage woodland area and is overlain by a fault hazard overlay.
- Review the available stereo-aerial photographs of the cycle lift route and vicinity, which provides a brief history of the area and information relating to stability of the general area.
- Review of the map *Geology of Dun Mountain* (Johnston, 1981) which shows the proximity of active faults relating to the RMP fault hazard overlay, and the underlying geology of the area.
- Walkover assessment of the proposed cycle lift route and sections of existing access tracks providing current access to the possible tower locations, as accessed in a top – down manner.
- Consult with the client.
- Prepare this report.

### 3. Site Description

Our understanding of a single cable gondola as proposed is that the cable must span in a straight line between top and base stations. Intermediate cable support is provided by towers of maximum 300m spacing and up to 20m tower height.

The proposed cycle lift route ascends from the base station within the Brook Motor Camp at approximately 90m elevation, to the top station on a cut / fill platform located on a west trending spur from Fringed Hill at approximately 710m. Both sites are currently level areas with four wheel drive access. The land underlying the proposed lift route is currently owned by Council.

The numerous four wheel drive, mountain bike and walking tracks in the vicinity, are used both for recreation and as specific access to infrastructure, such as power pole locations. The proposed cycle lift crosses power lines leading to Fringed Hill at two locations.

From the top station platform area, a steep roughly formed four wheel drive track leads down a northwest trending spur at slopes up to 18° to 20°. This track appears to be for forestry use and/or access to two power pole locations, and may provide the basis for access to proposed Tower 5.

From the top station area, a second four wheel drive track leads down a ridgeline to the southwest, which is known as Cummins Spur (also known as the Classic route). Approximately 150m down the track, a second rougher track commonly sloping 20° to 22°, with sections up to 27°, heads down Bullock Spur towards the northwest. This track provides access to proposed Tower 4 and Tower 5 locations, and continues down to intersect with the Dun Mountain Walkway. In the vicinity of proposed Tower 2 and Tower 3 the ground slope is steep, approximately 42° to 45°. Proposed Tower 1 is located along side an existing track leading up from the Brook Valley of moderate ground slope.

Generally the vegetation covering the slopes is regenerating native vegetation within scrub, with either mature wilding pines or remnants of former exotic forestry. The upper gully area of the Glen Stream catchment is generally mature native vegetation, which extends up slope to the top station and the area of an access track leading from the top station down to the start of Bullock Spur.

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**Nelson Cycle Lift Society  
Preliminary Geotechnical Appraisal  
for Proposed Cycle Lift  
Fringed Hill to Brook Valley, Nelson**

#### 4. Local Geology

The geology underlying the cycle lift area is shown on the geology map *Dun Mountain* (Johnston, 1981) as generally underlain by reasonably competent inter-bedded sandstone and siltstone of the Waiua Formation and Greville Formation bedrocks belonging to the Maitai Group. The exception to this is at the base station location which is shown to be underlain by a siltstone of the Marsden Coal Measures formation (m), with lithological boundaries defined by the east and west branches of the Waimea Fault. The approximate distance between the faults at this location is about 80m. NCC requires a 5m fault setback distance where the location of active faults can be determined. At this stage we do not know if the proposed base station has the required fault setback. Our initial observations of the site indicate the east branch of the Waimea Fault is likely to sub-parallel the toe of the hill slopes rising to Fringed Hill. This being the case, adequate setback of the base station from the fault trace appears feasible, but needs to be confirmed.

An earthquake originating from this fault is estimated to have a return period of over 6000 years. However, earthquakes originating from the more distant Alpine, Wairau, Marlborough, Northern Buller and Wellington Fault systems, are believed to present the majority of seismic hazard risk to the region. The Nelson area has been affected by five damage-causing earthquakes since European settlement in the region, and is considered to have a high to very high seismic hazard risk.

#### 5. General Slope Stability and Ground Conditions

Based on our review of the stereo aerial photographs and our site walkover, no evidence of significant deep seated instability was observed within the vicinity of the lift route. The steep slopes bounding the south side of Glen Creek contain areas of scree slope, which are covered by loose angular gravel of unknown depth. Generally, shallow instability was observed within limited sections of access track cut batters which expose the overlying soils and closely fractured bedrock. Some relatively minor, shallow slips within the overlying soil horizons exist.

During our walkover of the proposed cycle lift route, we observed exposed bedrock at numerous locations in the near level area of the proposed top station and within sections of the existing access tracks. These are general observations, however they suggest foundation ground conditions for tower construction are likely to be within bedrock at or near the ground surface, but will need to be confirmed prior to design.

While the *Geotechnical Cross Section* attached to this report indicates some relatively level sections of the lift route, which is misleading as in the case of the crossing of Glen Creek, where the route parallels contour lines with a cross slope up to 45°. Generally, ground slopes at tower locations and along potential access routes are moderately steep (18° to 30°) to steep (30° to 45°). Where significant depths of overlying soil or highly weathered bedrock exist, proposed track cut batters will require more conservative design and may require regular maintenance.

#### 6. Access to Proposed Tower Locations

Vehicle access to the top station is currently provided via the Tantragee Saddle - Fringed Hill four wheel drive track. With the exception of the main access track from Tantragee Saddle, current four wheel drive tracks have moderately steep sections up to 27°, suitable only for experienced four wheel drive users and specifically equipped off road vehicles. The tracks are suitable for track mounted diggers.

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**Nelson Cycle Lift Society  
Preliminary Geotechnical Appraisal  
for Proposed Cycle Lift  
Fringed Hill to Brook Valley, Nelson**

Further geotechnical assessment and topographic survey is required to determine feasible vehicle access to off track tower locations exists.

**7. Alternate Cycle Lift Route**

An alternate cycle lift route is shown on *Geotechnical Site Plan* which we have not assessed. Other routes are likely to exist, and may be feasible from a geotechnical perspective.

**8. Conclusion**

The proposed cycle gondola as shown comprises of the top and base stations and seven intermediate towers. The proposed route and tower locations appears feasible from a geotechnical perspective. Given the constraints of a single cable gondola and straight line route, the exact tower locations are mainly influenced by maximum cable span and the required ground clearance provided by the proposed maximum 20m tower height. The cableway route is generally steep, however no evidence of deep seated instability within bedrock was observed.

Some tower locations are on relatively level ground (top and bottom stations, tower 1 and tower 4, however five proposed tower locations are on steep to very steep ground where construction of access will be more difficult and require specific engineered design. Further geotechnical assessment will be required to confirm access routes during the design of specific tower locations which will also require more detailed survey information.

**9. References**

JOHNSTON, M R 1981: Dun Mountain, Map Sheet O27AC. Institute of Geological & Nuclear Sciences Limited, Lower Hutt.

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Project Number - 12437  
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**Nelson Cycle Lift Society  
Preliminary Geotechnical Appraisal  
for Proposed Cycle Lift  
Fringed Hill to Brook Valley, Nelson**

**10. Limitation**

This report is confidential and has been prepared solely for the benefit of the Nelson Cycle Lift Society and Nelson City Council. No liability is accepted by Nelson Consulting Engineers Ltd or by any principal, director, employee or agent of this firm, in respect of its use by any other person. Any other person who relies upon any matter contained in this report without consultation and agreement with Nelson Consulting Engineers Ltd does so entirely at their own risk.

This report must be reviewed for its applicability in the event that any substantial modifications are made to the site or adjacent properties, such that site conditions are changed substantially from the conditions at the time of the investigations.

If conditions are observed that are not as indicated in this report, please contact this office immediately. Unusual conditions may include signs of seepage, subsidence, cracking or slumping.

Yours faithfully,

**NELSON CONSULTING ENGINEERS LTD**



**John Higginbotham, CPEng, MIPENZ (Geotechnical, Structural)  
Principal Civil Engineer**

Attachments: Geotechnical Site Plan (5 July 2013), Geotechnical Cross Section A (5 July 2013), Alternate Route Cross Section B (5 July 2013).

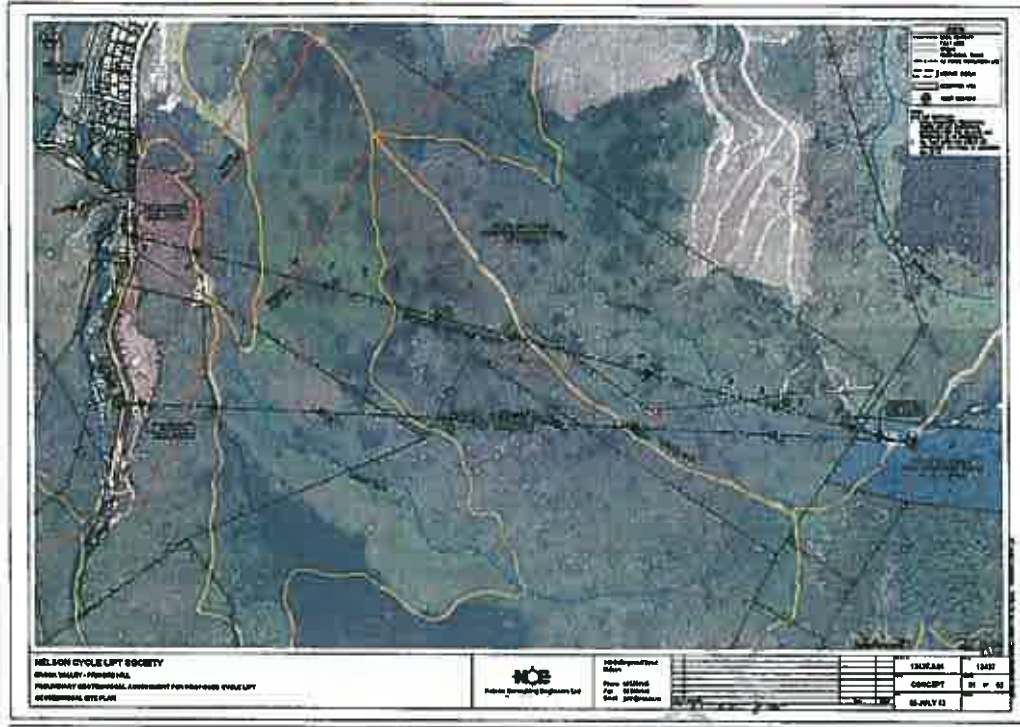
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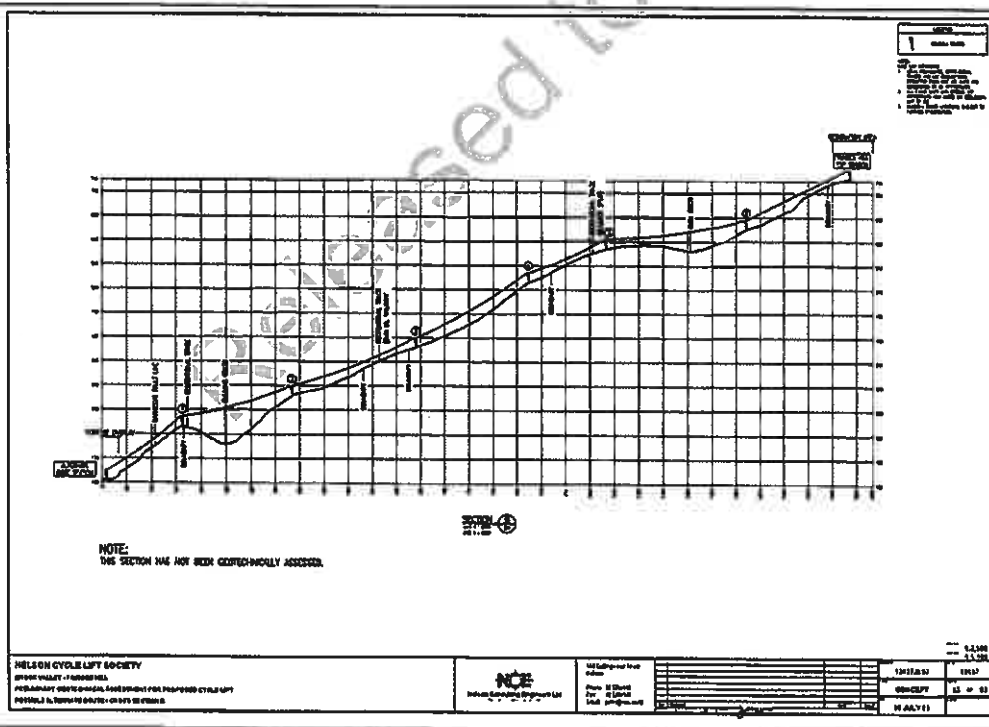
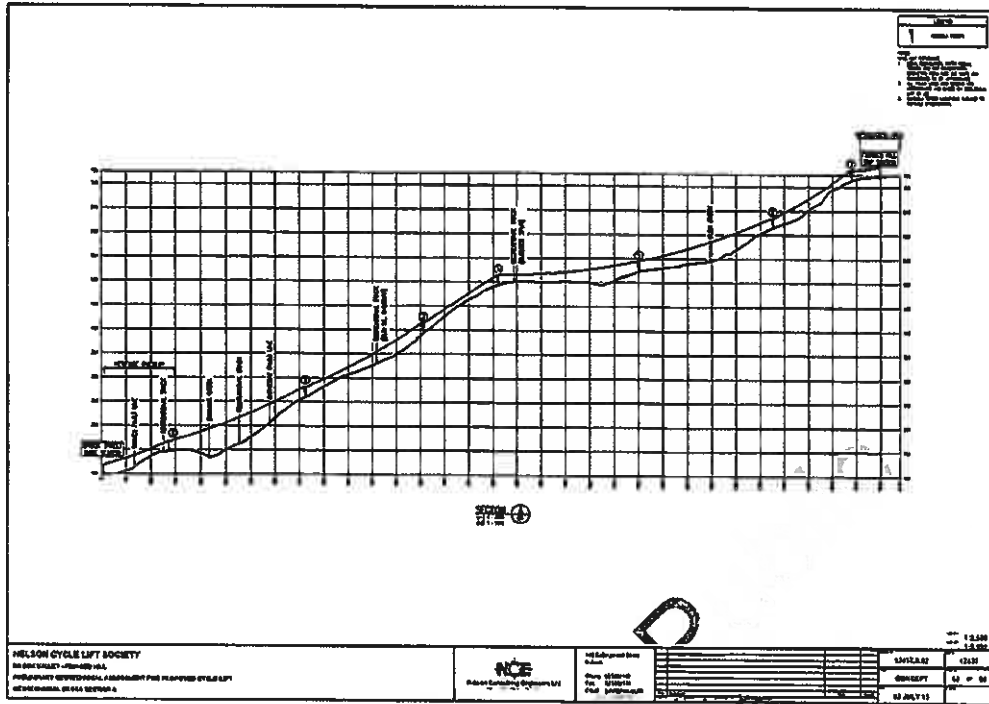
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## Appendix 2 Lyttelton Engineering report

21<sup>st</sup> March 2014

Nelson Cycle Lift Society  
Box 4049  
South Nelson  
Nelson 7045

Attention: Jo Rainey

Dear Jo

Re: Proposed Mountain Bike Gondola, Fringed Hill to Brook Valley, Nelson

Further to your correspondence in regards to the Fringe Gondola concept, we confirm discussion and preliminary investigation into the installation of a gondola on Fringe Hill as per the proposed line that was completed by Nelson Consulting Engineers.

A site inspection of the proposed bottom (x 2 locations) and top (Drive/Return) station locations has been undertaken. The proposed lift line was also reviewed.

A preliminary assessment is that the proposed station locations and lift line look suitable for installation of gondola. Equipment access to the top station during installation may require some upgrading of the access track. There will need to be a further survey undertaken to obtain an accurate ground profile so that a full engineering study can be completed. Ground pressure tests will be required for detailed design and construction. Lower than expected conditions would result in additional foundation costs.

A budget proposal has been provided based on the information received to date. This proposal provides the technical specification of the lift but it should be noted that this has been prepared for budget purposes based on limited information. This proposal has the drive station at the top and return being the bottom. This would require 415V 3 phase power at the drive (top) and 230V(bottom) at the return. The lift can be configured with the drive at the bottom but this will increase the drive power.

If you require any further information please do not hesitate to contact me or Damian Blackmur.

Yours Faithfully  
LYTTELTON ENGINEERING LTD

P G Judd  
ENGINEERING MANAGER



Appendix 3 LPOA Proposal Summary



**Fringe Gondola – Mtn Bike Gondola Lift**

- 8 place Gondola Lift

**Budgetary Profile Data**

Slope Length:	1,600 m	Speed:	Initial	Final
Vertical Rise:	610 m	Capacity Up:	5.08 m/sec	5.08 m/sec
Average Grade:	41%	Capacity Down:	500 pph	1000 pph
Rotation:	Clockwise	Spacing:	100%	100%
Carrier Type:	Gondola	Interval:	234m	117m
Carrier Size:	8 Place	Carriers #:	57.6 sec	28.8 sec
Drive Location:	Top	Travel Time:	18	31
Active Tension:	Bottom	Towers	5.2min	5.2min
Line Gauge:	4.8 m			
Cable Diameter:	45.0 mm			
Cable Length:	3,325m			
Carrier Parking:	Bottom			

2013 Budgetary Equipment Only	\$6,020,000	US Dollars	
2013 Budgetary Installation	\$1,620,000	NZ Dollars	Exchange Rate 1.181

## Appendix 4 Nelson Cycle Lift Society Committee

Chairman and founder Jo Rainey is a manager for NZ Trade & Enterprise. Chairman of Rainbow Sports Club, operator of Rainbow Ski Area. Deputy Chair Nelson College Board of Trustees.

Gilbert Robertson is director of Robertson Chartered Accountants. He is experienced in guiding new businesses through the initial start-up phase and mentoring them as they grow and succeed. Keen mountain-biker.

John Rollston is a chartered accountant and joined Crowe Horwath in February 2001 after working in the Australian and New Zealand commercial accounting sector for five and a half years. Chairman Nelson Bays Community Foundation. Keen mountain biker, and member of the Nelson MTB Club.

Martin Mongan and wife Glenda have recently moved from Christchurch to Nelson region. Director - Regional Economic Development and Business Relationships for NMIT. Martin has over 30-years experience in the tourism sector, encompassing airline, wholesale, and retail. Previously part owner of the Christchurch Tramway Ltd and Christchurch Gondola Ltd.

Alan Winwood is a civil engineer with over 40 years experience in NZ and overseas commercial and civil construction. He specializes in project costing, tender preparation, and project management. Is an active supporter and participant in the Nelson MTB scene since 1990, and long-standing member of the Nelson MTB club.

**Contact:**

Chairman  
NCLS  
Jo Rainey  
Box 4049,  
Nelson

[jo.rainey@xtra.co.nz](mailto:jo.rainey@xtra.co.nz)  
027 2749972