

Appendix C – Infrastructure Report



INFRASTRUCTURE REPORT

Mount Iron Wanaka

Rural Lifestyle Zone Submission

PROJECT: Mount Iron
PRINCIPAL: Allenby Farms Ltd
OUR REF: W4743
DATE: 3th April 2017

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REVISION / APPROVAL PANEL

Rev:	Date:	Prepared By:	Reviewed By:	Comments:
A	21/03/17	PHJ	DLW	Original issue
B	03/04/17	PHJ	DLW	Revised to include PSI

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1. SCOPE

This report has been prepared to provide servicing information to support submissions #502 (Allenby Farms Ltd). This area is shown on the plan in Appendix A. This report covers the following infrastructure issues.

- Natural Hazards
- Water Supply
- Wastewater
- Stormwater
- Network Utility Services (electricity and telecommunications)
- Access

2. NATURAL HAZARDS

2.1 Council Hazard maps

The council hazard maps identify this land as LIC1 as nil to low risk of liquefaction.

2.2 Preliminary site investigation.

A preliminary site investigation report has been undertaken by Opus, this report is included as appendix E.

This report indicates that it is highly unlikely that HAIL activities have been undertaken in the areas proposed for residential development.

2.3 Flooding / Inundation

The proposed building platforms have been sited so as to be clear of existing gullies and overland flow paths.

3. PROPOSED INFRASTRUCTURE

3.1 General

It is anticipated that all infrastructure for development would be designed and constructed in accordance with Council's infrastructure standards – "Land Development and Subdivision Code of Practice" adopted June 2015 and any subsequent amendments.

3.2 Water Supply

There is existing Council water reticulation located in both Hidden Hills Drive and Rob Roy Lane. The proposed building sites are located above the contour level that these existing

gravity supplies will service and will require a private water pump station to be placed to provide water to the sites and water tanks placed for firefighting supplies. It is envisaged that the building platforms would have a water tank onsite to supply firefighting water supplies with a static reserve at the top of the tank to be used for domestic supply. This will require individual pumps from the water tank on each site to provide domestic water pressure.

As the majority of the sites are accessed from Rob Roy Lane it is envisaged that this private pump station will be placed at this end of the site. As the sites will have water storage tanks this pump station does not need to supply water continuously and can be configured to pump during off-peak times if there are constraints in Councils current network capacity.

3.3 Wastewater

Although the underlying soils are suitable for onsite disposal this would require the careful placement of the dripper line through the kanuka outside the building platforms by hand so as not to remove any specimen trees. There is significant ongoing costs associated with an aerated septic tank and it is therefore considered more desirable to connect to the council reticulation.

There is council reticulated foul sewer located in both Hidden Hills Drive and Rob Roy Lane.

It is envisaged that foul sewer will be reticulated by a low-pressure foul sewer network as part of the development of the sites with each individual land owner being required to place individual pumps at the time a dwelling is built. It is expected that platforms 1 -12 will discharge to Rob Roy Lane and platforms 12 – 14 to Hidden Hills Drive. Although all lots could discharge to either point if one location was more preferable to council.

As these sites will all have individual pumps the timing of the discharge to the QLDC network can be scheduled to minimise the effects downstream.

3.4 Stormwater

Platforms 1 and 2

The test pitting undertaken for the sewage system for the Cleugh house adjacent to these platforms indicates that the site is underlain by a layer of topsoil of 600-700mm a gravel seam of 500mm over sandy loams. The gravel seam and sandy loams are suitable for disposal of stormwater to ground.

Platforms 3-8

These platforms are off a similar height to the platforms within in the Hidden Hills development on Hidden Hills Drive and Highfield Ridge. They are also in the same general area as the existing houses on Mt Iron.

The cut face behind the reservoir confirms that the materials are consistent with the test pits undertaken for the Hidden Hills development, these soil types are suitable for disposal of stormwater to ground.

Platforms 9-12

The overland flows from these sites ends up on the roading within the Hidden Hills development so a stormwater system utilising attenuation and discharge to the gulley below the site will be feasible. It is however expected that the underlying soils would be similar to the rest of Mount Iron at this elevation and that discharge to ground will be the preferred solution.

Platforms 13-14

The excavation for the sheep dip depository below platforms 14 and 15 was into materials consistent with the test pits for the Hidden Hills development. The Hidden Hills geo-technical report is attached as Appendix B. The geotechnical report for the Hidden Hills development confirms that these soil types are suitable for disposal of stormwater to ground.

In summary the underlying soils and topography are suitable for a stormwater solution to be designed at the time of development of these building platforms.

3.5 Network Utility Services

3.5.1 Electricity

There is existing electrical reticulation to the area of single phase 15kVA. A letter from Aurora confirming that future development in this area can be serviced to this standard is included in Appendix C.

3.5.2 Telecommunications

Chorus has confirmed that telecommunications can be made available to future development within the submission area. Confirmation from Chorus is included as Appendix D

3.6 Access

Access to the site will be provided from the existing sealed driveways in Hidden Hills Drive and Rob Roy Lane. The carriage way formation for these sites will be constructed to Council infrastructure code standards of 2.5m wide with passing bays every 50m where the road services 1 -6 lots and a 5.5m carriageway for where the road services more than 6 lots.

The existing sealed access from Rob Roy Lane consists of a 3.5m sealed carriageway within a 15m wide access strip. This will need to be widened to a 5.5m carriageway. The existing Hidden Hills access way consists of a 3.5m carriageway within a 20m wide access strip. This will require the addition of 1 passing bay to meet standards. There is sufficient land in each case to enable legal and practicable implementation of these works to meet Council standards.

These formation standards will minimise the earthworks and clearance required to service platforms.

4. Conclusion

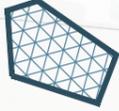
Development within the submission area can be serviced in accordance with Council's District Plan and Land Development and Subdivision Code of Practice. Specific design issues can be identified and resolved at the time of resource consent or specific engineering design and approval (if necessary). There are no engineering or servicing issues that would preclude the subject area being rezoned from Rural General to Rural Lifestyle.

Peter Joyce
Registered Professional Surveyor
Paterson Pitts Limited Partnership

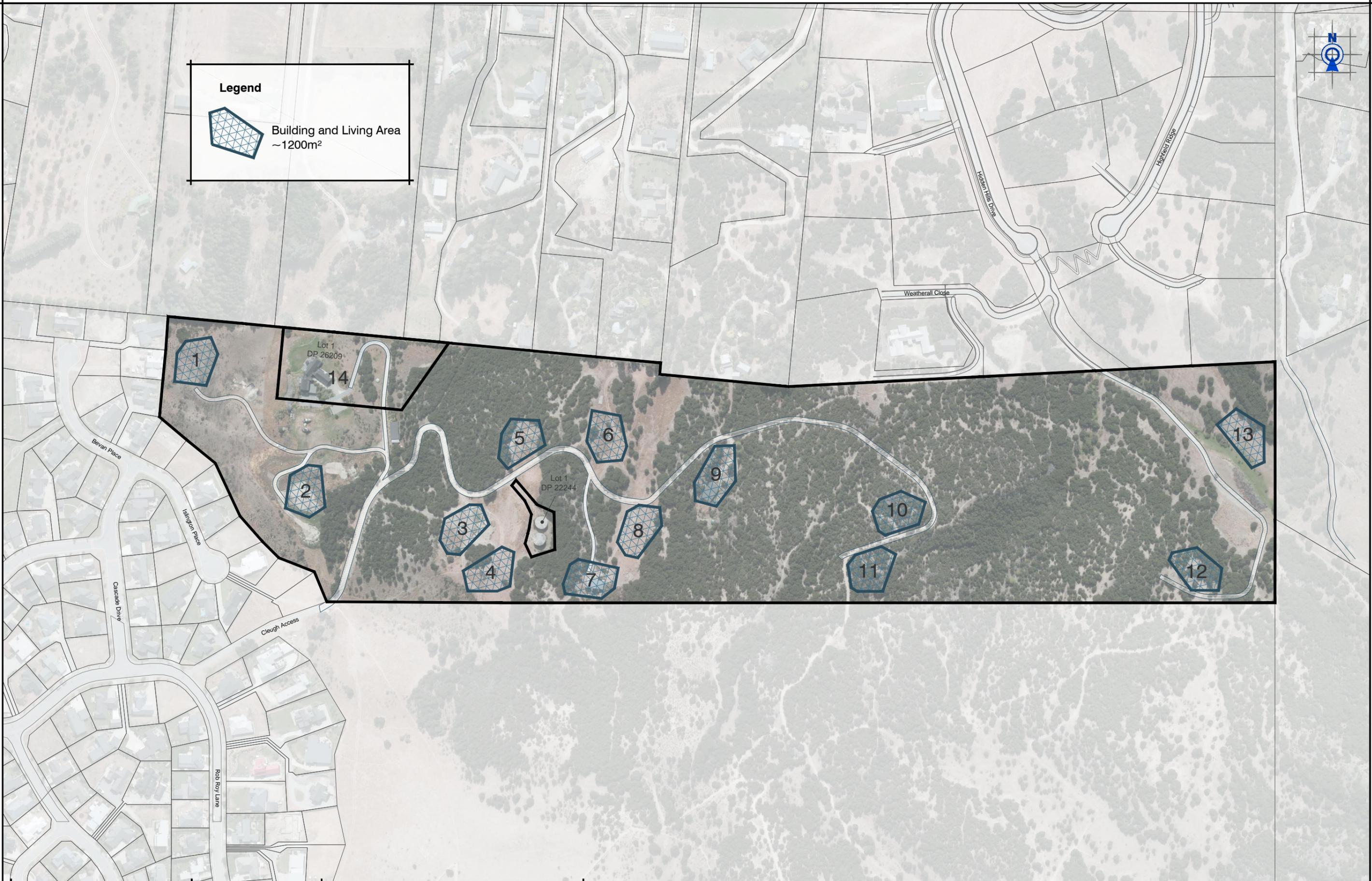
Appendix A Site Plan



Legend



Building and Living Area
~1200m²



Appendix B Hidden Hills geo-technical report.



Tonkin & Taylor

ENVIRONMENTAL AND ENGINEERING CONSULTANTS



REPORT

PATERSON PITTS PARTNERS LTD

**Allenby Farms Subdivision
Wanaka**

Report prepared for:

PATERSON PITTS PARTNERS LTD

Report prepared by:

TONKIN & TAYLOR LTD

Distribution:

PATERSON PITTS PARTNERS LTD

TONKIN & TAYLOR LTD (FILE)

August 2007

Job no: 51123.002

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1. Introduction

This letter report details the geotechnical assessment that has been carried out by Tonkin and Taylor Ltd (T&T) for the proposed 38 lot subdivision known as Allenby Farms.

The work has been undertaken at the request of Paterson Pitts Partners on behalf of the developer. T&T's letters of engagement dated 18 June 2007 and 12 July 2007 set out the scope of the work undertaken and the terms and conditions of engagement.

2. Site Characteristics

2.1. General

The development is located approximately 3km northeast of the Wanaka Township on a sloping site on the flanks of Mount Iron, recorded as Lot 3 DP 360537. A 38 lot subdivision is proposed for this site of approximately 20 ha, refer to Figure 1a in Appendix A. Main access to the site is from Aubrey Road with two primary access roads proposed. The site is currently used as agricultural paddocks with life style blocks on the eastern and western boundaries. Farm land borders the southern boundary of the development.

2.2. Elevation

The elevation of the site ranges from RL330 m in the northeast corner to RL405 m in the southeast corner. The lower part of the site, adjacent to Aubrey Road, is gently sloping down in a northern direction. The southern section of the site becomes more steeply sloping, with localised maximum gradients of up to 30 degrees. Upslope of the proposed subdivision is Mount Iron and Little Mount Iron at a maximum elevation of RL 548 m.

3. Geological Setting

3.1. General

The geology of Wanaka and Albert Town is dominated by glacial moraines and outwash gravel terraces formed during the glacial advances of the Pleistocene. Schist bedrock outcrops in the slopes of Mt Iron, a prominent glacially scoured hill lying between the two areas.

During the Albert Town Advance (35,000 yrs BP) a moraine loop formed near Albert Town, and till and outwash gravels were deposited. Further up valley in the Wanaka - Mt Iron area, tills and outwash gravels were deposited during the subsequent Hawea Advance (15,000 yrs BP).

During post glacial times loess was deposited on the terraces, and erosion during rainstorms produced alluvial fans.

3.2. Seismic Risk

The active Cardrona Fault lies 1.2km east of the site. However, this and other more distant regional faults (such as the Pisa and Grandview) are considered to pose a low seismic risk. This is due to the long return periods of fault movement, typically many thousands of years.

The main seismic risk to the site is from the Alpine Fault, 90km to the west, which represents the boundary of the Australian and Pacific plates. There is a high probability of a major earthquake on the fault, possibly up to Richter Magnitude 8, in the next 50 years. This would subject the Wanaka region to strong seismic shaking.

4. Geotechnical Assessment

4.1. Action undertaken

This geotechnical assessment comprised the following activities:

- A review of the results from nearby investigations and geological hazard maps for information pertaining to the site and surrounding area;
- Walkover site assessment by an engineering geologist, identifying the ground investigations required;
- Preparation of a geomorphologic map of the site;
- Assessment of the suitability of site for residential development;
- Meeting with Paterson Pitts Partners Ltd and the developers to discuss any potential geotechnical limitations and to identify the location of suitable building platforms on each lot;
- Completion of twenty two strategically located trial pits (TP01 - TP22) including logging and photographs to a maximum depth of 4.2 m;
- Recommendation of appropriate cut and fill batter angles for the earthworks design;
- Recommended soil parameters for foundation design and bearing capacity;
- Preparation of this report.

5. Geomorphology

5.1. Setting

The lower part of the site adjacent to Aubrey Rd is gently sloping. It comprises Hawea outwash terrace bearing several minor alluvial fans, refer to Figure 1a in Appendix A.

The remainder of the site consists of a dissected terrace of Albert Town Outwash Gravels, with terrace riser slopes typically sloping at 15 to 30 degrees. Small, flat to gently sloping terrace surface remnants are present at three locations at RL350 m and RL370 m.

A prominent north trending gully containing a minor creek traverses the southwest corner of the subdivision, and is the site of a 6 metre high farm dam. It is understood that the farm dam is to be removed in the earthworks as it is located on the proposed alignment of the access road. A number of small dry gullies are present on the terrace faces. A prominent north trending gully containing a minor creek traverses the southwest corner of the subdivision, and is the site of a farm dam (to be removed). A number of small dry gullies are present on the terrace faces.

The creek in the main gully above the farm dam is the only surface water flow on the site. However, there is evidence that runoff occurs down other smaller gullies during extreme rainfall events.

The 6 m high farm dam currently impounds a small shallow pond. Swampy ground with reed growth was noted above the sides of the creek upstream from the dam. It appears the creek may be fed by seepages from the gully sides; perhaps groundwater perched on glacial till.

6. Subsurface Conditions

6.1. Method of Investigation

The site was investigated with geological mapping, aerial photo interpretation and twenty two trial pits. The surface geology of the site is shown on the Site Plan in Figure 1a. Geological Cross Sections A-A, B-B and C-C, refer to Figures 2a-2c, illustrate the inferred subsurface materials.

6.2. Subsurface Composition

- Schist

One minor outcrop of schist bedrock was found in the subdivision, located near the upper boundary of Lot 22-23. The surface of the schist is thought likely to slope beneath the outwash gravels as indicated on the geological cross sections. However, these sections are speculative, and it is conceivable that schist bedrock may occur at shallow depth in some areas, especially in the general vicinity of the outcrop.

- Albert Town Outwash Gravel

This underlies the dissected Albert Town Advance terrace, and is exposed in a cut down the terrace face southwest of the farm dam. It typically consists of interbedded sandy fine to coarse GRAVEL, SAND with minor gravel, and silty SAND. Individual beds are up to 1m thick. The materials are slightly weathered, moist, and in a moderately dense condition.

Occasional boulders up to 1.5m are present in the gravels, and occur as erosional remnants on the terrace risers.

- Hawea Outwash Gravel

Trial pits adjacent to Aubrey Road found sandy fine to coarse GRAVEL underlain by fine to medium SAND. The materials were slightly weathered, moist, and in a medium dense condition. Field permeability tests indicate the gravels have high permeability, and are likely to be suitable for stormwater soakage pits.

- Alluvial Fans

These occur at the mouths of gullies draining the dissected terraces. Trial pits TP06 and TP09 indicate the materials are sandy fine to medium GRAVEL in a medium dense condition.

- Loess and Colluvium

A variable thickness of loess, ranging in thickness from 0 to 1.0m occurs over the site. The material is typically non plastic, micaceous SILT, in a loose condition. A thin veneer of colluvium was noted on some terrace risers, typically silty sandy GRAVEL in a loose condition.

The subsurface investigations confirmed that the steeper sections of the site are formed of Albert Town Outwash Gravels. The Albert Town Outwash Gravels are underlain by a layer of glacial till and then schist bedrock. The respective depths of the soil layers have not been confirmed in the Ground Investigation. At the toe of the slope, alluvial fans overly the Hawea Outwash Gravels.

6.3. Groundwater Consideration

Groundwater was encountered in only one of the twenty two trial pits, TP13 located adjacent to a creek that traverses the southwest corner of the subdivision.

Groundwater seepage was observed at a depth of 0.5 m below ground level at TP13, perched on the top of the glacial till layer. Throughout the remainder of the site, the ground water level is anticipated to be at least 4 m below existing ground level.

Full investigation logs and typical photographs are attached in Appendix A.

7. Engineering Considerations

Engineering considerations in this report are based on data from the subsurface investigation comprising twenty two trial pits and a review of the geological history and other geotechnical investigations nearby. The nature and continuity of subsurface conditions away from the test locations are inferred and it must be appreciated that actual conditions may vary from the assumed model.

7.1. Geological Hazards

No evidence of landslides or other forms of slope instability were found from aerial photos or field studies.

The presence of minor alluvial fans at the base of gullies indicates that runoff flows from extreme rainfall events must occasionally transport material out onto the flats. However, the risk to subdivision sites on the flats is considered low, given the small size of the catchments involved, and the intended installation of stormwater control systems as part of the development. The preliminary locations of building platforms shown on the site plan in Appendix A have been chosen in part to avoid areas that may be prone to flooding by runoff.

7.2. Engineering Parameters for Foundation Design

Scala Penetrometer testing was proposed to be included as part of the investigation however owing to the sizes and density of gravels encountered throughout the site,

penetrometer testing was not able to be performed. Based on the investigation results from this assessment and from the review of existing geotechnical information, all strata encountered are suitable for conventional shallow foundations, at least 300 mm wide and 300 mm deep founded on in situ materials, where allowable bearing of 100 kPa may be adopted.

When dwelling dimensions are confirmed site specific evaluation will be required in terms of NZS 3604.

All footings should be inspected at the excavation stage and any localised soft areas identified should be sub-excavated and backfilled with compacted hardfill. All topsoil and organic matter should be removed from the area to be covered by the building.

7.3. Cut and Fill Batters

Based on the geology encountered on site, maximum cut slopes of 1.5:1 (horizontal to vertical) are recommended unless subject to further investigations, with fill batters limited to 2:1. Sites for any batters higher than 2 m, or subject to overland flows should be inspected by a geotechnical practitioner.

Flat batters are more conducive to revegetation.

8. Suitability of Site for Residential Development

The tentative building sites are shown in Figure 1a contained in Appendix A. The location of the building platforms have been selected based on the relatively flat topography at each location, the accessibility from adjacent roads and the avoidance of possible surface run off paths. It is anticipated that for all of the building sites proposed, the required earthwork excavations will be less than 4.0 m.

Based on the comprehensive geotechnical assessment undertaken there have been no geotechnical issues identified that significantly affect development under Section 106 of the Resource Management Act 1991.

9. Applicability

This report has been prepared for the benefit of Paterson Pitts Partners Ltd with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

During construction, excavations should be examined by an inspector or engineer competent to confirm that subsurface conditions encountered are compatible with the inferred conditions on which this report has been based and assess any support requirements. It is important that we be contacted if there is any variation in subsoil conditions from those described in this report.

TONKIN & TAYLOR LTD
Environmental and Engineering Consultants
Report prepared by:

Graeme Halliday

Graham Brown

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.....

Graeme Halliday

Graham Brown

Authorised for Tonkin & Taylor by:

Graham Salt

.....

Graham Salt

Geotechnical Group Manager

MASS

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Appendix A: Preliminary design drawings

- **Figure 1a – Site Plan**
- **Figure 2a – Geological Cross Section A - A**
- **Figure 2b – Geological Cross Section B - B**
- **Figure 2c – Geological Cross Section C - C**

ENGINEERING
GEOLOGICAL MAP

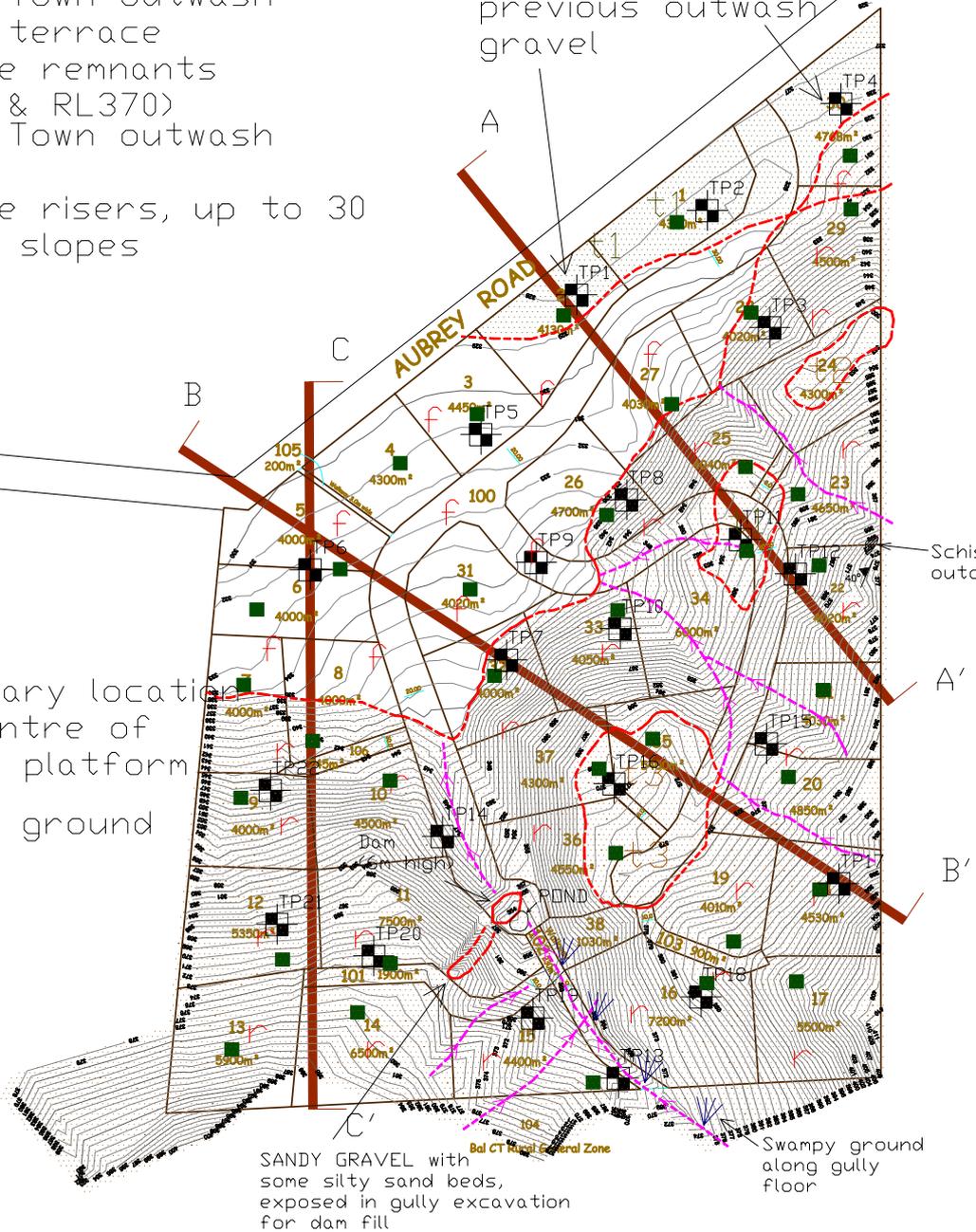


OUTLET ROAD

- ff Alluvial fan
- t1 Hawea outwash gravel terrace surface (RL330)
- t2 t3 Albert Town outwash gravel terrace surface remnants (RL350 & RL370)
- rr Albert Town outwash gravel terrace risers, up to 30 degree slopes

Possible stormwater infiltration sites in previous outwash gravel

- Schist
- Gully
- Preliminary location for centre of building platform
- Swampy ground



SANDY GRAVEL with some silty sand beds, exposed in gully excavation for dam fill

Swampy ground along gully floor



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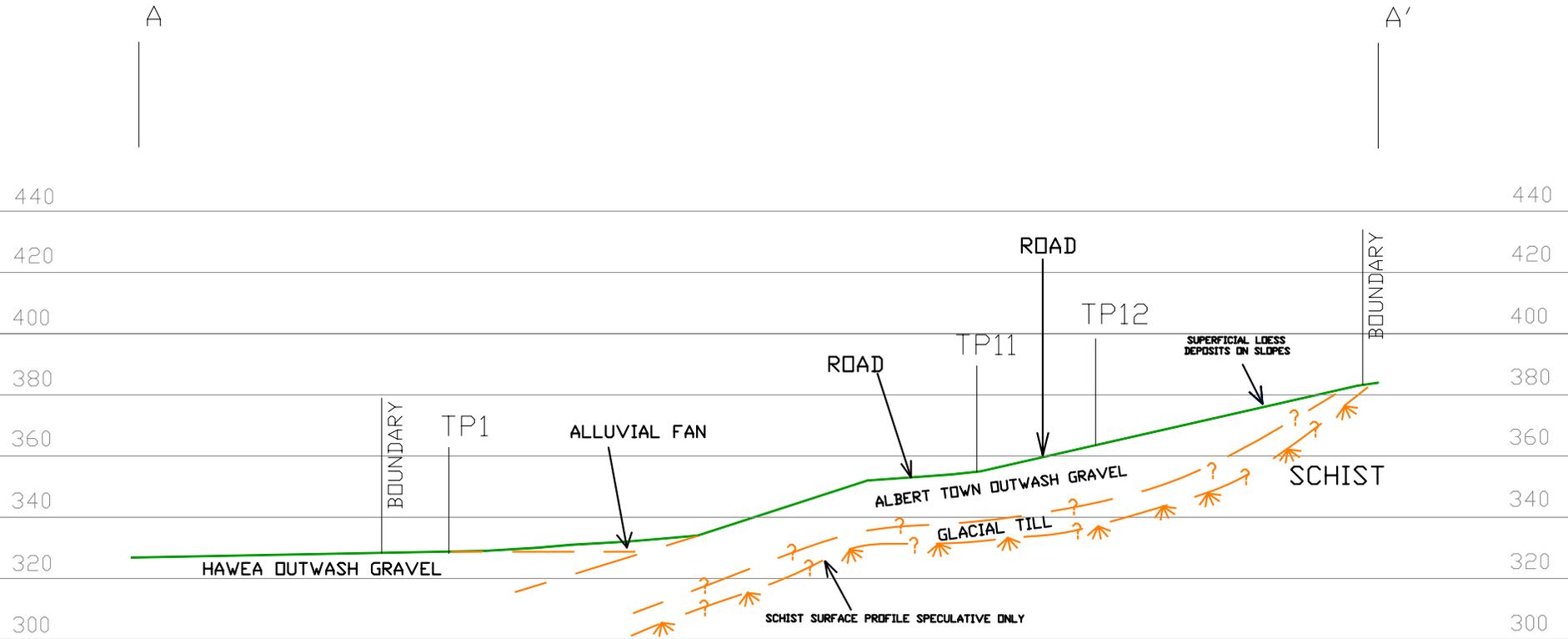
- AUCKLAND
- DUNEDIN
- WELLINGTON
- CHRISTCHURCH
- HAMILTON
- WHANGAREI

DRAWN	HY	27/07/07
DRAFTING CHECKED		
APPROVED		
CADFILE :		
SCALES (AT A4 SIZE)		
PROJECT No.	51123.002	FIG. No.

Paterson Pitts Partners Ltd
Geotechnical Investigations
Allenby Farms Subdivision, Wanaka
Site Plan

Fig. 1a

REV. 0



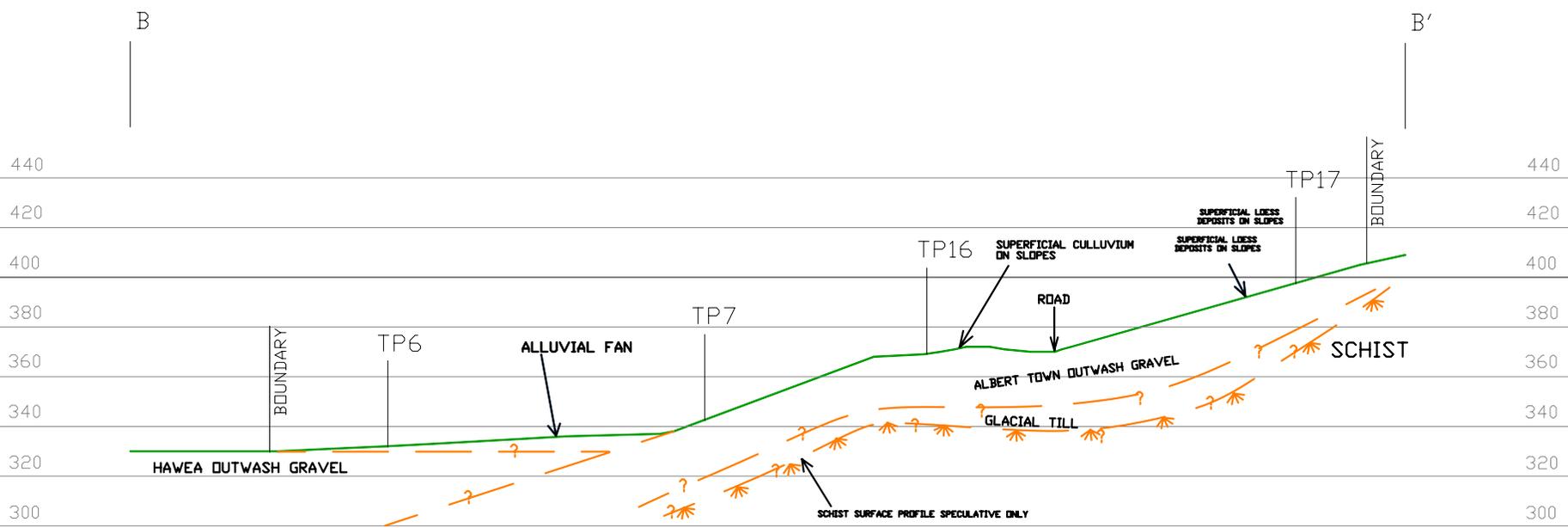
NB. Fundamental watertable unknown but likely to be at considerable depth. Local perched water table on surface of glacial till.



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DRAWN	HY	01/08/07
DRAFTING CHECKED		
APPROVED		
CADFILE :		
SCALES (AT A3 SIZE)		
PROJECT No.	51123.002	

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 Geotechnical Investigations
 Allenby Farms Subdivision, Wanaka
 Section A - A'



NB. Fundamental watertable unknown but likely to be at considerable depth. Local perched water table on surface of glacial till.



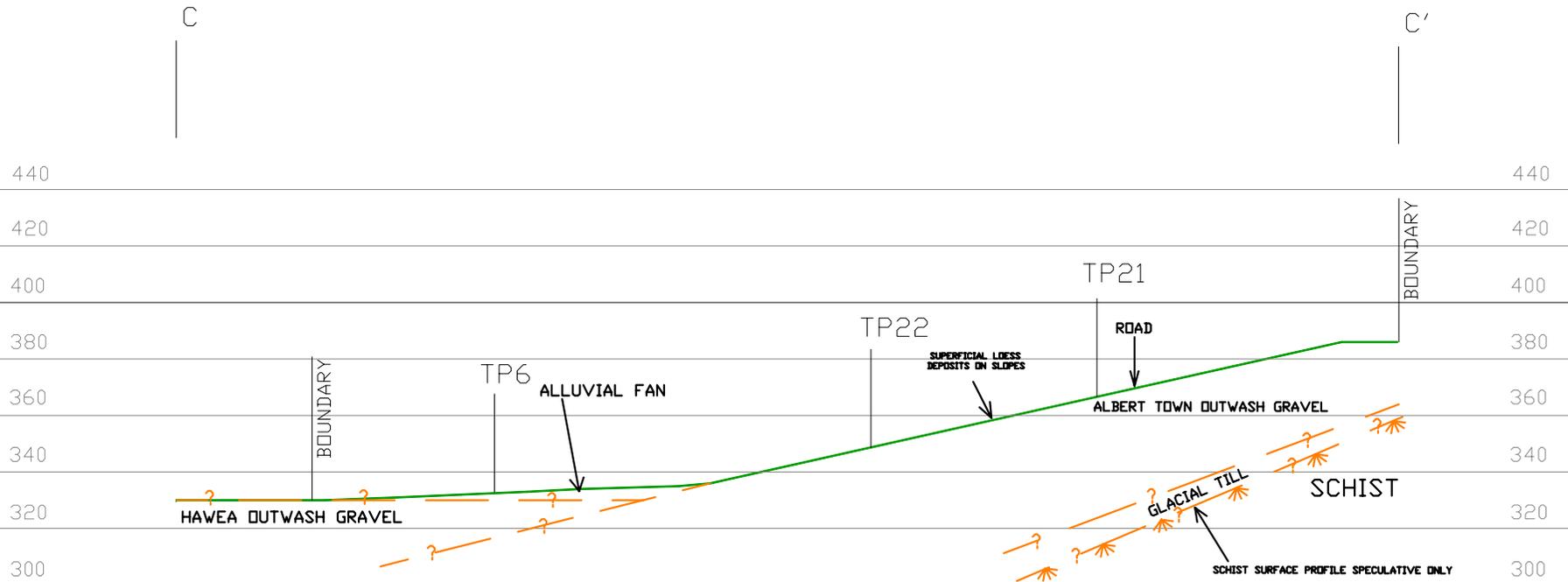
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 ■ HAMILTON ■ WHANGAREI

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APPROVED		
CADFILE :		
SCALES (AT A3 SIZE)		
PROJECT No.	51123.002	

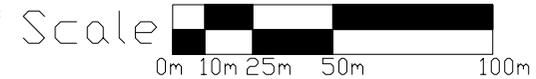
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 Allenby Farms Subdivision, Wanaka
 Section B - B'

FIG. No. Fig. 2b

REV. 0



NB. Fundamental watertable unknown but likely to be at considerable depth. Local perched water table on surface of glacial till.



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- WHANGAREI

DRAWN	HY	01/08/07
DRAFTING CHECKED		
APPROVED		
CADFILE :		
SCALES (AT A3 SIZE)		
PROJECT No.	51123.002	

Paterson Pitts Partners Ltd
Geotechnical Investigations
Allenby Farms Subdivision, Wanaka
Section C - C'

FIG. No. Fig. 2c

REV. 0

Appendix B: Test Pit Logs



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 1

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.4		Topsoil.		TOPSOIL
		0.8		Brownish grey, Sandy GRAVEL. Gravel, fine to coarse and sub-angular to subrounded; sand, medium to coarse. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL
		1.2				
		1.6		Grey, SAND . Fine to medium. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL
		2.0		Brownish grey, Sandy GRAVEL with minor silt. Gravel, fine to medium; sand, medium to coarse. Slightly weathered. Medium dense.		HAWEA OUTWASH GRAVEL
		2.4				
		2.8				
		3.2			Moist	
		3.6				
		4.0				
	NO SEEPAGE	4.4		Total Depth = 4 m		
		4.8				
		5.2				
		5.6				
		6.0				
		6.4				

COMMENT: Permiability test in 44 gallon drum 4m towards road at 0.9m depth gave $K=2 \times 10^{-3}$ m/sec. (HP21, MOW test method)	Logged By: G. Halliday
	Checked Date:
PHOTO REF.:	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 2

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL			
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION	
		0.4		Topsoil.		TOPSOIL	
		0.8		Brown, Sandy GRAVEL with some silt. Gravel, fine to coarse, sand, medium to coarse. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL	
		1.2		Brownish grey, Sandy GRAVEL . Sand, fine to coarse. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL	
		1.6		Brownish grey, Sandy GRAVEL . Sand, fine to coarse. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL	
		2.0		Grey, SAND with minor gravel and rare boulders. Gravel, fine, sand, fine to medium, boulders max size 300mm. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL	
		2.4		Grey, SAND with minor gravel and rare boulders. Gravel, fine, sand, fine to medium, boulders max size 300mm. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL	
		2.8		Grey, SAND with minor gravel and rare boulders. Gravel, fine, sand, fine to medium, boulders max size 300mm. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL	
		3.2		Grey, SAND with minor gravel and rare boulders. Gravel, fine, sand, fine to medium, boulders max size 300mm. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL	
		3.6		Grey, SAND with minor gravel and rare boulders. Gravel, fine, sand, fine to medium, boulders max size 300mm. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL	
		4.0		Grey, SAND with minor gravel and rare boulders. Gravel, fine, sand, fine to medium, boulders max size 300mm. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL	
	NO SEEPAGE	4.4	Total Depth = 4 m				
		4.8					
		5.2					
		5.6					
		6.0					
		6.4					

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 3

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.4		Topsoil.		TOPSOIL
		0.8		Brown, SILT. Non plastic, Medium dense.	Moist	LOESS
		1.2		Light grey, Silty sandy GRAVEL. Gravel, fine to medium; sand, fine. Slightly weathered. Weakly horizontally stratified, Medium dense.	Dry	COLLUVIUM
		1.6				
		2.0				
		2.4				
		2.8				
		3.2		Grey, Sandy GRAVEL with some boulders. Gravel, fine to coarse; sand, medium to coarse. Boulders max size 500mm. Slightly weathered. Weakly horizontally stratified, Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		3.6				
		4.0				
		4.4				
		4.8				
		5.2				
		5.6				
		6.0				
		6.4				
				Total Depth = 4 m		

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 4

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL				
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION		
	NO SEEPAGE	0.4		Topsoil. Brownish grey, Sandy GRAVEL with rare boulders. Gravel, fine to coarse; sand, medium to coarse, boulders max size 300mm. Slightly weathered. Medium dense.	Moist	TOPSOIL HAWEA OUTWASH GRAVEL		
		0.8						
		1.2						
		1.6						
		2.0						
		2.4						
		2.8						
		3.2						
		3.6						
		4.0						
		4.4				Grey, SAND. Sand, fine to medium. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL
		4.8				Total Depth = 4.2 m		
		5.2						
	5.6							
	6.0							
	6.4							

COMMENT: Permeability test in 44 gallon drum 10m towards road at 0.7m depth gave $K=2 \times 10E-3$ m/sec (HP21, MOW test method)	Logged By: G. Halliday
	Checked Date:
PHOTO REF.:	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 5

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.4		Topsoil.		TOPSOIL
		0.8		Brownish grey, Sandy GRAVEL. Gravel, fine to medium; sand, medium to coarse. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL
		1.2				
		1.6		Brownish grey, SAND with minor gravel. Gravel, fine to medium; sand, fine to medium. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL
		2.0				
		2.4		Brownish grey, Gravelly BOULDERS with some sand. Gravel, fine to coarse. Boulders max size 0.5m. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL
		2.8				
		3.2		Brownish grey, Sandy GRAVEL. Gravel, fine to coarse, sand, medium to coarse. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL
		3.6				
		4.0				
		4.4		Total Depth = 4 m		
		4.8				
		5.2				
		5.6				
		6.0				
		6.4				

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 6

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.4		Topsoil.		TOPSOIL
		0.8	X X X X	Brownish grey, SILT. Loose.	Moist	LOESS
		1.2	[Gravel pattern]	Yellow brown, Sandy GRAVEL. Gravel, fine to medium, occasional sand lenses, slightly to moderately weathered, oxidised. Medium dense.	Moist	FAN ALLUVIUM
		1.6				
		2.0				
		2.4				
		2.8		Brownish grey, Sandy GRAVEL with some boulders. Gravel, fine to coarse, sand, medium to coarse, boulders max size 0.5m. Slightly weathered. Medium dense.	Moist	HAWEA OUTWASH GRAVEL
		3.2				
		3.6				
		4.0				
		4.4		Total Depth = 3.7 m		
		4.8				
		5.2				
		5.6				
		6.0				
		6.4				

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 7

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION: Approx 2m above toe of slope		Inclination:	
Direction:		EASTING: mE	
EQUIPMENT: 20 Tonne excavator		OPERATOR:	
NORTHING: mN		COMPANY: Benchmark	
INFOMAP NO.		HOLE STARTED: 12-Jul-07	
ELEVATION: m		DIMENSIONS:	
METHOD:		EXCAV. DATUM:	
HOLE FINISHED: 12-Jul-07			

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.2		Brown, Silty sandy GRAVEL. Medium dense.	Moist	COLLUVIUM
		0.4		Grey and brown, Sandy GRAVEL. Gravel, fine to medium; sand, fine to medium. Approx 300mm thick beds. Slightly weathered. Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		0.6				
		0.8				
		1.0				
		1.2		Brownish grey, Sandy GRAVEL with rare boulders. Gravel, fine to coarse; sand, medium to coarse. Boulders max size 300mm. Slightly weathered. Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		1.4				
		1.6				
		1.8				
		2.0				
		2.2				
		2.4				
		2.6				
		2.8				
		3.0				
	NO SEEPAGE	3.2		Total Depth = 3 m		

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 8

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION: Approx 2m above base of slope.		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL				
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION		
		0.4		Topsoil.		TOPSOIL		
	NO SEEPAGE	0.8		Brownish grey, Sandy GRAVEL with occasional beds of sand. Gravel, fine to medium; sand, fine to medium. Slightly weathered. Medium dense.	Moist	Albert Town OUTWASH GRAVEL		
1.2								
1.6								
2.0								
2.4								
				2.4		Subhorizontal contact		
				2.8		Sandy GRAVEL with some boulders. Gravel, fine to coarse; Boulder with 1m diameter. Slightly weathered. Medium dense.	Moist	Albert Town OUTWASH GRAVEL
				3.2				
				3.6		Total Depth = 3.2 m		
				4.0				
		4.4						
		4.8						
		5.2						
		5.6						
		6.0						
		6.4						

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 9

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL							
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION					
		0.4		Topsoil.		TOPSOIL					
	NO SEEPAGE	0.8		Brownish grey and brown, Sandy GRAVEL with occasional beds of sand. Gravel, fine to medium; sand, fine to medium. Slightly weathered. Weakly stratified, Medium dense.	Moist	FAN ALLUVIUM					
		1.2									
		1.6									
		2.0									
		2.4									
		2.8									
		3.2									
							3.6		Grey, Sandy GRAVEL with occasional beds of sand. Gravel, fine. Slightly weathered. Medium dense.	Moist	FAN ALLUVIUM
							4.0		Total Depth = 3.3 m		
							4.4				
		4.8									
		5.2									
		5.6									
		6.0									
		6.4									

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 10

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.2		Topsoil.		TOPSOIL
		0.4				
		0.6	X	Brownish grey, interbedded gravelly silty SAND and sandy SILT. Gravel, fine to coarse; sand, fine. Slightly weathered. Non plastic, Medium dense.	Moist	GLACIAL TILL
		0.8	X			
		1.0	X			
		1.2	X			
		1.4	X			
		1.6	X			
		1.8	X	Grey, interbedded gravelly silty SAND and sandy SILT. Gravel, fine to coarse; sand, fine to medium. Unweathered. Non plastic, Medium dense.	Moist	GLACIAL TILL
		2.0	X			
		2.2	X			
		2.4	X			
		2.6	X			
		2.8	X			
		3.0	X			
		3.2		Total Depth = 3 m		

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 11

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.2		Topsoil.		TOPSOIL
		0.4				
		0.6		Brown-brownish grey, Sandy GRAVEL with occasional thin beds of SAND and silty SAND. Gravel, fine to medium; sand, fine to coarse. Slightly weathered. Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		0.8				
		1.0				
		1.2				
		1.4				
		1.6				
		1.8				
		2.0				
		2.2				
		2.4				
		2.6				
		2.8				
		3.0				
		3.2		Total Depth = 3 m		

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 12

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING:	mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:
NORTHING:	mN	INFOMAP NO.	COMPANY: Benchmark
ELEVATION:	m	DIMENSIONS:	HOLE STARTED: 12-Jul-07
METHOD:		EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.2		Topsoil.		TOPSOIL
		0.4	X X X X	Brown, SILT. Loose.	Moist	LOESS
		0.6	X X X X			
		0.8	X X X X			
		1.0	X X X X			
		1.2	X X X X			
		1.4	□ □ □ □	Brownish grey, Interbedded sandy GRAVEL, Silty SAND and SAND with some gravel. Gravel, fine to medium; sand, fine to coarse. Slightly weathered. Medium dense. Horizontal bedding, typically 300mm thick.	Moist	OUTWASH GRAVEL
		1.6	□ □ □ □			
		1.8	X X X X			
		2.0	□ □ □ □			
		2.2	X X X X			
		2.4	□ □ □ □			
		2.6	X X X X			
		2.8	□ □ □ □			
		3.0	X X X X			
		3.2				

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 13

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
	NO SEEPAGE	0.2		Topsoil.		ROOTS AND PEAT
		0.4				
	SEEPAGE from top of till @ 0.5m	0.6		Blueish grey and light brown, Interbedded Silty sandy GRAVEL, gravelly SILT and gravelly silty SAND. Gravel, fine to coarse; sand, fine, Slightly weathered. Non plastic, Medium dense.	Moist	GLACIAL TILL
		0.8				
		1.0				
		1.2				
		1.4				
		1.6				
		1.8				
		2.0				
		2.2				
		2.4				
		2.6				
		2.8				
		3.0				
		3.2				

COMMENT: Seepage from top of till at 0.5m	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 14

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
	NO SEEPAGE	0.2		Brownish grey, Sandy GRAVEL. Gravel, fine. Slightly weathered. Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		0.4		Brownish grey, SAND . Sand, medium. Slightly weathered. Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		0.6				
		0.8				
		1.0		Yellow, SAND with minor silt. Sand, fine. Slightly weathered. Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		1.2				
		1.4		Brownish grey, Sandy GRAVEL with cobbles. Gravel, fine to coarse. Cobbles max size 200mm. Slightly weathered. Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		1.6				
		1.8				
		2.0				
		2.2				
		2.4				
			2.6	Total Depth = 2.4 m		
		2.8				
		3.0				
		3.2				

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 15

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.2		Topsoil.		TOPSOIL
		0.4	X X X X	Brown, SILT. Slightly weathered. Non plastic, Loose.	Moist	LOESS
		0.6	□ □ □ □	Yellow brown, Interbedded sandy GRAVEL and sandy SILT and silty SAND with minor - some gravel. Gravel, fine to medium and coarse. Dipping out of slope at approx 10°. Slightly weathered. Medium dense. Beds 300-500mm thick.	Moist	Albert Town OUTWASH GRAVEL
		0.8	□ □ □ □			
		1.0	X			
		1.2	□ □ □ □			
		1.4	□ □ □ □			
		1.6	X			
		1.8	□ □ □ □			
		2.0	□ □ □ □			
		2.2	X			
		2.4	□ □ □ □			
		2.6	□ □ □ □			
		2.8	X			
		3.0	□ □ □ □			
		3.2		Total Depth = 3.1 m		

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 16

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.4		Topsoil.		TOPSOIL
		0.8	X X X X	Brown, SILT. Non plastic, Loose.	Moist	LOESS
		1.2	X X X X			
		1.6	X X X X			
		2.0	X X X X	Yellowish grey, Interbedded gravelly silty SAND and SILT. Gravel, fine to medium, sand, fine. Slightly weathered. Non plastic, Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		2.4	X X X X			
		2.8	X X X X			
		3.2	X X X X			
	NO SEEPAGE	3.6		Total Depth = 3.2 m		
		4.0				
		4.4				
		4.8				
		5.2				
		5.6				
		6.0				
		6.4				

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 17

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.2		Topsoil.		TOPSOIL
		0.4	X X X X	Brown, SILT. Loose.		LOESS
		0.6	X X X X			
		0.8	□ □ □ □	Yellow, Interbedded silty sandy GRAVEL, SILT and gravelly SAND. Gravel, fine to medium, occasionally coarse; sand, fine to medium. Slightly weathered. Non plastic, Medium dense. Hard to excavate. Weakly stratified.		Albert Town OUTWASH GRAVEL
		1.0	X X X X			
		1.2	□ □ □ □			
		1.4	X X X X			
		1.6	□ □ □ □			
		1.8	X X X X			
		2.0	□ □ □ □			
		2.2	X X X X			
		2.4	□ □ □ □			
		2.6			Total Depth = 2.5 m	
		2.8				
		3.0				
		3.2				

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 18

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.2		Topsoil.		TOPSOIL
		0.4				
		0.6		Yellowish grey, Interbedded sandy GRAVEL with minor-some silt and silty SAND and SILT. Gravel, fine to coarse. Slightly weathered. Medium dense. Occasional horizontally stratified beds.	Moist	Albert Town OUTWASH GRAVEL
		0.8				
		1.0	X			
		1.2				
		1.4				
		1.6				
		1.8	X			
		2.0				
		2.2				
		2.4	X			
		2.6				
		2.8	X			
		3.0				
		3.2		Total Depth = 3 m		

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 19

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.2		Topsoil.		TOPSOIL
		0.4				
		0.6		Brown, Sandy GRAVEL. Gravel, fine to medium. Slightly weathered. Loose.	Moist	COLLUVIUM
		0.8				
		1.0				
		1.2				
		1.4				
		1.6				
		1.8		White and grey, Calcite coated sandy GRAVEL with occasional horizons of SILT. Gravel, predominately fine to medium, some coarse. Slightly weathered. Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		2.0				
		2.2				
		2.4				
		2.6				
		2.8				
		3.0				
		3.2				
				Total Depth = 3 m		

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 20

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.2		Topsoil.		TOPSOIL
		0.4				
		0.6		Brown, Sandy GRAVEL. Gravel, fine to coarse. Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		0.8				
		1.0				
		1.2				
		1.4				
		1.6				
		1.8		Yellowish grey, Interbedded sandy GRAVEL with some silt and boulders. Gravel, fine to coarse; sand, fine to medium. Boulders max size 300mm. Medium dense. Weakly horizontally stratified.	Moist	Albert Town OUTWASH GRAVEL
		2.0				
		2.2				
		2.4				
		2.6				
		2.8				
		3.0		Total Depth = 2.7 m		
		3.2				

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 21

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.2		Topsoil.		TOPSOIL
		0.4		Brown, Sandy GRAVEL with rare boulders.. Gravel, fine to coarse; sand, fine to coarse. Boulders max size 1.0m. Slightly weathered. Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		0.6				
		0.8				
		1.0				
		1.2				
		1.4				
		1.6				
		1.8				
		2.0				
		2.2				
	NO SEEPAGE	2.4				
		2.6		Total Depth = 2.5 m		
		2.8				
		3.0				
		3.2				

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:
TP 22

PROJECT: Allenby Farms		Job Number: 51123.002	
LOCATION:		Inclination:	Direction:
EASTING: mE	EQUIPMENT: 20 Tonne excavator	OPERATOR:	
NORTHING: mN	INFOMAP NO.	COMPANY: Benchmark	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 12-Jul-07	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 12-Jul-07	

ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION (SPT)	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
		0.2		Topsoil.		TOPSOIL
		0.4				
		0.6		Yellowish grey and brown, Sandy GRAVEL with rare boulders and occasional beds of SILT and SAND. Gravel, fine to coarse; sand, fine to medium. Slightly weathered. Medium dense.	Moist	Albert Town OUTWASH GRAVEL
		0.8				
		1.0				
		1.2				
		1.4				
		1.6				
		1.8				
		2.0				
		2.2				
		2.4				
		2.6				
		2.8				
		3.0				
	NO SEEPAGE	3.2		Total Depth = 3 m		

COMMENT:	Logged By: G. Halliday
PHOTO REF.:	Checked Date:
	Sheet: 1 of 1



www.tonkin.co.nz



Appendix C

Confirmation of supply telecommunications.

Chorus Network Services

PO Box 9405
Waikato Mail Centre
Hamilton 3200
Telephone: 0800 782 386
Email: tsg@chorus.co.nz



24 February 2017

Sub Div Ref: WNK39074
Your Ref: W4934

Allenby Farms Ltd
P.O. Box 283,
Wanaka 9343

Attention: **Peter Joyce**

Dear Sir / Madam

Fibre Reticulation Contract (ABF)

SUBDIVISION RETICULATION - WNK: Rob Roy Lane, Wanaka. 15 units

Rob Roy Lane Wanaka

Thank you for your enquiry regarding the above subdivision.

Chorus is pleased to advise that, as at the date of this letter, we will be able to provide telephone reticulation for this subdivision. In order to complete this reticulation, we require a contribution from you to Chorus' total costs of reticulating the subdivision. Chorus' costs include the cost of network design, supply of telecommunications specific materials and supervising installation. In this instance, the Developer Contribution (as defined in the Subdivision Contract) is \$111,808.63 (including GST).

A copy of the Contract for the Supply and Installation of Telecommunications Infrastructure for the subdivision ("Subdivision Contract") is attached to this letter. If you decide to accept Chorus' offer and to proceed with reticulation of this subdivision, you will need to sign the Subdivision Contract and return it to us at: Chorus Network Services, PO Box 9405, Waikato Mail Centre, Hamilton 3200. The Subdivision Contract will govern our relationship with you in relation to reticulation of this subdivision.

You are also required to pay the Developer Contribution (see above) at the same time as you return the signed version of the Subdivision Contract to us. Clause 2.2 of the Special Terms of the Subdivision Contract explains your payment obligations in more detail.

If you do not sign the Subdivision Contract and return it to us within 90 days from the date of this letter, the offer made by Chorus to you under the Subdivision Contract is no longer valid and is automatically withdrawn. If you wish to proceed with reticulation of this subdivision in the future, we will need to issue a new agreement for you to sign at that time. We note that, if this occurs, the amount of the contribution required from you and other terms of the Subdivision Contract may change.

We draw your attention to the additional documentation included with this letter. It is very important that you read and understand this information as it relates to your obligations regarding reticulation of the subdivision.

If you have any queries, please do not hesitate to contact us.

Yours faithfully

A handwritten signature in black ink, appearing to read "Jono Tutty".

Jono Tutty

Network Services Coordinator

Encl:

- (i) Contract for the Supply and Installation of Telecommunications Infrastructure,
- (ii) Process for Connection of a Subdivision to the Chorus Network,
- (iii) Important Information for Developers,
- (iv) Chorus' Standard Subdivision Lay Specifications,
- (v) Standard Form Chorus Easement, and
- (vi) Private Corporate Client Authority and Instruction for an Electronic Transaction

Appendix D Confirmation of supply electricity



Your Ref:
Our Ref:

24 March 2017

Peter Joyce
Paterson Pitt Group
PO Box 283
Wanaka 9343

By email only: peter.joyce@ppgroup.co.nz

Dear Peter

**RE: ELECTRICITY SUPPLY FOR SUBDIVISION, ALLENBY FARMS LTD, WANAKA
PROPOSED 16 LOT SUBDIVISION OF ALLENBY FARMS, WANAKA**

Thank you for your letter and accompanying plans dated 17 March 2017, outlining the above proposed development.

Aurora can make an electricity supply available for this development, subject to the following conditions:

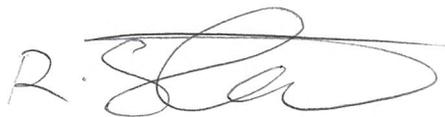
- Supply confirmation is limited to a single phase 15kVA supply per lot.
- Easements in gross, in favour of Aurora, must be granted over the placement of all new and existing Aurora plant associated with this development, unless installed in road reserve.
- Where the development involves further subdivision of a land parcel containing an existing serviced installation, the mains cables (overhead or underground) intended to supply each lot must be completely contained within the lot that it serves. In some cases this will require relocation of the cable serving the existing installation.
- All electrical installations must comply with Aurora's Network Connection Requirements and related standards & policies.
- The developer must comply with the Electricity Act, subordinate Regulations and associated Codes of Practice. Particular attention must be paid to the minimum distances between power lines and other structures defined in NZECP34:2011 "NZ Electrical Code of Practice for Electrical Safe Distances".
- No building shall be erected over any electricity easement without specific written authority from Delta's General Manager – Asset Management
- The developer is responsible for all resource consents and local authority approvals.
- The developer will be required to make capital contributions toward the costs of providing the power supply, in accordance with Aurora's Capital Contributions policy prevailing at the time the development, or each stage of development, proceeds.
- This approval will lapse within 12 months of the date of this letter, unless the developer enters into a formal supply agreement with Aurora for this development.



Please note that this letter is to confirm that a power supply can be made available and does not imply that a power supply is available now, or that Aurora will make power available at their cost.

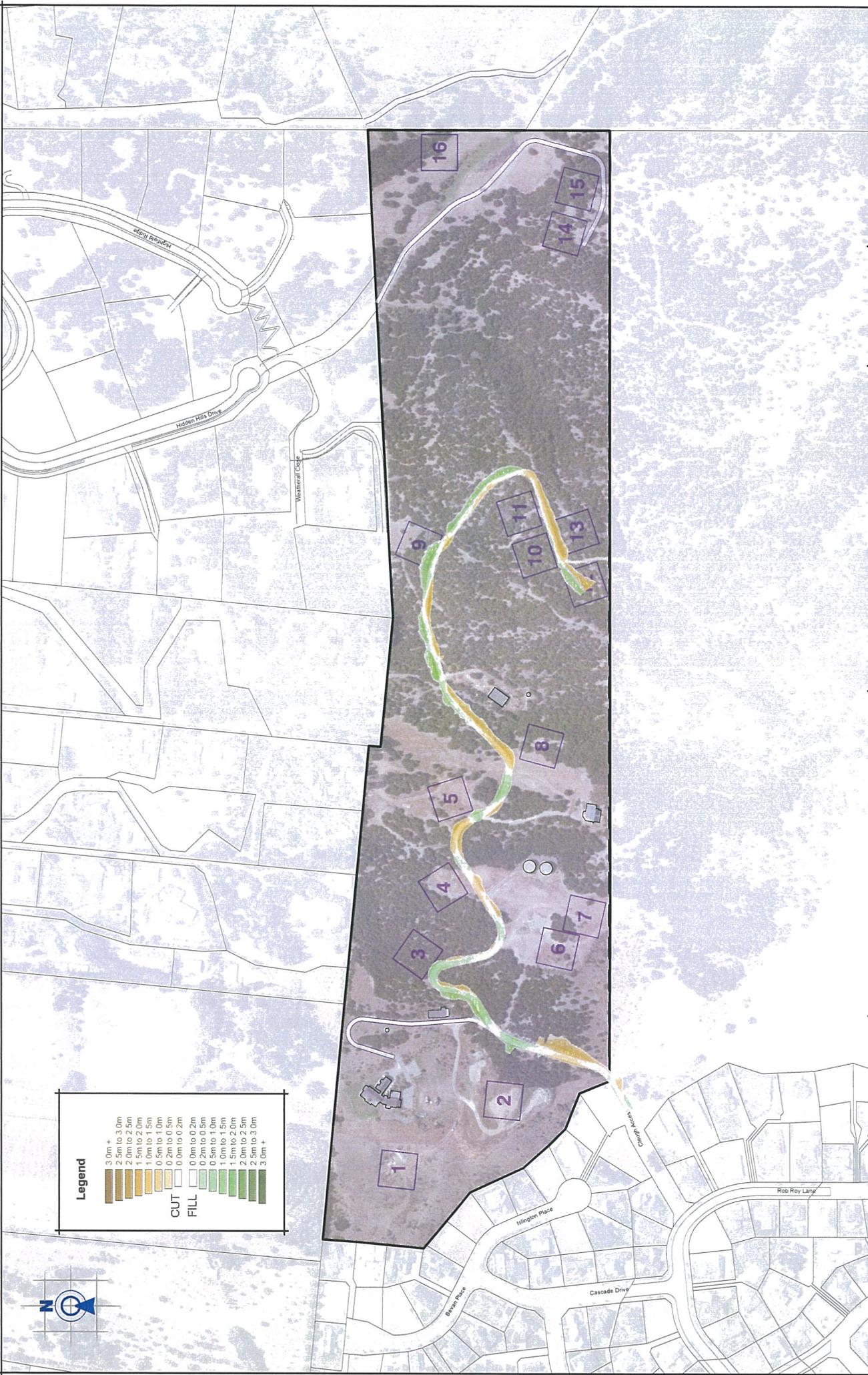
Aurora's Network Connection Requirements and Capital Contributions policy are available from <http://www.auroraenergy.co.nz/>. Should you require further information or clarification please contact the undersigned.

Yours sincerely

A handwritten signature in black ink, appearing to read 'R. Starkey', with a large, sweeping flourish extending to the right.

Richard Starkey
Commercial Development Manager (Delta)
For Aurora Energy Limited

DDI Phone	(03) 470 7504
Mobile	(021) 117 5100
Email	richard.starkey@thinkdelta.co.nz



Legend

3.0m +	3.0m +
2.5m to 3.0m	3.0m +
2.0m to 2.5m	3.0m +
1.5m to 2.0m	3.0m +
1.0m to 1.5m	3.0m +
0.5m to 1.0m	3.0m +
0.2m to 0.5m	3.0m +
0.0m to 0.2m	3.0m +
CUT	FILL
0.0m to 0.2m	0.0m to 0.2m
0.2m to 0.5m	0.2m to 0.5m
0.5m to 1.0m	0.5m to 1.0m
1.0m to 1.5m	1.0m to 1.5m
1.5m to 2.0m	1.5m to 2.0m
2.0m to 2.5m	2.0m to 2.5m
2.5m to 3.0m	2.5m to 3.0m
3.0m +	3.0m +

Compliance	UDAT	Original Size	Scale
Compliance	DHP	A3	1:3000 @ A3
Compliance	DHP		
Compliance	UDW		
Compliance	PHU	Sheet No	1
Compliance	PHU	Drawn On	16/03/2017
W4934		Revision	B

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Purpose & Drawing Title

CONCEPT EARTHWORKS

Client & Location

Allenby Farms Ltd.
Wanaka

WANAKA BRANCH
19 Reece Crescent
Wanaka 9343
T 03 443 0110
E wanakat@ppgroup.co.nz

PATERSONPITTS GROUP

Your Land Professionals
www.ppgroup.co.nz
0800 PPGROUP

Appendix E Preliminary site investigation report.



Mt Iron Rural Park Lifestyle Zone, Wanaka

Preliminary Site Investigation Report
Paterson Pitts Group Ltd



Contact Details

Name: Lisa Bond

Opus International Consultants Ltd
Alexandra Office
Tarbert Buildings, 69 Tarbert Street
PO Box 273, Alexandra 9340
New Zealand

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Document Details:

Date: March 2017
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Report No. 1356

Prepared by:



Lisa Bond CEnvP
Senior Geo-Environmental Consultant
SQEP

Reviewed and Approved for Release by:



Robert Bond CPEng
Team Leader/Senior Geotechnical Engineer
SQEP

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Appendices

A	Proposed Subdivision Layout Plan (showing piece of land)
B	Historical Information and Site Searches
C	Extracts from Golder Associates Validation Report
D	Site Photographs (inc. depository construction)

Executive Summary

Opus International Consultants Ltd (Opus) were commissioned by Paterson Pitts Group Ltd, (herein referred to as 'the Client') to undertake a Preliminary Site Investigation (PSI) for a parcel of land located at Hidden Hills Road and known as the Mt Iron Rural Lifestyle Zone (herein referred to as 'the site'). It is understood the client proposes to subdivide the site with a land use change to rural residential lifestyle blocks.

This report has been prepared in order to assess the potential for ground contamination to exist across the whole site, with particular emphasis on the proposed development areas. The presence of landfilling on an area of the site indicates that this piece of land is considered to be within the remit of the National Environmental Standards (2011), Appendix C – Hazardous Activities and Industries List (HAIL).

The Preliminary Site Investigation has revealed that historical uses on a piece of land on the site include a landfill depository for arsenic and pesticide contaminated soils, which was completed and capped in 2009. Outside of the piece of land there is no evidence that HAIL activities have been undertaken and as such the NES is considered not to apply to the remainder of the site

On the basis of a review of information currently available, as well as observations made during the site inspection, through the compilation of a conceptual site model and soils analysis as part of a limited preliminary sampling and analysis programme our assessment of the site is as follows:

- The majority of the site comprises natural open scrub land and trees which has a walking track present across it. No HAIL activities have been undertaken on the majority of the site.
- A small section of the site is known to contain contaminated soils from the remediation of another off site area and is considered for the purposes of this report as the 'Piece of Land';
- The piece of land has undergone infilling with contaminated soils mixed, compacted and capped in a controlled manner with an appropriate validation report and site management plan in place.
- No ground disturbance of the piece of land is proposed as part of this development with the area appropriately fenced from site visitors;
- No obvious signs of vegetation dieback was noted in any location across the site, with good vegetation growth noted across the capping layer of the piece of land.

Taking into consideration the information herein, including that the piece of land is to undergo subdivision only, it is considered more likely than not that the risk to human health due to potential contamination associated with the piece of land is LOW. As such it is considered highly unlikely that there will be a risk to human health associated with the proposed subdivision activity on the piece of land.

As such the requirement to undertake further detailed site investigation works prior to any disturbance of the ground is not considered necessary on the piece of land as identified on the proposed development layout.

Based on the results of this investigation, Opus recommends that:

- The site area outside of the piece of land has not undergone activities which are considered HAIL, therefore as such for the purposes of development in these areas the NES does not apply
- The 'piece of land' has undergone assessment via a Preliminary Site Investigation which, for the purposes of subdivision only, has determined that 'it is highly unlikely that there is a risk to human health should the activity be done to the piece of land';
- No ground disturbance should be undertaken on the identified piece of land without further assessment of the risks to human health being undertaken by a Suitably Qualified and Experienced contaminated land Practitioner (SQEP);
- This PSI report is included with any Resource Consent application for the proposed development;

1. Introduction

Opus International Consultants Ltd (Opus) were commissioned by Paterson Pitts Group Ltd, (herein referred to as 'the Client') to undertake a Preliminary Site Investigation (PSI) for a parcel of land located at Hidden Hills Road and known as the Mt Iron Rural Lifestyle Zone (herein referred to as 'the site'). It is understood the client proposes to subdivide the site with a land use change to rural residential lifestyle blocks.

1.1. Objective

This report has been prepared in order to assess the potential for ground contamination across the whole site, with particular emphasis on the proposed development areas. The presence of landfilling on an area of the site indicates that the piece of land is considered to be within the remit of the National Environmental Standards (2011), Appendix C – Hazardous Activities and Industries List (HAIL) namely:

G3: Landfill sites

As such the following objectives have been identified:

- Determine whether potentially contaminating activities have been undertaken on the site or its surrounds;
- Assess the potential risk of these activities to affect human health or the environment, particularly within the surrounds of the development areas;
- Assess whether further assessment or action is required with respect to the risks assessed; and
- Determine the likely impact upon sensitive receptors including site users, occupiers and construction workers on site.

1.2. Scope of Work

In order to achieve the objectives set out above, the following scope of works was undertaken:

- Review of the site history including available aerial photographs and anecdotal evidence;
- Review of readily available information with regards to the geology and hydrology of the site;
- Review of existing documents relating to the landfill on a section of the site;
- A site walkover inspection centred around the areas delineated as HAIL;
- Inspection of council online records including an Otago Regional Council HAIL search; and
- Characterisation of the site in line with NES guidance.

2. Site Identification and Description

2.1. Site Identification

The site is located off Hidden Hills Drive approximately 2.5km north east west of Wanaka centre as shown on figure 1 below.

The proposed development site is located on the property legally described as Lot 104 DP412843 comprising approximately 90 ha.

A Quickmap diagram detailing the current site boundary, and appellations of properties nearby are shown in Figure 2.

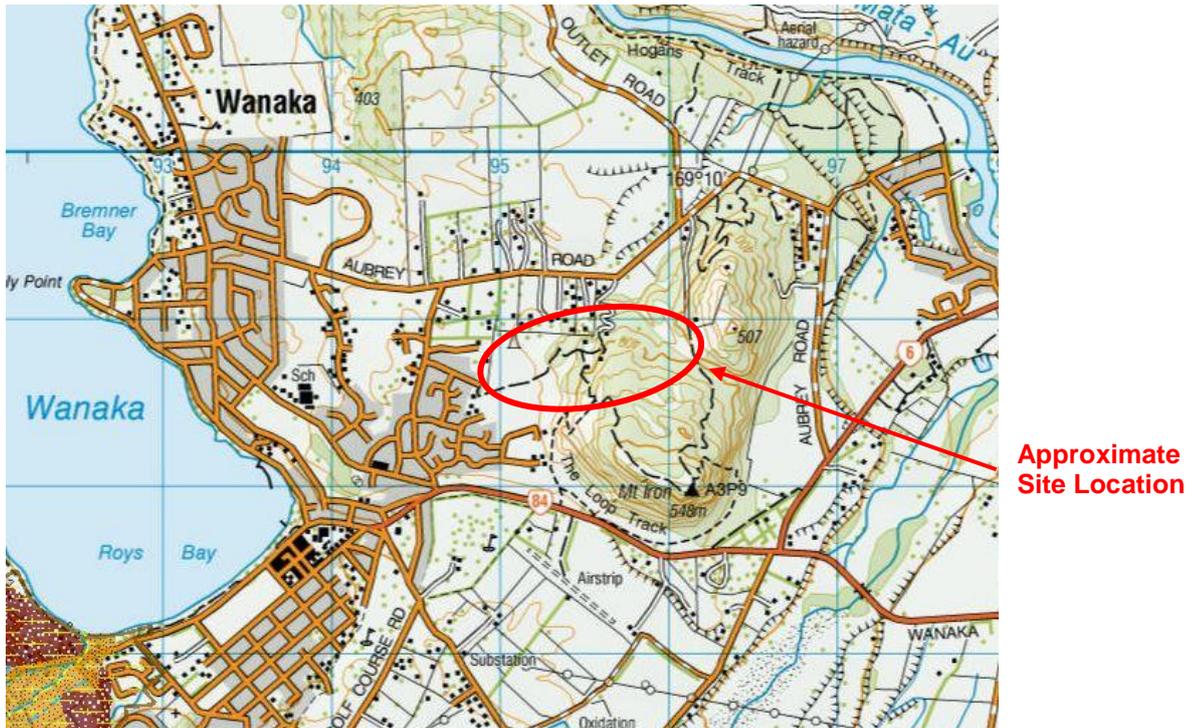


Figure 1: Site Location Plan

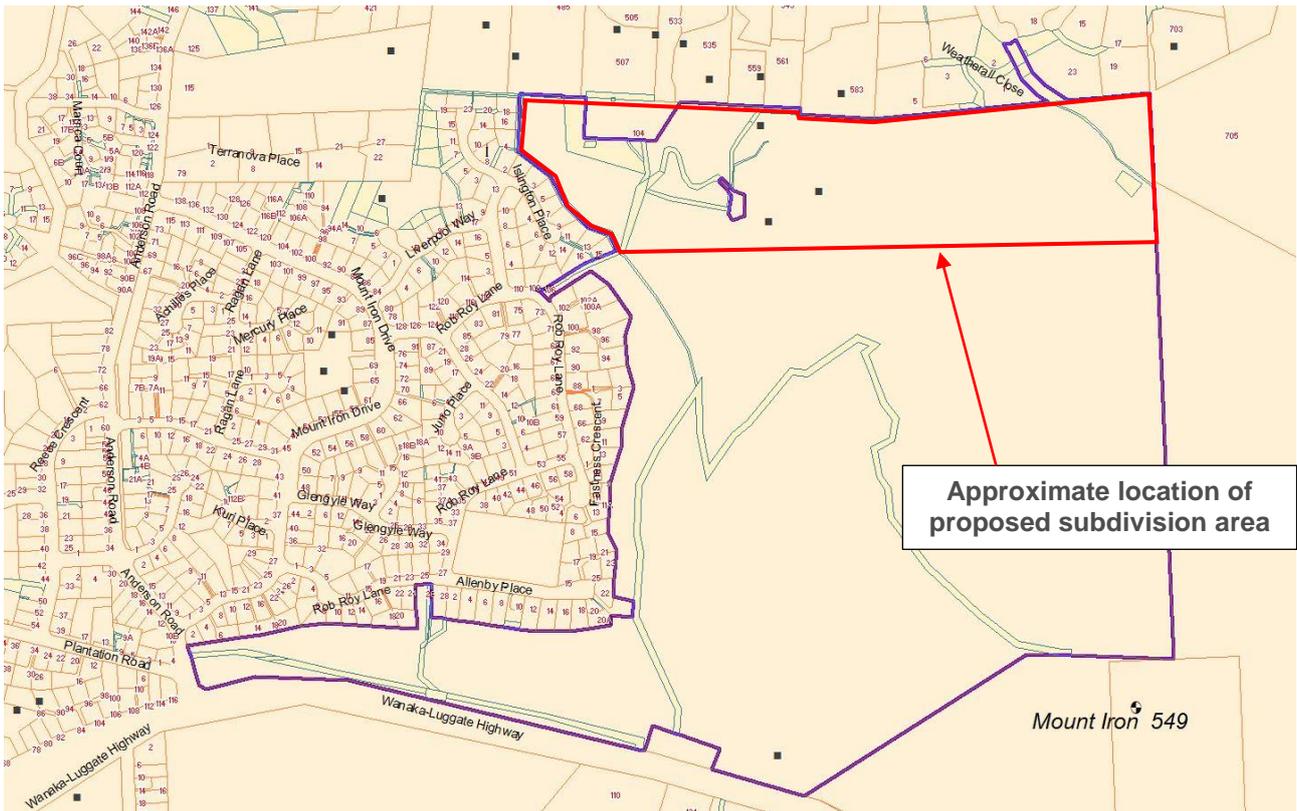


Figure 2: Quickmap extract for site and surrounds

The proposed subdivision layout plan is attached as Appendix A.

2.2. Site History

The history of the site has been gained from a review of sources including aerial photos from Google Earth, a review of Opus’s Quickmap Arc GIS database and a search of council records. Historical Information is presented in Appendix B of this report.

Historical aerial photographs dating back to 2005 have been viewed to give an indication of the recent history of the site area. These aerial photographs show the location of the depository for remedial works of a sheep dip, however no photographs were available to show the actual works being undertaken.

Anecdotal evidence from the site owner, Mr Lyndon Cleugh indicates that the majority of the site area comprises open rural land containing scrub land with walking tracks, with no development ever having occurred on the majority of the site in the past.

Mr Cleugh also gave details of the location of a sheep dip remediation depository on the site. A Site Validation Report undertaken by Golder Associates on behalf of Allenby Farms Ltd was made available for review. This review is detailed in section 2.2.3 of this report.

2.2.1. HAIL Database Search

A database search of records held by Otago Regional Council (ORC) for current or past land uses which may have the potential to contaminate land was undertaken. The results of this search are presented in Appendix B and indicates that part of the site is included on the database as verified HAIL. The reference for this is on ORCs records is HAIL.00717.02.

The database has recorded that ‘this site was used as a disposal location for contaminated soils from a nearby sheep dip in 2009. A site management plan was created for the site to ensure that the material remains contained so that risks from contaminants are adequately controlled’.

2.2.2. *Council Records*

Council records indicate that three resource consent applications have been made on the site for the establishment of temporary cellular on wheels (two) and a statue at the base of Mount Iron walking track. In addition two building consent applications have been submitted for alterations and additions to a dwelling on the site. The QLDC eDocs website also held a record relating to a fill depository plan for an area of the site. The site is currently located in an area zoned as rural on the District Plan¹.

2.2.3. *Remediation Depository Site*

Remediation of a sheep dip site proposed within a residential development to the north west of the site was undertaken in 2008. The adopted remedial method involved the excavation of arsenic and OCP contaminated soil from the former sheep dip, dilution of the soil with cleanfill derived from the site by way of mixing and deposition in to a depository site which is located within the subject site area.

Works were designed and Supervised by Golder Associates with a Site Validation Report² compiled following completion. The location of the depository site along with details of the layout and construction are presented in Appendix C.

The validation report indicates that the depository comprises an excavation approximately 10m x 20m which is 4m deep. Materials excavated from the depository area to create the pit were utilised as cleanfill on the sheep dip site or as mixing material. Contaminated soil from the off-site sheep dip was mixed at a ratio of 2:1 cleanfill to contaminated soil before being spread and compacted in layers within the depository.

Validation sampling and testing following compaction was undertaken to ensure that adequate and even mixing of the contaminated soil and cleanfill occurred. The mixed compacted soil was then covered with a layer of geotextile fabric at approximately 1m below existing ground level with the remaining volume above the geotextile covered with cleanfill derived from the depository site. Photos of the remedial works undertaken by Golder Associates in 2008 on the depository are presented within Appendix D.

2.2.4. *Certificates of Title*

A search for relevant certificates of title were undertaken for the site along with any associated survey plans in order to help determine the historical ownership and layout of the site. These details may give an indication as to past uses on the site and the potential for HAIL activities. Relevant certificates of title and survey plans are also presented within Appendix B

2.3. *Site Condition and Surrounding Environment*

A site inspection visit was undertaken on 22nd March 2017 by an Opus SQEP. Photographs taken at the time of the site inspection are presented in Appendix D.

The site is accessed via Hidden Hills Drive to the north west of the site. This driveway currently leads to a cul-de-sac. A rough track leads south from the cul-de-sac up an incline on to the Allenby Farms site.

This access track currently forms part of the Mount Iron walking track and is gated with a stile to prevent unauthorised vehicular access. Further up the steep incline is located the depository area for the remediated sheep dip. This area is fenced from the public and comprises a weed vegetated mound on the hillside alongside the walking track.

The remaining site area generally comprises open ground with various amounts of naturally occurring scrub vegetation and trees

No visual or olfactory evidence of contamination was noted across any of the site.

¹ QLDC Webmaps

²Golder Associates Site Validation Report, No. 087813141, December 2008

2.4. Geology and Hydrology

The geology underlying the site is understood to comprise Middle Permian to Triassic Schist comprising polytic and psammitic schist (TZIV) with areas of greenschist or amphibole and minor metachert, metagabbro and nephrite³ as shown in Figure 3. Mount Iron is a schist cored roche moutonee which acts as a small groundwater recharge area in Wanaka.

Groundwater information described in the GNS publication Groundwater quality of the Wanaka and Wakatipu basins, Central Otago, New Zealand⁴ indicates that the site is located on a groundwater divide, with groundwater on the eastern slopes of Mount Iron flowing towards the Cardrona River and on the southern slopes flowing towards the south. Queries made to ORC indicate that no groundwater abstraction bores are located on or near to the site.

Grow Otago⁵ rainfall data indicated an annual median rainfall of between 700 – 800mm in the vicinity of the site with an annual median potential evaporation of around 180mm per year, indicating an excess of water. The majority of this surplus recharges the local groundwater within the Wanaka basin.

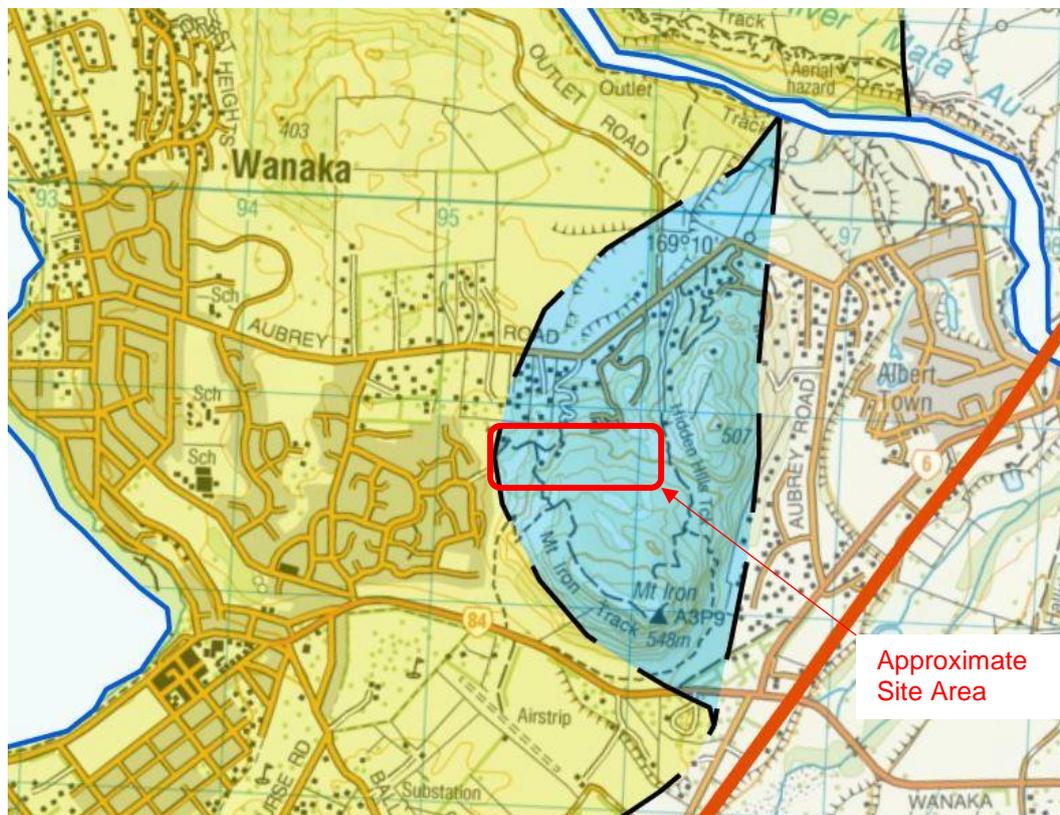


Figure 3: Geological Extract of the GNS Geology Map

3. Development Proposals

It is understood that the site is to be subdivided, with sections on the northern part of the site to undergo a land use change to rural residential lifestyle blocks. The proposed development site plan is presented in Appendix A

³ <http://data.gns.cri.nz/geology/>

⁴ <https://shop.gns.cri.nz/>

⁵ <http://growotago.orc.govt.nz/>

4. Conceptual Site Model

This section of the report relates to the assessment of contamination arising from the previous and current site conditions, both on and off the site that may impact on the proposed development.

4.1. Potential Sources of Contamination

A review of all data sources and anecdotal evidence indicates that the site has historically been used as a recreational area for walking with the majority of the site comprising virgin natural ground. One small area of the site is known to contain a contaminated soil depository which has undergone soil mixing in order to dilute contamination levels within the landfilling site. As such the following HAIL activities apply to the delineated piece of land under the NES guidance:

- **G3 – Landfill Sites**

Potential sources of contamination associated with this landfilling area include:

- Persistent pesticides including organochlorines; and
- Arsenic

4.2. Potential Pathways

Plausible pathways such as inhalation, dermal contact, ingestion, leaching, and migration of contaminated groundwater, migration of ground gases and hazardous vapours as well as aggressive attack on construction materials have all be considered as part of the development of the conceptual site model for this site.

The most plausible migration pathways are dependent upon the type of contaminants and in this instance are considered to be:

- Inhalation of contaminated dust;
- Dermal Contact with contaminated soils/water;
- Ingestion of contaminated material; and
- Leaching of contaminants into groundwater.

4.3. Potential Receptors

Given the proposed development of rural lifestyle dwellings along with a walking track across the site, the most sensitive receptors identified are as follows:

- Residents and visitors (end-users) to the proposed development;
- Construction workers during earthworks and construction; and
- Environmental receptors including groundwater and potential water bores

4.4. Source-Pathway-Receptor Linkages

Using the data obtained from various sources and brought together within this report, a conceptual site model (CSM) has been derived for piece of land and is presented in Figure 4.

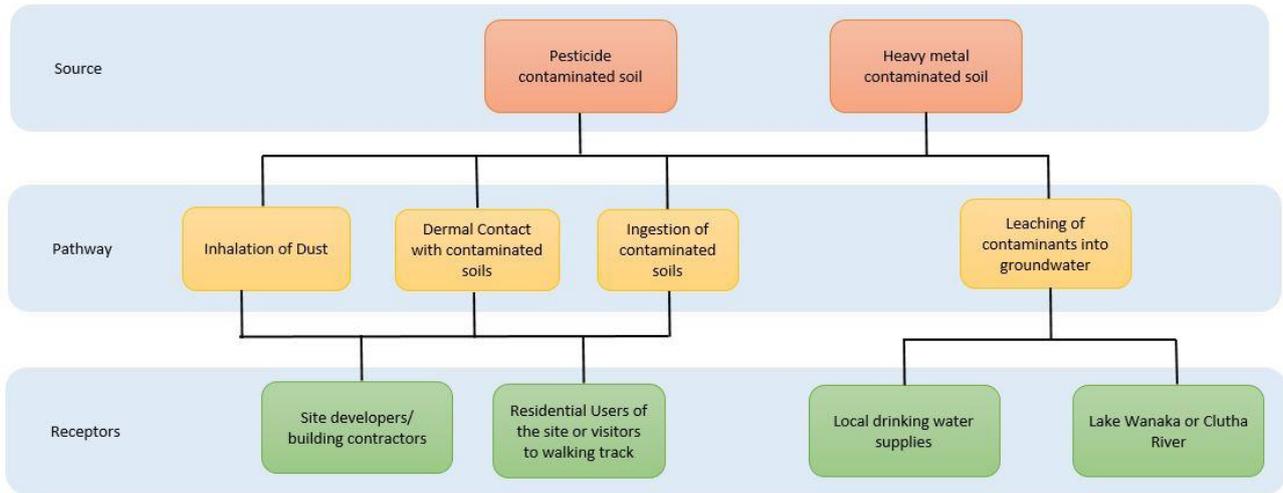


Figure 4: Conceptual Site Model

5. Basis for Guideline Values

For contaminated site assessments the hierarchy of reference documents containing guidelines for soils and waters, the MfE Contaminated Land Management Guidelines No 2 (November 2003) is referred to.

The development generally comprises a rural residential lifestyle block.

The primary human health receptors have been determined to be construction workers and end-users of the site. As such the end-use of rural residential (25% produce) is proposed for assessment purposes, as highlighted in Table 2.

Table 2: Land Use Scenario

Scenario	Description
Rural / lifestyle block	Rural residential land use, including home-grown produce consumption (10 per cent). Applicable to the residential vicinity of farm houses for protection of farming families, but not the productive parts of agricultural land. (Not for regulatory use.)
Residential	Standard residential lot, for single dwelling sites with gardens, including home-grown produce consumption (10 per cent).
High-density residential	Urban residential with limited soil contact, including small ornamental gardens but no vegetable garden (no home-grown produce consumption); applicable to urban townhouses, flats and ground-floor apartments with small ornamental gardens, but not high-rise apartments.
Parks / recreational	Public and private green areas and reserves that are used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields. Check exposure for park maintenance staff using commercial / industrial unpaved.
Commercial / industrial outdoor worker (unpaved)	Commercial / industrial site with varying degrees of exposed soil. Exposure of outdoor workers to near-surface soil during routine maintenance and gardening activities with occasional excavation as part of maintaining sub-surface utilities (ie, a caretaker or site maintenance personnel). Also conservatively applicable to outdoor workers on a largely unpaved site.

6. Site Characterisation

The purpose of this preliminary site assessment, in general accordance with CLMG No1 and the NES for Assessing and Managing Contaminants in the Soil to Protect Human Health (2011), is to provide as assessment of the historical land uses and intended land use to determine whether or not the activities have, more likely than not, resulted in contamination of the soil that may be hazardous to human health.

On this basis and on the basis of a review of information currently available, as well as observations made during the site inspection and through the compilation of a conceptual site model our assessment of the site is as follows:

- The majority of the site comprises natural open scrub land and trees which has a walking track present across it. No HAIL activities have been undertaken on the majority of the site.
- A small section of the site is known to contain contaminated soils from the remediation of another off site area and is considered for the purposes of this report as the 'Piece of Land';
- The piece of land has undergone infilling with contaminated soils mixed, compacted and capped in a controlled manner with an appropriate validation report and site management plan in place.
- No ground disturbance of the piece of land is proposed as part of this development with the area appropriately fenced from site visitors;
- No obvious signs of vegetation dieback was noted in any location across the site, with good vegetation growth noted across the capping layer of the piece of land.

Taking into consideration the information herein, including that the piece of land is to undergo subdivision only, it is considered more likely than not that the risk to human health due to potential contamination associated with the piece of land is LOW. As such it is considered **highly unlikely** that there will be a risk to human health associated with the proposed subdivision activity on the piece of land.

Although not a requirement of the NES an assessment of risk to environmental receptors indicates that any migration of contaminants to groundwater from the piece of land is unlikely and taking into consideration the geotextile capping on the piece of land, any leaching of contaminants through near surface soils would be relatively slow and as such readily diluted and dispersed within the groundwater system on Mount Iron. As such a risk to groundwater and/or future water bore locations is not considered to exist on the site.

7. Conclusions and Recommendations

The Preliminary Site Investigation has revealed that historical uses on a piece of land on the site include a landfill depository comprising arsenic and pesticide contaminated soils which was completed and capped in 2009. Outside of the piece of land there is no evidence from sources including ORC, council records, anecdotal evidence or historical records that HAIL activities have been undertaken and as such the NES is considered not to apply to the remainder of the site.

A validation report for remedial works indicate that contaminated soils were mixed with cleanfill prior to compacting in order to dilute the source of contamination within the soil. Following completion of the remedial works the depository area was covered with a geotextile and capped with cleanfill derived from the site excavation. These works were designed and supervised by SQEP and undertaken in an appropriate manner with a site management plan in place to control the site in the future.

The conceptual site model and initial qualitative human health risk assessment presented herein is based upon information gained from a site inspection, anecdotal evidence, information gained from QLDC and other sources. The conceptual site model indicates that historical and current site activities have a low potential risk of having contaminated the site outside the 'piece of land'.

The piece of land itself is not proposed for development and is to remain as a fenced area outside of any subdivided residential section. Records are held by local and territorial authorities indicating the landfills presence and controls are in place to manage the piece of land.

Although HAIL activities are noted to have been undertaken on the piece of land, the remaining site area has not undergone HAIL activities. As such, it is considered **highly unlikely** that there is a risk to human health should the proposed activities be undertaken on the site.

As such the requirement to undertake further detailed site investigation works prior to any disturbance of the ground is not considered necessary provided that the identified piece of land is excluded from development proposals (Appendix A).

7.1. Recommendations

Based on the results of this investigation, Opus recommends that:

- The site area outside of the piece of land has not undergone activities which are considered HAIL, therefore as such for the purposes of development in these areas the NES does not apply
- The 'piece of land' has undergone assessment via a Preliminary Site Investigation which for the purposes of subdivision only has determined that 'it is highly unlikely that there is a risk to human health should the activity be done to the piece of land';
- No ground disturbance should be undertaken on the identified piece of land without further assessment of the risks to human health being undertaken by a Suitably Qualified and Experienced contaminated land Practitioner (SQEP); and
- This PSI report is included with any Resource Consent application for the proposed development;

8. Applicability and Limitations

This report has been produced on behalf of the Paterson Pitts Group Ltd and no responsibility is accepted to any third party for all or any part. This report should not be relied upon or transferred to any other parties without the express written authorisation of Opus. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill. This report should only be reproduced in full.

We have reviewed information across the entire site identified in Figure 2. However this investigation concentrates on contamination levels in the soil through the identified 'piece of land' where development is proposed to occur. As such any further earthworks outside of this area of sampling would require further investigation to establish the risk posed to human health.

This report has been prepared for a specific purpose, as agreed between Opus and the Client. A tailored scope of works has been used to achieve the objectives, and the report should therefore not be used for different objectives.

This report has been prepared by Opus with all reasonable skill and care within the terms of the Contract with the Client, and taking account of the information made available by the Client, as well as the staff and resources devoted to it by agreement with the Client. The findings and opinions conveyed via this report are based on information obtained from a variety of sources, as detailed, which Opus believes are reliable. Nevertheless, Opus cannot and does not guarantee the authenticity or reliability of any information supplied by other parties.

The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry best practice. Whilst this report may express an opinion on the possible configuration of strata or contaminants between or beyond exploratory hole positions or on the possible presence of features based on either, visual, verbal or published evidence, this is for guidance only, and no liability can be accepted for its accuracy. Should further data be obtained that differs from that presented in this report, then conclusions and recommendations may no longer be valid.

The report is valid at the date of release. The condition of the site may change with time so that the results and interpretation are no longer valid. In addition, guidelines and legislation may change, making assessment of results and recommendations invalid.



Appendix A – Proposed Subdivision Layout Plan (showing piece of land)

Mt Iron Rural Park Lifestyle Zone, Wanaka

Preliminary Site Investigation Report
Paterson Pitts Group Ltd



LEGEND

~1000m² = Proposed Building Platform

= Staked Platform Location

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WANAKA BRANCH
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 or P.O. Box 283
 Wanaka 9343
 T 03 443 0110
 E wanaka@ppgroup.co.nz

Client & Location:
**Allenby Farms Ltd.
 Wanaka**

Purpose & Drawing Title:
**CONCEPT PLAN
 Proposed Building Locations – As-Staked**

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Surveyed by:	LDAR / DHP	Original Size:	Scale:
Designed by:	DHP	A3	1:2500 @ A3
Drawn by:	DHP		
Checked by:	DLW		DO NOT SCALE
Approved by:	DLW		
Job No:	W4934	Sheet No:	Revision No: Date Created:
		1	A 20/04/2016



Appendix B – Historical Information and Site Searches

Mt Iron Rural Park Lifestyle Zone, Wanaka

Preliminary Site Investigation Report
Paterson Pitts Group Ltd

QuickMap Title Details



Information last updated as at 06 Mar 2017

COMPUTER FREEHOLD REGISTER DERIVED FROM LAND INFORMATION NEW ZEALAND

Identifier 471461
Land Registration District Otago
Date Issued 07 October 2009

Prior References

351269

Type Fee Simple
Area 90.1242 hectares more or less
Legal Description Lot 104 Deposited Plan 412843

Proprietors

Allenby Farms Limited

501 771 Gazette Notice declaring State Highway No 84 (Queenstown - Wanaka) a limited access road - 17.8.1978 at 1.41 pm
 Subject to a right to take and convey water over parts marked BD-AN-BC, BC-BB, BB-BA-AZ on DP 412843 created by Transfer 521335.1 - 20.8.1979 at 9:28 am

Appurtenant to part formerly Lot 7 DP 301337 is a right to drain sewage specified in Easement Certificate 676848.8 - 15.4.1987 at 9:18 am

The easement specified in Easement Certificate 676848.8 is subject to Section 309 (1) (a) Local Government Act 1974
 Subject to a right to drain sewage over part marked AY-AW and AW-AX on DP 412843 created by Transfer 727961 - 5.5.1989 at 9:51 am

Subject to a right to drain sewage over parts marked AV-AW and AW-AX on DP 412843 created by Transfer 733164 - 14.7.1989 at 9:14 am

Subject to a right to drain sewage over part marked AT-AU on DP 412843 created by Transfer 733831 - 24.7.1989 at 9:31 am

Subject to a right to drain sewage over parts marked AR-AS on DP 412843 created by Transfer 737998.1 - 18.9.1989 at 10:18 am

Subject to a right (in gross) to convey water over parts marked AQ-AP, AP-AO and BF on DP 412843 in favour of Queenstown Lakes District Council created by Transfer 802220 - 6.4.1992 at 9:20 am

The easements created by Transfer 802220 are subject to Section 309 (1) (a) Local Government Act 1974

Subject to a right to convey water over part marked AL-AM-AN on DP 412843 created by Transfer 832685 - 25.6.1993 at 9:45 am

Appurtenant hereto is a right to drain sewage created by Transfer 845904 - 23.12.1993 at 12:24 pm

The easement created by Transfer 845904 is subject to Section 243 (a) Resource Management Act 1991

Appurtenant hereto is a right to drain sewage created by Transfer 870227.1 - 23.11.1994 at 9:17 am

Appurtenant to part formerly Lot 7 DP 301337 is a right to drain sewage specified in Easement Certificate 888024.23 - 1.8.1995 at 10:34 am

The easements specified in Easement Certificate 888024.23 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to convey water over parts marked AI, X, AJ & AK on DP 412843 in favour of Queenstown Lakes District Council created by Transfer 915759 - 10.9.1996 at 10:25 am

Appurtenant to part formerly Lot 7 DP 301337 is a right to drain sewage specified in Easement Certificate 915760.31 - 10.9.1996 at 10:25 am

The easements specified in Easement Certificate 915760.31 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) of way over parts marked AG & AH and a right to convey water over part marked AG all on DP 412843 to Queenstown Lakes District Council created by Transfer 5064660.6 - 27.7.2001 at 12:14 pm

The easements created by Transfer 5064660.6 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way, right to convey electric power and telephonic communications over parts marked AE & AF on DP 412843 specified in Easement Certificate 5064660.7 - 27.7.2001 at 12:14 pm

The easements specified in Easement Certificate 5064660.7 are subject to Section 243 (a) Resource Management Act 1991

5147978.2 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 1.2.2002 at 12:30 pm

Subject to a right of way on foot, bike, for dogs and light vehicles for limited purposes over part marked AD on DP 412843 created by Transfer 5152001.5 - 12.2.2002 at 9:00 am

Subject to a right (in gross) to convey electricity and a right to Establish and Maintain Switch gear and Ancillary Equipment over part marked AC on DP 412843 to Dunedin Electricity Limited created by Transfer 5291983.7 - 24.7.2002 at 9:00 am

The right to convey electricity easement created by Transfer 5291983.7 is subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to drain water over parts marked AA1, AA2, AB1, AB2, K1 & K2 on DP 412843 to Queenstown Lakes District Council created by Transfer 5291983.8 - 24.7.2002 at 9:00 am

The easement created by Transfer 5291983.8 is subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Transfer 5291983.9 - 24.7.2002 at 9:00 am

Appurtenant hereto are rights to drain water and sewage created by Transfer 5291983.10 - 24.7.2002 at 9:00 am

Appurtenant hereto is a right to drain water and sewage created by Easement Instrument 5498507.7 - 25.2.2003 at 9:00 am

The easements created by Easement Instrument 5498507.7 are subject to Section 243 (a) Resource Management Act 1991

Appurtenant hereto is a right to drain water and sewage created by Easement Instrument 5936812.9 - 18.3.2004 at 9:00 am

The easements created by Easement Instrument 5936812.9 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Easement Instrument 5936812.9 - 18.3.2004 at 9:00 am

5978837.1 Variation of Covenant 5936812.9 - 23.4.2004 at 9:46 am

Subject to a right (in gross) to convey electricity and a right to establish and maintain electricity transformers, switchgear and ancillary equipment over parts marked X and Y on DP 412843 to Aurora Energy Limited created by Easement Instrument 6325453.9 - 25.2.2005 at 9:00 am

Some of the easements created by Easement Instrument 6325453.9 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right to drain water and sewage over parts marked U, V, W & BE DP 412843 created by Easement Instrument 6325453.10 - 25.2.2005 at 9:00 am

Land Covenant in Easement Instrument 6325453.10 - 25.2.2005 at 9:00 am

Subject to a right to convey sewage over part marked U DP 412843 created by Easement Instrument 6494894.2 - 14.7.2005 at 9:00 am

Subject to a right (in gross) to convey electricity and to transform electricity over parts marked BG,R1 & R2 on DP 412843 to Aurora Energy Limited created by Easement Instrument 6781410.8 - 9.3.2006 at 9:00 am

The easements excepting the right to transform electricity created by Easement Instrument 6781410.8 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to convey telecommunications and computer media over parts marked BG,R1 & R2 on DP 412843 to Telecom New Zealand Limited created by Easement Instrument 6781410.9 - 9.3.2006 at 9:00 am

The easements excepting computer media created by Easement Instrument 6781410.9 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) of way and a right to convey water over parts marked BG,R1,R2 DP 412843 to Queenstown Lakes District Council created by Easement Instrument 6781410.10 - 9.3.2006 at 9:00 am

The easements created by Easement Instrument 6781410.10 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way and a right to convey telecommunications and electricity over parts marked BG,R1 & R2 on DP 412843 and a right to convey telecommunications over part marked W on DP 412843 created by Easement Instrument 6781410.11 - 9.3.2006 at 9:00 am

Some of the easements created by Easement Instrument 6781410.11 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way over part marked BG DP 412843 created by Easement Instrument 6781410.12 - 9.3.2006 at 9:00 am
 The easements created by Easement Instrument 6781410.12 are subject to Section 243 (a) Resource Management Act 1991
 Land Covenant in Easement Instrument 6781410.12 - 9.3.2006 at 9:00 am

Subject to a right to convey electricity in gross over parts marked 133b & 133c on DP 412843 and establish & maintain an electricity transformer & ancillary equipment in gross over part marked 133b on DP 412843 to Aurora Energy Limited created by Easement Instrument 7475457.6 - 25.7.2007 at 9:00 am

The easements except right to convey electricity marked 133b DP 387159 created by Easement Instrument 7475457.6 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way (pedestrian) in gross over parts marked 133a, 133d, R1 & BG on DP 412843 and a right to drain water in gross over parts marked 133a, R1, R2 & BF on DP 412843 to Queenstown Lakes District Council created by Easement Instrument 7475457.7 - 25.7.2007 at 9:00 am

The easements created by Easement Instrument 7475457.7 are subject to Section 243 (a) Resource Management Act 1991
 Land Covenant in Easement Instrument 7475457.10 - 25.7.2007 at 9:00 am

7479209.2 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 27.7.2007 at 9:00 am

7479209.3 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 27.7.2007 at 9:00 am

Subject to a right to convey electricity in gross over parts marked A, B & C on DP 412843 in favour of Aurora Energy Limited created by Easement Instrument 7616575.2 - 15.11.2007 at 9:00 am

Land Covenant in Easement Instrument 7772303.2 - 4.4.2008 at 9:00 am

Subject to a right to drain stormwater and sewage (in gross) over parts marked E, G and I and a right to drain stormwater, sewer, and to operate a pump station (in gross) over part marked F and a right to drain stormwater, electricity and water (in gross) over part marked J and a right to convey electricity and water (in gross) over parts marked K1 & K2 all on DP 412843 in favour of Queenstown Lakes District Council created by Easement Instrument 7913004.3 - 20.8.2008 at 9:00 am

The easements created by Easement Instrument 8202701.6 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to drain sewage and convey water over part marked 104a and a right of way (pedestrian/cycle) over parts marked 104a, 104b, 104c & 104d and a right to drain water over parts marked 104a & 104d all on DP 412843 in favour of Queenstown Lakes District Council created by Easement Instrument 8202701.6 - 7.10.2009 at 9:10 am

Subject to a right (in gross) to convey electricity over part marked 104a on DP 412843 in favour of Aurora Energy created by Easement Instrument 8202701.8 - 7.10.2009 at 9:10 am

The easements created by Easement Instrument 8202701.8 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to convey telecommunications and computer media over part marked 104a on DP 412843 in favour of Telecom New Zealand Limited created by Easement Instrument 8202701.9 - 7.10.2009 at 9:10 am

The easements created by Easement Instrument 8202701.9 are subject to Section 243 (a) Resource Management Act 1991

The easements created by Easement Instrument 8202701.12 are subject to Section 243 (a) Resource Management Act 1991

Subject to a gas easement (in gross) over part marked 104a on DP 412843 in favour of Rockgas Limited created by Easement Instrument 8202701.12 - 7.10.2009 at 9:10 am

The easements created by Easement Instrument 8202701.13 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way over part marked 104a on DP 412843 created by Easement Instrument 8202701.13 - 7.10.2009 at 9:10 am

Appurtenant hereto is a right of way and a right to establish and maintain a sign created by Easement Instrument 8202701.13 - 7.10.2009 at 9:10 am

Land Covenant in Easement Instrument 8202701.14 - 7.10.2009 at 9:10 am

Subject to Section 59 Land Act 1948

8202701.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 7.10.2009 at 9:10 am

The information provided on this report forms a guideline only. As a result, Custom Software Limited cannot and does not provide any warranties or assurances of any kind in relation to the accuracy of the information provided through this report, the Site and Service. Custom Software Limited will not be liable for any claims in relation to the content of this report, the site and this service.

QuickMap Title Details Historic Information



Information last updated as at 06 Mar 2017

COMPUTER FREEHOLD REGISTER DERIVED FROM LAND INFORMATION NEW ZEALAND

Identifier 471461
Land Registration District Otago
Date Issued 07 October 2009

Historic Memorials

501 771 Gazette Notice declaring State Highway No 84 (Queenstown - Wanaka) a limited access road - 17.8.1978 at 1.41 pm
 Subject to a right to take and convey water over parts marked BD-AN-BC, BC-BE, BE-BA-AZ on DP 412843 created by Transfer 521335.1 - 20.8.1979 at 9:28 am
 Appurtenant to part formerly Lot 7 DP 301337 is a right to drain sewage specified in Easement Certificate 676848.8 - 15.4.1987 at 9:18 am
 The easement specified in Easement Certificate 676848.8 is subject to Section 309 (1) (a) Local Government Act 1974
 Subject to a right to drain sewage over part marked AY-AW and AW-AX on DP 412843 created by Transfer 727961 - 5.5.1989 at 9:51 am
 Subject to a right to drain sewage over parts marked AV-AW and AW-AX on DP 412843 created by Transfer 733164 - 14.7.1989 at 9:14 am
 Subject to a right to drain sewage over part marked AT-AU on DP 412843 created by Transfer 733831 - 24.7.1989 at 9:31 am
 Subject to a right to drain sewage over parts marked AR-AS on DP 412843 created by Transfer 737998.1 - 18.9.1989 at 10:18 am
 Subject to a right (in gross) to convey water over parts marked AQ-AP, AP-AO and BF on DP 412843 in favour of Queenstown Lakes District Council created by Transfer 802220 - 6.4.1992 at 9:20 am
 The easements created by Transfer 802220 are subject to Section 309 (1) (a) Local Government Act 1974
 Subject to a right to convey water over part marked AL-AM-AN on DP 412843 created by Transfer 832685 - 25.6.1993 at 9:45 am
 Appurtenant hereto is a right to drain sewage created by Transfer 845904 - 23.12.1993 at 12:24 pm
 The easement created by Transfer 845904 is subject to Section 243 (a) Resource Management Act 1991
 Appurtenant hereto is a right to drain sewage created by Transfer 870227.1 - 23.11.1994 at 9:17 am
 Appurtenant to part formerly Lot 7 DP 301337 is a right to drain sewage specified in Easement Certificate 888024.23 - 1.8.1995 at 10:34 am
 The easements specified in Easement Certificate 888024.23 are subject to Section 243 (a) Resource Management Act 1991
 Subject to a right (in gross) to convey water over parts marked AI, X, AJ & AK on DP 412843 in favour of Queenstown Lakes District Council created by Transfer 915759 - 10.9.1996 at 10:25 am
 Appurtenant to part formerly Lot 7 DP 301337 is a right to drain sewage specified in Easement Certificate 915760.31 - 10.9.1996 at 10:25 am
 The easements specified in Easement Certificate 915760.31 are subject to Section 243 (a) Resource Management Act 1991
 Subject to a right (in gross) of way over parts marked AG & AH and a right to convey water over part marked AG all on DP 412843 to Queenstown Lakes District Council created by Transfer 5064660.6 - 27.7.2001 at 12:14 pm
 The easements created by Transfer 5064660.6 are subject to Section 243 (a) Resource Management Act 1991
 Subject to a right of way, right to convey electric power and telephonic communications over parts marked AE & AF on DP

412843 specified in Easement Certificate 5064660.7 - 27.7.2001 at 12:14 pm

The easements specified in Easement Certificate 5064660.7 are subject to Section 243 (a) Resource Management Act 1991

5147978.2 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 1.2.2002 at 12:30 pm

Subject to a right of way on foot, bike, for dogs and light vehicles for limited purposes over part marked AD on DP 412843 created by Transfer 5152001.5 - 12.2.2002 at 9:00 am

Subject to a right (in gross) to convey electricity and a right to Establish and Maintain Switch gear and Ancillary Equipment over part marked AC on DP 412843 to Dunedin Electricity Limited created by Transfer 5291983.7 - 24.7.2002 at 9:00 am

The right to convey electricity easement created by Transfer 5291983.7 is subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to drain water over parts marked AA1, AA2, AB1, AB2, K1 & K2 on DP 412843 to Queenstown Lakes District Council created by Transfer 5291983.8 - 24.7.2002 at 9:00 am

The easement created by Transfer 5291983.8 is subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Transfer 5291983.9 - 24.7.2002 at 9:00 am

Appurtenant hereto are rights to drain water and sewage created by Transfer 5291983.10 - 24.7.2002 at 9:00 am

Appurtenant hereto is a right to drain water and sewage created by Easement Instrument 5498507.7 - 25.2.2003 at 9:00 am

The easements created by Easement Instrument 5498507.7 are subject to Section 243 (a) Resource Management Act 1991

Appurtenant hereto is a right to drain water and sewage created by Easement Instrument 5936812.9 - 18.3.2004 at 9:00 am

The easements created by Easement Instrument 5936812.9 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Easement Instrument 5936812.9 - 18.3.2004 at 9:00 am

5978837.1 Variation of Covenant 5936812.9 - 23.4.2004 at 9:46 am

Subject to a right (in gross) to convey electricity and a right to establish and maintain electricity transformers, switchgear and ancillary equipment over parts marked X and Y on DP 412843 to Aurora Energy Limited created by Easement Instrument 6325453.9 - 25.2.2005 at 9:00 am

Some of the easements created by Easement Instrument 6325453.9 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right to drain water and sewage over parts marked U, V, W & BE DP 412843 created by Easement Instrument 6325453.10 - 25.2.2005 at 9:00 am

Land Covenant in Easement Instrument 6325453.10 - 25.2.2005 at 9:00 am

Subject to a right to convey sewage over part marked U DP 412843 created by Easement Instrument 6494894.2 - 14.7.2005 at 9:00 am

Subject to a right (in gross) to convey electricity and to transform electricity over parts marked BG,R1 & R2 on DP 412843 to Aurora Energy Limited created by Easement Instrument 6781410.8 - 9.3.2006 at 9:00 am

The easements excepting the right to transform electricity created by Easement Instrument 6781410.8 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to convey telecommunications and computer media over parts marked BG,R1 & R2 on DP 412843 to Telecom New Zealand Limited created by Easement Instrument 6781410.9 - 9.3.2006 at 9:00 am

The easements excepting computer media created by Easement Instrument 6781410.9 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) of way and a right to convey water over parts marked BG,R1,R2 DP 412843 to Queenstown Lakes District Council created by Easement Instrument 6781410.10 - 9.3.2006 at 9:00 am

The easements created by Easement Instrument 6781410.10 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way and a right to convey telecommunications and electricity over parts marked BG,R1 & R2 on DP 412843 and a right to convey telecommunications over part marked W on DP 412843 created by Easement Instrument 6781410.11 - 9.3.2006 at 9:00 am

Some of the easements created by Easement Instrument 6781410.11 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way over part marked BG DP 412843 created by Easement Instrument 6781410.12 - 9.3.2006 at 9:00 am

The easements created by Easement Instrument 6781410.12 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Easement Instrument 6781410.12 - 9.3.2006 at 9:00 am

Subject to a right to convey electricity in gross over parts marked 133b & 133c on DP 412843 and establish & maintain an electricity transformer & ancillary equipment in gross over part marked 133b on DP 412843 to Aurora Energy Limited created by Easement Instrument 7475457.6 - 25.7.2007 at 9:00 am

The easements except right to convey electricity marked 133b DP 387159 created by Easement Instrument 7475457.6 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way (pedestrian) in gross over parts marked 133a,133d,R1 & BG on DP 412843 and a right to drain

water in gross over parts marked 133a, R1, R2 & BF on DP 412843 to Queenstown Lakes District Council created by Easement Instrument 7475457.7 - 25.7.2007 at 9:00 am

The easements created by Easement Instrument 7475457.7 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Easement Instrument 7475457.10 - 25.7.2007 at 9:00 am

7479209.2 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 27.7.2007 at 9:00 am

7479209.3 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 27.7.2007 at 9:00 am

Subject to a right to convey electricity in gross over parts marked A, B & C on DP 412843 in favour of Aurora Energy Limited created by Easement Instrument 7616575.2 - 15.11.2007 at 9:00 am

Land Covenant in Easement Instrument 7772303.2 - 4.4.2008 at 9:00 am

Subject to a right to drain stormwater and sewage (in gross) over parts marked E, G and I and a right to drain stormwater, sewer, and to operate a pump station (in gross) over part marked F and a right to drain stormwater, electricity and water (in gross) over part marked J and a right to convey electricity and water (in gross) over parts marked K1 & K2 all on DP 412843 in favour of Queenstown Lakes District Council created by Easement Instrument 7913004.3 - 20.8.2008 at 9:00 am

7957884.1 Mortgage to Rabobank New Zealand Limited - 8.10.2008 at 3:03 pm

10395514.1 Discharge of Mortgage 7957884.1 - 12.4.2016 at 10:03 am

The easements created by Easement Instrument 8202701.6 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to drain sewage and convey water over part marked 104a and a right of way (pedestrian/cycle) over parts marked 104a, 104b, 104c & 104d and a right to drain water over parts marked 104a & 104d all on DP 412843 in favour of Queenstown Lakes District Council created by Easement Instrument 8202701.6 - 7.10.2009 at 9:10 am

Subject to a right (in gross) to convey electricity over part marked 104a on DP 412843 in favour of Aurora Energy created by Easement Instrument 8202701.8 - 7.10.2009 at 9:10 am

The easements created by Easement Instrument 8202701.8 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to convey telecommunications and computer media over part marked 104a on DP 412843 in favour of Telecom New Zealand Limited created by Easement Instrument 8202701.9 - 7.10.2009 at 9:10 am

The easements created by Easement Instrument 8202701.9 are subject to Section 243 (a) Resource Management Act 1991

The easements created by Easement Instrument 8202701.12 are subject to Section 243 (a) Resource Management Act 1991

Subject to a gas easement (in gross) over part marked 104a on DP 412843 in favour of Rockgas Limited created by Easement Instrument 8202701.12 - 7.10.2009 at 9:10 am

The easements created by Easement Instrument 8202701.13 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way over part marked 104a on DP 412843 created by Easement Instrument 8202701.13 - 7.10.2009 at 9:10 am

Appurtenant hereto is a right of way and a right to establish and maintain a sign created by Easement Instrument 8202701.13 - 7.10.2009 at 9:10 am

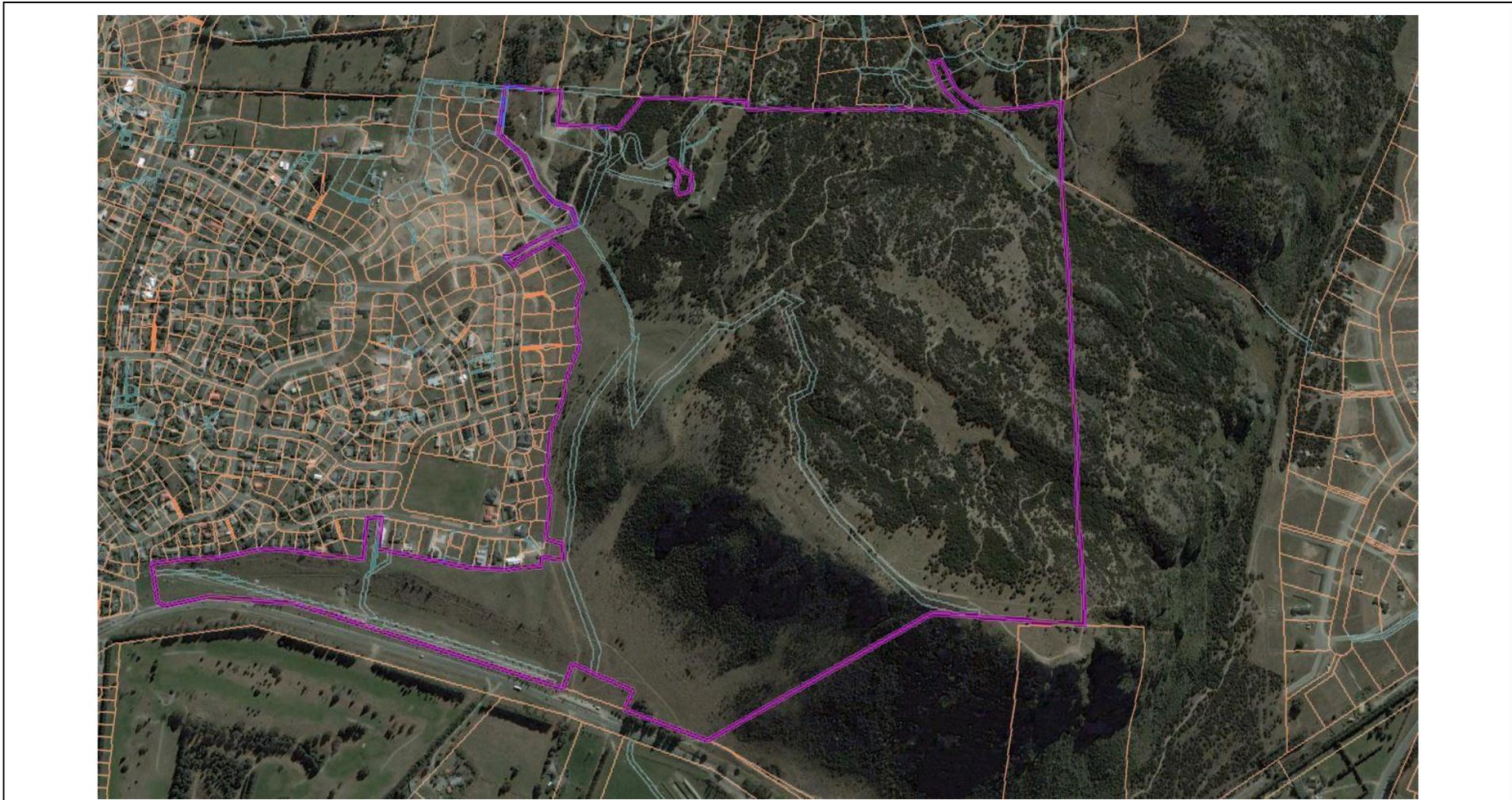
Land Covenant in Easement Instrument 8202701.14 - 7.10.2009 at 9:10 am

Subject to Section 59 Land Act 1948

8202701.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 7.10.2009 at 9:10 am

Historic Owners

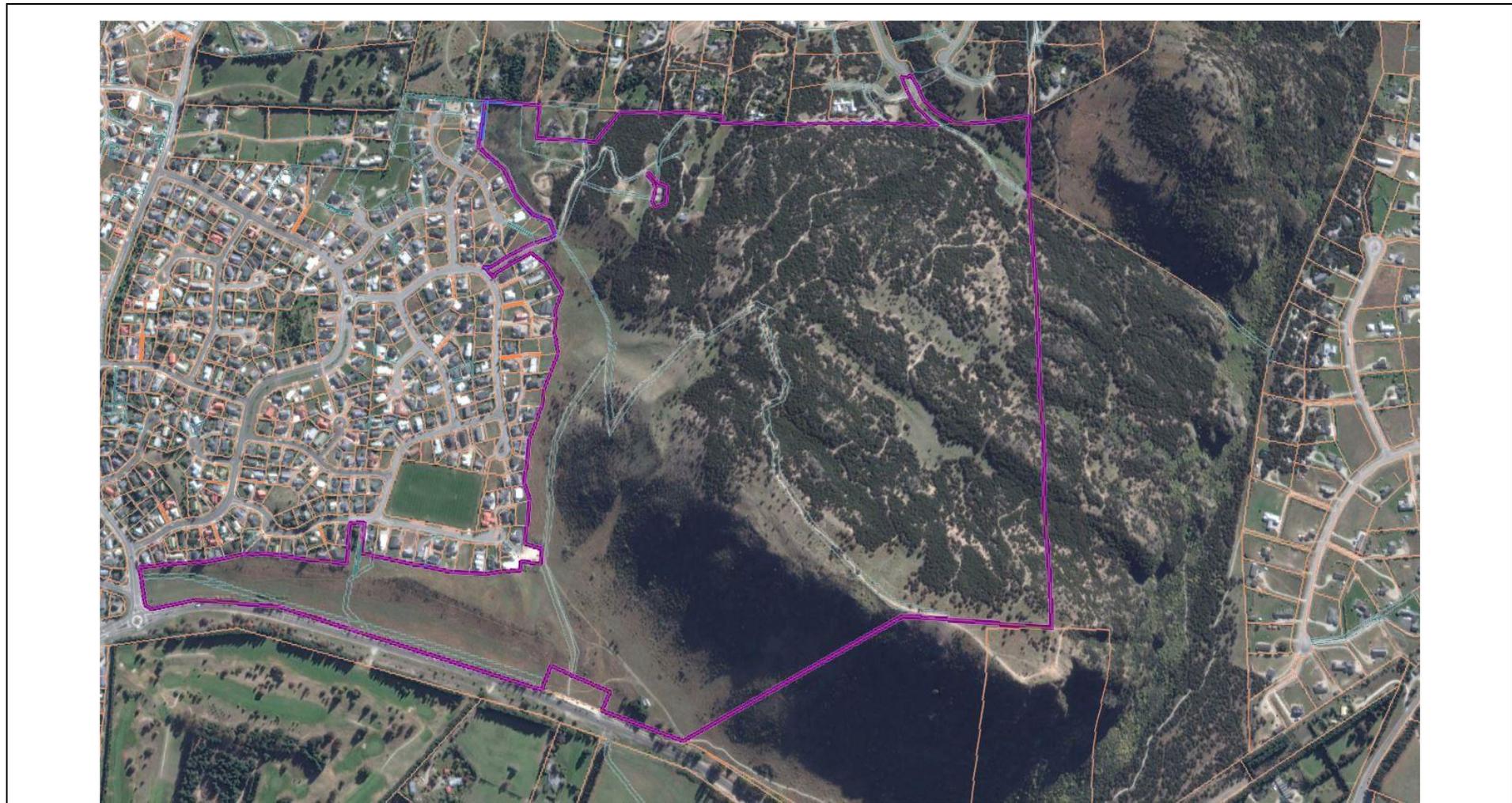
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 Opus International Consultants Ltd P +64 3 440 2400 Alexandra Office Tarbert Buildings, 69 Tarbert Street PO Box 273, Alexandra 9340 New Zealand	Project: Allenby Farms, Wanaka	<h2>Appendix B</h2> <h3>Aerial Photo 2005</h3> <p>Courtesy of Go9ogle Earth</p>
	Project No.: 6-XZ346.00 Client: Paterson Pitts Group Ltd	



	Opus International Consultants Ltd P +64 3 440 2400 Alexandra Office Tarbert Buildings, 69 Tarbert Street PO Box 273, Alexandra 9340 New Zealand	Project: Allenby Farms, Wanaka Project No.: 6-XZ346.00 Client: Paterson Pitts Group Ltd	Appendix B
			Aerial Photo 2011 Courtesy of Google Earth



 <p>Opus International Consultants Ltd P +64 3 440 2400 Alexandra Office Tarbert Buildings, 69 Tarbert Street PO Box 273, Alexandra 9340 New Zealand</p>	<p>Project: Allenby Farms, Wanaka</p>	<p>Appendix B</p> <p>Aerial Photo 2012 Courtesy of Google Earth</p>
	<p>Project No.: 6-XZ346.00 Client: Paterson Pitts Group Ltd</p>	



31 March 2017

Dear Lisa,

Thank you for your enquiry regarding information that the Otago Regional Council may hold regarding potential soil contamination at the properties indicated below:

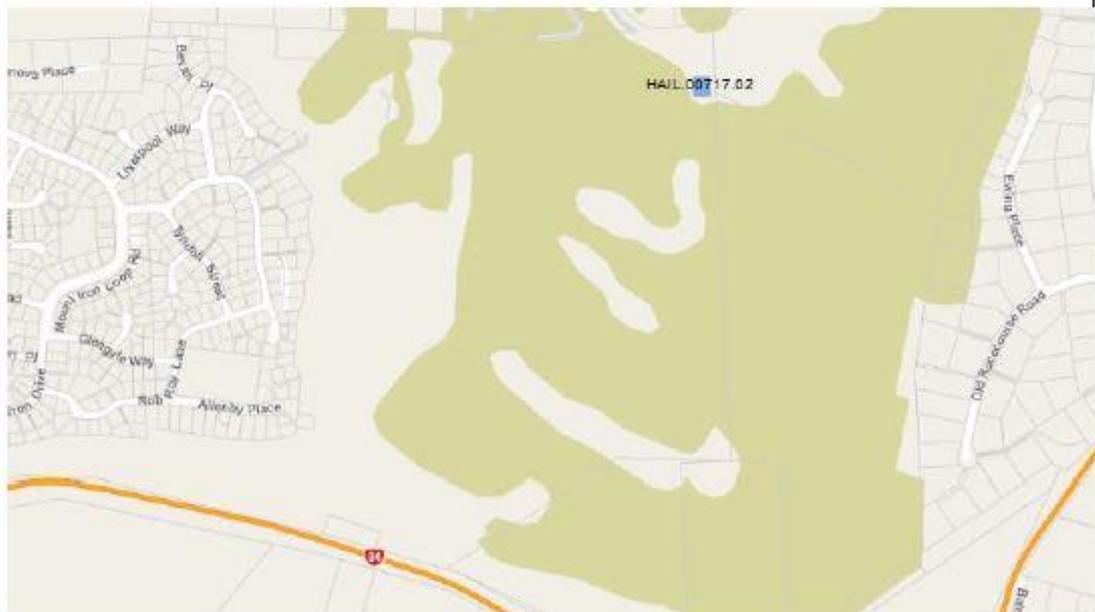
Address	Legal Description or Valuation Number
-	Lot 104 DP 412843

The Otago Regional Council maintains a database of properties where information is held regarding current or past land-uses that have the potential to contaminated land. Land-uses that have the potential to contaminate land are outlined in the [Ministry for the Environment's Hazardous Activities and Industries List \(HAIL\)](#).

Where investigation has been completed, results have been compared to relevant soil guideline values. The database is continually under development, and should not be regarded as a complete record of all properties in Otago. The absence of available information does not necessarily mean that the property is uncontaminated; rather no information exists on the database. You may also wish to examine the property file at the relevant City or District Council to check if there is any evidence that activities occurring on the HAIL have taken place.

I can confirm that:

Part of the above land does appear on the database, with a HAIL Status of **Verified HAIL** and a Contamination Status of **Managed for Recreation Land Use**. The reference number for this site is HAIL.00717.02.





This site was used as a disposal location for contaminated soils from a nearby sheep dip in 2009. A site management plan was created for the site to ensure that the material remains contained so that risks from contaminants are adequately controlled. A number of reports are held on file and are available upon request.

Please feel free to contact me if you have any other enquires, or you would like to discuss the matter further.

Regards,

Simon Beardmore
Senior Environmental Officer

The enclosed/attached information is derived from the Otago Regional contaminated land register and is being disclosed to you pursuant to the Local Government Official Information and Meetings Act 1987. This information reflects the Otago Regional Council's current understanding of this site, which is based solely on the information obtained by the Council and held on record. It is disclosed only as a copy of those records and is not intended to provide a full, complete or entirely accurate assessment of the site. Accordingly, the Otago Regional Council is not in a position to warrant that the information is complete or without error and accepts no liability for any inaccuracy in, or omission from, this information. Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.



Appendix C – Extracts from Golder Associates Validation Report

Mt Iron Rural Park Lifestyle Zone, Wanaka

Preliminary Site Investigation Report
Paterson Pitts Group Ltd



OPUS PROJECT NUMBER: 087813141 | PROJECT TITLE: MT IRON RURAL PARK LIFESTYLE ZONE, WANAKA | DATE: DECEMBER 2008



TITLE | SUBDIVISION PLAN WITH SHEEP DIP AND DEPOSITORY LOCATION

DECEMBER 2008
 PROJECT | 087813141

2

QANZ Form 450
 RLO

4.3.3 Depository

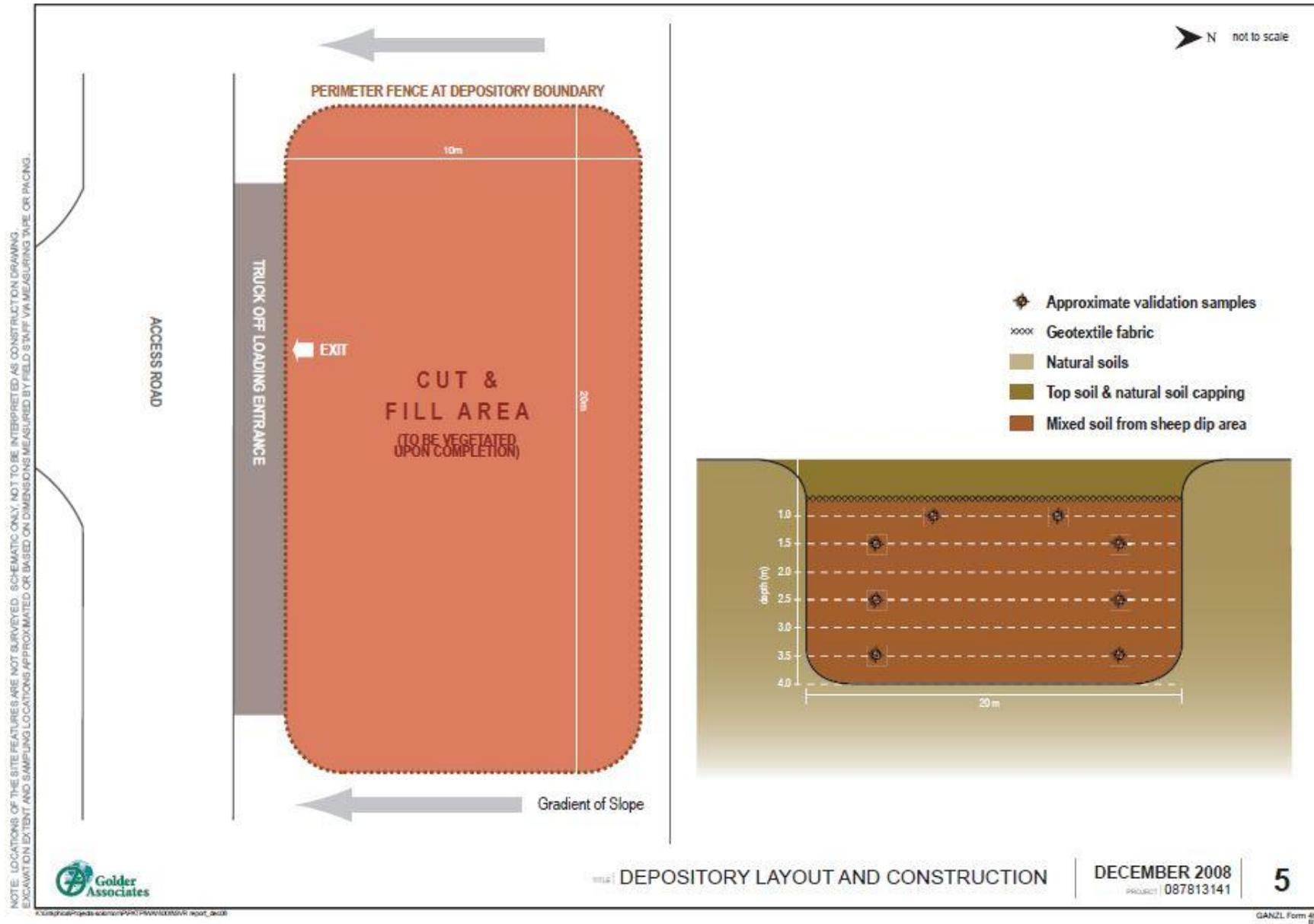
The depository comprised an excavation approximately 10 m x 20 m and 4 m deep (Figure 5) and was located approximately 200 m to the south of the sheep dip, in an area not to be redeveloped for residential use. The location of the depository was identified as a suitable location as it was situated within a less sensitive area of the development. The depository location is also subject to less frequent exposure due to its remote location, and exposure will be further reduced through a dilution of contaminant concentrations to acceptable levels through mixing and placement of cleanfill over the impacted soil.

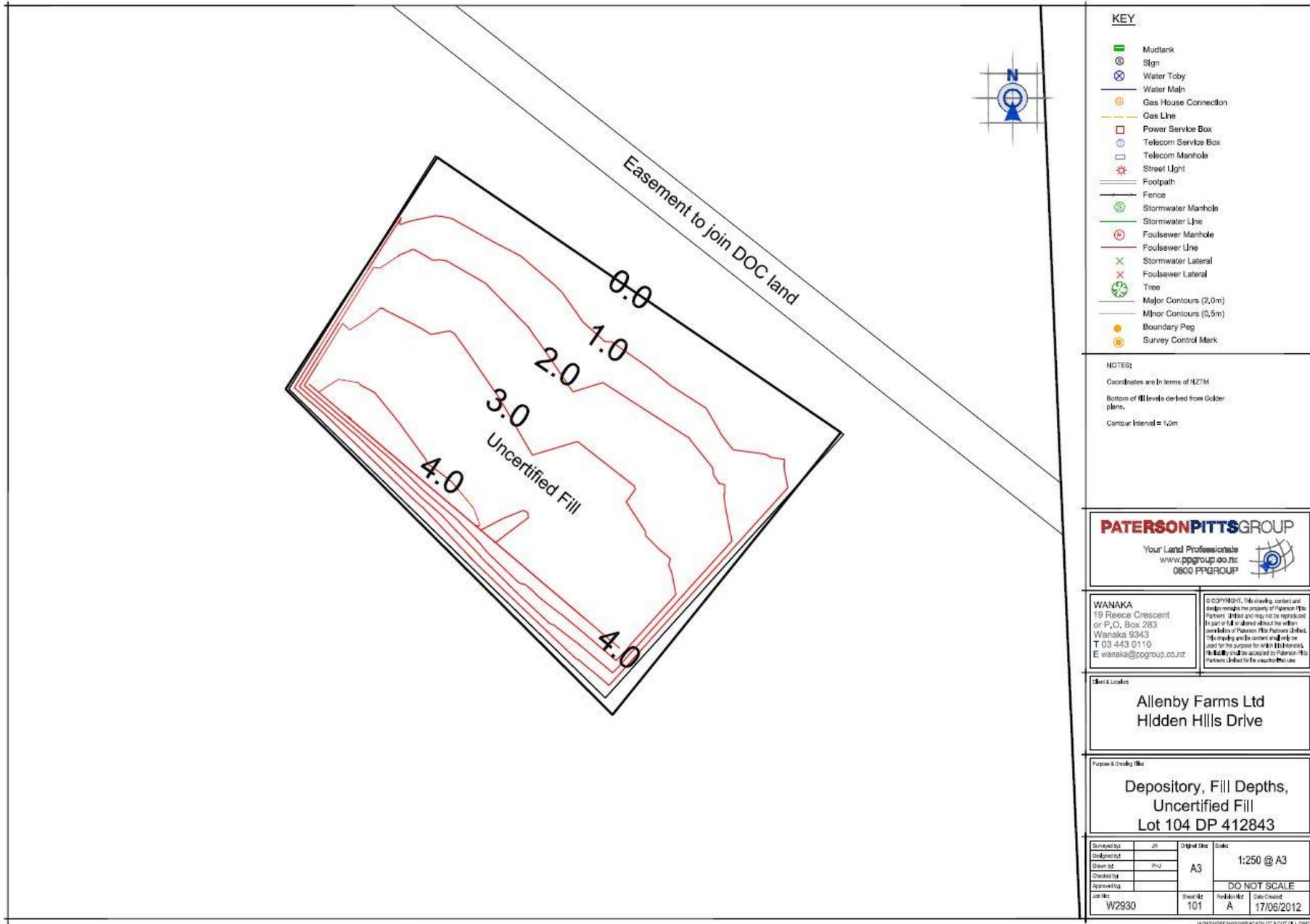
The depository was excavated to generate additional cleanfill suitable for use within the site development works (Plate 16). Investigations undertaken by PPP indicated that the lithology of the depository generally comprised a layer of humus top soil to 0.3 m bgl overlying gravels to at least 3 m bgl. The overlying top soil was determined as not suitable for use in the development works and was therefore stockpiled adjacent to the depository for use in the soil mixing and where appropriate as backfill for the sheep dip excavation.

Excavated soil from the sheep dip was transported to the depository using trucks with a capacity of approximately 7 m³. Soil was unloaded directly in to the depository and mixed with cleanfill excavated from the depository. The contaminated material was diluted at a rate of approximately 2:1 (cleanfill : impacted soil). The soil was thoroughly mixed using a Caterpillar 210 LC-7 excavator prior to being spread across the area of the depository and compacted (Plates 17 to 19).

Validation sampling was undertaken following the deposition and compaction of approximately 1 m of soil within the depository. The sampling programme was designed to characterise the vertical distribution of contaminant concentrations within the depository and to ensure that adequate and even mixing of the contaminated soil with cleanfill was occurring throughout the process.

Following excavation of all contaminated soil from the former sheep dip and dilution within the depository, a layer of geotextile fabric was placed across the top surface of the mixed soil (Plate 20). The finished level of the mixed soil, and hence the layer of geotextile fabric, was approximately 1.0 m below the natural surface layer of the surrounding land. The remaining volume of the depository above the geotextile fabric was filled with cleanfill derived from the initial depository excavation (Plate 21).







Appendix D – Site Photographs (inc depository construction)

Mt Iron Rural Park Lifestyle Zone, Wanaka

Preliminary Site Investigation Report
Paterson Pitts Group Ltd

Photo 1



'Piece of Land' where soil depository is located alongside walking track
(March 2017)

Photo 2



Fence line delineating 'Piece of Land'
(March 2017)

Photo 3



Depository prior to filling with sheep dip soil
(Courtesy of Golder Associates validation report December 2008)

Photo 4



Placement of sludge/soil in the depository
(Courtesy of Golder Associates validation report December 2008)

Photo 5



Mixed soils depository and placement of geotextile fabric as visual indicator
(Courtesy of Golder Associates validation report December 2008)

Photo 6



Capping of mixed soil in depository
(Courtesy of Golder Associates validation report December 2008)



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