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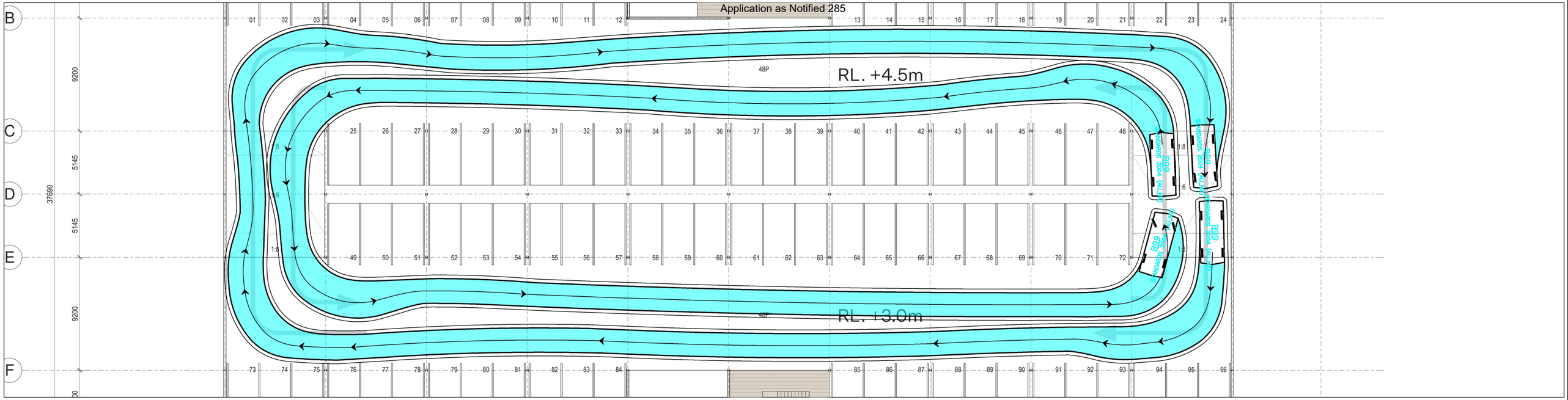
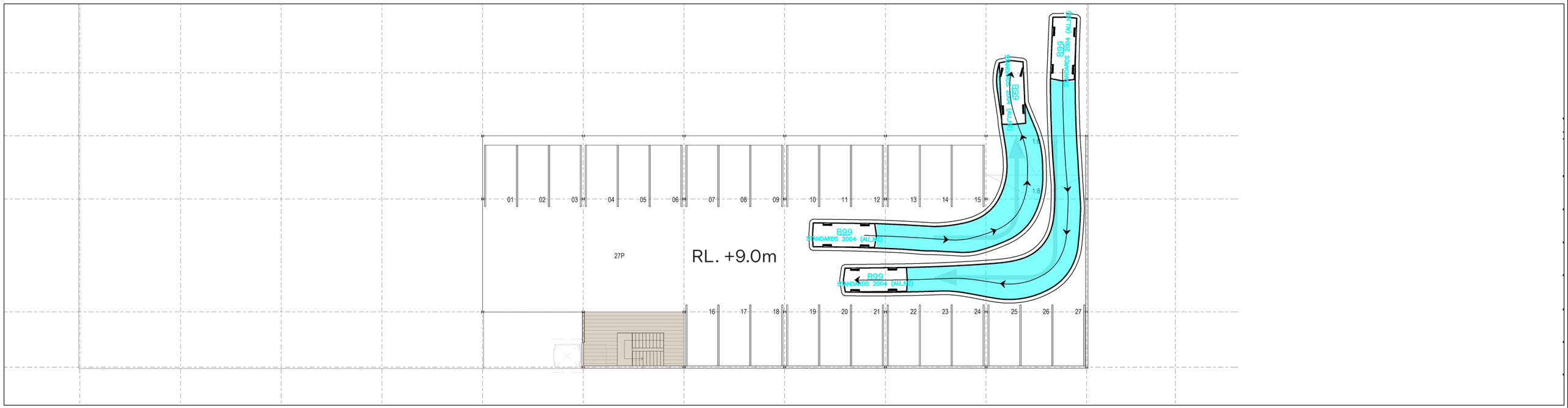


FIRST AND SECOND LEVEL CIRCULATION



THIRD LEVEL CIRCULATION

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WANAKA FIRST DISTRICT, THREE PARKS ROA

99TH PERCENTILE VEHICLE TRACKING - FIRST, SECOND, AND THIRD LEVEL CIRCULATION

FOR INFORMATION

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By A MACE-COCHRANE
Project #1323003

Appendix 4. Queenstown Lakes Proposed District Plan Transport Compliance Assessment

29.5 Rules - Standards for activities outside roads			
Table 29.3 - Standards for activities outside roads			
PARKING AND LOADING			
29.5.1	Location and Availability of Parking Spaces	**Complies**	Two emergency vehicle bays are provided for the hospital which are appropriately located. The loading for larger vehicles is provided at basement level.
29.5.2	**Size of Required Parking Spaces and layout**		
a.	All provided parking spaces and associated manoeuvring areas are to be designed and laid out in accordance with the Car Parking Layout requirements of Table 29.7 and Diagram 3 (car space layouts) of Schedule 29.2. This standard does not apply to parking, loading and associated access areas for Ski Area Activities in the Ski Area Subzone.	**Complies**	The proposed parks are 4.6m long, with 0.4m of overhang from the wheel stop, and 2.6m wide.
29.5.3	**Gradient of Parking Spaces and Parking Areas**		
	Parking spaces and parking areas other than mobility parking spaces shall have a gradient of no more than 1 in 20 parallel to the angle of parking, and a gradient of no more than 1 in 16 in any other direction.	**Complies**	The site is flat, and the parking building will be designed to ensure that no park exceeds the maximum gradient.
29.5.4	**Mobility Parking spaces**		
a.	Other than in relation to residential units and visitor accommodation with less than 6 guests, mobility parking spaces shall be provided in accordance with the following minimum standards:	**Complies**	Accessible parks are 4.6m long, with 0.4m of overhang from the wheel stop, and 2.5m wide, with 1.3m of width between the next carpark.
b.	Where two or more activities are located on one site, the activity with the greater mobility parking requirement is the number of mobility parks provided.	**Will Comply**	Considering all activities proposed, the other health care facilities require the highest number of mobility spaces (five are required). Eight mobility parking spaces are provided; however, only four are able to be accessed by the general public/other health care facility staff. It is recommended these spaces are relocated onto the ground floor level, to ensure compliance with this rule. It has been assumed that there are 35 professional staff and 15 FTE staff associated with Allied Health and the health consultancy. This equates to three staff spaces and two visitor spaces.
	Reference to Table	**Complies**	

d. on a level surface;	**Complies**	
e. clearly signposted;	**Complies**	
f. located on the same site as the activity;	**Complies**	The parking building is located on the same block of land where the other proposed buildings are located.
g. as close as practicable to the building entrance; and	**Complies**	The four public accessible spaces (i.e., not for hospital staff) are located on the ground floor, with an adjoining footpath providing direct access to the other buildings across the pedestrianised space and the hospital.
h. accessible to the building via routes that give direct access from the car park to the building.	**Complies**	The basement level accessible parks provide direct access to the hospital building; however, are not able to be utilised by staff of Allied Health or the health consultancy. It is recommended these spaces are relocated onto the ground floor level, allowing them to be accessed by all. The ground floor accessible parks can access the buildings via a footpath; however, are required to cross the pedestrianised lane way to access the commercial/health buildings.
29.5.5 Drop off/ pick up (set down) areas in all zones except in the Queenstown Town Centre Zone, the Wānaka Town Centre Zone, and the Arrowtown Town Centre Zone.		
a. All day care facilities, educational activities, and healthcare facilities must provide drop off/ pick up (set down) areas to allow vehicles to drop off and pick up children, students, elderly persons, or patients in accordance with the following standards:	**Infringes**	Three pick-up/drop-off spaces are proposed for the hospital. At this stage, it is unknown how many professional staff will be employed by the hospital; however, it is assumed this will exceed 30. No spaces are proposed for Allied Health or the health consultancy.
Reference to Table	**Complies**	
29.5.6 Reverse manoeuvring for any day care facility, educational facility, or healthcare facility	**Complies**	The pick-up and drop-off spaces are provided such that a vehicle does not need to reverse onto a road. Further to this, there is sufficient manoeuvring space for ambulances to exit in a forwards direction. There is sufficient manoeuvring space provided within the parking building, meaning no vehicle is required to reverse out of the building.
29.5.8 Queuing	**Infringes**	Approximately 25.0m and 7.0m of queuing space is provided at the public and hospital staff/loading accesses, respectively. The District Plan requires 30.0m of queuing space for the public access and 12.0m of queuing space is required for the other access.

29.5.9 Loading Spaces		
a. Off-street loading shall be provided in accordance with this standard on every site in the Coneburn Industrial Zone, General Industrial and Service Zone, Business Mixed Use Zone, the Town Centre zones, and the Local Shopping Centre Zone, except in relation to unstaffed utility sites and on sites where access is only available from the following roads: a. Queenstown Mall b. Beach Street c. Shotover Street d. Camp Street e. Rees Street f. Marine Parade g. Church Street h. Earl Street i. Ballarat Street j. Memorial Street k. Helwick Street l. Buckingham Street	**Infringes**	A loading area is provided in the basement level of the carpark which services the hospital and can service the four frontage buildings. This has been designed in accordance with the vehicle type required to deliver MRI equipment. Small deliveries for the four frontage buildings are likely to occur on the road frontage.
b. Every loading space shall meet the following dimensions:	**Complies**	The provided loading area is 4.5m high.
Reference to Table	**Complies**	
c. Notwithstanding the above: (i) Where articulated trucks are used in connection with any site sufficient space not less than 20m in depth shall be provided. (ii) Each loading space required shall have unobstructed vehicular access to a road or service lane. (iii) Parking areas and loading areas may be served in whole or in part by a common manoeuvre area, which shall remain unobstructed.	**Complies**	Loading vehicles have direct access to the basement level of the parking building, with unobstructed turning space.
29.5.10 Surface of Parking Spaces, Parking Areas, and Loading Spaces	**Complies**	All parking areas will be formed and sealed.
29.5.11 Lighting of parking areas		
a. Excluding parking areas accessory to residential activity, where a parking area provides for 10 or more parking spaces, which are likely to be used during the hours of darkness, the parking and manoeuvring areas	**Complies**	It is assumed that lighting will be provided that complies with this rule.

and associated pedestrian routes shall be adequately lit.		
b. Such lighting shall be designed in accordance with the Queenstown Lakes District Council Southern Light Part One - A Lighting Strategy (March 2017) and Queenstown Lakes District Council Southern Light Part Two – Technical Specifications (March 2017).	**Complies**	It is assumed that lighting will be provided that complies with this rule.
c. Such lighting shall not result in a greater than 10 lux spill (horizontal or vertical) of light onto any adjoining site within the Business Mixed Use Zone, the Town Centre Zones, and the Local Shopping Centre Zone, measured at any point inside the boundary of any adjoining site.	**Complies**	It is assumed that lighting will be provided that complies with this rule.
d. Such lighting shall not result in a greater than 3 lux spill (horizontal or vertical) of light onto any adjoining site that is zoned High Density Residential, Medium Density Residential, Low Density Residential, Airport Zone, or the land subject to Designation #2 measured at any point more than 2m inside the boundary of the adjoining site.	**Complies**	None of these zones are adjacent to the site.
29.5.12 Bicycle parking and the provision of lockers and showers		
Bicycle parking, lockers, and showers shall be provided in accordance with the minimum requirements specified in Table 29.6 and the layout of short term bicycle parking, including aisle depth, shall have minimum dimensions presented in Diagram 5 (bicycle layouts) of Schedule 29.2.	**Complies**	Considering all of the activites proposed on the site, 54 short term and 67 long term cycle parks are required. This requirement is split by activity below. Retail: - 4 short term - 6 long term Office: - 9 short term - 36 long term Other health care facility: - 30 short term - 15 long term Food and beverage: - 8 short term - 2 long term Hospital: - 3 short term - 7 long term A total of 164 cycle parks have been provided (54 short term and 114 long term). In addition to this, 67 lockers and seven unisex showers are provided. It is anticipated that the four office buildings will

		contain showers and lockers for the remaining long term cycle parks.
ACCESS		
29.5.13 Access and Road Design	**Infringes**	The public vehicle access to the parking building, ambulance bay, and hospital pick-up and drop-off area is proposed to be 7.0m wide. The access to the basement level of the parking building is proposed to be approximately 9.0m wide. According to Table 3.3 of the Code of Practice, the vehicle access width should be no wider than 5.7m.
29.5.14 Width and design of vehicle crossings - urban zones		
a. The following vehicle crossing widths shall apply as measured at the property boundary:	**Complies**	The public vehicle access to the parking building, ambulance bay, and hospital pick-up and drop-off area is proposed to be 7.0m wide. The access to the basement level of the parking building is proposed to be approximately 9.0m wide.
b. Vehicle crossings in all zones other than in those rural zones which are regulated by Rule 29.5.16 shall comply with Diagram 2 and with either Diagram 6 or 7 in Schedule 29.2, depending on the activity served by the access, such that: (i) the access crosses the property boundary at an angle of between 45 degrees and 90 degrees; (ii) the vehicle crossing intersects with the carriageway at an angle of 90 degrees plus or minus 15 degrees; (iii) roading drainage shall be continuous across the length of the crossing; (iv) all vehicular accessways adjacent to State Highways shall be sealed from the edge of the carriageway to the property boundary.	**Complies**	The vehicle crossing design will comply with these standards.
c. For vehicle crossings in all zones other than in those rural zones which are regulated by Rule 29.5.16, the width of the vehicle crossings at the kerb shall be 1.0m wider than the width at the boundary.	**Complies**	The vehicle crossing will be 1.0m wider at the kerb line.
d. All vehicle crossings in all zones other than in those rural zones which are regulated by Rule 29.5.16 shall be located at least 500mm from any internal property boundary and from any other vehicle crossing on the same site.	**Complies**	Assumed to comply.

29.5.16 Maximum Gradient for Vehicle Access		
a. The maximum gradient for any private way used for vehicle access shall be 1 in 6.	**Complies**	Assumed to comply.
c. The vehicle break-over angles shown in Diagram 2 of Schedule 29.2 shall not be exceeded over any part of the width of the vehicle access/ crossing.	**Complies**	Assumed to comply.
29.5.17 Minimum Sight Distances from Vehicle Access on all roads other than State Highways	**Complies**	There is no requirement in the district Plan for sight distance in a 40km/h zone. Austroads Part 4A suggests that the minimum approach sight distance in a 40km/h zone is 40.0m (for a reaction time of 2.0 seconds). For vehicles travelling along Road 4 and turning right into Deering Street, there is approximately 30.0m of sight distance available.
29.5.19 Maximum Number of Vehicle Crossings	**Complies**	Two vehicle crossings are proposed, with one on Deering Street and the other on Road 4. These are both local roads and the frontage length is greater than 19.0m.
29.5.21 Minimum distances of Vehicle Crossings from Intersections		
a. No part of any vehicle crossing shall be located closer to the intersection of any roads than the following minimum distances permitted below and as shown in Diagram 12 of Schedule 29.2:	**Complies**	The two proposed vehicle crossings are located more than 25.0m from the closest intersection.
b. Roads with a speed limit of less than 70 km/hr: Reference to Table	**Complies**	

Wānaka Health Precinct

Resource Consent Application

Urban Design Assessment – Final

Prepared for Roa

26th November 2024

RESET

Document Control

Client:	Roa
Project:	Wānaka Health Precinct
Document Name:	Urban Design Assessment
Document Status:	Final
Date:	26th November 2024
Author(s):	Garth Falconer Director | Urban Designer & Landscape Architect NZILA Fellow
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(Cover image: by Warren Mahoney)

CONTENTS

1 INTRODUCTION

Reset Urban Design Limited (‘Reset’) has been engaged by Roa (‘the Applicant’) to undertake an urban design assessment (‘UD assessment’) as part of the documentation for the Resource Consent application for the proposed hospital and health development (The ‘proposed development’) on a 1.3 hectare land at Three Parks, Wānaka (‘Site’). The proposed development is also known as Wānaka First District.

The proposal seeks to construct an integrated health precinct incorporating a regional hospital complex, four allied health buildings, and a parking building with associated circulation network and landscape (‘The Proposal’). This comprehensive development of a large-scale health facility with strong focus on delivering substantial community, cultural and sustainability outcomes is a major addition to the developing Three Parks town centre and broaden the healthcare services in the wider Upper Clutha district.

The purpose of this report is to provide a comprehensive assessment of the proposal including an analysis of the site within its local and strategic and planning context, and the Urban Design performance of the proposal with reference to the relevant provisions and assessment matters set out in the Proposed District Plan (PDP), as well as a range of general topics regarding urban design best practice.

This Urban Design Report should be read in conjunction with the following expert reports:

- Assessment of Environmental Effects (AEE) report by Erin Stagg (November 2024)
- Architectural and Urban Design Report by Warren Mahoney (June 2024)
- Landscape Report by Reset (November 2024)

2 SITE ANALYSIS

2.1 Site Context

The Site is a large open block of relatively flat greenfield land located approximately 1.2km from Roys Bay shoreline in Wānaka within the emerging mixed use 100 hectare centre known as Three Parks, which is zoned for a mix of commercial, business, community facilities, and residential uses.

Based on former farmland, virtually the entire Three Parks development area since rezoning for urbanisation in 2007 has been fully earthworked and modified into a developing mixed-use centre.

The site of the proposal lies towards the south of the partially completed retail centre which at the core of Three Parks.

The Site has a northeast to southwest orientation and forms a rectangular block framed by a grid of roads and largely defined by the central spine road called Sir Tim Wallis Drive. The Sites immediate context is one of an open urban environment partially contained by a series of 2 to 3 level commercial buildings which are consolidating from the south. Blocks of undeveloped land extend from the site to the north along Sir Tim Wallis Drive until the retail centre. To the southeast of the Site is undeveloped future commercial land and a large open expanse which is a Council reserve and is planned to accommodate active recreation including team sports.

The 1.316 hectare site itself is open and undeveloped with a level contour. There is no existing vegetation or watercourses or any other features present on the site.

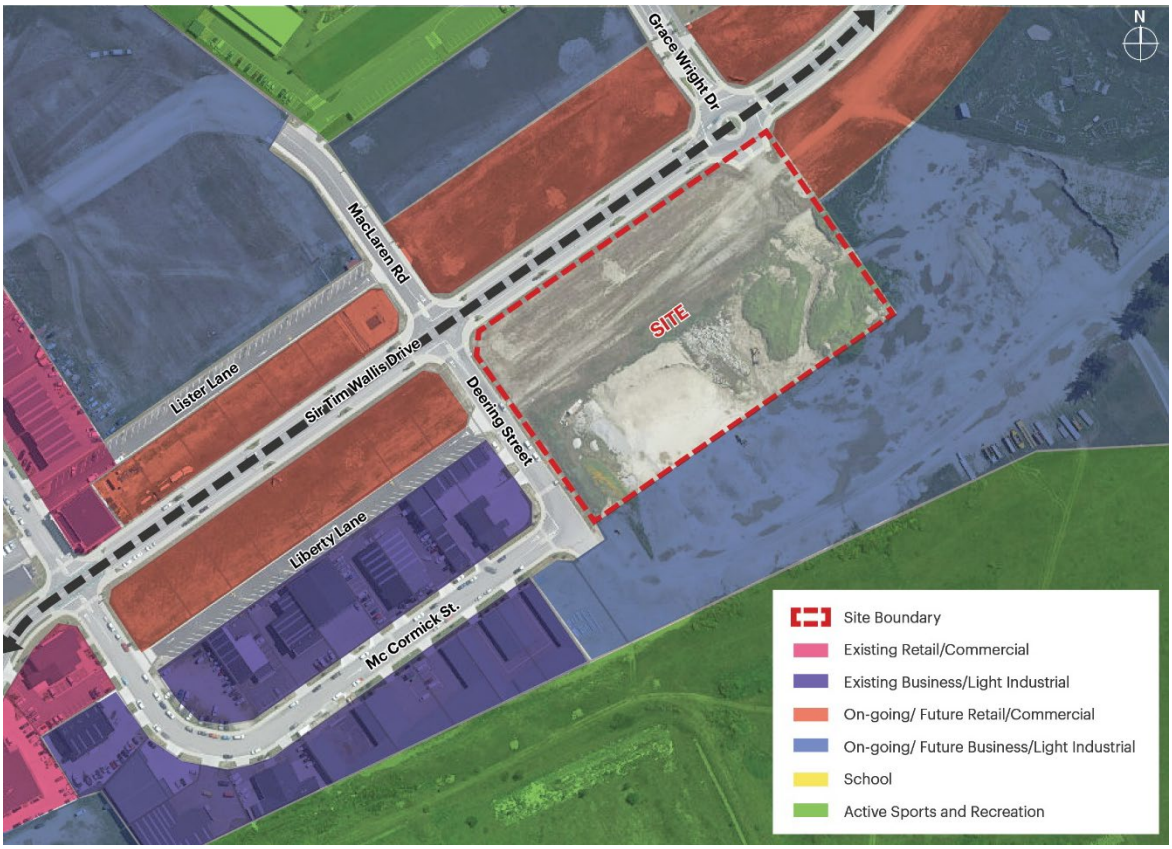


Figure 1 - Site context plan

2.2 Surrounding and Wider Context

Three Parks is centred on Sir Tim Wallis Drive which connects the established commercial industrial area of Ballantyne Road to the south with State Highway 84 to the north. A number of facilities are developing within Three Parks including several existing retail, a supermarket large format retail, a primary school (Te Kura O Take Karara), The Wānaka Recreation Centre (including a swimming pool), and a number of office and commercial buildings including a large format hardware store (Mitre 10).

The structure of Three Parks is simply based on a retail centre in the middle connected by a commercial strip along Sir Tim Wallis Drive, supported by business land and with larger residential land to the rear.

The Site is located about 400m to the south from the Three Parks retail centre and has a long frontage with Sir Tim Wallis Drive which is a 23m wide arterial road with a roundabout on the intersection with Grace Wright Drive on the northern side of the Site. Deering Street on its southern flank is developed with light commercial buildings including office, storage, car sales and servicing businesses. Approximately 200m to the west is the Primary School and Recreational Centre which are easily accessed along Grace Wright Drive.

The Site has road frontage on all four sides, including two unformed roads – an extension to McCormick Street to the east, and an extension to Grace Wright Drive to the north.

Currently the overall site context is one of a partially developed southern section of the larger Three Parks centre. Buildings and businesses extending from Ballantyne Road along Sir Tim Wallis Drive are relatively modest small to medium businesses and commercial activities accommodated in 2 to 3 storey buildings mainly of tilt slab concrete construction. Recently approved on the opposing corner of Deering and Sir Tim Wallis Drive is Aspiring House which is a 19.5m high 4 level office building.

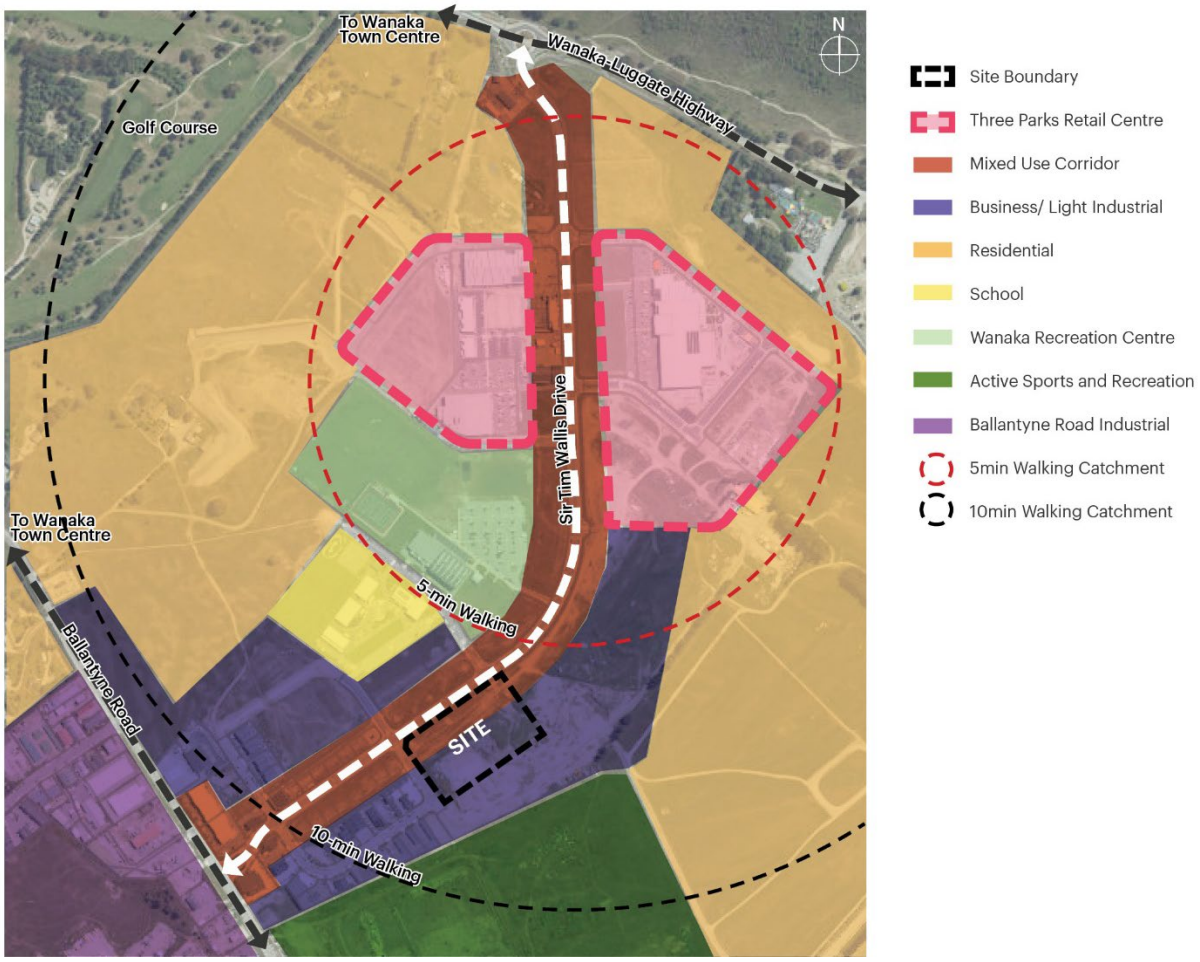


Figure 2 - Site surrounding context plan showing the site is within 5 minutes walk of the retail centre and near the school and recreation centre.

2.3 Strategic Context

Responding to the continued growth of Wānaka and the wider Upper Clutha area, Three Parks has been developed as a secondary urban centre complimenting the traditional town centre at Roys Bay, which is largely built out and contained by the lake, steep contours, reserves and developed residential land. The large scale, flat and relatively unrestricted nature of Three Parks allows for the future growth of the township and for the location of larger format facilities.

The area is accessed off the arterial Ballentyne Road and the Wānaka Luggate Highway and flanked by large open space reserves with the Golf Course to the west and the developing active sports Council reserve to the east.

Currently there is no hospital in Wānaka though there are several small medical centres that provide general practise services including Aspiring Medical Centre and Wānaka Medical Centre on Cardrona Valley Road.

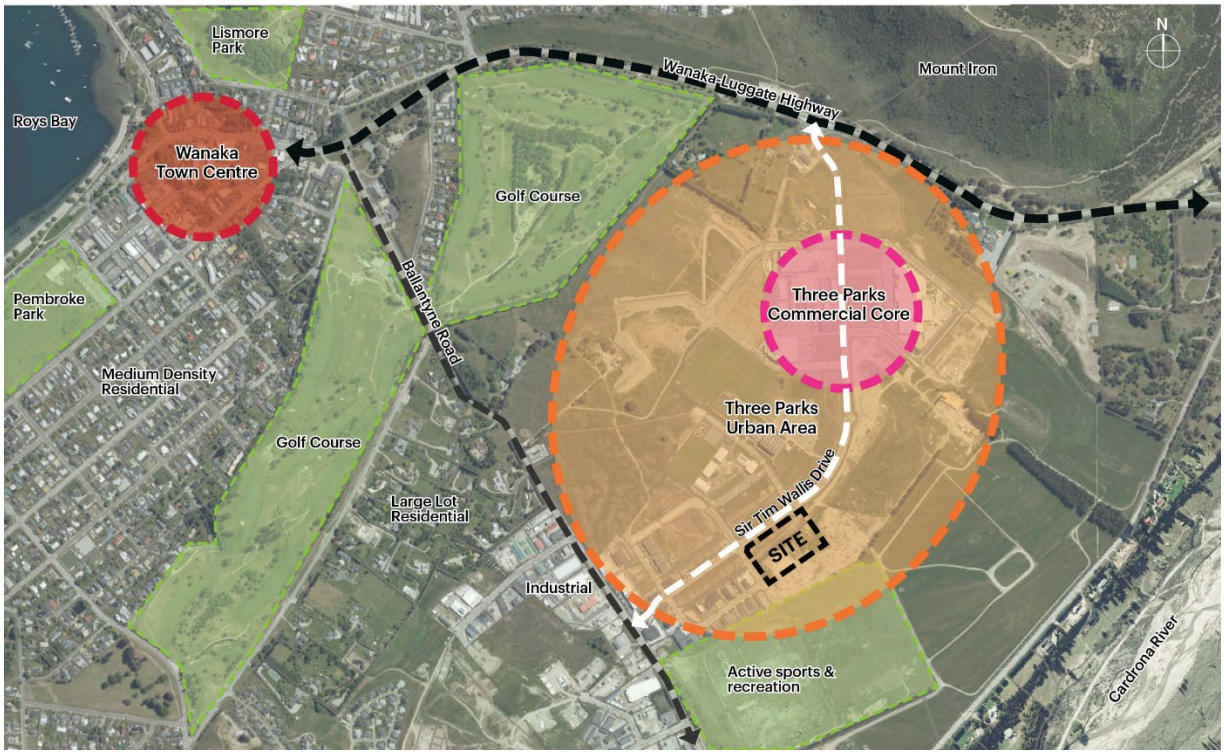


Figure 3 - Site location in the broader Wānaka context

3 THE PROPOSAL

The proposal is for a comprehensive full block wide health precinct based on a five-level 21m high (to the roof) hospital which will provide a range of care including operating theatres and medical facilities for surgical procedures and inpatient beds. On the hospital roof a helicopter landing area is provided for emergencies and delivery of patients to main centres if required. The height of the helipad is 22.8m and lift shaft 26.94m.

Surrounding the hospital and edging Sir Tim Wallis Drive will be four new 4 to 5 level commercial buildings providing a mix of allied medical services, with ground floor ancillary hospitality and retail. A 3 storey 12m high parking building to the rear of the site will provide for 305 spaces and underground loading and servicing for the hospital. A major feature of the site layout is the wide internal pedestrian street and generous scaled communal open spaces fronting Sir Tim Wallis Drive. The open spaces are designed to create a strong community focus with gathering areas, recreation, eateries, and provision for events, food trucks and markets.

The design proposal has been based on a comprehensive analysis of the site and best practice urban design principles. The initial design vision, guiding principles, key design consideration, and objectives have been briefly outlined and well illustrated in the combined Architectural and Urban Design Report ('UDR') prepared by Warren and Mahoney (June 2024). These have been added to and further developed with the subsequent development of the Waiora Way Landscape Report

(WWLR) by RESET in partnership with Aukaha (26th Nov 2024) which has provided a comprehensive Concept Masterplan which considers the landscape context and is led by mana whenua informed cultural values.

The vision is for an integrated block wide strategy with design principles that fundamentally address community wellbeing, cultural and sustainable design. Four key urban design considerations are outlined in the UDR, including establishing Sir Tim Wallis Drive as the primary commercial address, creating an urban pathway along Grace Wright Drive, providing fine grained permeability between building blocks and creating a central pedestrian street. The UDR also sets out a number of key urban design objectives. These are: promoting the presence of water and nature in public spaces, liberate public space and strengthen parking infrastructure, create spaces and buildings with the ability to adapt and evolve and promote a pedestrian-friendly traffic network.

Figure 4 - Proposed Site Masterplan (by Warren and Mahoney)

The WWLR builds its more detailed design considerations from a careful analysis of the landscape context which fundamentally includes the cultural context. For mana whenua the sites significance relates to its location and the fundamental importance of water; between Wānaka (Lake Wānaka), Ōrau/Cardrona River and the Mata Au/ Clutha River. The core values of mana, whakapapa, mauri and tapu were developed with mana whenua through a value workshop to develop specific Design principles mana, taiao. Whakapapa, tapu/noa and mauri. These culturally derived design principles have been developed to generate a block wide open space strategy including surfacing, permeability and planting.

The landscape concept for Waiora Way, the central pedestrian street, recognises the importance of water and takes inspiration from the meandering form of the nearby Ōrau/Cardrona River together with the Ara Tawhito (River travel) to create a river like flow of space interjected with nodes of activity which includes thresholds, healing gardens, interactive and performance/learning areas together with community and market spaces.

In urban design terms, the key features of the proposal are outlined as follows:

Site Arrangement

- The primary commercial address is directly on Sir Tim Wallis Drive with a series of buildings reinforcing the main spine road and with laneways permeating into the core of the block.
- Waiora Way, the wide pedestrian street, extends across the block providing both an internal focus for activities and a key circulation route and cultural character for the entire block.
- The hospital is the anchor of the site and is set back from the main street with good access from the rear.
- The car park building is located alongside the hospital and provides for visitors and users of the site.

Building Layout and Design

- The frontage with Sir Tim Wallis Drive is strongly defined with four discretely separated buildings that have tapered edges which lead into pedestrian lanes. A central open space heart opens up to Waiora Way (the internal pedestrian street).
- The fine grain layout creates a high level of permeability with connections extending into the neighbouring blocks.
- The frontage design is based on four buildings with alternating materiality and heavily modulated facades.
- The consolidated scale and the high quality of the building design will create a strong focus and benchmark for the surrounding area which is developing.

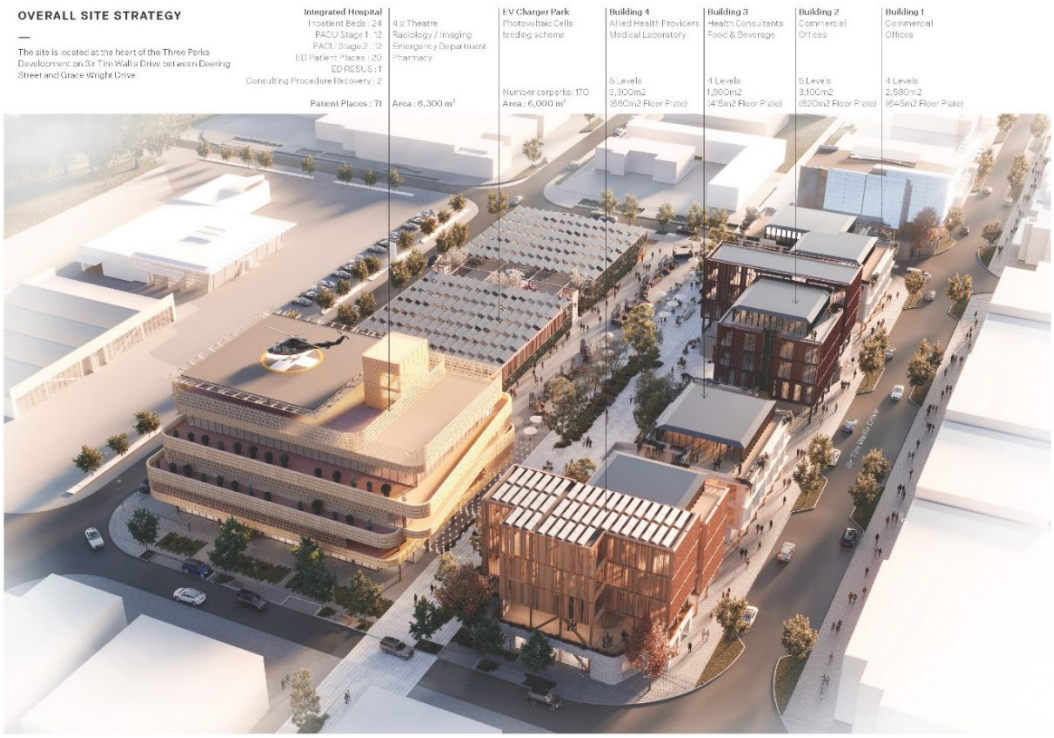


Figure 5 - Overall building and open space rendering (by Warren Mahoney)

Circulation

- Key pedestrian access points are located off Sir Tim Wallis Drive with laneways that provide a continuous flow through the block with only minor level changes allowing universal access.
- Waiora Way (internal pedestrian street) provides the key circulation route for non-vehicle movement and also provides a 4m wide clear emergency route.
- Delivery, drop off and service access are located off Deering Street and McCormick Street.
- Ambulance access is located off McCormick Street.

Public Realm

- Core to creating a vibrant community destination are wide generous open spaces that are fitted out with high quality materials.
- A site activity programme extends across the block with a range of features including learning and performance spaces, a market area and interactive areas.
- Cultural values through spatial design focuses a cultural narrative with specific area designs and materials, furniture and interpretation.
- Low impact natural drainage features such as bioswales and permeable paving are incorporated throughout the public realm and streetscape.

Landscape Treatment

- Street trees edge all the borders of the block.

- Native planting forms the basis of an extensive planting strategy with some exotic species providing seasonal interest.
- Healing gardens provide sensory and medicinal planting.
- Planted bioswales/rain gardens feature across the site collecting and filtering stormwater.
- Robust materials, surfacing and light colours are inspired by the local mountain landscape.

Parking and servicing arrangement

- The parking building is of a low scale, recessive and lightly detailed.
- The car parking building features green walls, sustainable EV charging and rooftop solar panels.
- Secured bicycle parks are incorporated into the edges of the parking building.

4 STRATEGIC AND PLANNING CONTEXT

4.1 The Proposed District Plan

The Site has a split zoning. The northern third of the Site is zoned Business Mixed Use (BMU) which contains the four commercial buildings while the remainder is located within the Three Parks Business Zone (TPB) which contains the pedestrian lane, the hospital and car parking building. (*Refer to zoning map below)*

Figure 6 - Site zoning plan (source: QLDC PDP Website)

The Business Mixed Use (BMU) zone seeks to '*provide for complementary commercial, business, retail and residential uses that supplement the activities and services provided by town centres*' while the primary purpose of the Three Parks Business Zone (TPB) is to '*provide for a range of industrial, service and trade related activities*'. The TPB provides for a range of activities not necessarily suited to either the Three Parks Commercial or General Industrial and Service zones

A full description of the relevant statutory considerations has been comprehensively set out in the AEE. The following sections provide a summary of the key provisions in the PDP that are of relevance to the urban design aspects of the proposal. The objectives, policies and rules outlined below inform the structure of the UD assessment set out in Section 5 of this assessment.

BMU

Objective 16.2.1 states:

'An area comprising a high intensity mix of compatible residential and non-residential activities is enabled.'

Policies 16.2.1.2, 16.2.1.7 & *16.2.1.9* implement *Objective 16.2.1* and state:

16.2.1.2 Enable a range and mix of compatible business, residential and other complementary activities to achieve an urban environment that is desirable to work and live in.

16.2.1.7 Ensure that the location and direction of lights does not cause significant glare to other properties, roads and public places and promote lighting design that mitigates adverse effects on views of the night sky and provide a safe and well-lit environment for pedestrians.

16.2.1.9 Minimise opportunities for criminal activity through incorporating Crime Prevention through Environmental Design (CPTED) principles as appropriate in the design of lot configuration and the street network, carparking areas, public and semi-public spaces, accessways/pedestrian links/lanes, and landscaping.

Objective 16.2.2 states:

'New development achieves high quality building and urban design outcomes that minimises adverse effects on adjoining residential areas and public spaces.'

Policies 16.2.2.1, 16.2.2.3, *16.2.2.5, 16.2.2.8 & 16.2.2.10* implement *Objective 16.2.2* and state:

16.2.2.1 Require the design of buildings to contribute positively to the visual quality, vitality, safety and interest of streets and public spaces by providing active and articulated building frontages and avoid large expanses of blank walls fronting public spaces.

16.2.2.3 Require a high standard of amenity and manage compatibility issues of activities within and between developments through site layout, landscaping and design measures.

16.2.2.5 Incorporate design treatments to the form, colour or texture of buildings to add variety, moderate their scale and provide visual interest from a range of distances.

16.2.2.8 Apply consideration of the operational and functional requirements of non-residential activities as part of achieving high quality building and urban design outcomes.

16.2.2.10 Require consideration of the relevant design elements identified in the Business Mixed Use Design Guide 2021.

Relevant built form/urban design standards are outlined below.

- *Rule 16.5.2* requires:
  'Outdoor storage and storage of waste and recycling shall be screened from public places and adjoining Residential zones.'

- *Rule 16.5.4* sets out maximum building coverage of 75%.
- *Rule 16.5.9.1* sets out maximum building height of 12m in Wānaka. *Rule 16.5.9.2* requires that *'Any fourth storey (excluding basements) and above shall be set back a minimum of 3m from the building frontage'.*
- With regard to lighting and glare, *Rule 16.5.11* requires that:

  16.5.11.2 No activity shall result in a greater than 10 lux spill (horizontal or vertical) of light onto any adjoining property within the Zone, measured at any point inside the boundary of any adjoining property.

  16.5.11.3 No activity shall result in a greater than 3 lux spill (horizontal or vertical) of light onto any adjoining property which is zoned residential measured at any point more than 2m inside the boundary of the adjoining property.

QLDC Business Mixed Use Zone Design Guide 2021

The QLDC Business Mixed Use Zone Design Guide 2021 identifies twelve design elements for business mixed use zones in the area. These key design elements include:

- *01 Create a positive street edge and a sense of place;*
- *02 Building facade treatment;*
- *03 Building height and roof form;*
- *04 Signage;*
- *05 Open space provision and boundary interfaces;*
- *06 Accessibility;*
- *07 Parking areas;*
- *08 Waste and service areas;*
- *09 Private and safe environments;*
- *10 Building material and lighting;*
- *11 Environmental sustainability;*
- *12 Landscape materials and planting.*

A series of detailed guidelines regarding the methods and mitigation measures to achieve the anticipated outcomes within the BMU zone are also outlined in relation to each of the topics to provide further guidance on design practice.

TPB

Objective 19B.2.1 states:

'A high quality, functional business area which provides for a wide range of industrial, service and trade related activities, limited retail and office activities, and restricts the establishment of residential and other non-compatible activities.'

Policies 19B.2.1.1, 19B.2.1.3, 19B.2.1.4, 19B.2.1.5 & *19B.2.1.6 implement Objective 19B.2.1* and state:

19B.2.1.1 Enable a variety of compatible activities while managing adverse effects, including reverse sensitivity effects.

19B.2.1.3 Avoid office and retail activities unless they are small scale and ancillary to the principal use of the site.

19B.2.1.4 Ensure that the design of buildings and associated development is of a high quality while meeting the functional needs of industrial and service activities.

19B.2.1.5 Require outdoor storage areas are appropriately located and screened to limit any adverse visual effects on public places and adjoining residential zones.

19B.2.1.6 Encourage design treatments to the form, colour or texture of buildings to add variety, moderate their scale and provide visual interest from a range of distances.

Relevant built form/urban design standards are outlined below.

- All buildings in the TPB require a restricted discretionary activity consent pursuant to *Rule 19B.4.6*, with the following matters of discretion (where applicable) applying:

  a. external appearance, including colours and materials;
  b. glazing treatment;
  c. design treatment;
  d. signage platforms;
  e. lighting;
  f. the ability to service the building(s), in terms of roading, water supply, stormwater and wastewater;
  g. location and screening of storage;
  h. provision for and screening of waste and recycling space;
  i. landscaping; and
  j. access, manoeuvring, loading, location of car parking, provision for mobility parking;
  k. natural hazards; and
  l. where Electricity Sub-transmission Infrastructure or Significant Electricity Distribution Infrastructure as shown on the Plan maps is located within the adjacent road any adverse effects on that infrastructure.

- *Rule 19B.5.1.5* requires that *'Where a site adjoins a different zone or public place, except roads, all buildings (other than those for industrial and service activities for which standard 19B.5.1.1 applies) shall be set back not less than 4.5m.*'

- *Rule 19B.5.2* requires that *'Outdoor storage and storage of waste and recycling shall be screened from public areas and adjoining zones by a 2m high solid fence.'*

- With regard to lighting and glare, *Rule 19B.5.3* requires that:

  19B.5.3.1 All exterior lighting, other than footpath or pedestrian link amenity lighting, installed on sites or buildings within the zone shall be directed away from adjacent sites, roads and public places, and so as to limit the effects on the amenity of adjoining sites, the safety of the road network, and on the night sky.

  19B.5.3.2 No activity shall result in a greater than 10 lux spill (horizontal or vertical) of light onto any adjoining property within the Zone, measured at any point inside the boundary of any adjoining property.

- *Rule 19B.5.5* sets out maximum building coverage of 75%.

- *Rule 16.5.9.1* sets out maximum building height of 10m and no greater than 3 storeys.

4.2 The Queenstown Lakes Spatial Plan (2021)

The Queenstown Lakes Spatial Plan (2021) (QLSP) sets out a spatial framework for '*how and where the communities of Wakatipu and Upper Clutha can Grow Well and develop*'.

QLSP promotes a consolidated approach for future developments to growth. For Wānaka, a mixed-use, high-density corridor is envisaged to link the established Wānaka Town Centre with the new emerging centre at Three Parks.

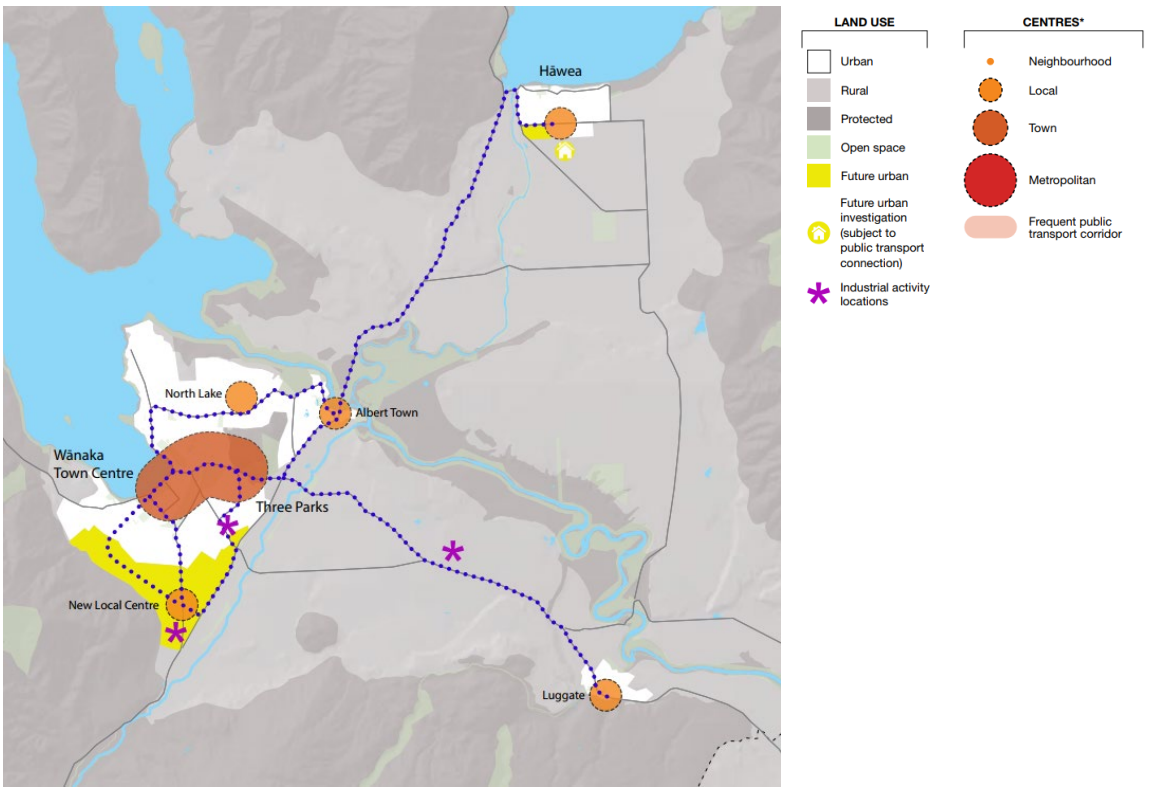


Figure 7 - Upper Clutha spatial elements plan (source: the Queenstown Lakes Spatial Plan)

As identified in the QLSP, the Wānaka Town Centre - Three Parks Corridor will be key focus of commercial activities and employment in the Upper Clutha to provide for a variety of commercial services and community activities whilst delivering well-functioning medium and higher density neighbourhoods. There is strong alignment between the proposal and the Spatial Plan.

5 URBAN DESIGN ASSESSMENT FRAMEWORK

Having reviewed the relevant statutory and planning documents outlined in the Section 4 of this report, several key factors have been identified to assist with assessing the urban design performance of the proposed development.

The assessment criteria are informed by the statutory framework provided by the PDP and consider the best practice urban design requirements, including the relevant design elements identified in the QLDC Business Mixed Use Design Guide 2021.

The key urban design aspects that guide the assessment of the proposal are whether the proposed development will:

- **Provide for a diverse range of activities that complement the urban environment of Three Parks**
  (This criterion relates to PDP objectives 16.2.1, 19B.2.1 and policies 16.2.1.2, 19B.2.1.1, 19B.2.1.3)
- **Create a positive street edge and an engaging and visually interesting streetscape;**
  (This criterion relates to PDP objective 16.2.2 and policy 16.2.2.1)
- **Achieve a balanced outcome between providing for a high level of amenity and meeting the functional needs of various activities through a comprehensive approach to site layout, building arrangement and landscape design;**
  (This criterion relates to PDP objectives 16.2.2, 19B.2.1 and policies 16.2.2.3, 16.2.2.8, 19B.2.1.4)
- **Achieve a high-quality building design with consideration given to building height, massing and modulation, façade treatment and architectural details;**
  (This criterion relates to PDP objectives 16.2.2, 19B.2.1 and policies 16.2.2.1, 16.2.2.5, 19B.2.1.4, 19B.2.1.6)
- **Provide high amenity public and communal open spaces with a high level of accessibility and connectivity for all modes;**
  (This criterion relates to PDP objectives 16.2.2, 19B.2.1 and policies 16.2.2.3, 16.2.2.8, 19B.2.1.4)
- **Ensure alignment with CPTED principles;**
  (This criterion relates to PDP objective 16.2.1 and policy 16.2.1.9)
- **Accommodate carparking, waste and service areas in a manner that does not visually dominate the public realm;**
  (This criterion relates to PDP objectives 16.2.2, 19B.2.1 and policies 16.2.2.8, 19B.2.1.4, 19B.2.1.5)

- **Minimise adverse effects on adjacent neighbours and public streets.**
  (This criterion relates to PDP objectives 16.2.2, 19B.2.1 and policies 16.2.1.7, 16.2.2.1, 19B.2.1.1)

  Promote sustainable design and local character. (This criterion relates to PDP policy *16.2.2.10)*

6 ASSESSMENT OF URBAN DESIGN PERFORMANCE

6.1 Provide for a diverse range of activities that complement the urban environment of Three Parks

Currently there are no medical facilities of scale located within Three Parks. The proposal will provide a substantial surgical hospital in Central Otago, benefiting the region with healthcare not otherwise provided. Consultation rooms and medical research facilities in the adjoining commercial/allied health buildings will also be a huge benefit for the Upper Clutha region.

The Site is very accessible and centrally located within Three Parks. The built form will majorly assist in the framing of the main spine road and the consolidation of the commercial strip. There is no residential land nearby or proposed on the Site.

The internal pedestrian street ‘Waiora Way’ provides a flow of activity nodes that stitch and enliven the block together with areas dedicated to events, gatherings, interaction, exchange and repose.

The proposal is a comprehensively scaled facility that is vital to the health needs of the growing population. The quality of the design will create a new benchmark and will become a major feature of Three Parks with an open and inviting layout that will be attractive to the public.

Overall, the mixed-use buildings, culturally informed public spaces and low impact natural drainage will create a high benchmark for future development and add substantially to the consolidation of the urban fabric of Three Parks.

Collectively, it is considered the proposal aligns with the PDP objectives 16.2.1, 19B.2.1 and policies 16.2.1.2, 19B.2.1.1, 19B.2.1.3.

6.2 Create a positive street edge and an engaging and visually interesting streetscape

The four buildings contain and front Sir Tim Wallis Drive with a strong form, variety and modulation of facades and materials that is engaging and of a human scale. The architects design alternates warm toned vertical screens with more solid rendered forms creating contrasting forms that break

down the massing and create interest. There are no expanses of blank or inactive walls around the allied health buildings fronting the streets or internal spaces.

Street trees encircle and soften the edge of the block. A series of Laneways with threshold entry features between the buildings invite exploration from the street into the heart of the block.

Occupying a corner at the rear of the block the hospital provides a solid anchoring mass and an interface with the street which is positive with large areas of glazing, wide entrances and a possible pharmacy on the corner of McCormick Street and Grace Wright Drive. The horizonal banding and the wide verandahs of the upper levels of the hospital building are architectural features that succeed in diminishing the buildings scale. The perceived height of the upper levels of the hospital building is further reduced by successively stepping back from the street edge. The proposed helipad will be concealed on the top and not viewable from the street.

The car park building is enclosed with a recessive mesh screen and climbing plants which provide an adequately sectionalised and diffuse façade to the street. The car park building is long and squat, its height despite being slightly over the 10m permitted height (being 12 m on one half and 0.5m on the other) is of a scale that fits in well with the adjoining Mc Cormick Street and Waiora Way.

The buildings are laid out to provide a wide sidewalk on all edges reinforced with street tree planting and bio swales/rain gardens.

The ground floor on all the buildings is open with high ceiling and mainly accommodate reception, retail and hospitality. The open spaces between the buildings are wide, well-lit and feature pedestrian facilities and seating.

Lighting is a key feature of the frontage with streetlights and amenity lighting of the pedestrian spaces including pole lighting, catenary soffit and under seat lighting fixtures.

The materiality is strongly rendered and tactile with warm greys and terracotta colours drawn from the local landscape.

Figure 8 - Interface with Sir Tim Wallis Drive showing the four commercial buildings (by Warren Mahoney)

Overall, the buildings front the street strongly with articulation of the street edges that are rich in building modulation and interest with wide pathways and pedestrian accessways creating positive interfaces with surrounding streets.

Collectively, it is considered the proposal aligns with the PDP objective 16.2.2 and policy 16.2.2.1.

6.3 Achieve a balanced outcome between providing for a high level of amenity and meeting the functional needs of various activities through a comprehensive approach to site layout, building arrangement and landscape design

There is a high level of amenity throughout the site with facilities and spaces strategically located to maintain activity and reasons for the public to be there on Site.

Vehicles are set apart from pedestrian spaces reducing their presence on Site.

Food and beverage outlets are located on street corners leading into the internal pedestrian street.

The pedestrian street begins to the west on Deering Street featuring an event space which is supported by foodstalls and a market in a wide-open space, these are also accessed through the car park building where provisions can be brought. The pedestrian street will have removeable bollards to allow emergency and occasional service access.

The centre of Waiora Way is an open space featuring a series of culturally significant sculptural elements, providing the opportunity to gather for a range of activities.

A site wide landscape and planting strategy features extensive soft surfaces that also act as stormwater collectors and filters together with a mix of native plantings including trees reinforcing the street edges. Planting is also proposed in many places on the buildings to further soften facades.

Opposite the hospital, in the pedestrian street, is an interactive space that is proposed as a key community facility.

To the rear on McCormick Street there is a drop off zone to the hospital and access to parking and to a pharmacy.

The lighting strategy for the entire block encompasses a hierarchy of lights with pole lighting along the street edge and the internal pedestrian street, together with façade mounted lights along the laneways and feature lighting including catenary, globe and seating fixtures at key entrances and gathering spaces. The lighting will provide a well-lit pedestrian environment, and all lighting will be positioned to avoid light spill onto neighbouring properties and detailed to avoid glare and adverse effects on the night sky.

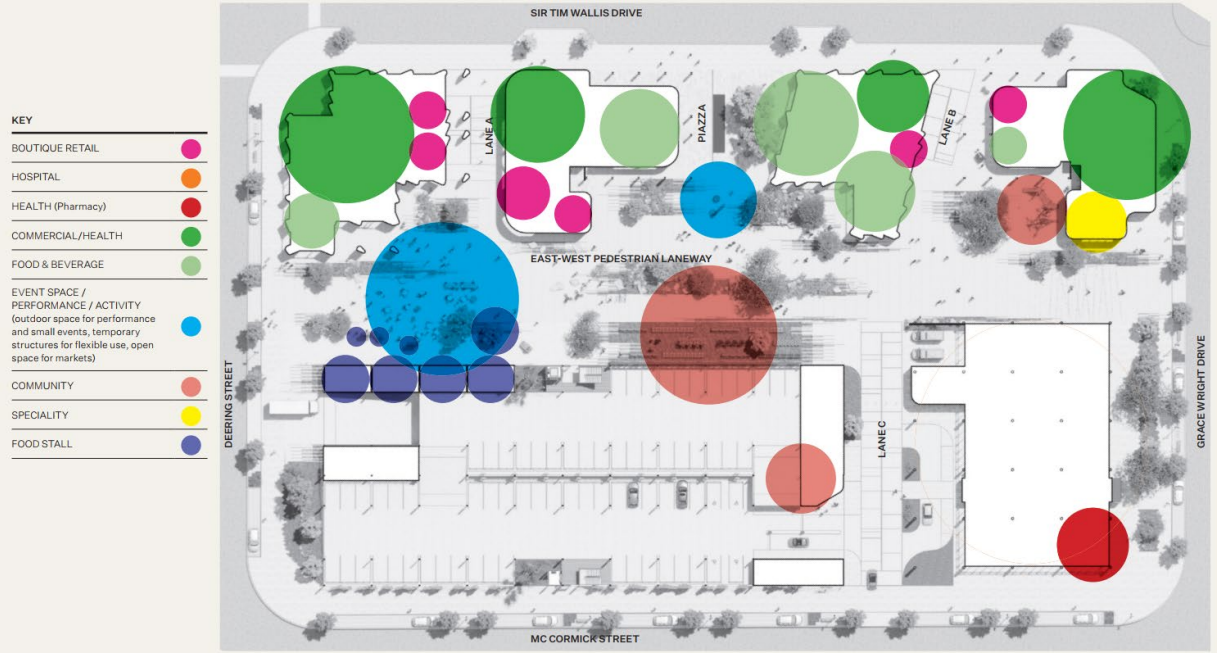


Figure 9 - Site activity diagram (by Warren Mahoney)

Figure 10 - View of the wide central plaza and an adjoining retail lane (by Warren Mahoney)

A number of recommendations are outlined below to ensure a high-quality urban design outcome:

- Night lighting and glare reduction and avoidance measures will be further detailed to address policy *16.2.1.7*
- If a possible children's playspace is proposed as a key community facility this will warrant further information regarding location, scope and compliance measures.

Overall, the precinct wide approach has successfully integrated functional requirements with high amenity spaces and activities.

Collectively, it is considered the proposal aligns with the PDP objectives 16.2.2, 19B.2.1 and policies 16.2.2.3, 16.2.2.8, 19B.2.1.4 provided that the recommendations are sufficiently addressed.

6.4 Achieve a high-quality building design with consideration given to building height, massing and modulation, façade treatment and architectural details

Across the block the cumulative building coverage is 58.28% well below the maximum of 75%.

Apart from the car park building the rest of the building heights do exceed the permitted height of 12m within the BMU and 10m within the TPBZ, however the zone rules do allow for greater heights to be enabled where positive urban design outcomes are achieved. The Site will be a landmark and the corners are expressed, there is also little to no overshadowing of neighbouring sites. Noting also the QLDC Proposed Urban Intensification Variation will lift permitted heights to 20m within BMU in Queenstown, and 16.5m in Wānaka, and 16.5m within the Wānaka Town Centre. The Planning report points out that there have been recent Resource Consent approvals for buildings of a similar height notably the Aspiring House building opposite on McCormick Street being 19.35m maximum height, and the Mount Iron Resort with a 19.5m hotel.

The arrangement of the buildings across the Site locates the larger masses of the car park and the hospital at the rear of the block with the smaller separate allied health buildings fronting onto Sir

Tim Wallis Drive. The largest mass is the car park building however it is also the lowest at 3 storeys and the most screened from the main street.

The hospital building is the tallest on Site at 21m at the roof level and has a proposed helipad on the roof with associated lift shaft. The building is horizontally banded with verandas, rendered soft tones and extensive glazing creating a grounded and highly accessible design exterior to this key public facility. The ground floor of the hospital is very high, open and glazed. The rounded corners of the building facilitate continuity and an integrated form.

Figure 11 - View of hospital complex from Grace Wright Drive (by Warren Mahoney)

Figure 12 - Commercial buildings elevation facing Sir Tim Wallis Drive showing the varied heights and facades (by Warren Mahoney)

Figure 13 - North elevation of 3 storey car parking building (by Warren Mahoney)

The four commercial buildings that front Sir Tim Wallis Drive are paired into alternating forms that provide variety in form and height. Two of the 4 level buildings are vertically rendered with terracotta screens whilst the two lower 3 storey buildings are more horizontally detailed with masonry brick.

Commercial building 1 and 3 have the fourth level set back, therefore complying with Rule 16.5.9.2. Building 2 and 4 do not have the fourth level set back, but the fifth level is largely glazed elevations. The alternating stepped skyline of buildings 1 to 4 provides variety and recalls the skyline of the wider mountain setting.

The long low parking building is light, recessive and diffuse in detail and features green walls further breaking its mass into sections. The 4m high ground floor is designed so that it can be adapted to other uses over time.

Overall, the architectural design package prepared by Warren and Mahoney shows that a great deal of attention has gone into the building design and the integration with the open spaces. In terms of the height of the facility the overall height of the front four buildings on Sir Tim Wallis Drive has low impact on the streetscape. The height of the hospital and the car park building at the rear of the site provide a balanced mass that is anchors the layout of the block.

It is also worth noting that Willowridge the developer of Three Parks since inception (and all the undeveloped surrounding sites) have taken a careful approach to all aspects of proposed developments in order to maintain overall integration, have given approval to this proposal.

Collectively, it is considered the proposal aligns with the PDP objectives 16.2.2, 19B.2.1 and policies 16.2.2.1, 16.2.2.5, 19B.2.1.4, 19B.2.1.6.

6.5 Provide high amenity public and communal open spaces with a high level of accessibility and connectivity for all modes

Waiora Way, the pedestrian street, performs a central role in creating a strong spine for the Site and links directly with surrounding streets.

Across Waiora Way, drawing on the braided river like flow, the cultural narrative of Ara Tawhito (river travel) provides a story telling journey based on three major public spaces Manaaki/community space, the Te Ngākau/ heart and Tākaro/interactive space.

The public spaces are large and are both open and linear. The entrances are well defined balancing containment with openness often flanked by trees and overhead amenity lighting features. The nodes of activity are generously furnished and feature a range of natural elements such as glacial boulders and sculptural elements.

With the provision of food and beverage, markets, events and passive recreation, the open spaces will function as communal gathering areas attracting and retaining pedestrian activity. Having facilities like the market space that can be used for transitional and mobile gatherings and events will allow some flexibility and robustness to the year-round attractiveness of the open spaces.

There is also some scope for adaptability in the public spaces and activities to harness the potential for evolution in the use of the spaces especially as the area is developing.

Figure 14 - Landscape Concept Masterplan (by RESET and Aukaha)

Overall, there is a high level of amenity in the open spaces which are conducive to community gatherings and are highly accessible.

Collectively, it is considered the proposal aligns with the PDP objectives 16.2.2, 19B.2.1 and policies 16.2.2.3, 16.2.2.8, 19B.2.1.4

6.6 Ensure alignment with CPTED principles

The use of natural strategies so that crime prevention is integrated into the design based on the provision of surveillance, access management, territorial reinforcement and quality environments.

The block wide design has provided well defined entrances, routes and spaces that are overlooked and have good lighting and sightlines. The provision of verandahs around the façade of the hospital and largely glazed facades to the commercial buildings provide high levels of natural surveillance.

The layout is clear and logical and should create a sense of community ownership. Sightlines are kept open into and across the site with generously scaled lanes and the central pedestrian street.

Multiple exit routes are provided, and ground levels are largely active frontages. A block wide high-level lighting plan is proposed to provide a well-lit nighttime environment for pedestrians.

There do not appear to be areas of potential concealment within the internal pedestrian street. However, the car park building with its long street edge could be of concern. A concierge is proposed embedded within the car park building opposite the hospital entrance in what will be a busy area and will require high levels of surveillance. The furthest away corner on McCormick and Deering streets is an area with potentially the least surveillance and the wide planted area could provide unwanted concealment. Though CCTV will be integrated across the Site and will provide remote coverage of all areas.

Materials that have been indicated have a high level of robustness and vandal resistant.

There has been community engagement and input at the start of the project, and this is proposed to be continued with user groups being involved in the detail design phase.

However, a number of recommendations for the detail phase are outlined below to ensure a high-quality urban design outcome:

- More detail on lighting will be required to show sufficient lux levels across the Site.
- Personal safety concerns around the back of the car park should be addressed in the detail phase.
- A management and maintenance regime plan – noting the extra provisions around the 24/7 Emergency area.

Overall, the integrated design for the block wide precinct with its mixed use and wide continuous public spaces fit well with CTPED principles.

Collectively, it is considered the proposal aligns with the PDP objective 16.2.1 and policy 16.2.1.9 provided that the recommendations are sufficiently addressed.

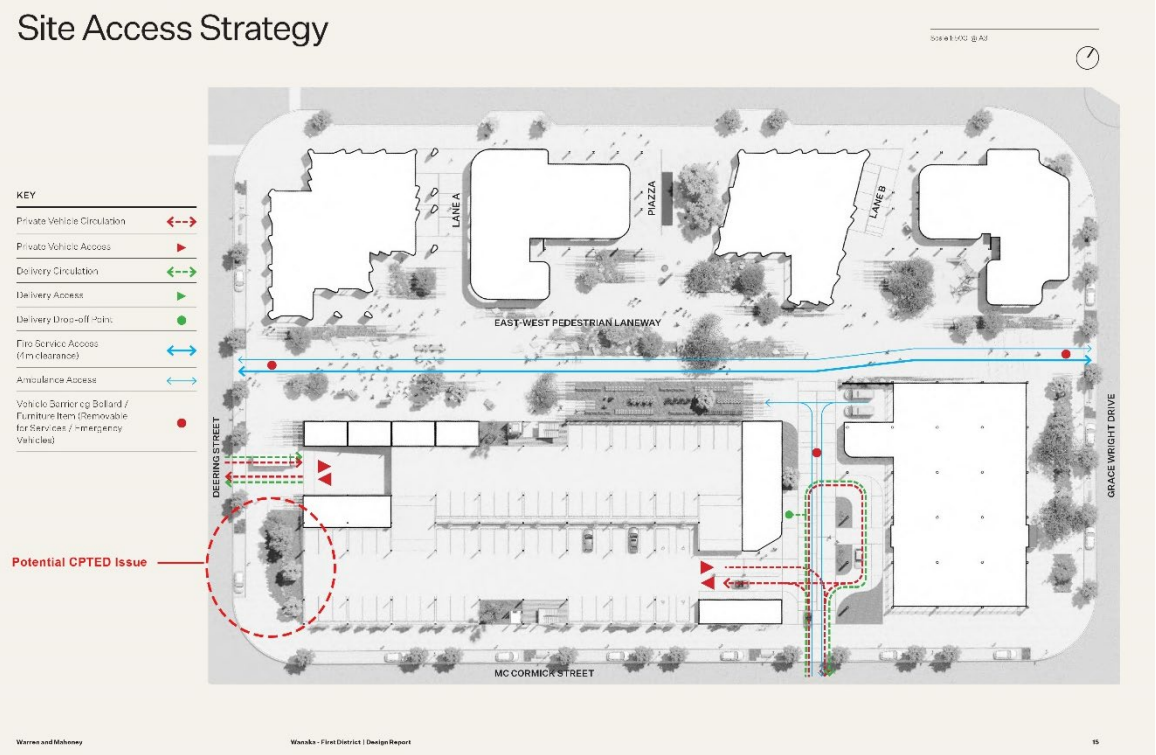


Figure 15 - Site Access Strategy – note CPTED issue (by Warren Mahoney)

6.7 Accommodate carparking, waste and service areas in a manner that does not visually dominate the public realm

The health precinct will draw large numbers of people, visitors and particularly the hospital will use of high volumes of resources.

The site access strategy for vehicles, service and emergency has been integrated into the design of the block. Vehicles will be restricted to the rear of the Site accessing the car park building off Deering and Mc Cormick Streets. The drop off area for the hospital is accessed off McCormick Street in a shared space lane.

Access to the pedestrian street for emergency and restricted service vehicles is possible through a retractable bollard. Largely the pedestrian realm will be physically and visually separate from vehicles.

Location and storage methods of waste has not yet been detailed. The options appear to be either internally located within the individual buildings or externally in a separate compound. An internal location reduces ground level uses, and external location involves transfer and potentially a highly visible collection area. PDP Rule 16.5.2 requires the screening of outdoor storage and waste facilities from public places.

To comply with the 6 Greenstar standard an Operational Waste Management Plan details the re use, upcycling and conversion of waste to energy and the reduction of outgoing waste. Waste streams will have to be accommodated within dedicated waste storage areas.

An internal waste facility will be further detailed which could be provided in the basement of the hospital and given the hygiene and safety concerns this seems most appropriate. The Commercial buildings do not have a basement, and the ground level is dedicated to retail and hospitality uses. An external waste storage area for the commercial buildings could possibly be integrated into the car park building to screen the facility.

The following recommendation is outlined below to ensure a high-quality urban design outcome:

- An Operational Waste Management Plan will need to be detailed by a qualified Waste Auditor during detail design phase to best practise sustainability standards including the location and the adequate screening of any waste storage areas from the public.

Overall, the infrastructural requirements of the precinct are able to be integrated without intruding or dominating the public realm.

Collectively, it is considered the proposal aligns with the PDP objectives 16.2.2, 19B.2.1 and policies 16.2.2.8, 19B.2.1.4, 19B.2.1.5 provided that the recommendations are sufficiently addressed.

6.8 Minimise adverse effects on adjacent neighbours and public streets.

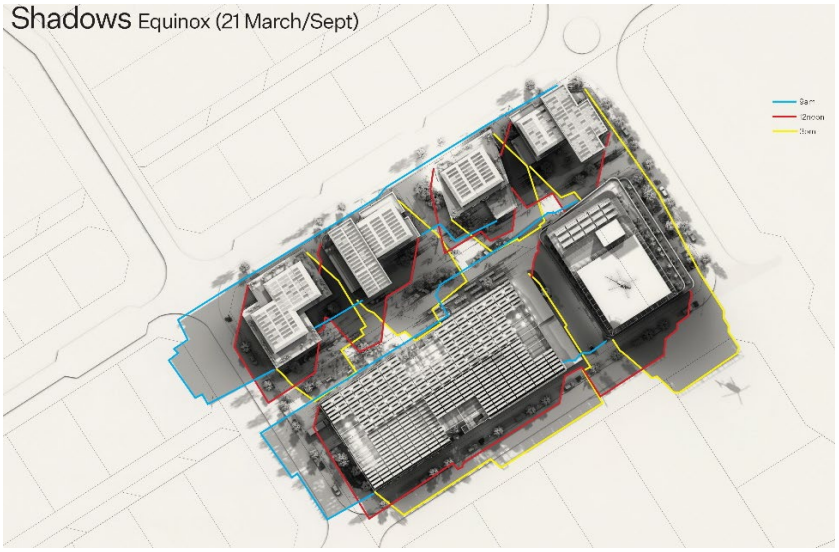
There are no residential uses within the neighbouring sites which accommodate commercial uses and activities, or none planned in the yet to be undeveloped sites adjacent to the north and east.

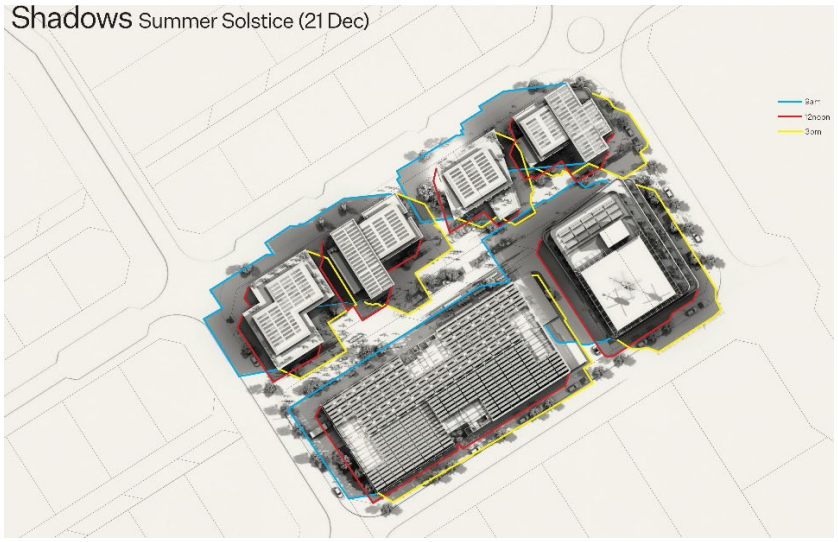
The busiest vehicle areas are located at the rear of the site and will mostly be accessed off the roundabout on Sir Tim Wallis Drive and Grace Wright Drive.

The streetscape design is as noted earlier in this report is of high amenity and generous spacing making strong connections with the adjoining street network.

Lighting spill and glare is to be avoided. Given the Site is bounded by wide road reserves adjoining non-residential land uses are reasonably distant.

Noise from the helicopter will create some nuisance however the helipad is located on the rooftop of the hospital at the farthest location on the Site and an acoustic engineer has been engaged by the client to provide advice through the detail design phase.





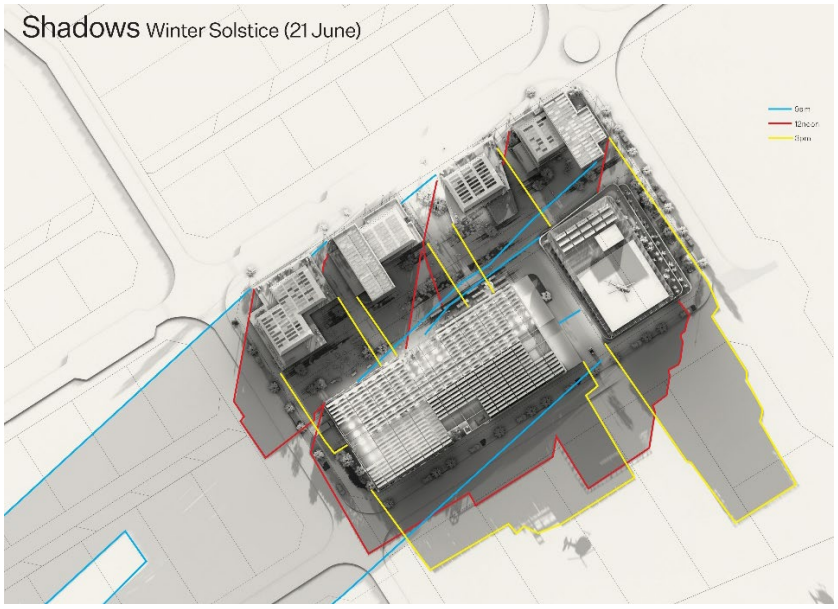


Figure 16 - Shading Diagrams (by Warren Mahoney)

Being on a flat wide site within a developing business zone, the potential visual effects and shading of the relatively low-rise development on neighbouring commercial properties are regarded as minimal. As the shading diagrams show, due to the north south orientation of the rectangular site and the surrounding road, much of the year the shadows would be contained by the road reserve.

The following recommendation is outlined below to ensure a high-quality urban design outcome:

- An acoustic engineering report on potential noise effects will be required
- Further detail on lighting effects on neighbouring properties will be required including to meet Rule 19B.5.3.2 showing less than 10 lux light spill onto any adjoining property.

Collectively, it is considered the proposal aligns with the PDP objectives 16.2.2, 19B.2.1 and policies 16.2.1.7, 16.2.2.1, 19B.2.1.1. provided that the recommendations are sufficiently addressed.

6.9 Support Sustainable design and local character

The project is designed comprehensively to focus on community wellbeing, sustainable design, carbon reduction and resilience. The design brief aims to achieve Green Star 6 communities' certification for the precinct from the New Zealand Green Building Council which would put the development in the world leading category. The Greenstar accreditation spans across the key categories of governance, liveability, economic prosperity environment and innovation.

The four buildings fronting Sir Tim Wallis drive are intended to achieve Green Star 6 Multi Building certification which is the highest standards of sustainability. Whilst the car park and hospital buildings are not able to achieve this standard due to their functions, they do include many of the design features. The hospital could also be designed to Healthcare Building Certification which includes strategies for low carbon building materials under single building certification within the GreenStar system of accreditation

The general environmental features of the proposal are Photo Voltaic panels located on all of the roofs, low carbon construction of the buildings, electric recharging for vehicles in the car park along with extensive bicycle parking, low impact stormwater devices and use of indigenous planting.

A Greenstar Gap Analysis has been provided by Warren and Mahoney, included in the application. This report details the background to the Greenstar programme and in matrix form indicates how the design development is tracking towards achieving the Greenstar goals. This is an exhaustive process that demonstrates the commitment to providing a leading sustainable development.

The design of the buildings and use of materials has also been informed by reference to the alpine setting including drawing on seasonal colours.

The Health Precinct's public realm and landscape design have been the focus for partnership between Mana Ahurea agency Aukaha and Reset seeking to recognise cultural values through the spatial design of the Site.

Through workshops, the co-design team have developed a strong design approach that builds on the importance of Wai/water and takes inspiration from the nearby braided river form of Ōrau/Cardrona River to create a flow to the public spaces which are interjected with activity nodes including learning spaces, interactive areas and pocket parks. The result is a site plan that is founded on cultural values integrated with activities, spaces, circulation and augmented with specific furniture, surfacing, lighting choices that resonate with the local landscape and cultural context.

The following recommendation is outlined below to ensure a high-quality urban design outcome

- Continue an engaged co design process with Aukaha through detail design.
- Further development and monitoring through the Greenstar programme

Collectively, it is considered the proposal aligns with the PDP policies 16.2.2.10. provided that the recommendations are sufficiently addressed.

7 CONCLUSION

In summary, the Wānaka Health Precinct design proposal has taken a comprehensive approach to the development of a major Healthcare precinct based on a well considered integrated building and open space layout together with a co-designed cultural strategy within the developing Three Parks mixed use business centre.

High quality modulated buildings frame the main street frontage and lead into the unique design of Waiora Way, a wide internal pedestrian street that links across the Site and to adjoining properties. Throughout the proposal are best practice urban design features that aim for the highest Greenstar standards.

The proposal is solidly aligned with objectives and policies of the Queenstown Lakes District Spatial Plan, the PDFP / Three Parks Mixed Use Business Zones and Design Guidelines.

The proposal will set a high standard for a large-scale development within Three Parks, assisting with the consolidation of the developing urban fabric and adding a much needed health care facility for the growing population of the wider district.

Through the report a relatively small number of recommendations have been made in order to improve urban design outcomes such as further lighting design information, CPTED and co-design

with mana whenua. These items should be addressed in and will form part of the detailed design phase.

In conclusion, the proposed development can be supported from an urban design perspective subject to the recommendations outlined in this report.

Garth Falconer

Director

Reset

ENVIRONMENTAL MANAGEMENT PLAN

ROA HEALTH PRECINT
3 PARKS
WANAKA

JULY 2024

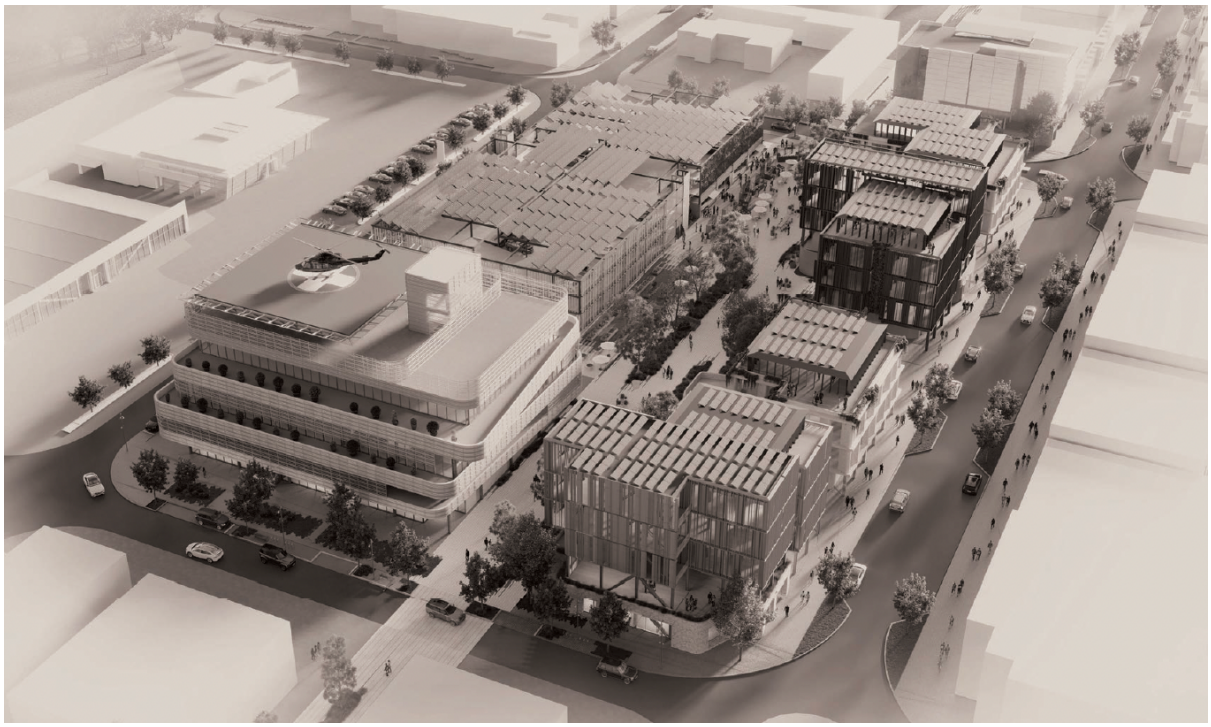


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Table of Contents

DOCUMENT CONTROL

DATE	REV DESCRIPTION	AUTHOR
19/07/24	Original Rev A	Steve Hewland

GENERAL SITE AND PROJECT DESCRIPTION

This Environmental Management Plan (EMP) covers works for the proposed Roa Health Precinct within 3 Parks development, Wanaka. The site is directly adjacent to Sir Tim Wallis Drive and is currently being prepared for use by the developer. The project consists of the construction of 4 multi storey office buildings for medical services, a 5-storey hospital, and a car parking building with basement level.

SQEP

This plan has been prepared by Steve Hewland, a SQEP as defined by QLDC's Guidelines for the Preparation of Environmental Management Plans June 2019.

Environmental Management Best Practice

Erosion and Sediment Controls for this project are designed, installed, maintained and decommissioned in accordance with the following principles:

a) Erosion and sediment controls in accordance with GD05 "Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region 2016" are integrated with construction planning
b) Effective and flexible erosion and sediment control plans are developed based on soil, site slope, weather, construction conditions and the receiving environment
c) The extent and duration of soil exposure is minimised
d) Water movement through the site is controlled – in particular clean water is diverted around the site and 'dirty' and 'clean' water is kept separated as far as practicably possible
e) Soil erosion is minimised as far as reasonable and practical (to the satisfaction of QLDC)
f) Disturbed areas are promptly stabilised
g) Sediment retention on site is maximised (i.e. must meet the discharge criteria for suspended sediment in the Water Quality section below))
h) Controls are maintained in proper working order, at all times
i) The site is monitored and erosion and sediment practices adjusted to maintain the required
j) performance standard, and
k) Avoidance of discharges, especially sediment off site.

EMP Updates

This EMP will be reviewed when;
1.The construction program moves from one Stage to another; or
2. Any significant changes have been made to the construction methodology since the original plan was accepted for that Stage; or
3. There has been an Environmental Incident and investigations have found that the management measures are inadequate; or
4. Directed by QLDC's Monitoring and Enforcement team
Where undertaken, updates to the EMP will be submitted to QLDC for acceptance at RCMonitoring@qldc.govt.nz

Environmental roles and responsibilities

- Project Manager – Name and Contacts details TBC
    - Overall responsibility for the environmental management and implementation of this plan
    - Ensuring the EMP is updated as required
    - Ensuring appropriate training is given to all staff on environmental management and the implementation of this plan
    - Providing the resources necessary to implement this plan

- Attend to Environmental Incidents and Complaints

- Environmental Representative – Name and Contacts details TBC

  This role should actively support the project leadership (Project Manager and/or Supervisor) with the day-today implementation of environmental controls and administrative activities. In particular, the role involves:

  - Implementation of environmental management
  - Undertake EMP inductions
  - Ensure installation of environmental controls as per the ESCP and EMP
  - Undertake environmental site inspections of the project, as detailed below
  - Oversee the maintenance and improvement of defective environmental controls
  - Undertake Environmental Incident reporting
  - Keep project leadership informed of environmental performance of the project
  - Inform staff of procedures and constraints applicable to managing specific environmental issues
  - Responsible for providing environmental inductions to all staff and sub-contractors
  - Assist the project leadership in attending to Environmental Incidents and Complaints

- Environmental Advisor/Manager ('SQEP') Steve Hewland 021 942 099 steve@hewland.co.nz
  - Provide technical and onsite advice regarding this plan and implementation of the ESCP controls as required.

Site inspections

The Environmental Representative will undertake and document Weekly and Post-Rain Event site inspections using the checklist in Appendix 5 for the purpose of the following:

- This EMP is being followed.
- Review that the Erosion and sediment controls as described in the ESCP **Appendix 1** or subsequent revision are installed and working appropriately and identifying any necessary maintenance.
- Identifying any environmental incidents.
- Verifying preparedness for adverse weather conditions where significant rain and/or wind is forecast

The Environmental Representative will also undertake daily pre-start inspections to ensure that no new environmental issues have arisen, or mitigation measures have been compromised from the previous days work.

The Site Inspection records shall be made available to QLDC within 48 hours of a request being made.

Notification and management of environmental incidents

An environmental incident is anything where the EMP has failed leading to any adverse environmental effects offsite (including sediment and nuisance effects associated with dust as well as spills of fuels, chemicals and concrete to ground or a water body).

Concrete contamination is a serious issue so it is important the site manages concrete products and activities correctly and avoid a discharge to a waterbody or stormwater. Ensure concrete wash down does not enter any sediment device, stormwater network, or a waterbody. Cement wash water and cement-based products harm the environment because:

- They are strongly alkaline, due to their high lime content. This alkalinity can kill or burn aquatic life in much the same way an acid would.
- High sediment loads can smother and kill aquatic life living in the bed of a waterbody. It also scrapes and clogs fish gills.
- Sediment reduces sunlight penetration and makes it difficult for plants to get the energy they need to live and for aquatic life to find food.

If an incident occurs undertake immediate remedial actions to mitigate adverse environmental effects. Immediate response actions should not be delayed. Once the immediate risk from the Environmental Incident is alleviated,

the Environmental Representative shall investigate the cause of the breach and/or adverse environmental effects, then identify and implement corrective actions as soon as practicable.

Call the ORC Compliance team and the pollution hotline immediately on 0800 800 033 for any incidents that cannot be brought under control, or for discharges of sediment, oil or chemicals to a waterbody, race or drain.

Take a lot of photos of the incident and immediate surrounds. Complete the form in **Appendix 3** (or the ORCs Environmental Incident Report form available on their website) and notify QLDC within 12 hours of becoming aware of the incident, also send the form to the Compliance team at Otago Regional Council at pollution@orc.govt.nz

Records and registers

Environmental records are collated onsite and can be made available to QLDC upon request. Records and registers to be managed onsite shall include the following:

- Environmental Induction attendance register (**Appendix 2**).
- Environmental Incident reports and associated corrective actions undertaken (**Appendix 3).**
- Complaints register and associated corrective actions undertaken (**Appendix 4)**.
- Daily diary entries (including pre-start and post rain inspection observations).
- Weekly Inspections **(Appendix 5).**

Site induction

A site induction will be undertaken for all project staff. A copy of this is included in **Appendix 2**.

Cultural Heritage

This site is not a known cultural heritage site. Nevertheless, earthworks will be undertaken in accordance with the obligations of the *Heritage New Zealand Pouhere Tāonga Act*, 2014 (HNZPTA). In the event of accidental discovery, the Accidental Discovery Protocol found in **Appendix 6** of this document will be followed.

Chemical and fuel management

The Contractor will ensure spill response equipment is available on the site for use in an emergency. Material Data Safety Sheets (MSDS) should be kept on site for all chemicals used and stored on site. Only appropriately trained personnel should use these chemicals. Spill response equipment will be commensurate with the site location, topographical features, type and quantity of chemicals and fuels being stored on site. As a minimum it should be able to isolate and contain oil from a hydraulic hose bursting. Such as;

All machinery associated with the earthworks activity must be operated in a way, which ensures that spillages of hazardous substances such as fuel, oil, grout, concrete products and any other contaminants are prevented.

Refuelling of machinery will conform to the following requirements:
a) Occur at least 30m from a waterway

b) Fuelling activity to be supervised at all times
c) Hoses to be fitted with a stop valve at the nozzle end, ideally at an appropriately bunded or at designated laydown and hardstand area.

Chemicals and fuels exceeding 250 litres on site are to be confirmed following contractor procurement and prior to works commencing.

Dust Management

Dust is the biggest risk to loss of sediment from this site. There is potential for dust to be generated by excavation, truck un/loading, vehicle movements, stockpiles, and compaction activities and this should not leave the boundaries of the site. The site is exposed to winds from all directions, with the predominant wind from the NW. The contractor will be vigilant with the regard to the risk of dust generation and the following mitigation measured are proposed:

- Maintain effective stabilised entrances.
- Only exposing the minimal areas require to complete the tasks.
- During periods of high winds, vehicle movements and construction activities may need to be reduced or suspended to minimise potential dust nuisance. Sequence operations to account for wind changes during the day. Scale back operations to an area that can be controlled for dust when conditions are windy.
- Use of water carts or K lines that are effective for dampening down the haul route, cut faces, stockpiles, excavated foundation areas, and any other area capable of creating dust.
- Use of well compacted aggregate surfaces, when left undisturbed these are a stable surface in terms of dust generation.
- Application of hydro seed and/or straw mulch and/or soil binders. Binding materials can be added to the hydroseed mix to more effectively bind the topsoil surface to create a crust which is able to stay in place over a prolonged period of time.
- Install hard and soft landscaping as soon as possible. Where appropriate, straw mulch will be applied to promote grass seed germination or as temporary stabilisation. Temporary stockpiles will be suitably sealed off and stabilised as material is placed.

Re-use of water collected in sediment retention devices for dust suppression is very unlikely to be possible due to the very free draining soils. If water is being sourced from a:
a) QLDC's drinking water network via a standpipe; or
b) A waterbody such as a lake, river, stream or groundwater
It is important that:
a) An appropriate temporary water connection has been authorised by QLDC if water is being taken from the drinking water network, and
b) The water abstractor has considered QLDC's backflow prevention policy such as version,31 and/or
c) Water abstracted from a waterbody meets the relevant permitted activity requirements in RPW or an appropriate resource consent is in place. Please consider the rate of take and volume limits where applicable.
d) Backflow prevention is in place to stop contaminants syphoning back into the network or waterbody causing contamination.

If any complaints are received record in the Complaints Register in Appendix 4 and follow the incident response process Appendix 3.

Waste management

There is no vegetation removal. Construction waste will be managed within the works area in a typical fashion with skip bins, covered as necessary. To minimise waste recycling is expected to occur and the contractor will supply a wheelie bin or similar for this purpose.

Vibration Management

Managing vibration effects includes avoiding nuisance to public, residents or people utilising the area in the vicinity of the site, and managing vibration to avoid structural damage to buildings and structures within and beyond the site. The potential generators of vibration will be compaction equipment and heavy vehicles moving. In this case it is not expected to be necessary however, if it is required a vibration management plan will be prepared by others.

Noise Management

Managing noise effects includes avoiding nuisance to public, residents or people utilising the area in the vicinity of the site. The potential generators of noise will be compaction equipment, heavy vehicles moving, power tools, and rock breaking. If the noise levels specified in NZS6803:199 are going to be exceeded a noise management plan will be prepared by others. If there is a non-compliance mitigation and management measures are to be implemented and recorded in the Complaints Register (Appendix 4). Hours of work will be constrained in accordance with the resource consent conditions to be confirmed.

General Measures

Complaints can arise even if the noise and vibration levels comply with the Project limits. To minimise complaints, the following common mitigation measures are recommended:

- No shouting.
- No unnecessary use of horns.
- No rough handling of material and equipment.
- No banging or shaking excavator buckets, operation must be smooth to avoid impact noise.
- No unnecessary steel on steel contact (e.g. during the loading of scaffolding on trucks), fit hammers with
- nylon heads to minimise impact noise.
- Use rubber tracked equipment rather than steel tracked equipment where practicable.
- Maintain equipment well to minimise rattles, squeaks, minimise unwanted noise due to normal ageing and wear and tear.
- Fit engines with exhaust silencers and engine covers where practicable, engine bays may be lined with noise absorbent materials.
- Avoid tonal reversing or warning alarms (beepers). Regulate man-machine interface with effective traffic
- management plan, safe walkways.
- Scheduling activities to be undertaken when nearby sensitive receiver buildings are unoccupied.

Communications Plan with Neighbours

The site is surrounded by other large scale developments in various stages, there are no immediate residential neighbours. Prior to commencing on site the contractor will erect a sign at the entrance with project contact details. The complaints register in Appendix 4 is to be used to record all complaints.

Requirements for the discovery of contaminated land

Given the earthworks that would have already been undertaken at time of subdivision it is highly unlikely any contaminated land remains. However, if unexpected contamination is discovered by sight or odour during excavation or by land disturbance works, the Contractor will:

- Cease all earthworks in the area of the contamination immediately.
- Notify ORC within 24 hours of the discovery.
- Employ an SQEP with specific contaminated land expertise (CL-SQEP) to perform an assessment of the discovery.

Appropriate remediation and/or disposal options for the discovered contaminated soils must occur, including notifying ORC and outlining and following an Accidental Discovery Procedure. This may require the engagement of a CL-SQEP if contaminated material is discovered. Works in the area affected by contamination can only recommence once any required consents are obtained. Additional consent(s) may be required if material other than clean fill is proposed to be used on site.

Erosion and Sediment Control Plan

Relevant site features

The site is currently being prepared under the subdivision works. Below is the proposed finished levels, with dashed contour lines at 250mm intervals;

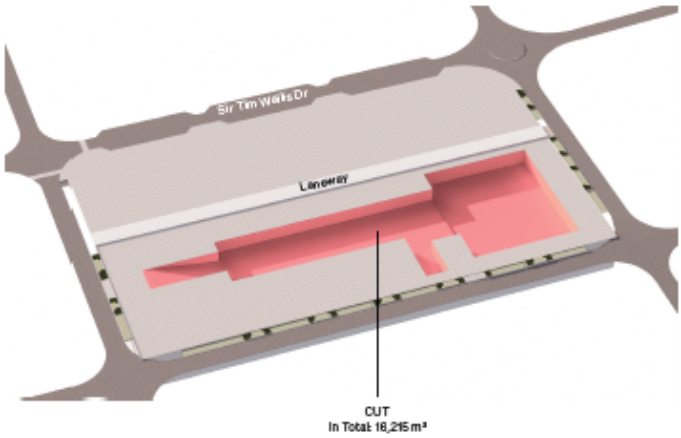
There is approximately 0.5m – 0.75m of fall across the site from west to east, with a slightly lower future laneway along its length.

The underlying soils are very free draining river deposits. A very high soakage rate of between 2,098 – 9,726mm/hr was determined at the time of the underlying subdivision.

The site is surrounded by roads on all four sides and for this reason there is no potential for stormwater to run onto the site.

Earthworks Summary

All of the earthworks are cut to waste (approximately 16,000-17,000m^3 removed off site), with no areas of fill above ground level (engineered fill, drainage aggregate, and trench bedding may be imported). Other than hard and soft landscaping elements, there are six distinct areas of earthworks, one for each building. The four office buildings and part of the car park building are at grade with excavation up to 1.2m for foundations. The hospital and part of the car park building have a basement level that varies from 4m to 5.45m deep. Details of the earthworks are shown in cross sections included in Appendix 7. The basement level cut is shown below;



Building construction may be staged, the bulk earthworks will be undertaken beforehand in a single stage. Considering the lack of any stormwater run-on potential, earthworks are predominately below ground level, and the very high soakage rates, the water quality risks are low. However, due to the scale of the earthworks with a total exposed area of approximately 7,900m^2 the project is considered to be "Medium Risk" in terms of QLDCs guidelines for the preparation of EMPs.

In addition to benefiting from the very gently sloping site and lack of stormwater run-on potential, the key approaches to minimising erosion risk is to limit the areas of exposed soils and rely on the very high soakage rates across the site.

Draft EMP Construction Methodology / Control installation sequence

Construction methodology as it relates to erosion and sediment control. To be confirmed once a contractor has been engaged;

1. Install a security fence around the perimeter of the site.
2. A site compound/yard with laydown area and materials storage will be established by stripping topsoil and gravelling areas as necessary to create a stabilised area.
3. Establish stockpile area(s) and update ESCP plan with locations.
4. Construct stabilised entry/exit points at each end of the laneway. A wheel wash or shaker ramps may need to be incorporated subject to weather conditions, ie if mud is being created and tracked on wheels.
5. Construct a temporary haul route along the alignment of the laneway. Strip top soil layers to reach a gravel running surface, import a gravel running course if necessary to provide a stabilised surface. Include a drainage swale along its length, ensure the invert of this is in the free draining layer so it will act as a soakage trench. Install dropout pits at locations shown on the plan, these let coarse sediment to settle and also will act as a soakage pit, direct any discharge from the pit to an excavated area that will act as a soakage basin.
6. Excavation of the office building foundation areas (500m2-700m2) will occur one at a time starting with the lowest elevation Building 4. The carpark/hospital basement excavation may be progressed in stages. The building footprint and a working area immediately surrounding it will be stripped of topsoils, and the footprint excavated. The foundation excavations will create contained lower ground levels with exposed very free draining gravels at their bases, any rain that falls within this footprint (or flows into it) is contained. The area of exposed surfaces at ground level is limited to small working areas surrounding each building and access to/from it and the haul route, and these surfaces will be exposed free draining gravels. For these reasons the potential for any sediment laden runoff is considered very low, the use of silt fences below specific building works areas should be considered as the project progresses.
7. Once the Building 4 excavation has occurred and prior to any further ground disturbance, direct the discharge from the lower dropout pit into this 600m^2 area. This will be a minimum of 400mm deep and act as a temporary sediment basin with a minimum storage volume of 240m^3. At the time the concrete foundations are poured for Building 4 and this sediment basin is decommissioned the EMP and ESCP will be updated.
8. Maintain effective dust control at all times.

9. Minimise exposed unstabilised areas with hard landscaping, aggregate, or secured temporary cover as soon as possible and prior to the next rain event.
10. Install soft and hard landscaping areas as soon as possible. Review the ESCP controls for this stage.
11. Decommission ESCP controls once 80% stabilisation of exposed areas has been achieved.

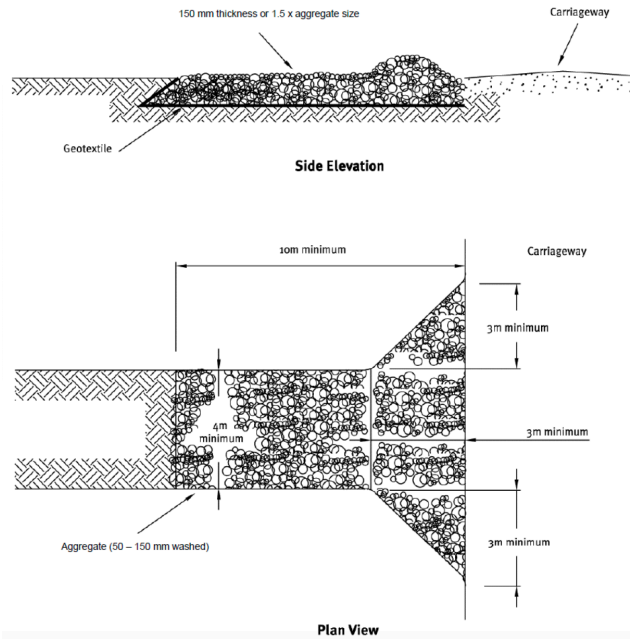
Type and Location of Erosion and Sedimentation Controls

Erosion and sediment control will be generally undertaken in accordance with the *Guidance Document 2016/005: Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (GD05)*. The ESCP will be updated as and when required as the project progresses.

Refer to Appendix 1 for a copy of the ESCP

Stabilised Entrance

Stabilised entrances will be placed at each end of the laneway haul route. They are to be constructed in accordance with the GD-05 specifications; A minimum of 10m long, 4m wide and with 150mm thickness of 50-150mm washed aggregate.



Haul Route

A haul route will be established through the site using the alignment of the laneway, this surface will be stabilised with an aggregate running course (likely AP20). The haul route within the laneway alignment is lower than the surrounding land. A drainage swale will be constructed to convey overland flow downslope towards the eastern end of the site. In these free draining soils this will effectively be a soakage trench. Drop out pits are installed along the route which will act as soakage basins and direct any discharge to nearby excavated areas for soakage.

Dropout Pit

Dropout pits will be installed along the haul route swale to allow heavier particles to drop out and to slow the velocity of any flow. Given the very high soakage rates this will also act as a soakage device. The minimum dimensions of this are 1000mm wide and 1000mm deep.

Sediment Basin

The Building foundation excavations will occur as part of the bulk earthworks phase. These are large areas (600m^2 minimum) with very free draining bases that will act as temporary soakage areas for significant rain events. No calculations are considered necessary as this capacity far exceeds the minimum requirements for the size of the total site, also the catchment will decrease in size as building foundation and basement areas are excavated. Significant soakage within the swale and drop out pits is also expected. Overall, this approach is very conservative.

Emergency Response Procedure

When a significant rain event (one that can generate overland flow) is forecast the following emergency responses will be undertaken by the Environmental Representative;

1. Stop works in time to inspect and repair ESCP controls.
2. Stabilise and/or cover all exposed surfaces as much as possible.
3. Cover any stockpile with an impermeable material.
4. Ensure the surface of the drop put pits and sediment basins are not glogged, muck out if necessary.
5. Observe weather and check all ESCP controls throughout the event.

Water Quality Monitoring

Considering the lack of any stormwater run-on potential, earthworks are predominately below ground level, and the very high soakage rates, the water quality risks are low. Regardless, the Contractor will at all times undertake reasonable and practicable management measures to avoid adverse environmental effects within the site or adjacent land into which the site discharges. The Erosion and Sediment Control Plan Appendix 1 demonstrates the method for preventing the migration of sediment beyond the site boundaries.

Visual monitoring will occur daily and during/following rain events to check that no sediment is leaving the site. Whilst it is very unlikely to occur, any water leaving the site must meet the relevant resource consent conditions and the following criteria as defined in the QLDC Guidelines for the Preparation of EMPs, with the exception of pH which has a lower limit of 5.5 as per GD05;

WATER QUALITY PARAMETER	DISCHARGE CRITERIA
Turbidity (measured with nephelometer)	<100 NTU
TSS Total Suspended Solids (lab test sample)	<50 mg/L
pH (measured with pH strips or handheld device)	Stable reading between 5.5-8.5
Hydrocarbons or tannins	No visible trace
Waste	No waste or litter is visible

Observations and any preventative measures taken are to be recorded in a daily job diary. If there are any visual signs of sediment crossing property boundaries call the Environmental Consultant Steve Hewland of Hewland Projects immediately and stop work that could be causing it. Review controls and look for opportunities to reduce the risk of sediment load in locations that have been shown to pass sediment through the fence. If possible, a turbidity measurement will be taken at the sediment location using a calibrated handheld nephelometer (or sent to a lab for TSS analysis). If 100NTU is exceed, and/or obviously sediment laden water has crossed the boundary this constitutes an environmental incident so refer also to the “Notification and management of environmental incidents” section above.

Appendix 1 – EROSION AND SEDIMENT CONTROL PLAN (ESCP)

Foundations to buildings (approx 1200mm deep)

Excavation for basement (see supporting drawings)

TOTAL: Approx. 7,805m²

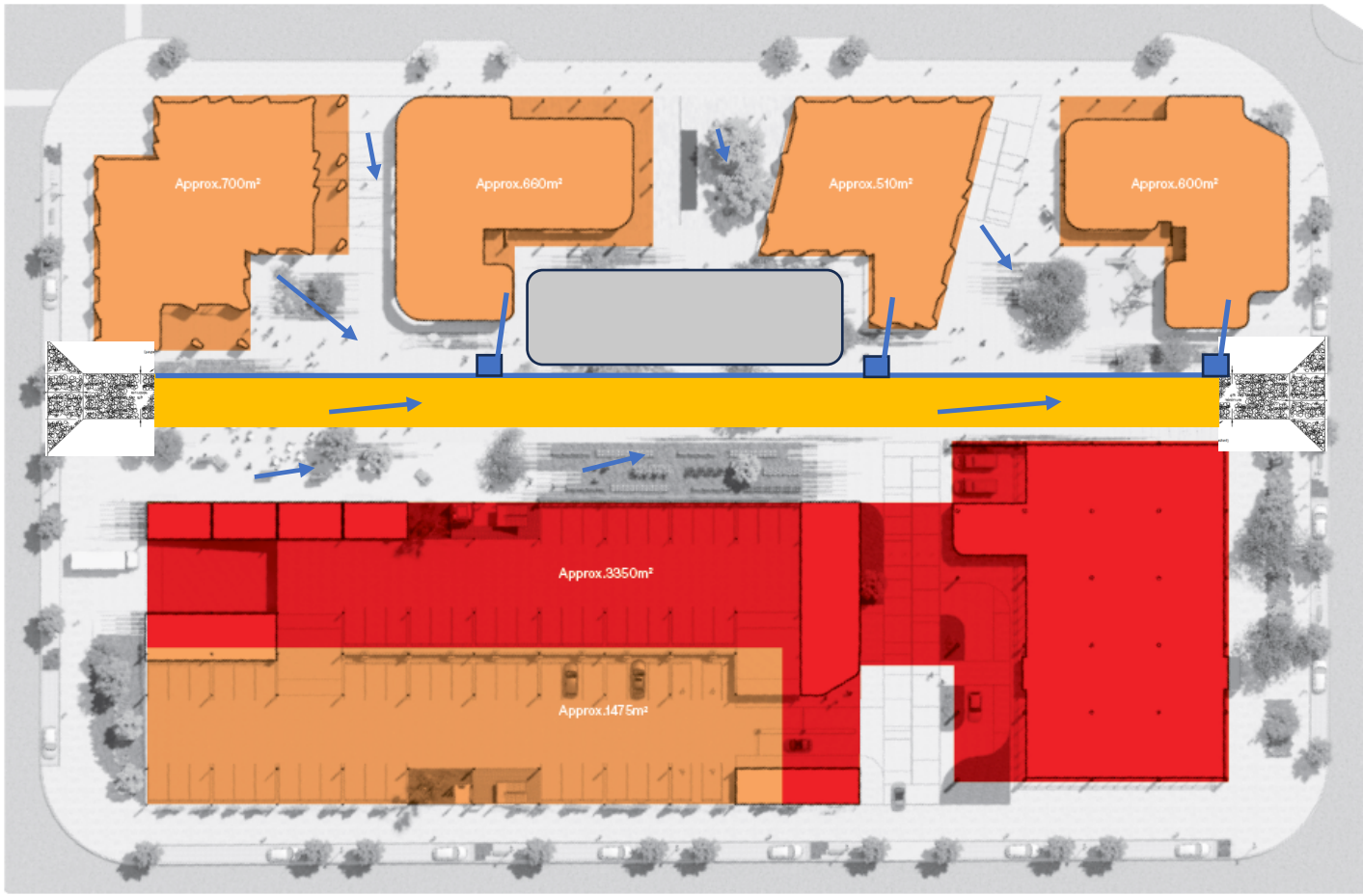
Site compound

Stabilised Entrance

Soakage swale, trafficable in location of compound

Haul route

Dropout Pit



Revision A

Appendix 2 - SITE ENVIRONMENTAL INDUCTION

The purpose of this site environmental induction is to ensure that all staff and subcontractors onsite are aware of their environmental responsibilities. This is induction is given to every contractor working on site during the earthworks phase by the Environmental Representative. Each recipient of this induction will sign the induction register.

Address			
ORC Consent Number (if applicable):	**RM**		
District or City Council Consent Number (if applicable):	**RM**		
Resource consent holder/representative:			
Name		Phone No.	
Contractor:			
Name		Phone No.	
Environmental Representative:			
Name		Phone No.	
SQEP:			
Name		Phone No.	

Roles and Responsibilities

- TBC is the Environmental Representative for this project. The environmental reps role is;

Implementation of environmental management
> Ensure installation of environmental controls as per this EMP
> Undertake environmental site inspections of the project
> Oversee the maintenance and improvement of defective environmental controls
> Undertake Environmental Incident reporting

Communication
> Keep project leadership informed of environmental performance of the project
> Inform staff of procedures and constraints applicable to managing specific environmental issues
> Responsible for providing environmental inductions to all staff and sub-contractors

Complaints and Incidents
> Attending to Environmental Incidents and Complaints

a) Specific locations within the site of environmental significance or risks, including Exclusion Zones and Sensitive Environmental Receptors, Fuelling areas, Stockpile areas.

One of the key approaches to minimising erosion risk is on this project is to limit the areas of exposed soils across the site. Do not unnecessarily disturb ground outside of the immediate work areas.

b) Scope and conditions of resource consents applicable to the works.

Resource consent has not yet been issued. When it is the following is to be included in this induction;

- Who has copies

- On-site copies available (and where)
- Any specific conditions for this site/activity
- Contaminated land procedures explained if relevant to the site, and understood

c) Environmental management measures stipulated in the EMP

Ensure all of the erosion and sediment controls including the stabilised entrance way are installed and in good working order at all times.

d) Procedures of notifying of potential Environmental Incidents

An environmental incident is anything where the EMP has failed leading to any adverse environmental effects offsite (including sediment and nuisance effects associated with dust as well as spills of fuels and chemicals to ground or a water body).

If an incident occurs undertake immediate remedial actions to mitigate adverse environmental effects. Immediate response actions should not be delayed. Once the immediate risk from the Environmental Incident is alleviated, the Environmental Representative shall investigate the cause of the breach and/or adverse environmental effects, then identify and implement corrective actions as soon as practicable. If a chemical or fuel spill occurs immediately use the spill kit on site to contain the spill. Collect any contaminated soil or water in containers (or on a truck depending on volume) onsite and dispose of to the Vitoria Flats contaminated soils landfill facility.

Call the ORC Compliance team and the pollution hotline immediately on 0800 800 033 for any incidents that cannot be brought under control, or for discharges of sediment, oil or chemicals to a waterbody, race or drain.

Take a lot of photos of the incident and immediate surrounds. Complete the form in Appendix 3 (or the ORCs Environmental Incident Report form available on their website) and notify QLDC within 12 hours of becoming aware of the incident, also send the form to the Compliance team at Otago Regional Council at pollution@orc.govt.nz

e) Procedures for managing storm events (wind and rain)

The site should always be suitably stabilised to limit erosion and sedimentation, any potential spills, discharges and deposition of waste from site. In the event of a heavy rain forecast follow the Emergency Response procedure set out on Page 11 of the EMPO.

Environmental Induction Attendance Register Pro forma

Name	Date	Signature	Name	Date	Signature

APPENDIX 3: ENVIRONMENTAL INCIDENT REPORT FORM

Project Address:	QLDC Consent Number (if applicable): RM123456 BC123456
Brief Project Description:	

Instructions

Complete this form for all environmental incident that cause contaminants (including sediment) or environmental nuisance to leave the site. Please be succinct, stick to known facts and do not make assumptions.

Once completed submit to the Regulatory team at Queenstown Lakes District Council at RCMonitoring@qldc.govt.nz Call the Regulatory team immediately on 03 441 0499 for any serious or ongoing incidents that cannot be brought under control.

Incident details

Date and Time	Date: XX/XX/XX Time: XX:XX am ☐ pm ☐
Description Provide a brief and factual description of what happened during the incident, include relevant details such as: > The estimated distance to the nearest waterway (include storm water and dry courses) > The estimated distance to the nearest sensitive receiver > The activity being undertaken when the incident occurred Sketches/diagrams/photos may be reference and appended to this report to aid in the description of the incident	
EXACT location of the incident Include address, landmarks, features, nearest cross street, etc Maps and plans can be attached to the incident report if appropriate	
Quantity or volume of material escaped or causing incident (provide and estimate if quantity unknown)	
Who identified the incident?	☐ Contractor ☐ Council ☐ Community ☐ Other

What immediate actions/control measures were taken to rectify or contain the incident?

What initial corrective action will be taken to prevent similar incidents recurring in the near future?

Has the Otago Regional Council been notified? ☐ Yes ☐ No

Approvals:

Environmental Representative/Person making report

Name..... Signature.....

Organisation..... Date.....

Mobile phone number.....

Site Supervisor

Name..... Signature.....

Organisation..... Date.....

Mobile phone number.....

Appendix 4 - Complaints Register

Name & Address of Complainant Contact Details	
Nature of the Complaint	
Location, Date and Time of the Alleged Event	
Weather Conditions at the time of Event Include wind direction and speed if noise/dust related	
Recommendations for Rectification	
Actions to be Taken	
Confirmation that the Complainant has been Informed of Rectification	
Confirmation the Matter has been Closed Out	Date: Name: Signature:

Appendix 5 – Weekly and Post Rain inspection

DATE;

ENVIRONEMTNAL REPRESENTATIVE;

WEATHER OBSERVATIONS;

ITEM	OBSERVATIONS	CORRECTIVE ACTIONS NEEDED?	ACTION TAKEN AND WHEN
Surrounding Roads		Check there is no excessive erosion or sediment deposition from vehicle movements	
Stabilised Entrance		Maintain the stabilised entranceway in a condition to prevent sediment from leaving the construction site (This may require several applications of new aggregate during the life of the practice.) Supplementary street sweeping at regular intervals on adjacent roads may still be required in association with stabilised entranceways	
Swale and Dropout Pit		Remove any accumulated sediment and remove risk of overtopping due to a lack of freeboard. Check invert and outlets to ensure that these remain free from scour and erosion. Look for low spots, areas of water ponding, formation of tunnel gullies, sediment deposition and debris blockage. Take particular care to protect against damage from earthmoving operations and reinstate the swale if damaged.	
Sediment/soakage basin		Ensure the swale is directed into this area.	
General Soil Exposure		Has soil exposure been minimised by staging the works to minimise the area of soil exposed at any one time and provide progressive stabilisation of disturbed surfaces.	

Appendix 6 – Accidental Discovery Protocol

HERITAGE NEW ZEALAND
POUHERE TAONGA

Heritage New Zealand Pouhere Taonga Archaeological Discovery Protocol

Under the Heritage New Zealand Pouhere Taonga Act (2014) an archaeological site is defined as any place in New Zealand that was associated with human activity that occurred before 1900 and provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand. For pre-contact Maori sites this evidence may be in the form of bones, shells, charcoal, stones etc. In later sites of European/Chinese origin, artefacts such as bottle glass, crockery etc. may be found, or evidence of old foundations, wells, drains or similar structures. Burials/koiwi tangata may be found from any historic period.

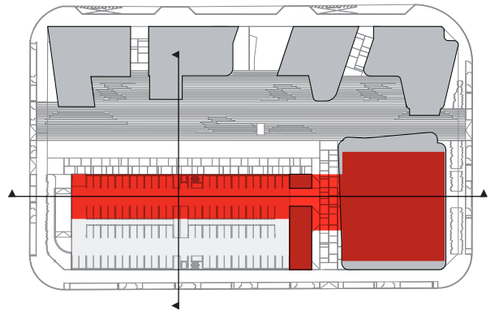
In the event that an unidentified archaeological site is located during works, the following applies;

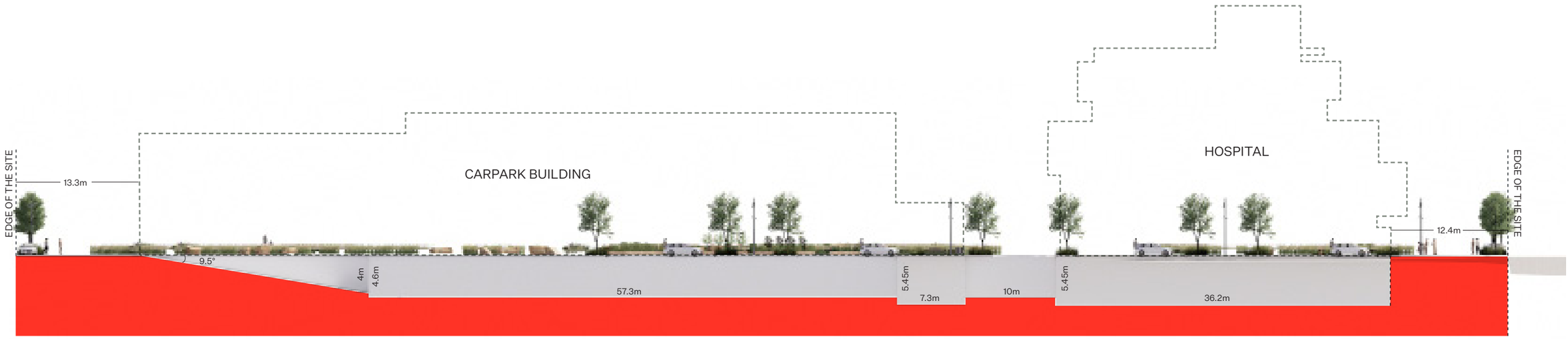
1. Work shall cease immediately at that place and within 20m around the site.
2. The contractor must shut down all machinery, secure the area, and advise the Site Manager.
3. The Site Manager shall secure the site and notify the Heritage New Zealand Regional Archaeologist. Further assessment by an archaeologist may be required.
4. If the site is of Maori origin, the Site Manager shall notify the Heritage New Zealand Regional Archaeologist and the appropriate iwi groups or kaitiaki representative of the discovery and ensure site access to enable appropriate cultural procedures and tikanga to be undertaken, as long as all statutory requirements under legislation are met (*Heritage New Zealand Pouhere Taonga Act*, *Protected Objects Act*).
5. If human remains (koiwi tangata) are uncovered the Site Manager shall advise the Heritage New Zealand Regional Archaeologist, NZ Police and the appropriate iwi groups or kaitiaki representative and the above process under 4 shall apply. Remains are not to be moved until such time as iwi and Heritage New Zealand have responded.
6. Works affecting the archaeological site and any human remains (koiwi tangata) shall not resume until Heritage New Zealand gives written approval for work to continue. Further assessment by an archaeologist may be required.
7. Where iwi so request, any information recorded as the result of the find such as a description of location and content, is to be provided for their records.
8. Heritage New Zealand will determine if an archaeological authority under the *Heritage New Zealand Pouhere Taonga Act* 2014 is required for works to continue.

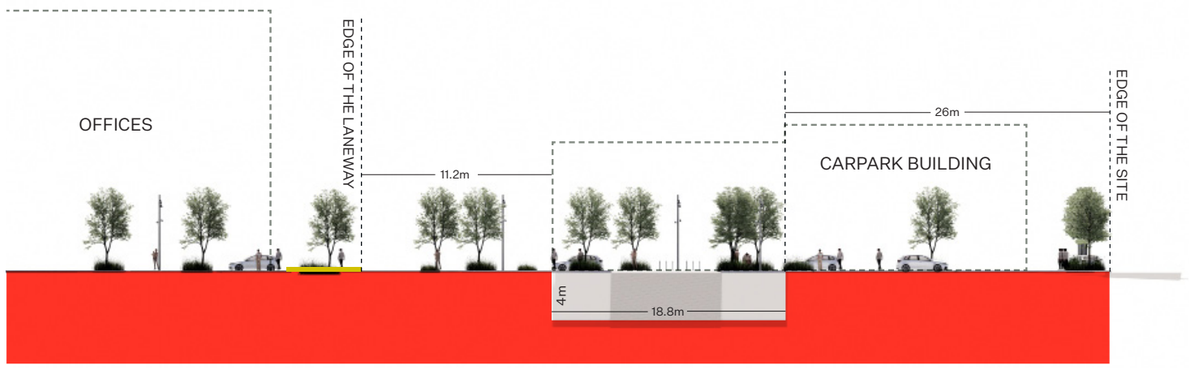
It is an offence under S87 of the *Heritage New Zealand Pouhere Taonga Act 2014* to modify or destroy an archaeological site without an authority from Heritage New Zealand irrespective of

Appendix 7 - Plans with cross sections detailing earthworks

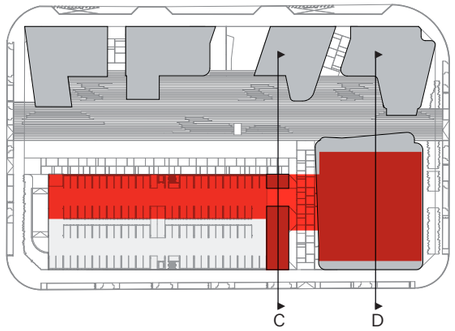
Earthwork Plan & Sections

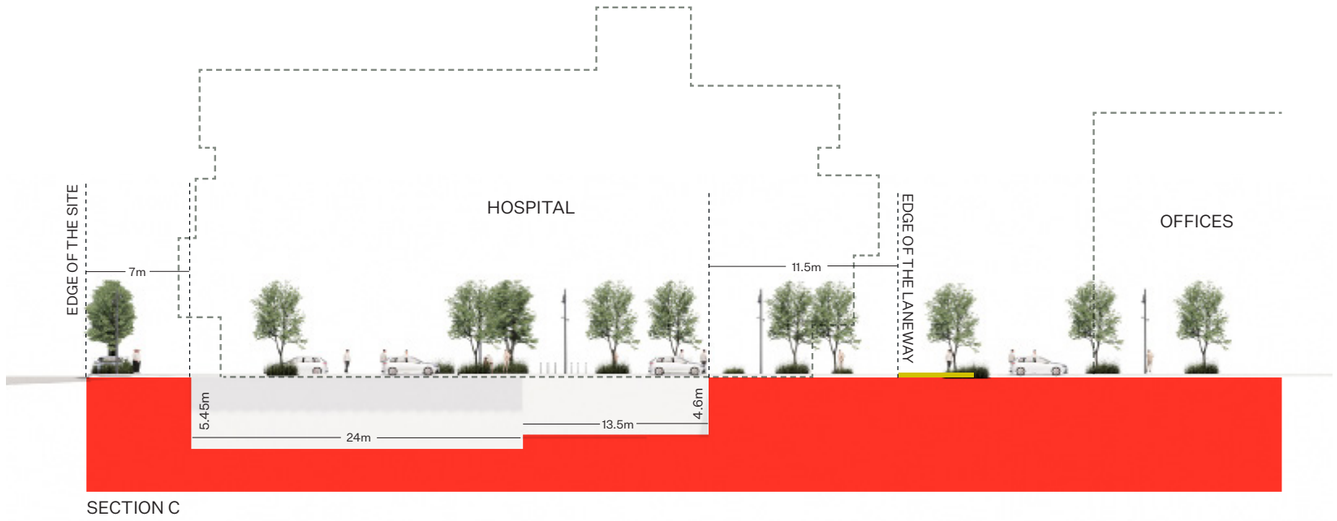




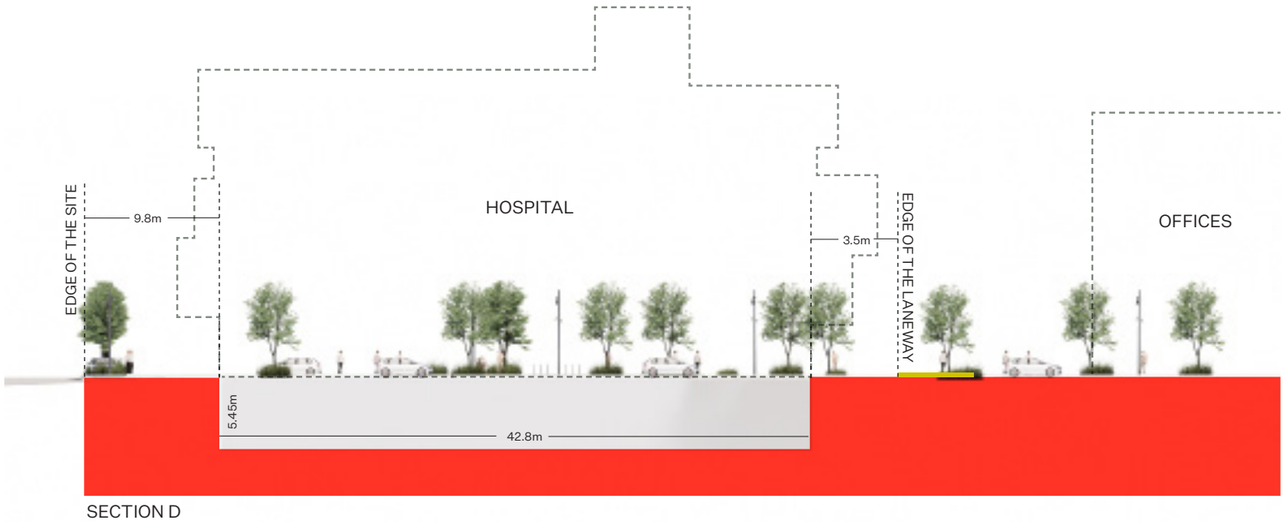


Earthwork Plan & Sections





SECTION C



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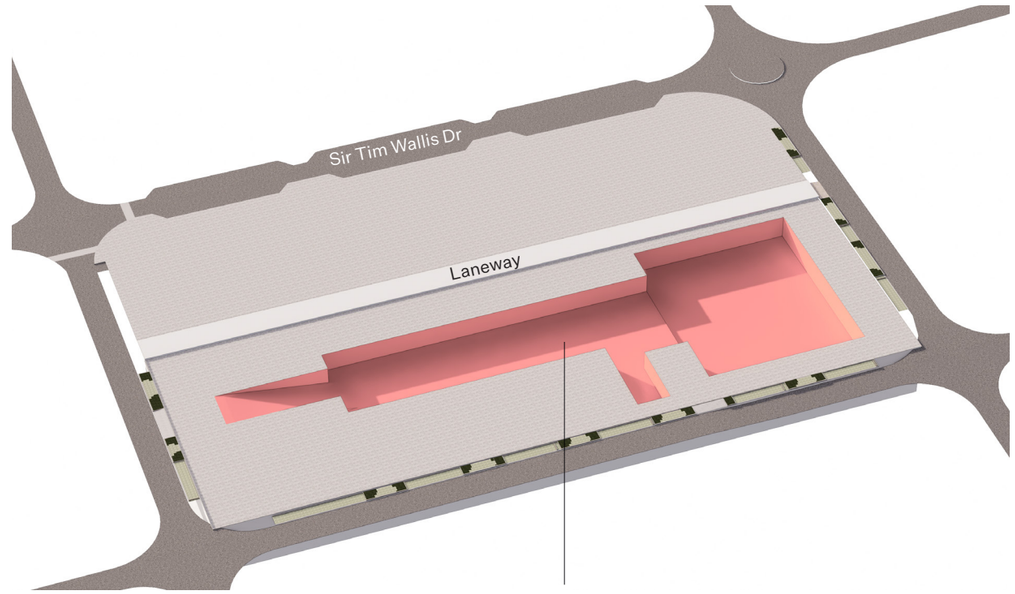


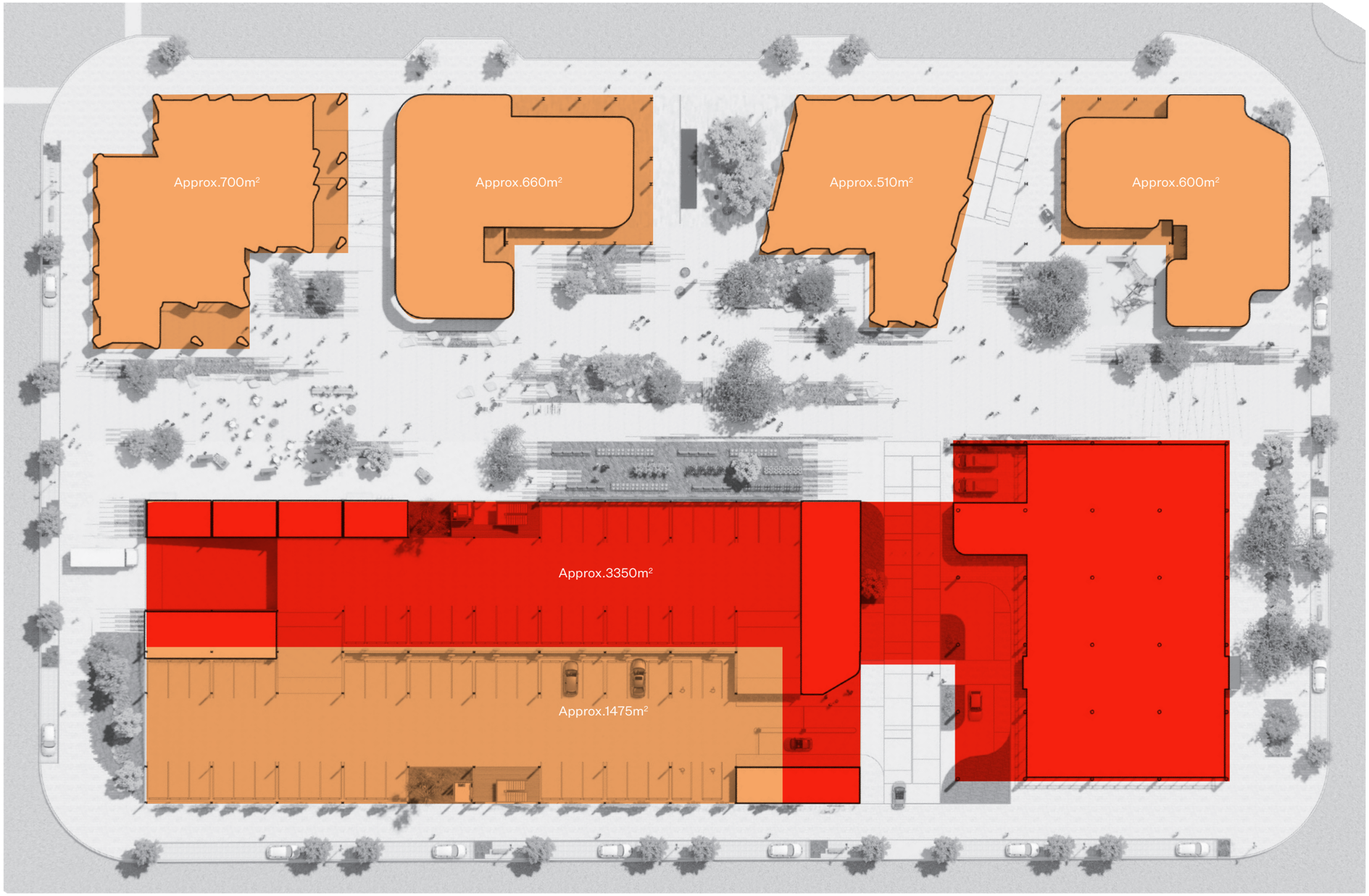
CUT
In Total: 16,215 m³

Earthwork Plan - Disturbed Ground

Foundations to buildings
(approx 1200mm deep)

Excavation for basement
(see supporting drawings)

TOTAL: Approx. 7,805m²



Holmes

Level 2, 41 Ballarat Street
PO Box 1266
Queenstown 9348
holmesanz.com

Memorandum

To:	Jo Fyfe		
Company:	Roa		
From:	Andrea Jarvis		
Date	29 April 2024	Project No:	146891.33
Subject:	Roa Integrated Hospital - Resource Consent Infrastructure Report		

1 INTRODUCTION

Holmes NZ LP has been engaged by Roa to provide a civil infrastructure report to support a land use consent application for a proposed integrated hospital, associated EV charger station and carparking, allied health and medical consulting facilities and associated commercial development at Three Parks, Wānaka.

This proposed development comprises a four level plus basement integrated hospital with 6,300 m^2 gross floor area (total), and a car parking structure for 305 cars, including 78 EV charging spaces. The development is applicable to lots 49-61 within RM230084. Refer scheme plan below

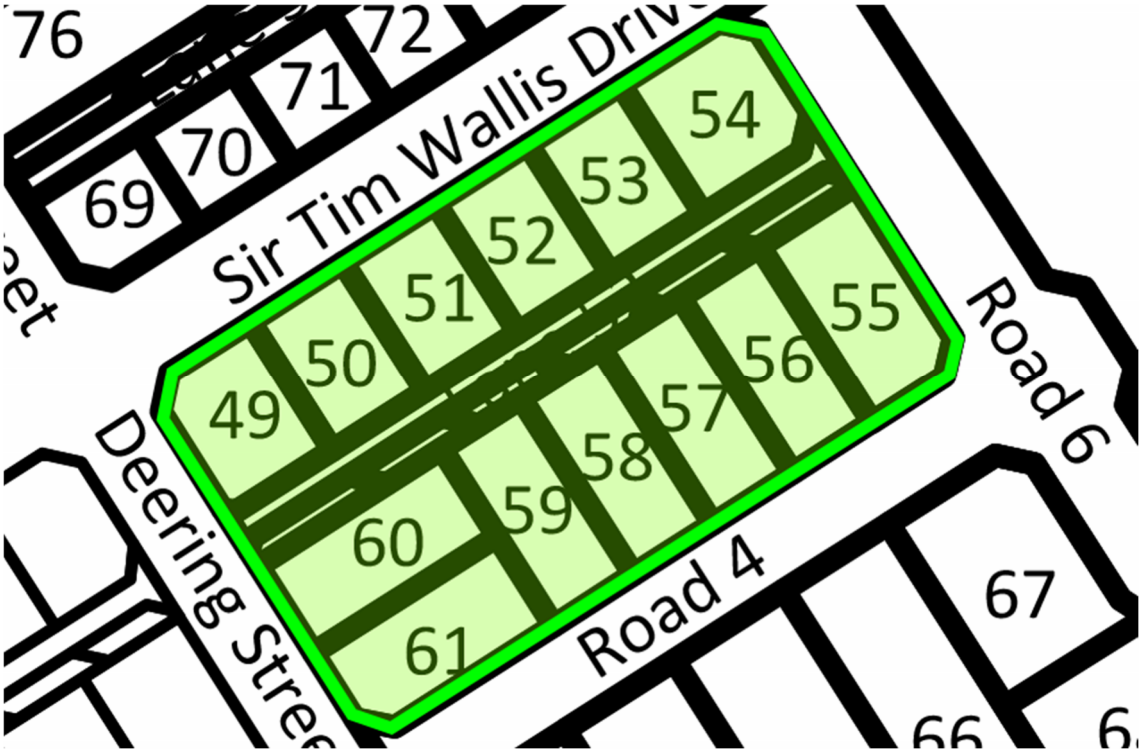


Figure 1 RM230084 Scheme Plan, subject site shown in green

The civil scope of the project consists of the following:

- Review existing information including:
  - Existing approved Subdivision Consent (RM230084)
  - Existing Resource Consent for EV charging station (RM230650)
- Prepare a report to support a Resource Consent application that will:

- Compare the current proposal to the consented baseline
- Assess infrastructure effects as a result of the new proposal

2 BASELINE SCHEME

RM230084 was granted in May 2023 after processing on a non-notified basis. This application had the following characteristics:

- 29 lot commercial subdivision
- 12 accessory parking lots
- 2 access lots
- 1 lot to vest as Road and an associated balance lot

The QLDC Engineering Report associated with RM230084 concluded:

- Potable water connections can be made to each lot from new water mains to be installed within the access lots, with lateral locations to be determined during future design phases
- Class FW4 firefighting water supply has been tested and shown to be available in the area
- Wastewater can be discharged to mains within the access lots, with lateral locations to be determined during future design phases
- Stormwater from Roads and undeveloped lots will be managed within a stormwater reserve, located in the wider subdivision (beyond the subject sites)
- Secondary stormwater flows beyond the 5% AEP event from developed lots will be managed within the stormwater reserve, with 5% AEP flows captured by on-site soakage pits within lots

RM230650 was granted in January 2024 after processing on a non-notified basis. This application had the following characteristics:

- 78 EV charging stations
- Across future lots 57-59 (2,655m^2 in total)
- 40 of the 78 carparks to be covered with a shelter (total structure area 716 m^2)

The QLDC Engineering Report associated with RM230650 concluded:

- Water demands are expected to be minimal
- Sufficient firefighting flows are available from the local hydrant network
- Wastewater connection will not be used
- Stormwater can be discharged to on-site soakage pits within the lot

The lots subject to this proposal (49-61) have a combined total area of 11,360 m^2. Additionally with the access lot and parking lots, the total site area subject to this proposal is 13,160 m^2.

3 WATER SUPPLY

Water demands for the baseline (based on underlying zoning) and current proposed scheme are as shown in tables 1 and 2 below. Based on the underlying Business Mixed Use Zone, and the Three Parks Business Zone, baseline demands assume 3 storey buildings and 75% site coverage, and water demands assuming medium water usage at 0.7 l/s/ha (including peaking factors). Medium Water use would allow for the full range of anticipated water use patterns allowed for within both zones.

Lot	Lot Area (m^2)	Building Area (75% coverage) (m^2)	GFA (3 levels) (m^2)	Demand (l/d)
49	825	618.75	1856.25	0.13
50	755	566.25	1698.75	0.12
51	755	566.25	1698.75	0.12
52	755	566.25	1698.75	0.12
53	755	566.25	1698.75	0.12
54	960	720	2160	0.15
55	1,030	772.5	2317.5	0.16
56	885	663.75	1991.25	0.14
57	885	663.75	1991.25	0.14
58	885	663.75	1991.25	0.14
59	885	663.75	1991.25	0.14
60	1,005	753.75	2261.25	0.16
61	1,010	757.5	2272.5	0.16
			Total	**1.79**

Table 1: Water Demand - Three Parks Business Zone and Business Mixed Use Zone Baseline

Facility	Beds	Demand (l/bed/day)	Average Dry Weather Flow (l/s)	Peak Daily Dry Weather Flow (l/s)
Hospital	71	550	0.45	1.13
Facility	**Use**	**Total GFA (m^2)**	**Demand (l/s/Ha)**	**Peak Daily Dry Weather Flow (l/s)**
Carpark	Incl EV charging and Motorbike parking	6,000	-	-
Building 1	Commercial	2,580	0.4	0.10
Building 2	Commercial	3,100	0.4	0.12
Building 3	Health Consultancy / Food & Beverage	1,660	0.7	0.12
Building 4	Allied Health, Laboratory, Food & Beverage	3,300	0.7	0.23
			Total	**1.70**

Table 2: Water Demand, This application - QLDC LDSCoP 2020

For RM230084, QLDC's processing engineer concluded that adequate flows and pressures are available from the Council reticulated scheme for both potable and fire-fighting purposes. Of note is the FW4 fire fighting flows available. RM230650's processing engineer concluded that minimal water would be required for the EV charging station, other than a hose tap for minimal cleaning and landscape irrigation. Both of these conclusions are still valid for this application.

Water demands for the proposed facilities have been calculated based on the following:

- Commercial buildings will have light water use demands
- The carparking and EV charging facility will not generate potable water demands
- Allied Health and Health Consultancy facilities are conservatively assumed to have medium water use demands. This also allows for the food and beverage offerings within these buildings
- Water use and wastewater generation for hospitals typically ranges from 450-600 litres/bed/day. For this modern facility, and also noting the GreenStar aspirations for the project, which will include water reducing fixtures, conservatively 550 litres/bed/day has been applied. These usage rates allow for all use associated with each patient bed (sanitary and sterilisation facilities, theatres, ensuite bathrooms etc).
- Sprinklered buildings are anticipated. Based on table C1 in PAS4509:2008, and assuming an ordinary fire hazard category, approximately 45 L/s of fire fighting flows would be required (20-25 L/s for sprinklers plus 25 L/s from hydrants). The FW4 supply available provides 50 L/s from each of two hydrants, so is significantly more than required.

The proposed development, based on these relatively conservative demand assumptions, has a lower loading than the underlying Three Parks Business and Business Mixed Use zoning would assume.

Based on the lower demands, it is concluded that the network will have the capacity to support this development.

4 WASTEWATER

While some minor irrigation of planted areas may be required, particularly during plant establishment, the majority of the water use on the site is expected to be within the buildings. We have therefore assumed that the water demands will roughly equate to the wastewater demands, and so the calculations in the water section above also apply to wastewater generation.

As per the conclusions for RM230084 and EM230650, the receiving infrastructure was determined to be able to handle the demands from the subdivision and EV charging station respectively. With lower overall demand (based on conservative wastewater generation rates), we conclude that this proposal will have a similar impact on the infrastructure and therefore be able to be supported.

5 STORMWATER

RM230084, as noted above, allows for flows from undeveloped sites and the Roads to a stormwater reserve. This reserve will also cater for the secondary flows from developed sites, with each lot to have soak pits with capacity for the 5% AEP event.

The intent for this development is to soak stormwater to ground. This will primarily take the form of raingardens and associated soakage devices within the laneway and in landscaped areas around the buildings.

Rainwater tanks may be utilised for non-potable re-use (especially within commercial spaces), which would reduce the volume soaking to ground. Test pits undertaken in the wider area have shown adequate soakage is available to manage the anticipated flows.

Figure 2 Proposed Bulk & location plan

The specific design of raingardens, soakpits and other stormwater devices will be undertaken during future design phases, following site specific soakage testing, however outline calculations have been undertaken to inform feasibility.

These calculations assume:

- Soakage rate of 360 mm/hr (based on geotechnical testing on sites nearby)
- Laneway is 80% impermeable, the remainder is green landscaping available for soakage devices
- No Rainwater Harvesting is utilised (for conservatism)

Facility	Roof/Hardstand Area (m^2)	Soakage Device depth (m)	Soakage Device Area (m^2)
Hospital	1,600	1.77	24
Carpark	3,000	1.77	45
Building 1	645	1.97	9
Building 2	620	1.86	9
Building 3	415	1.87	6
Building 4	660	2.04	9
Laneway	1,424	1.81	21
Total			**123**

Table 3: Roof Areas and Soakage device sizing

These calculations show that with a soakage device depth of approximately 2 m, less than 125 m^2 of soakage area will be required. The remaining 20% of the laneway area is 356 m^2 and thus soakage within these areas is feasible without needing to design soakage devices to be installed under hardstand areas.

5.1 Stormwater Treatment

Vehicle movements in and out of the carpark/charging facility will generate levels of stormwater contaminants similar to a low use Road. Prior to soakage to ground, adequate stormwater treatment for trafficked areas will be provided. This will be designed in future design stages. This will primarily take the form of swales and raingardens and similar nature-based solutions, with proprietary devices where nature-based solutions are not feasible.

6 OTHER SERVICES

RM230084 and RM230650 both provided provisioning feasibility letters from both Power and Telecommunications. These both concluded that servicing the development is feasible. No appreciable difference in telecommunications or power demands are anticipated for this development over the assumed loads for the prior consents and therefore this provisioning is considered still relevant. Both Aurora and Chorus have been contacted to confirm this.

7 EARTHWORKS

7.1 Earthworks Quantities

RM230084 allows for earthworks to construct flat sites ready for development. It is assumed that following subdivision, the sites will be stabilised with topsoil and grass, and so a site scrape will be required within

the building footprints prior to further construction. As shown on the attached earthworks plans from Warren & Mahoney, the combined area of the areas without basements is approximately 3,945 m^2.

Assuming a 200mm site scrape for each building, the site scrape in these areas will equate to earthworks cut volume of approximately 800 m^3. The integrated hospital will have a single level basement to accommodate support functions and medical imaging, and the carpark will have a partial basement to accommodate the hospital energy centre as well as additional carparking at the same level as radiology. As per the attached earthworks plans from Warren & Mahoney, approximately 16,215 m^3 of earthworks will be required for the basement areas, over an area of 3,350 m^2. The excavation depths in all basement areas are greater than their distance from the boundary of the site.

Detailed excavation for foundations will be assessed as part of the building consent for each structure and are excluded from this assessment.

7.2 Earthworks Effects

The geotechnical engineering report provided with RM230084 describes the underlying soils as mainly glacial deposits and recommends maximum batter angles within all materials (assuming wet ground) of 2H:1V. Distances from boundaries do not allow these batter angles to be achieved, and so temporary retaining is likely to be required. This will be designed during the detailed design phase of the project. Permanent retaining will be integral with the building structure in all cases, and again will be designed in later phases of the project.

The earthworks volumes anticipated therefore to exceed the permitted activity limits for this zoning (500 m^3 per site). The overall site area and volumes anticipated will result in this being considered a Medium Risk project as outlined in QLDC's Guidelines for Environmental Management Plans (EMP). Whilst the full EMP will be provided by the Contractor, an outline erosion and sediment control plan will be included in a future resource consent application, which will show the likely sediment control measures to be utilised on the site. There are no sensitive watercourses in the vicinity of the site, and so a high-risk classification is not considered necessary.

7.3 Erosion and Sediment Control

It is expected that both earthworks and construction phase erosion and sediment control measures will be able to sufficiently mitigate environmental effects. These measures would include:

- Minimising areas of disturbed soils at any one time, where possible
- Sediment retention ponds, likely to be multiple in locations close to each earthworks area
- Stockpile management (including dust suppression and exclusion of stormwater runoff from these areas)
- Construction vehicle crossing points with wheel washing facilities
- Silt fences as a final line of defence

An indicative Erosion and Sediment Control plan is shown in Appendix A. It is noted that the site is relatively flat, and so silt fences may be required around the full perimeter. It is assumed the site will be developed in stages, and so sediment retention ponds and other sediment control measures are shown adjacent to each expected work front.

8 CONCLUSION

The proposed development is generally of lower impact on infrastructure than the underlying subdivision consented under RM230084. Water and wastewater demands are both anticipated to be lower.

Stormwater quality and quantity will both be managed via on-site processes, resulting in the impact on the receiving environment being as anticipated by the subdivision consent.

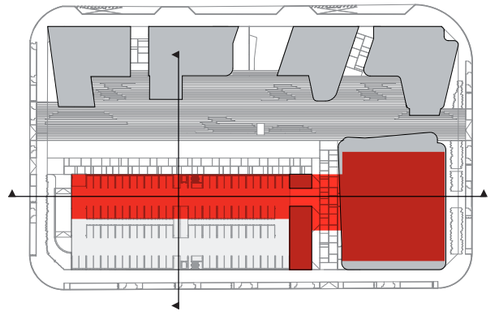
Earthworks will be managed with an Earthworks Management Plan completed by the Contractor prior to construction commencing. With no sensitive watercourses nearby, usual construction phase erosion and sediment control measures are expected to be able to manage the environmental effects.

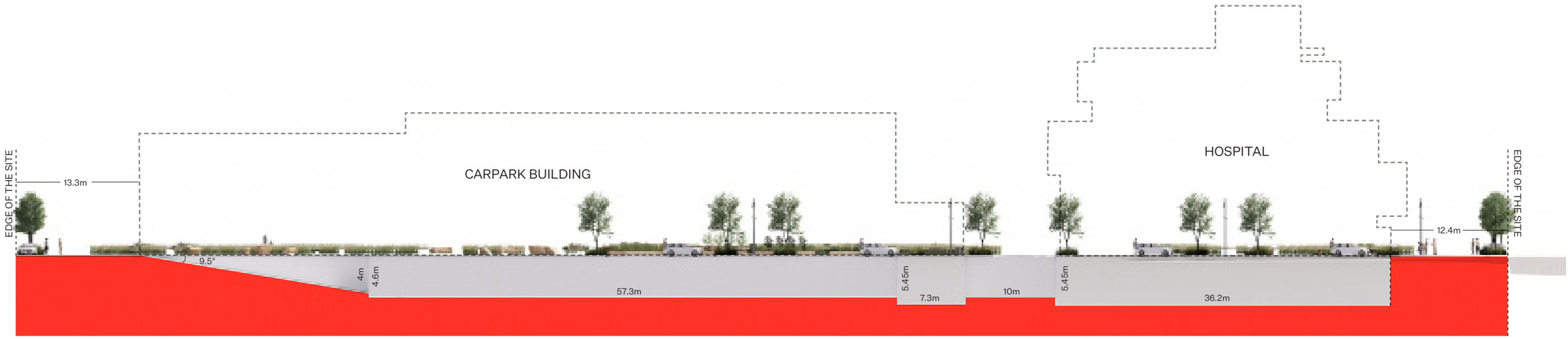
Andrea Jarvis
PRINCIPAL, CIVILS
Holmes NZ LP

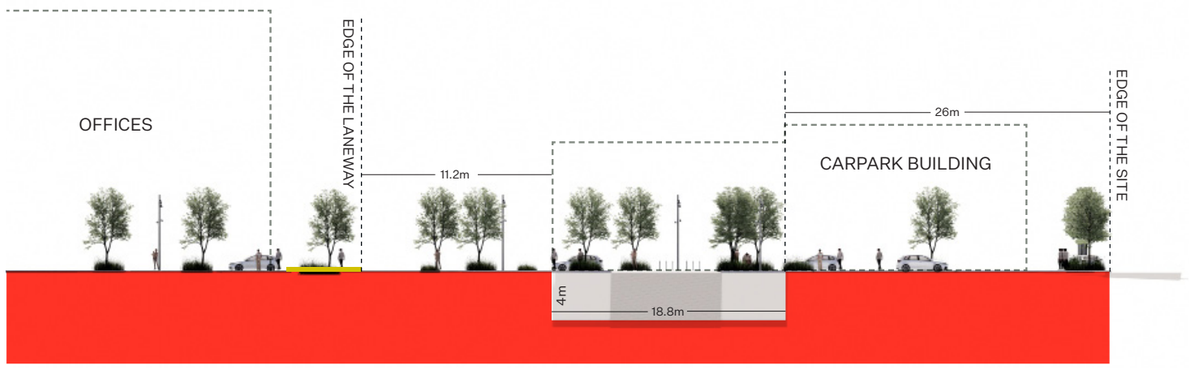
Copies to: Mike Saegars, Roa

Appendix A Earthworks Plans

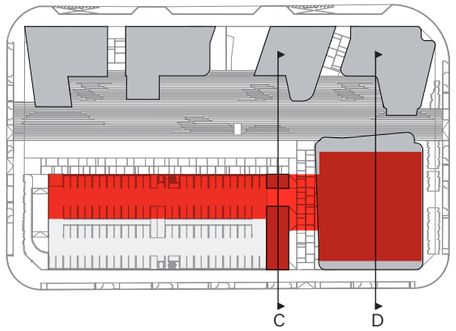
Earthwork Plan & Sections

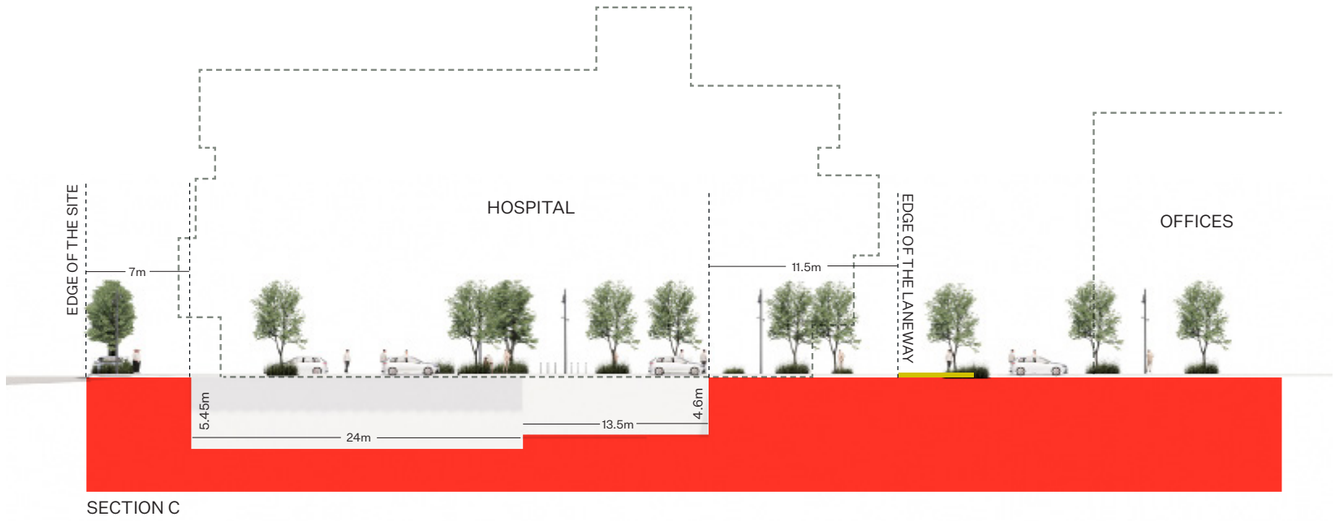




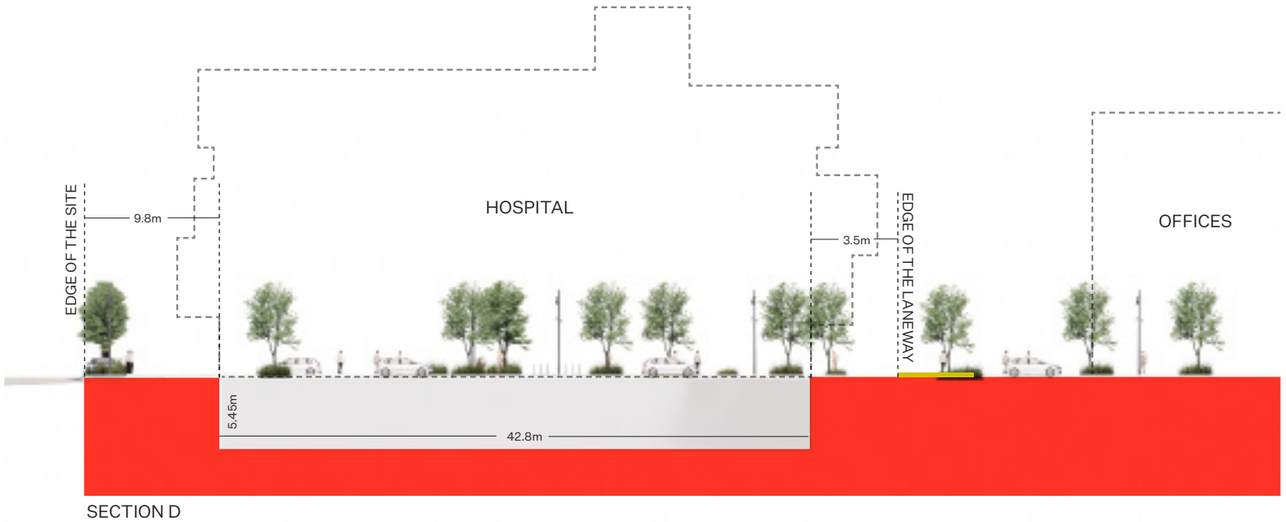


Earthwork Plan & Sections





SECTION C



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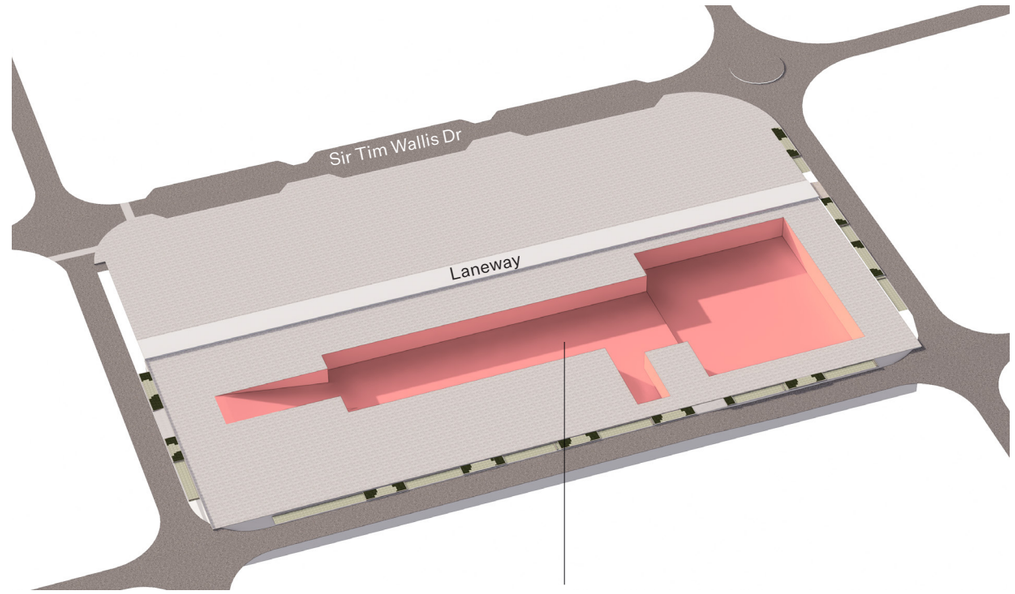

CUT
In Total: 16,215 m³

Earthwork Plan - Disturbed Ground

Foundations to buildings (approx 1200mm deep)

Excavation for basement (see supporting drawings)

TOTAL: Approx. 7,805m²

Erosion and Sediment Control Measures

- Temporary Retaining
- Silt Fences
- Sediment retention ponds
- Topsoil Stockpile
- Stabilised Construction Entrance, rumble strip and wheel wash

Appendix B Calculations

Holmes

Project Name : First District Wanaka
Project No : 146891.33
Calcs By: ATJ
Date: 26-Apr-24
Page No:

CALCULATIONS

Soak Pit Hospital

Based on BC:E1 Surface Water

Impervious (asphalt or concrete)

C	0.85		Runoff coefficient
I	18.2	mm/hr	Rainfall depth (for 1hr duration with 20% AEP - from HiRDs RCP 8.5)
A	1600	m2	Catchment area
Rc	**24.75**	**m3**	Runoff for 1hr storm

Pervious (grass and garden)

C	0.25		Runoff coefficient
I	18.2	mm/hr	Rainfall Depth (for 1hr duration with 20% AEP - from HiRDs)
A	0	m2	Catchment area
Rc	**0.00**	**m3**	Runoff for 1hr storm

Asp	24	m2	Area of soak pit base
Sr	360.0	mm/hr	From Site soak pit testing Nearby
Vsoak	**8.64**	**m3**	Volume disposed of by soakage in 1hr
Vstore	**16.11**	**m3**	
Pit Type	Rock Filled		
Vpit	**42.40**	**m3**	

Pit Width	8.0	m
Pit Length	3.0	m
Min Pit Depth	**1.77**	**m**

Soak Pit Carpark

Based on BC:E1 Surface Water

Impervious (asphalt or concrete)

C	0.85		Runoff coefficient
I	18.2	mm/hr	Rainfall depth (for 1hr duration with 20% AEP - from HiRDs RCP 8.5)
A	3000	m2	Catchment area
Rc	**46.41**	**m3**	Runoff for 1hr storm

Pervious (grass and garden)

C	0.25		Runoff coefficient
I	18.2	mm/hr	Rainfall Depth (for 1hr duration with 20% AEP - from HiRDs)
A	0	m2	Catchment area
Rc	**0.00**	**m3**	Runoff for 1hr storm

Asp	45	m2	Area of soak pit base
Sr	360.0	mm/hr	From Site soak pit testing Nearby
Vsoak	**16.20**	**m3**	Volume disposed of by soakage in 1hr
Vstore	**30.21**	**m3**	
Pit Type	Rock Filled		
Vpit	**79.50**	**m3**	

Pit Width	15.0	m

Pit Length	3.0	m
Min Pit Depth	**1.77**	**m**

Soak Pit Building 1

Based on BC:E1 Surface Water

Impervious (asphalt or concrete)

C	0.85		Runoff coefficient
I	18.2	mm/hr	Rainfall depth (for 1hr duration with 20% AEP - from HiRDs RCP 8.5)
A	700	m2	Catchment area
Rc	**10.83**	**m3**	Runoff for 1hr storm

Pervious (grass and garden)

C	0.25		Runoff coefficient
I	18.2	mm/hr	Rainfall Depth (for 1hr duration with 20% AEP - from HiRDs)
A	0	m2	Catchment area
Rc	**0.00**	**m3**	Runoff for 1hr storm

Asp	10.5	m2	Area of soak pit base
Sr	360.0	mm/hr	From Site soak pit testing Nearby
Vsoak	**3.78**	**m3**	Volume disposed of by soakage in 1hr
Vstore	**7.05**	**m3**	

Pit Type	Rock Filled	
Vpit	**18.55**	**m3**

Pit Width	3.5	m
Pit Length	3.0	m
Min Pit Depth	**1.77**	**m**

Soak Pit Building 2

Based on BC:E1 Surface Water

Impervious (asphalt or concrete)

C	0.85		Runoff coefficient
I	18.2	mm/hr	Rainfall depth (for 1hr duration with 20% AEP - from HiRDs RCP 8.5)
A	660	m2	Catchment area
Rc	**10.21**	**m3**	Runoff for 1hr storm

Pervious (grass and garden)

C	0.25		Runoff coefficient
I	18.2	mm/hr	Rainfall Depth (for 1hr duration with 20% AEP - from HiRDs)
A	0	m2	Catchment area
Rc	**0.00**	**m3**	Runoff for 1hr storm

Asp	9	m2	Area of soak pit base
Sr	360.0	mm/hr	From Site soak pit testing Nearby
Vsoak	**3.24**	**m3**	Volume disposed of by soakage in 1hr
Vstore	**6.97**	**m3**	

Pit Type	Rock Filled	
Vpit	**18.34**	**m3**

Pit Width	3.0	m
Pit Length	3.0	m
Min Pit Depth	**2.04**	**m**

Soak Pit Building 3

Based on BC:E1 Surface Water

Impervious (asphalt or concrete)

C	0.85		Runoff coefficient
I	18.2	mm/hr	Rainfall depth (for 1hr duration with 20% AEP - from HiRDs RCP 8.5)
A	420	m2	Catchment area
Rc	**6.50**	**m3**	Runoff for 1hr storm

Pervious (grass and garden)

C	0.25		Runoff coefficient
I	18.2	mm/hr	Rainfall Depth (for 1hr duration with 20% AEP - from HiRDs)
A	0	m2	Catchment area
Rc	**0.00**	**m3**	Runoff for 1hr storm

Asp	6	m2	Area of soak pit base
Sr	360.0	mm/hr	From Site soak pit testing Nearby
Vsoak	**2.16**	**m3**	Volume disposed of by soakage in 1hr
Vstore	**4.34**	**m3**	
Pit Type	Rock Filled		
Vpit	**11.41**	**m3**	

Pit Width	2.0	m
Pit Length	3.0	m
Min Pit Depth	**1.90**	**m**

Soak Pit Building 4

Based on BC:E1 Surface Water

Impervious (asphalt or concrete)

C	0.85		Runoff coefficient
I	18.2	mm/hr	Rainfall depth (for 1hr duration with 20% AEP - from HiRDs RCP 8.5)
A	600	m2	Catchment area
Rc	**9.28**	**m3**	Runoff for 1hr storm

Pervious (grass and garden)

C	0.25		Runoff coefficient
I	18.2	mm/hr	Rainfall Depth (for 1hr duration with 20% AEP - from HiRDs)
A	0	m2	Catchment area
Rc	**0.00**	**m3**	Runoff for 1hr storm

Asp	9	m2	Area of soak pit base
Sr	360.0	mm/hr	From Site soak pit testing Nearby
Vsoak	**3.24**	**m3**	Volume disposed of by soakage in 1hr
Vstore	**6.04**	**m3**	
Pit Type	Rock Filled		
Vpit	**15.90**	**m3**	

Pit Width	3.0	m
Pit Length	3.0	m
Min Pit Depth	**1.77**	**m**

Soak Pit Laneway

Based on BC:E1 Surface Water

Impervious (asphalt or concrete)

C	0.85		Runoff coefficient
I	18.2	mm/hr	Rainfall depth (for 1hr duration with 20% AEP - from HiRDs RCP 8.5)
A	1424	m2	Catchment area
Rc	**22.03**	**m3**	Runoff for 1hr storm

Pervious (grass and garden)

C	0.25		Runoff coefficient

I	18.2	mm/hr	Rainfall Depth (for 1hr duration with 20% AEP - from HiRDs)
A	0	m2	Catchment area
Rc	**0.00**	**m3**	Runoff for 1hr storm
Asp	21	m2	Area of soak pit base
Sr	360.0	mm/hr	From Site soak pit testing Nearby
Vsoak	**7.56**	**m3**	Volume disposed of by soakage in 1hr
Vstore	**14.47**	**m3**	
Pit Type	Rock Filled		
Vpit	**38.08**	**m3**	

Pit Width	3.0	m
Pit Length	7.0	m
Min Pit Depth	**1.81**	**m**

Appendix C RM230084 Geotechnical Report

WILLOWRIDGE DEVELOPMENTS LTD

STAGE B3,
THREE PARKS, WANAKA

GEOTECHNICAL INVESTIGATION AND SOIL INFILTRATION ASSESSMENT FOR A PROPOSED COMMERCIAL SUBDIVISION

REF: R8468-1B
DATE: 23 NOVEMBER 2022

GCL Ground Consulting Ltd

REPORT QUALITY CONTROL

REPORT PREPARED BY: **GROUND CONSULTING LIMITED (GCL)**

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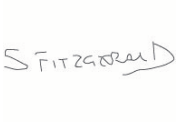
DOCUMENT CONTROL				
REPORT TITLE		GEOTECHNICAL INVESTIGATION AND SOIL INFILTRATION ASSESSMENT FOR A PROPOSED COMMERCIAL SUBDIVISION		
REPORT REFERENCE		R8468-1B	PROJECT NUMBER	8468
CLIENT		WILLOWRIDGE DEVELOPMENTS LTD C/- PATERSON PITTS GROUP (WANAKA)		
REV	DATE	REVISION STATUS	AUTHOR	REVIEWER
A	15 NOVEMBER 2022	CLIENT REVIEW	SHANNON FITZGERALD	GCL
B	23 NOVEMBER 2022	ISSUED TO CLIENT	SHANNON FITZGERALD	GCL
APPROVAL				
AUTHOR SIGNATURE			REVIEWER SIGNATURE	
NAME		SHANNON FITZGERALD B.SC, PGDIPSCI, (GEOL), MAIG, MENGNZ	NAME	
TITLE		SENIOR ENGINEERING GEOLOGIST	TITLE	

EXECUTIVE SUMMARY

Scope of Work		GCL has been engaged to conduct a geotechnical investigation and a soil infiltration assessment for a 29 lot commercial development at Stage B3, Three Parks, Wanaka. and make appropriate recommendations for resource consent, including for foundations, earthworks and stormwater disposal
Development Proposal		The proposed development comprises the subdivision of Lot 981 (LT 574876) & Lot 972 (LT 567411) into 29 commercial Lots. Access to the development will be gained via Sir Tim Wallis Drive and an internal road network. Onsite disposal of stormwater is the preferred management option
Ground Conditions	Published Geology	• The site is mapped as being underlain by Late Pleistocene Glacier Deposits comprising unsorted bouldery clay-rich Gravel (till) with minor banded silt and sand lenses • The site towards the south is mapped as being underlain Late Pleistocene River Deposits comprising unweathered to slightly weathered, well-sorted, sandy Gravel forming large outwash terraces in the Clutha catchment
	Previous Investigations	none
	Observed Site Geology	The site is underlain for the most part by River Deposits comprising loosely to tightly packed Sand and Gravel.
	Groundwater	Depressed groundwater levels
	Surface Water	No surface water bodies, lineation or ephemeral flows paths were observed
Natural Hazards	Liquefaction	Site investigations have proven competent granular soils and a review of bore logs indicates a depressed groundwater regime. As such, the perceived risk of liquefaction is considered low to nil.
	Alluvial Landforms	The site contains no alluvial landforms
	Seismic Characteristics	Seismic Soil Class D is considered appropriate. The site is generally located within a seismically active area. As such, the design should be cognisant of NZS1170.5.
Geotechnical Considerations	Slope Stability	The site is remote from slope instability features or steeper slope prone to instability
	Building Platform	The site will require the removal of the existing soil and aggregate stockpiles followed by typically ground profiling to establish level building platforms and grading suitable for commercial development
	Bearing Capacity	NZS3604 'good ground' was consistently achieved across the site.
	Soil Expansivity	The site sub-soils are considered to be non-expansive with regard to AS2870.
	Settlement	Maximum 12kPa building load, 1.5m wide footing & 1.5m deep fill.
	Earthworks	Standard conditions apply to align with Earthworks Code of practice. The lower alluvium profile, Glacial Till and River Deposits are suitable for reuse as engineered fill.
Stormwater Disposal	Onsite to-ground stormwater disposal is feasible	
Wastewater Disposal	Serviced by reticulated public services administered by QLDC	

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PART A: SITE CONDITIONS

1 INTRODUCTION

1.1 PROJECT BRIEF

GCL has completed a geotechnical investigation and soil infiltration assessment for a proposed 29 lot commercial subdivision at Stage B3, Three Parks, Wanaka. The investigation has been undertaken at the request of Paterson Pitts Group (Wanaka) on behalf of the client Willowridge Developments Ltd.

The proposed development (site) is legally described within Lot 981 (LT 574876) & Lot 972 (LT 567411). The site location is presented in Drawing 001.

This geotechnical report has been prepared to obtain resource consent from the Queenstown Lakes District Council (QLDC).

This report includes a summary of the investigations undertaken and provides an assessment of:

- Ground Conditions
- Groundwater Conditions
- Desktop based Natural Hazards Assessment
- Building Platform Stability
- Foundation Conditions
- Earthworks Recommendations
- Review ORC bores GIS viewer
- Other Pertinent Constraints and Issues Identified With The Site

1.2 REPORT LAYOUT

This report is divided into three sections for convenience:

- Part A: Site conditions. This section provides a factual assessment of the proposed development, including a summary of the development, desktop study, site description, and sub-surface investigations undertaken.
- Part B: Geotechnical considerations. This section provides a geotechnical interpretative assessment of the proposed development, including site stability, foundation conditions, and site earthworks constraints.
- Part C: Environmental considerations. This section provides an assessment of stormwater management and wastewater management

1.3 PROPOSED SITE DEVELOPMENT

The proposed development comprises the following features and components:

- No earthworks construction plans were provided during the investigation. A scheme plan was provided by Paterson Pitts Group Wanaka (Documents Reference: W3850-10 DWG No. 003 Sheet No. 101a) dated 14 September 2022. Refer to Appendix D

- The proposed development comprises the subdivision of Lot 981 (LT 574876) & Lot 972 (LT 567411) to form 29 commercial lots ranging in size from 550 - 2,200m^2.
- Sir Tim Wallis Drive bisects the proposed development. Access to Lots 49 – 68 will be gained via Deering Street, Roads 4 & 6. Access to Lots 69 – 77 will be gained via Maclaren Road or Grace Wright Drive.
- We anticipate the removal of the soil and aggregate stockpiles, followed by minor ground profiling to provide suitable gradients for the access roads and building platforms. However, given the relatively level nature of the site, the earthworks are not expected to be substantial.
- We understand that onsite disposal of stormwater is the preferred disposal option for the development, with the road network providing secondary flow paths. Onsite stormwater disposal will most likely be achieved by soakage devices placed as appropriate.
- Effluent management is serviced by the reticulated public service administered by QLDC.

2 DESKTOP STUDY

2.1 PREVIOUS INVESTIGATIONS

GCL has reviewed the QLDC eDocs facility, which provided limited site investigation documentation for the immediate area.

GCL has previously conducted investigations throughout the Three Parks Development and local area and is therefore familiar with the local geology. Previous GCL reports containing pertinent information relevant to the current site have been reviewed and relied on where appropriate for the benefit of this current report, as follows:

2.2 NEW ZEALAND GEOTECHNICAL DATABASE

The New Zealand Geotechnical Database (NZGD) has been viewed. The following assessments have been identified in the vicinity of the proposed development.

- ENGEO Ltd completed seven (7) test pits to around 2m depth within the building footprint of the new Wanaka School. The test pit logs revealed a typical Three Parks soil profile comprising a Topsoil and Alluvium mantle over, Glacial Deposits (SAND and GRAVEL, brownish grey, loosely packed, bedded, well graded)
- This assessment neighbours the northwest portion of the proposed development comprising Lots 69 – 77.

2.3 HISTORIC AERIAL PHOTOGRAPHS

Aerial photographs from Google Earth dating from 1985 to 2021 were studied to observe the site over time and assess the geomorphological setting. The review of historical aerial photography indicates that there has been no significant modification of the site over this period, aside from recent earthworks associated with subdivision development and temporary stockpiling of soil materials

The review of historical aerial photography is summarised in the table below:

Table 1: Historic remote imagery summary

Year	Site Description
1985 - 2012	• The site and wider area remain mostly unmodified, aside from an unsealed vehicle access road that passes along the southern lot boundary (Stage B3), now called McCormick Street. The site otherwise presents as arid and grassed.
2012 - 2019	• The site was used for stockpiling soil material. • Ground profiling has occurred around the site. • Installation of Sir Tim Wallis Drive and construction of the Wanaka Recreational Centre
2019 – 2021	• Several commercial developments, including New World, Mitre 10 and BP, have been constructed within other stages of the Three Parks development that surround the site

2.4 PUBLISHED GEOLOGY

The Geological Map of New Zealand, Sheet 18 (Wakatipu), at a scale of 1:250,000, maps the site at the interface between the following geological formations.

- The site is mapped as being underlain by Late Pleistocene Glacier Deposits comprising unsorted bouldery clay-rich Gravel (till) with minor banded silt and sand lenses.
- The site towards the south is mapped as being underlain Late Pleistocene River Deposits comprising unweathered to slightly weathered, well-sorted, sandy Gravel forming large outwash terraces in the Clutha catchment
- The Cardrona-Hawea Fault is mapped approx. 500m to the southeast of the site. This fault is best described as a 'possibly active' with a calculated rupture recurrence interval of 20,000 – 30,000yrs.
- Given the accuracy of the mapping method used, the site may comprise characteristics of both basement schist and onlapping glacial deposits.
- The figure below illustrates the described geological formations.

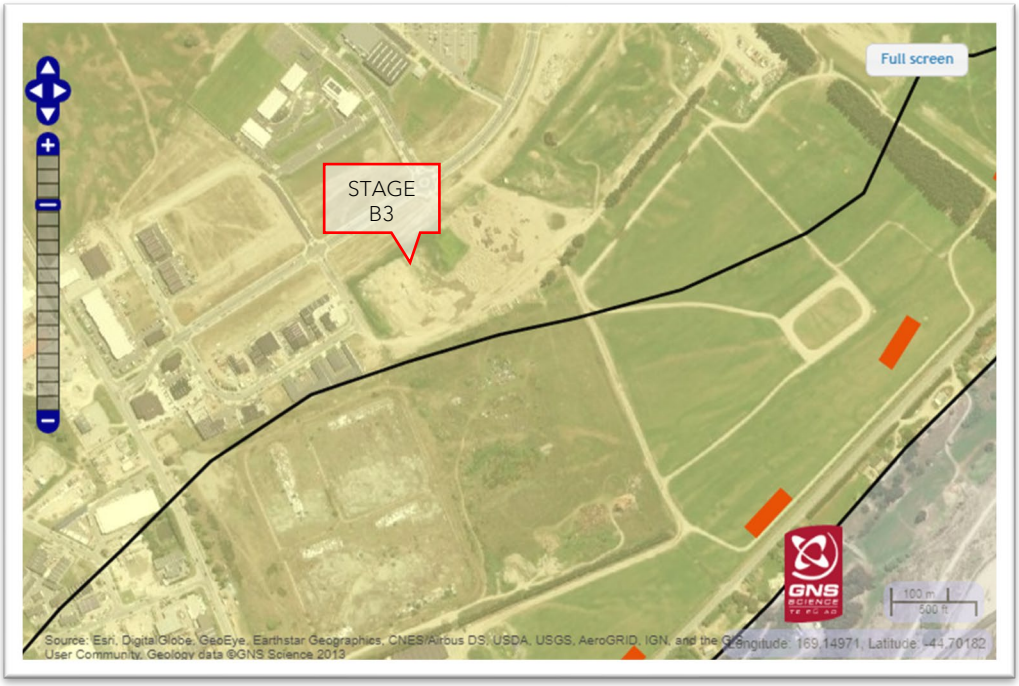

Figure 1: Illustrates the geological formations relevant to the subject site. North of the solid black line indicates Glacial Till. South of the solid black line indicates River Deposits. The heavy broken 'red line' towards the site southeast is the Cardrona- Hawea Fault trace.

2.5 SITE SERVICES

Based on the QLDC GIS viewer, the property is serviced by the following reticulated services.

- Two service lanes, No. 52 & 53 are proposed either side of Sir Tim Wallis Drive, passing through Stage B3. The service lanes contain an 'active' 150mm diameter U-PVC foul/sewer pipe. However, provisions for electricity, gas, communications, and water supply are likely within.
- Seven (7) to-ground stormwater disposal devices surround the subject site along formed roadways.
- A principal water mains supply and trunk consisting of 100mm to 300mm diameter PE pipes are respectively located along or branching off Sir Tim Wallis Drive.
- The disposal of stormwater onsite via below-ground devices is likely required.

2.6 WATER BORES

Surrounding the site are the following water allocation consents:

- Well/Bore (F40/0004) RM21.384.01 is located 730m toward the northeast
- Well/Bore (F40/0019) is located 640m toward the northwest

3 SITE CONDITIONS

3.1 SITE DETAILS

The site comprises Lot 981 (LT 574876) & Lot 972 (LT 567411), located within Stage B3 of the Three Parks development, Wanaka.

The site is located on the outskirts of Wanaka, approximately 4km south of the township. Currently, the site is accessed via Sir Tim Wallis Drive or private access associated with Central Machine Hire and Nicolls Garden Group Wanaka.

Neighbouring properties towards the site's northwest are at various stages of construction and completion. The land toward the site's southeast is currently vacant pending future commercial and industrial development

The site is currently purposed for the stockpile of soils and aggregates.

A site location map is presented in Drawing 001.

3.2 SITE TOPOGRAPHY

The site occupying a rectangular area of 4.8ha, is located on broad, undulated, gently sloping topography. Spot heights across the site are between 318 – 320m ASL, which tend to fall towards the site's northeast. The geomorphic setting is consistent with the surrounding area.

The southeast site portion is screened from Sir Tim Wallis Drive by a 3 – 4m high landscape bund to mitigate against the transfer of noise and dust associated with the stockpiling of soils and aggregates. Some stockpiles remain; however, most are depleted as the site enters its next development phase.

3.3 EXISTING SITE DEVELOPMENT FEATURES

The site is presently vacant and contains no direct development features besides stockpiling of soils and aggregates, the installation of Sir Tim Wallis Drive and services lanes 52 & 53 as illustrated in Drawing 002.

3.4 SITE SURFACE WATER FEATURES

The site contains no surface water features. However, a review of aerial imagery (before the development of Three Parks) indicates the transfer of stormwater runoff in a general southwest to northeast direction. The assertion is based on 'green' lineation's conveying water during rainfall (ephemeral flow paths) to the growth benefit of the covering vegetation/grass.

This report does not provide a specific assessment of surface water features.

3.5 SLOPE INSTABILITY FEATURES

The site contains no observed slope instability features and is remote from steeper slopes where instability features can form.

3.6 NATURAL HAZARDS

3.6.1 QLDC & ORC GIS Hazard Mapping

Based on the ORC and QLDC GIS hazard mapper and database, the site area has the following characteristics listed in the table below:

Table 2: Provides a summary of listed hazards for the site

Data Source	Hazard		Note
QLDC	Liquefaction	Firm sediments and a derepressed groundwater regime underlie the site, indicative of a low to zero liquefaction potential.	Refer to Sections: 3.6.2 & 3.6.3
QLDC	Seismic	The site is within a seismic-prone area comprising Cardrona-Hawea Fault 500m to the site's southeast and the Alpine Fault 75km towards the site's west.	Refer to Section: 3.6.4
QLDC	Flooding	The site is not mapped within a known flood hazard.	n/a
QLDC & ORC	Alluvial Fans	The site is not within an area of known alluvial fan features.	n/a
ORC	Landslides	The site is not within an area of known landslide features.	n/a
QLDC	Environmental	The site is not mapped within a Building Hazard Act/HAIL site	n/a
QLDC	Other	The site is not mapped within 'other land' hazards.	n/a
ORC	Fan Landform	The site is not within an area of known fan landform features.	n/a
ORC	Ground Classification (Seismic Soil Class)	The seismic soil classification for the area is Class D.	Refer to Section 11.1

3.6.2 Tonkin & Taylor (T&T) Liquefaction Hazard Assessment for QLDC

In 2012, T&T published their Queenstown Lakes District Liquefaction Hazard Assessment Report, a summary usually attached to the LIM for any property. The report indicates that the site does not lie within mapped liquefaction zones. This is interpreted to mean that the site has a low to nil perceived risk for liquefaction.

In addition, good engineering practice promotes site investigation to satisfy the requirements of NZS3604 and determine 'Good Ground' is available and that no saturated fine-grained soils are prone to liquefaction.

3.6.3 ORC Liquefaction Hazard Zoning

The ORC hazard mapping now refers to the recent GNS report "Assessment of liquefaction hazards in the Queenstown Lakes, Central Otago, Clutha and Waitaki Districts, Otago (2019)".

According to this report, the project site is classified as Domain A. This classification suggests that the ground is predominantly underlain by bedrock or firm sediments, with a low to zero liquefaction potential.

3.6.4 Active Faults

The site comprises the following active fault features

- The Cardrona-Hawea Fault system is located 500m towards the site's southeast. The system is best described as 'possibly active' with a calculated rupture recurrence interval between 20,000 – 30,000yrs and a net slip rate of 0.05mm/yr. It is important to note that the seismic risk is considered low owing to the long recurrence intervals for ground-rupturing earthquakes. In addition, it should be noted that the placement of such fault boundaries is associated with a generous margin of error. No fault trace surface expression was visible in the immediate development area.
- The Alpine fault system is located 75km towards the site's northwest. The rupture recurrence interval of the Alpine Fault is between 350 - 400yrs. It is expected that a magnitude eight (8) event could occur within the next 50yrs.

It is important to note that the Wanaka region and surrounding area are at significant seismic risk from potentially strong ground shaking, likely associated with a rupture of the Alpine Fault, located along the West Coast of the South Island. The proximity of the described active faults should be considered during the detailed design phase. All new development, infrastructure, buildings and structures should be designed and constructed cognisant of the region's seismic risk in accordance with NZS1170.5.

4 SUBSURFACE CONDITIONS

4.1 FIELD INVESTIGATIONS

The investigations were constructed to assess the sub-surface conditions in the vicinity of the development and were undertaken by a suitably qualified engineering geologist from GCL.

The investigation locations were determined with construction and topographic plans provided by the client, a handheld GPS and the Queenstown Lakes District Council GIS viewer.

The sub-surface investigation consists of the following assessments.:

- 16x mechanically excavated test pits (TP101 – 116) were completed to a maximum depth of 4.0m to assess ground conditions across the subject site. The test pits were sited on roughly even centres to establish a sound geological model. Test pit excavation ceased once geology had been established, or the excavator limit was met. The test pits were twinned with Scala penetrometer tests and taken to refusal, expect TP110, which was a non-geotechnical test pit.
- TP101, TP110 & TP111 were completed in the vicinity of the preferred stormwater disposal area to determine soil infiltration potential for an onsite disposal device. The proposed stormwater disposal locations were pre-determined and provided by PPG.
- The approximate locations of the sub-surface investigations are shown in Drawing 002.
- Refer to Appendix A for a comprehensive account of soil arisings and Appendix B for photos of test pit excavations.

4.2 INVESTIGATION LOGGING

Soils recovered from the investigations have been logged and presented in Appendix A. Logging of the soil encountered has been undertaken according to NZ Geotechnical Society Guidelines for the Field Classification and Description of Soil and Rock for Engineering Purposes.

The Scala penetrometer results have been plotted on logs as presented in Appendix A. Determination of the soil density as tested by the Scalas has been undertaken utilising "NZ Geotechnical Society Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes", Table 2.8.

4.3 GROUND CONDITIONS

A summary of the sub-surface conditions identified in the investigations undertaken is presented below in order of depth from the ground surface. The sub-surface conditions have been extrapolated between the investigations undertaken. Whilst care has been taken to provide sufficient sub-surface information, following best practice for the purposes of building consent, no guarantee can be given on the validity of the inference made. As such, it should be appreciated that ground conditions may vary between the investigations undertaken.

4.3.1 Fill

Fill comprising sandy GRAVEL was identified in TP114 & 115. Given the quality of the prepared subgrade and soil compaction achieved within the test pits completed, it is likely that the material was strategically constructed to an engineering standard as part of Sir Tim, Wallis Drive Road alignment. Some structural fill would appear to extend the peripheries of the road as part of general ground profiling and levelling.

4.3.2 Uncontrolled Fill

Various forms of uncontrolled fill were identified from surface to shallow depth throughout the southern half of Stage B3 (soil and aggregate stockpiling area). In addition, 200mm of sandy GRAVEL was identified from the surface at TP116.

4.3.3 Topsoil

Topsoil was identified in the following forms.

- Rehabilitation/covering Topsoil was observed across the bulk of the development to a depth between 0.2 - 0.4m bgl.

- Native Topsoil was identified in TP105 – 106 & TP110 to around 0.3m bgl
- Buried Topsoil was identified in TP104 (only) from 0.9 – 1.1m depth bgl

4.3.4 Loess

Light brown silty SAND, interpreted as Loess, was identified at TP110 (only) between 0.3 – 0.5m depth bgl. Grass rootlets extend the soil profile.

4.3.5 Alluvium

Alluvium comprising light yellowish brown silty sandy GRAVEL was generally identified beneath the Topsoil mantle unless otherwise removed during previous subdivision ground profiling. In some soil assessments, only the lower portion of the Alluvium horizon was present, which generally comprises the more granular component of the soil makeup before transitioning into the underlying formation.

4.3.6 Glacial Deposits (Till) and River Deposits

Glacial Till and River Deposits are the predominant underlying material.

River Deposits were identified in all test pits except TP110, which was Glacial Till.

River Deposits are characterised by the following:

- SAND (medium to coarse), GRAVEL (subrounded to subangular in shape and fine to medium with lesser amounts of coarse), minor schist and quartz lithic cobbles and boulders up to 400mm in diameter,
- The material presents as light grey, dry, and loosely to tightly packed, often resulting in partial pit wall collapse or pit widening from beneath the alluvium horizon. In places, the material can be described as 'running gravels'
- Free-draining soil infiltration properties,
- Discrete sub-horizontal or gently dipping stratograded bedding structures throughout, generally defined by poorly graded coarse-size fraction layers

Glacial Till is best described as a light grey sandy GRAVEL with minor cobbles and boulders. Sand is fine to coarse-grained. Gravel is fine to coarse in size and subrounded to subangular in shape. Oversize comprising cobbles and boulders are subrounded to subangular and up to 300mm in diameter. Subtle sub-horizontal bedding structures are evident throughout. The material is generally dry to moist and tightly packed.

4.3.7 Soil Strength

The following protocol determines soil strength:

- The effort required to excavate a test pit and for the test pit to remain stable 'true' for the duration observed.
- The completion of Scala penetrometer tests.

The table below summarises soil strength/bearing capacity for the described soil units.

Table 3. Summary of soil strength parameters

Soil type	Commentary	SPT Blow Count per 100mm Rod Advancement	Inferred Soil Density
Fill	Tightly packed, pit wall exposure remains stable	14+	Dense
Uncontrolled Fill	n/a	n/a	n/a
Topsoil	Most rehabilitation/covering topsoil appeared firm	n/a	n/a
Alluvium	Loosely to tightly packed, blow count increases with depth, sensitive to moisture	6 - 14	Medium dense to dense
Loess	Loosely packed, sensitive to moisture	n/a	Loose to medium dense (inferred)
River Deposits	Loosely to tightly packed. Provides good bearing capacity when confined, however may destabilise when excavated or unconfined	8 - 29	Dense to very dense
Glacial Till	Consistent favourably bearing capacity from upper contact, soil strength generally increases with depth	n/a	Dense (inferred)

4.3.8 Groundwater

Groundwater was not encountered within any investigations undertaken to a depth of at least 4.0m bgl. Groundwater is susceptible to seasonal variation, and it should be noted that the investigations were undertaken in November 2022 (Spring/Summer).

Given the nature and topography of the site, it is unlikely that a coherent groundwater table would rise significantly to the extent that it would interfere with shallow foundations or stormwater disposal devices.

PART B: GEOTECHNICAL CONSIDERATIONS

5 GROUND MODEL

5.1 GENERAL

- We have developed a ground model for the site based on the investigations undertaken to date, including a desktop study, site mapping, and sub-surface tests. A summary of the ground model is provided as follows in the vicinity of the proposed development:
- The site is located within a vacant portion of mostly flat land between several commercial establishments and retail centres. The site dips very gently towards the northeast.
- The site is considered undeveloped, except for temporary soil and aggregate stockpiling and the installation of Sir Tim Wallis Drive through the sites central portion. A landscaping bund screens Sir Tim Wallis Drive from the material stockpiles to the south. The northwestern site half has been subject to ground profiling (minor to cut to fill earthworks) as part of the wider Three Parks Development. This site portion currently presents as rehabilitated and grassed.
- The site is underlain by generally competent ground conditions comprising River Deposits and Glacial Till typical of the area. When unconfined, River Deposits can destabilise, requiring a capping layer to increase soil strength/bearing capacity. Glacial Till, on the other hand provides consistently favourable bearing capacity. The site is typically mantled with rehabilitation/covering Topsoil, underlain by, or in part, an alluvium horizon, best described as a 'transitional' layer between the upper soils and the predominant underlying formation. The ground conditions identified are reasonably consistent with academic mapping and interpretation completed by others.
- The ground conditions are considered suitable for onsite to-ground stormwater disposal. River Deposits tend to provide more favourable soil infiltration properties owing to the absence of fines, underlying impermeable structures and intergranular void space.
- The site does not contain any prominent surface water features. However, based on a review of aerial photographs (before the development of Three Parks), northeast-trending drainage lineation can be interpreted from areas of intense grass growth, otherwise surrounded by arid conditions.
- The site contains depressed groundwater levels; no groundwater inflows were identified in the sub-surface investigations. The 'coherent' groundwater level is susceptible to seasonal variations. It is feasible that 'coherent' groundwater levels may rise over that measured following a period of prolonged rainfall and during the winter months but not to the extent that it would interfere with the proposed development foundations or stormwater disposal system.
- The site is located 500m northwest of a 'possible active fault', although the perceived risk of ground rupturing events is considered low to nil given the calculated recurrence interval of 20,000 – 30,000yrs. However, it is important to recognise that the site is generally located within a seismically active area. As such, structures should be designed and built accordingly to national and local standards.
- The ground model developed above has been utilised to consider the various geotechnical aspects of the proposed development, presented in the following sections of this report.

5.2 GEOTECHNICAL RISK

The ground model presented in this report is based on the investigations undertaken to date. It should be appreciated that there is an inherent risk with the formulation of a ground model. In particular, we note the following:

- Ground conditions can vary between investigations undertaken, and there is always some natural variability in ground conditions.
- Discrete sub-surface investigations may not identify small-scale ground irregularities, particularly those associated with human disturbance such as offal pits, drainage line backfills, and landscaping works.
- Ground strength varies with changes in water content, soil type, and ground loading. As such, it should be appreciated that weaker ground conditions may develop over that measured due to periods of wet weather and during the winter months.
- The potential geotechnical effects of climate change are not well defined for New Zealand. Effects may include changes in groundwater levels, soil saturation, and surface water characteristics, affecting the proposed development.

Given the potential risk profile provided above, we have adopted a conservative approach when considering the geotechnical aspects of the proposed development.

6 BUILDING PLATFORM DEVELOPMENT

6.1 GENERAL

The proposed development will require the formation of suitable building platforms on which a series of commercial buildings can be sited in a safe and stable manner. Plans provided to GCL to date do not indicate the earthworks involved with forming building platforms.

However, we anticipate the removal of the soil and aggregate stockpiles, followed by minor ground profiling (levelling of undulations and in-filing of topographic lows) to provide suitable gradients for the access roads and building platforms.

This is considered feasible and largely mimics earthworks undertaken for a series of building platforms constructed within adjacent Three Parks for various commercial and retail structures.

The following sections in this report provide recommendations on forming the building platform concerning site stability, foundation conditions, site earthworks, and stormwater management. The client should appreciate these recommendations before building platform development design commences.

7 BUILDING PLATFORM STABILITY

7.1 GENERAL

The proposed development is located on broad, gently undulating topography underlain by competent ground conditions and remote from steeper slopes and slopes prone to slope instability features.

The low overall slope angles and underlying competent ground conditions in the vicinity of the proposed development should provide safe and stable building platforms concerning slope stability conditions.

A safe and stable building platform is defined as having a low to negligible risk of failure over the lifetime of the development. It is assessed as a factor of safety where a quantitative slope stability assessment is undertaken. Given the negligible slope angles in the vicinity of the site, we consider that a qualitative assessment of slope stability (as provided above) is acceptable for defining risk for this site, and a more rigorous quantitative analysis is not required.

Minor ground profiling is required to provide suitable level building platforms within the existing topography as described in the previous report section. We consider that appropriate site development constraints are required to maintain safe and stable conditions. This is addressed later in this report.

8 BEARING CAPACITY

8.1 GENERAL

Bearing capacity is discussed in this report in terms of ultimate limit state design methods outlined in AS/NZS 1170. As such, per AS/NZS 1170, we have provided "ultimate" bearing capacity values and an appropriate "dependable" bearing capacity for foundation design. The dependable bearing capacity has been determined from a strength reduction factor of 0.5 (i.e., a factor of safety of 2), which is in general accordance with the requirements of AS/NZS 1170.

Our interpretation of the engineering description of the soil conditions and relative density and strength measurements based on the site-specific testing undertaken has determined the bearing capacity. The values presented consider natural variability of ground strength likely between investigations undertaken and potential strength reduction associated with saturated soil conditions.

It is also assumed that engineering fill will be placed to specification to provide an ultimate bearing capacity of 300kPa.

8.2 SHALLOW PAD/STRIP FOOTING AND SLAB FOUNDATION SOLUTION

The table below outlines design bearing capacities for a shallow pad/strip footing solution. The design capacities are based on a minimum foundation embedment depth of 450mm into the competent ground.

Table 4. Shallow Pad/Strip Footing Design Parameters

Load Case	Ultimate Bearing Capacity	Strength Reduction Factor	End Dependable Bearing Capacity
Ultimate limit state design	300kPa	0.5	150kPa

8.3 RIB-RAFT /WAFFLE SLAB SOLUTION

The table below outlines design bearing capacities for a rib-raft/waffle slab solution.

Table 5. Rib-raft/Waffle Slab Design Parameters

Load Case	Ultimate Bearing Capacity	Strength Reduction Factor	End Dependable Bearing Capacity
Ultimate limit state design	300kPa	0.5	150kPa

8.4 SHALLOW PILE FOUNDATION

The table below outlines design bearing capacities for a shallow pile foundation solution for lightweight timber structures and appurtenant structures.

Table 6: Shallow Pile Foundation Design Parameters

End Bearing Case			
Load Case	Ultimate Bearing Capacity	Strength Reduction Factor	End Dependable Bearing Capacity
Ultimate limit state design	300kPa	0.5	150kPa
Augured Pile Skin Friction (for non-expansive soil)			
Load Case	-	Strength Reduction Factor	Dependable Skin Friction
Ultimate limit state design	-	0.5	10kPa

The appointed project structural engineer will subject the embedment depth to formal engineering design. Soil Expansivity section of this report should be referred to with providing an appropriate embedment depth to mitigate expansive soil.

8.5 FOUNDATION SERVICE BRIDGING

We recommend that where a service line and associated backfilled trench are located within a 45° loading line taken from a load-bearing structure base, foundation bridging is required.

Service line trenching and backfilling should be per recommendations provided in the Earthworks Constraints section of the report.

The design bearing capacities for a bridging pile foundation solution can be taken from the above tables to the maximum depth of the investigations undertaken. Should deeper piles be required, specific investigations may be required as determined by a suitably qualified person. Skin friction should be ignored for the section of piles within the 45-degree zone of influence of the service line (projected from the pipe's invert to the ground surface).

The piles' clearance requirements and depths should be designed according to the council's construction clearance provisions.

8.6 RETAINING WALLS

Engineered retaining walls will be required onsite under the following circumstances:

- where the retention height is greater than 1.5m;
- where retaining wall supports any surcharged loads such as sloping ground and structure/traffic loads, and
- where retaining wall failure will affect the stability and integrity of adjacent structures and neighbouring properties.

The table below provides geotechnical parameters for the engineered retaining wall design as required:

Table 7: Retaining Wall Design Parameters

Cohesion (c')	Friction Angle (□')	Design c_u (Cohesive Soil)	Ultimate Bearing Capacity	Unit Weight (□)
0kPa	32°	50kPa	300kPa	18kN/m^3

All retaining walls should be constructed with appropriate toe drainage and backfilled to their full height with lightly compacted free-draining granular material or other appropriate drainage solution. Toe drainage should be discharged at a point that will not impact or influence the construction works onsite or be connected to the reticulated stormwater system.

As usual, any building foundations laterally located within a 45-degree envelope of influence arising from the base of a batter or retaining wall should be subject to a specific design that does not induce unacceptable stresses in such batters or retaining walls. Clause 3.1.2 (b) of NZS3604:2011 also places restrictions on the proximity of building foundations from unretained batters. Where foundations will lie on the lower side of such walls, care should be taken to ensure that the active wedge behind any associated excavation does not remove support to the passive wedge supporting those walls. As such, foundations should be no closer than 'the height of the adjacent retaining wall plus the depth of foundation below ground level.

9 GROUND SETTLEMENT

9.1 GENERAL

The proposed building platform is underlain by competent ground conditions. The competent ground conditions are considered to be at least normally consolidated and should accommodate low to moderate loads without inducing significant ground consolidation and associated differential ground settlement within Building Code limits (a maximum differential settlement ratio of 1 in 240).

As a prudent measure, however, ground loading constraints are recommended as follows:

- A maximum building uniform distributed load (UDL) of 12kPa, including live + dead loads (limits overall building loads).
- A maximum footing width/diameter of 1.0m (limits the extent of high point, pad and line loads.

- A maximum fill depth of 1.5m (limits the load provided by fill soil).

Should the proposed development exceed these constraints, we recommend that a specific settlement analysis be undertaken for the development and may require more extensive investigations than that undertaken to date.

10 SOIL EXPANSIVITY

10.1 GENERAL

The site soil is not considered susceptible to soil shrink/swell development associated with changes in soil moisture content. This is based on the logging of recovered soil samples. Our experience with the type of soils encountered onsite is considered to provide a suitable qualitative assessment of soil expansivity.

There is no specific engineered foundation design required to resist shrink/swell associated with non-expansive soil.

11 SEISMIC CONSIDERATIONS

11.1 SEISMIC SOIL CLASS

Site investigations in the vicinity of the building platform have identified medium dense to dense granular soils (River Deposits), which extend to a measured depth of at least 4.0m but likely at least 30m based on local borehole information. As such, we consider the site sub-soil Class D appropriate according to NZS1170.5.

11.2 EARTHQUAKES

The Queenstown Lakes region, as for most of New Zealand, has been identified as being prone to seismic activity. The region is at significant seismic risk from potentially strong ground shaking, likely associated with a rupture of the Alpine Fault, located along the West Coast of the South Island. There is a moderate probability that an earthquake with an expected magnitude of over eight will occur along the Alpine Fault within the next 50 years.

As such, an appropriate allowance for seismic loading should be made during the detailed design of the proposed building, foundations, retaining structures, and earthworks.

11.3 LIQUEFACTION

The building platform is not considered at risk from liquefaction due to the soil's granular makeup, the strength/density of the soil profile, and the depressed groundwater regime.

12 SITE DEVELOPMENT CONSTRAINTS

12.1 GENERAL

A formal earthworks plan has not been provided to date. However, we anticipate the removal of the soil and aggregate stockpiles, followed by minor ground profiling (levelling

of undulations and in-filing of topographic lows) to provide suitable gradients for the access roads and building platforms.

This is considered feasible and largely mimics earthworks undertaken for a series of building platforms constructed within adjacent Three Parks for various commercial and retail structures.

Following are general guidelines for site development earthworks that can be utilised for scoping work.

12.2 GENERAL EARTHWORKS DISCUSSION

The proposed site development works may require excavation and/or temporary batters before constructing formal retaining structures, building platforms, and access roads and driveways. There is the risk of collapse of soil batters during construction, especially if left unsupported for an extended period and or left exposed during a prolonged period of rainfall. Therefore, we recommend the following precautions:

- Cut faces should not be left unsupported for an extended period and may require additional protection with polythene sheeting during inclement weather.
- Where excavations are immediately adjacent to or situated on a property boundary, further precautions may be required to ensure stability through temporary buttressing. These works should be assessed and approved by a suitably qualified person.
- The contractor is expected to employ the appropriate plant and machinery to undertake the excavation and retaining wall construction.
- The contractor is responsible for ensuring that all necessary precautions are undertaken to protect exposed temporary batters.
- Appropriate silt and stormwater control measures should be employed.

The Topsoil layer is considered unsuitable for reuse as engineered fill. The site-won soil (Lower Alluvium Profile, River Deposits, and Glacial Till) is likely to provide a source of material for fill placement subject to its performance per NZS 4431:1989.

12.3 SITE PREPARATION

During the earthwork's operations, all Topsoil and organic matter, and other unsuitable materials should be removed from the construction areas per the recommendations of NZS 4431:1989. The subgrade should be inspected before fill being placed and or foundations being constructed to establish it has a suitable bearing capacity and is clear of unsuitable materials.

Appropriate shallow-graded sediment control measures should be installed during construction where rainwater and drainage runoff overexposed soils are likely. If slope gradients over 5% are proposed in soils, then the construction and lining of drainage channels are recommended, e.g., geotextile and suitably graded granular material, or similarly effective armouring.

Exposure to the elements should be limited for all soils and covering the soils with polythene sheeting will reduce degradation due to wind, rain, and surface runoff. Under no circumstances should water be allowed to pond or collect near or under a foundation or slab. This can be avoided with the shaping of the subgrade to prevent water ingress or ponding.

If fill is utilised as bearing for foundations, it should be placed and compacted per the recommendations of NZS 4431:1989 and certification provided to that effect.

The upper soils present at the site are prone to erosion, both by wind and water, and should be protected by hardfill capping or re-topsoiled/mulched and re-vegetated as soon as the finished batter or subgrade levels are achieved.

Where the building platform has been rutted by heavy machinery or softened due to ponded rainwater, the platform should be trimmed back to competent ground and reinstated with compacted hardfill to design subgrade level before the commencement of building construction.

12.4 EXCAVATIONS

Recommendations for temporary and permanent slope batters are provided in the table below. Slopes required to be steeper than those described below should be structurally retained or subject to specific geotechnical design.

All slopes should be periodically monitored during construction for signs of instability and excessive erosion, and where necessary, corrective measures should be implemented to the satisfaction of a Geotechnical Engineer or Engineering Geologist. Should construction and earthworks be undertaken during the winter period, the frequency of the inspections should increase, with site inspections being made after any significant weather event.

Seepages are common in excavations completed in hillside areas, and drainage measures, such as horizontal drains may be required if excessive groundwater seepages are encountered during excavation. The final design and location of all sub-soil drainage works should be confirmed during construction by a suitably qualified and experienced Geotechnical Engineer or Engineering Geologist.

Recommended temporary and permanent batter angles for cut slopes up to a maximum of 3.0m in wet and dry conditions are presented below. The batters provided should be adhered to where more than one soil type is present within the slope or defaulted to the shallower angle where appropriate.

Table 8: Batter angles for soil slopes

Material Type	Recommended Maximum Batter Angles for Temporary Cut Slopes Formed in Soils		Recommended Maximum batter Angles for Permanent Cut Slopes Formed in Dry (Drained) Slopes
	Wet Ground	Dry Ground	
Engineered Fill[1]	2H:1V	1H:1V	2H:1V (unretained, drained)
River Deposits	2.5H:1V	0.5H:1V	2.5H:1V or by assessment
Glacial Deposits	2.0H:1V	0.5H:1V	2.0H:1V or by assessment

[1] If constructed

Inspections of soil cuts will be required during construction to confirm the above recommendations. Based on the site observations, a reduction in batter angles from those provided above may be required. Conversely, if materials are performing, they may be steepened if site conditions and construction sequencing/programme are favourable.

12.5 ENGINEERED FILL SLOPES

As recommended in the table above, unretained engineered fill slopes should be formed at 2H:1V (or flatter), providing they are well-drained and compacted to the appropriate

specification based on NZS 4431:1989. If steeper grades are required, the fill will require geogrid reinforcement to form slopes up to 45° but subject to specific engineering design from a chartered professional engineer.

12.6 FOUNDATION PROVISIONS (NZS3604:2011)

Regarding NZS 3604, Section 3.1.2 (b), any foundation for a building erected at the top of a bank shall be 600mm behind the ground line, as shown in the figure below. The horizontal distance (H) from top to bottom shall not exceed 3m. The slope beyond the bank shall not exceed 10° degrees for a distance of 10m.

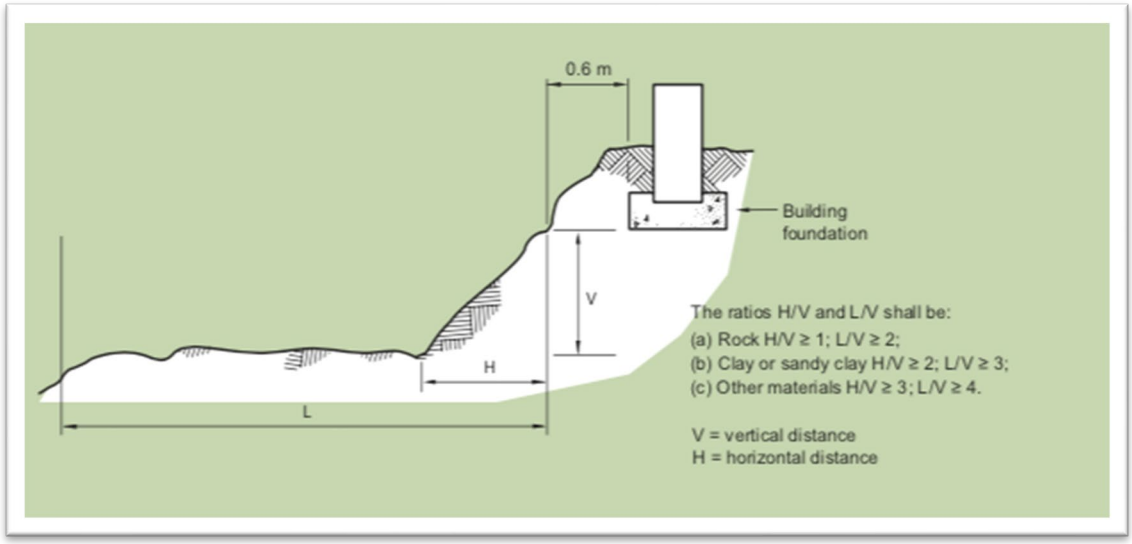

Figure 3, Regarding NZS 3604, Section 3.1.2 (c) fill, including hard fill, placed over undisturbed ground or certified fill, shall not exceed 600mm in depth above natural ground level, if within 3m of a foundation. Where this condition cannot be met, the fill shall be tested and certified to be of appropriate density/strength.

12.7 CONSTRICTION MONITORING AND CERTIFICATION

Any structural fill earthworks required for the development should be undertaken in general accordance with the council's Land Development Code of Practice (incorporating NZS 4404 and NZS 4431).

Of particular importance are the inspection and certification of the following:

- Subgrade inspection.
- Suitability of site won material for reuse and engineered fill.
- Performance of temporary cut batters.
- Foundation inspections.
- Hardfill >300mm depth or built as a slope >2H:1V.

12.8 SERVICES

We recommend that all underground services are backfilled with adequately compacted backfill to minimise significant trench consolidation and settlement risk.

Trench excavations should be shored or battered appropriately per the OSH/DOL Approved Code of Practice for Safety in Excavations and Shafts for Foundations (April 2000).

The contractor is expected to employ the appropriate plant and machinery to undertake the excavation and retaining wall construction.

12.9 UNSUITABLE MATERIAL

Recommendations for foundation design provided in the Bearing Capacity section of this report are based on foundations embedded within "good ground" according to NZS 3604:2011. To achieve "good ground", we recommend the following:

- A suitably qualified person should inspect all foundation excavations.
- Care should be taken to ensure that all unsuitable material such as the topsoil layer, weak ground, areas of non-engineered fill, and or hard spots are removed from the building platform before building construction.
- The undercut for the building footprint should extend for a horizontal distance equivalent to the undercut depth beyond the footprint. The undercut should be backfilled with engineered fill up to the required formation level unless specified otherwise by a suitably qualified person.

12.10 STORMWATER MANAGEMENT CONCERNING SLOPE STABILITY

A specific stormwater management assessment has not been undertaken as part of this report. However, we recommend that stormwater disposal should comply with the operative District/Regional Plans and the Building Code and, in particular, meet the following conditions:

- The disposal of stormwater should not provide a nuisance to neighbouring properties and public infrastructure.
- Stormwater should be managed in such a way as to avoid slope erosion, earthworks batters, retaining walls, building structures, and effluent disposal areas.
- Stormwater should be managed in such a way as to have no significant effect on overall slope stability conditions.
- Site development should be mindful of existing surface water features, including overland flow paths, and appropriate remedial measures should be provided where required.

PART C: ENVIRONMENTAL CONSIDERATIONS

13 STORMWATER MANAGEMENT

13.1 GENERAL

Stormwater disposal should comply with the operative District & Regional Plans, the Building Code, and recognised New Zealand standards and guidelines. In summary, this requires the following:

- Hydrogeological neutrality should be provided within receiving environments (such as overland flow paths, streams, and reticulated stormwater systems) with the addition of impervious surfaces. In addition, the disposal of stormwater should not provide a nuisance to neighbouring properties and public infrastructure.
- Stormwater should be managed in such a way as to avoid slope erosion, earthworks batters, retaining walls, building structures, and effluent disposal areas.
- Stormwater should be managed in such a way as to have no significant effect on overall slope stability conditions.
- Stormwater should be directed to a public reticulated stormwater system where possible.
- Site development should be mindful of existing surface water features, including overland flow paths, and appropriate remedial measures should be provided where required.

13.2 SOAKAGE TESTING METHODOLOGY AND TEST RESULTS

In order to determine the suitability for soils to accommodate onsite to-ground soakage, a single soakage test was completed at the following three sites: TP101, TP110 & TP111.

Table 9. Summary of soakage test results

Test Site	Width (m)	Length (m)	Depth (m)	Basal Area (m^2)	Volume (L)	Duration (minutes)	Test Completion (%)	Soakage Rate (mm/hr – Unfactored)
TP101	2.2	3.7	1.8	8.1	8,000	14	100	4,212
TP110	2.2	2.6	2.3	5.7	8,000	40	100	2,098
TP111	1.2	3.5	1.8	4.2	8,000	12	100	9,726

Soakage methodology is as follows:

- Potable water sourced from the local reticulated system was transferred to each testing location using an 8,000L water truck.
- Each test used approximately 8,000L of water discharged through a pumped 100mm diameter hose to ensure sufficiently rapid water ingress to replicate a storm event.
- The soakage rate was recorded against a measuring device over time until 95% of the applied dosage had infiltrated the subsoils.

A comprehensive record of the soakage tests undertaken is provided in Appendix C. Specific testing of any formed soakage device should be undertaken as part of the detailed design phase, given the natural variability in soakage expected.

13.3 SITE SOAKAGE CONDITIONS / COMMENTARY

- Three soakage assessments were completed at locations pre-determined by PPG.
- Investigations undertaken as part of this assessment demonstrate that the site is underlain by granular soils comprising sands, sandy gravels and gravelly sands with very few horizons of finer-grade material. In addition, the groundwater is depressed and may well be at least 20m below ground level.
- We confirmed a soil infiltration potential between 2,098 – 9,726mm/hr (unfactored) was achieved. Higher soakage rates were attributed to the free draining River Deposits in TP101 & TP111, and the lesser soakage rate (TP110) associated with Glacial Deposits. Soakage tests were undertaken between 1.8 – 2.3m bgl at approximately 319mRL elevation.
- Soil drainage characteristics appear more favourable towards the east (TP101 & 111) owing to the unstructured coarse river deposits makeup.
- We recommend adopting a 0.5 Factor of Safety (reduction of 2) to allow for possible silt ingress over time which may impact the performance and longevity of the stormwater disposal device.
- We consider a preliminary soakage rate for the given soil type can be adopted:
    - River Deposits1,000mm/hr (factored)
    - Glacial Deposits: 500mm/hr (factored)
- We recommend undertaking confirmation soakage testing during the detailed design stage should a permanent soakage solution be required for this location.
- The client's responsibility is to ensure that the design soakage rate is appropriate for the application.

The soakage test results, and soakage test locations are shown in the appendices and Drawing 002.

14 LIMITATIONS

14.1 GENERAL

Ground Consulting Ltd has undertaken this assessment according to the brief provided, based on the site and location as shown in Drawing 002. This report has been provided for the benefit of our client and for the authoritative council to rely on to process the consent for the specific project described herein. No liability is accepted by this firm or any of its

directors, servants or agents, in respect of its use by any other person, and any other person who relies upon the information contained herein does so entirely at their own risk.

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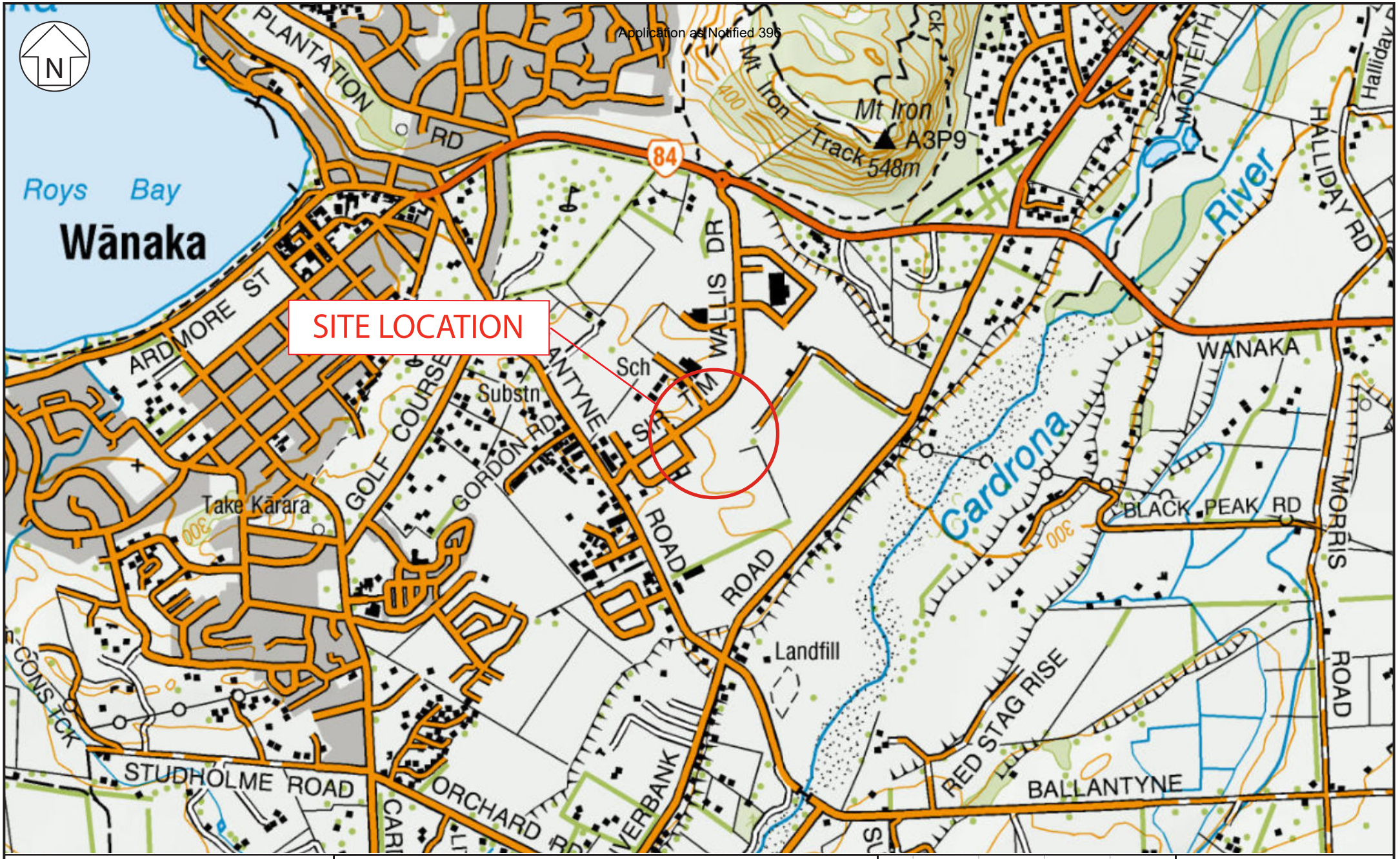
The sub-surface conditions have been extrapolated between the investigations undertaken. Whilst care has been taken to provide sufficient sub-surface information following best practice, no guarantee can be given on the validity of the inference made. It must be appreciated that actual conditions could vary from the assumed model.

14.2 FURTHER INVESTIGATIONS REQUIRED

This assessment has been undertaken for the proposed site development to date. Any structural changes, alterations and additions made to the proposed development should be checked by a suitably qualified person and may require further investigations and analysis.

Inspections will be required during construction to assess the LLA. This is to ensure ground conditions encountered are in accordance with the findings of this assessment. If ground conditions differ from those presented in this report, a suitably qualified person should seek advice on design and construction modifications.

DRAWINGS



GCL Ground Consulting Ltd

WILLOWRIDGE DEVELOPMENTS LTD

STAGE B3, THREE PARKS, WANAKA

SITE LOCATION PLAN

Rev	Date	Status	Drafted	Reviewer
A	17/11/2022	Issued	SF	GCL

File Ref. R8468-1A-DWG001.ai

Scale (A4) 1:20,000

0 80 400 800m

Project No. 8468

Report Ref. R8468-1A

DWG No. 001

GCL Ground Consulting Ltd

WILLOWRIDGE DEVELOPMENTS LTD

STAGE B3, THREE PARKS, WANAKA

SITE INVESTIGATION PLAN

Rev	Date	Status	Drafted	Reviewer
A	17/11/2022	Issued	SF	GCL

File Ref. R8468-1A-DWG002.ai

Scale (A4) NTS

0 0 0

Project No. 8468

Report Ref. R8468-1A

DWG No. 002

APPENDIX A: TEST PIT LOGS

Application as Notified 399

INVESTIGATION LOG

TP&SPT101

Report Ref R8468-1

Client	Coordinates (NZTM2000)	Elevation	Location Method (±2m)
Willowridge Developments Ltd			MAP

Location Stage B3, Three Parks Development, Wanaka

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Samples	Depth (m)	Legend	Vane Shear Strength (Vane No: Vane Size: 0mm; 50 100 150 200)	Values (kPa)	Scala Penetrometer (Blows / 100mm; 2 4 6 8 10 12 14 16 18)	Groundwater
TOPSOIL	TOPSOIL, with some silt and sand, with minor gravel, with trace cobbles; brown. Covering/Rehabilitation TS.			TS			5	
RIVER DEPOSITS	Sandy GRAVEL, with minor cobbles; light grey/grey. Medium dense to dense; dry; gravel, fine to coarse, subround to subangular; sand, medium to coarse; cobbles, subround to subangular, up to 100mm.						12 15 26 >>	
	Gravelly SAND, with minor cobbles; light grey/grey. Medium dense to dense; dry; sand, medium to coarse; gravel, fine to coarse, subround to subangular; cobbles, subround to subangular, up to 100mm.						34 >>	
	SAND & GRAVEL; light grey/grey; bedded. Medium dense; dry; sand, medium to coarse, gravel, fine, subround to subangular; discrete stratograde bedding. Minor pit wall collapse towards base.		1				42 >>	
	End of Investigation: 1.8m Geology Established		2					
			3					

Investigation Information

Depth	1.8m	**Logged By**	SF/TD	**Start Date**	01/11/22
Termination	ology Establis	**Checked By**	SF	**End Date**	02/11/22
Machine Used		**Test Pit Dimensions**		**Logged Date**	01/11/22

Investigation Type

- ☐ Hand Auger (50mm)
- ☑ Test Pit
- ☐ Scala Penetrometer

Water Legend

- Standing Water Level
- Out flow
- In flow

Log ref: R8468-1 TP&SPT112

Application as Notified 400

INVESTIGATION LOG

TP&SPT102

Report Ref R8468-1

Client	Coordinates (NZTM2000)	Elevation	Location Method (±2m)
Willowridge Developments Ltd			MAP

Location Stage B3, Three Parks Development, Wanaka

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Samples	Depth (m)	Legend
TOPSOIL	TOPSOIL, with some silt and sand, with minor gravel, with trace cobbles; brown. Covering/Rehabilitation TS.			TS
ALLUVIUM	GRAVEL, with some sand, with minor cobbles; light brown. Medium dense; dry; gravel, medium to coarse, subround to subangular; sand, medium to coarse; cobbles, rounded to subround, up to 80mm.			
	GRAVEL, with some boulders, with minor sand; greyish brown. Medium dense; dry; gravel, fine to coarse, subround to rounded; boulders, subround, up to 300mm; sand, medium to coarse.			
RIVER DEPOSITS	Sandy GRAVEL, with some cobbles, with trace boulders; dark grey. Medium dense; dry; gravel, coarse, subround to subangular, unweathered; sand, medium to coarse; cobbles, subround to subangular, up to 150mm; boulders, subround to rounded, up to 500mm, slightly weathered.		1	
	Cobbly GRAVEL, with minor sand; light brown grey. Medium dense; dry; gravel, medium to coarse, subround to subangular; cobbles, subround to subangular, up to 140mm; sand, fine to medium.			
	Sandy GRAVEL, with some cobbles, with trace boulders; dark grey with some light brown. Medium dense; dry; gravel, medium to coarse, subround to subangular, unweathered; sand, coarse; cobbles, subround to rounded, up to 140mm, unweathered; boulders, subround, up to 300mm, slightly weathered.		2	
	Cobbly GRAVEL, with some sand, with minor boulders; dark grey. Loose to medium dense; moist; gravel, fine to coarse, subround to rounded; cobbles, subround to subangular, up to 140mm; sand, medium to coarse; boulders, subround to rounded, up to 400mm; Slight moisture found at this level. Material loose, walls colappsing as TP was being excavated.			
	Cobbly GRAVEL, with some sand; dark grey light brown. Loose to very loose; moist; gravel, fine to coarse, subround to subangular, unweathered; cobbles, subround to rounded, up to 190mm, unweathered; sand, coarse; One boulder found in this range, size of 450mm long by 250mm wide. TP still collapsing while being excavated and walls falling away constantly.		3	
	End of Investigation: 3m Geology Established			

Vane Shear Strength
Vane No:
Vane Size: 0mm
50 100 150 200

Values (kPa)

Scala Penetrometer (Blows / 100mm)
2 4 6 8 10 12 14 16 18

4
8
14
21 >>
30 >>
29 >>
34 >>
18

Groundwater

Investigation Information

Depth	3m	**Logged By**	SF/TD	**Start Date**	01/11/22
Termination	ology Establis	**Checked By**	SF	**End Date**	02/11/22
Machine Used		**Test Pit Dimensions**		**Logged Date**	01/11/22

Investigation Type

- ☐ Hand Auger (50mm)
- ☑ Test Pit
- ☐ Scala Penetrometer

Water Legend

- Standing Water Level
- Out flow
- In flow

Log ref: R8468-1 TP&SPT102

Application as Notified 401

INVESTIGATION LOG

TP&SPT103

Report Ref R8468-1

Client	Coordinates (NZTM2000)	Elevation	Location Method (±2m)
Willowridge Developments Ltd			MAP

Location Stage B3, Three Parks Development, Wanaka

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Samples	Depth (m)	Legend	Vane Shear Strength (Vane No: Vane Size: 0mm)	Values (kPa)	Scala Penetrometer (Blows / 100mm)	Groundwater
TOPSOIL	TOPSOIL, with some silt and sand, with minor gravel, with trace cobbles; brown. Covering/Rehabilitation TS.			TS	50 100 150 200		4	
RIVER DEPOSITS	Gravelly SAND, with minor cobbles, with trace silt; light brown grey. Medium dense; dry; sand, medium to coarse; gravel, fine to coarse, subround to subangular; cobbles, subround to rounded, up to 120mm.						6 6 14 15	
	Sandy GRAVEL, with minor cobbles; dark grey. Medium dense to dense; dry; gravel, fine to coarse, subround to subangular; sand, medium to coarse; cobbles, subround to subangular, up to 80mm.		1				18 22 >> 27 >>	
	Sandy GRAVEL, with some cobbles, with trace boulders; light grey. Medium dense; dry; gravel, fine to coarse, subround to subangular, unweathered to slightly weathered; sand, medium to coarse; cobbles, subangular to subround, up to 100mm, slightly weathered; boulders, subround to rounded, up to 300mm, unweathered.		2					
	Sandy GRAVEL, with some cobbles and boulders; light brown. Very loose; dry; gravel, subround to rounded, unweathered; sand, medium to coarse; cobbles, subround to subangular, up to 150mm, slightly weathered, boulders, subround to rounded, up to 400mm, unweathered; TP walls have no integrity, ED due to continual collapse of walls.. **End of Investigation: 2.6m Collapse**		3					

Investigation Information

Depth	2.6m	**Logged By**	SF/TD	**Start Date**	01/11/22
Termination	ology Establis	**Checked By**	SF	**End Date**	02/11/22
Machine Used		**Test Pit Dimensions**		**Logged Date**	01/11/22

Investigation Type

- ☐ Hand Auger (50mm)
- ☑ Test Pit
- ☐ Scala Penetrometer

Water Legend

- Standing Water Level
- Out flow
- In flow

Log ref: R8468-1 TP&SPT103

Application as Notified 402

INVESTIGATION LOG

TP&SPT104

Report Ref R8468-1

Client	Coordinates (NZTM2000)	Elevation	Location Method (±2m)
Willowridge Developments Ltd			MAP

Location Stage B3, Three Parks Development, Wanaka

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Samples	Depth (m)	Legend	Vane Shear Strength (Vane No: Vane Size: 0mm)	Values (kPa)	Scala Penetrometer (Blows / 100mm)	Groundwater
UNCONTROLED FILL	UNCONTROLLED FILL: Sandy GRAVEL, with minor silt & topsoil with trace cobbles; grey brown. Medium dense; dry; gravel, medium to coarse, subround to rounded, unweathered; sand, medium to coarse; cobbles, subangular to subround, up to 80mm, unweathered. Topsoil contamination in upper 200mm						7, 16, 16, 22 >>, 24 >>, 30 >>, 16	
BURIED TOPSOIL	Brown light gey. Medium dense; moist; TP undertaken close to fill store, native topsoil found at 0.6 m Enough moisture in soil for it to be cohesive when squeezed.		1	TS T TS				
ALLUVIUM	Silty SAND, with some gravel, with minor cobbles; brown. Dense; moist; sand, fine to coarse; gravel, fine to coarse, subangular to subround, slightly weathered; cobbles, subangular to angular, up to 70mm, slightly weathered.							
RIVER DEPOSITS	Sandy GRAVEL, with some silt, with trace cobbles; dark brown orangy. Medium dense; moist; gravel, fine to coarse, subround to subangular; sand, fine to coarse; cobbles, subround to subangular, up to 60mm; very weathered upper 500mm.		2					
	Sandy GRAVEL, with minor silt, with trace boulders; brownish grey . Medium dense to dense; moist; gravel, fine to coarse, subangular to subround; sand, medium to coarse; boulders, subround, up to 300mm.							
	End of Investigation: 3m Geology Established		3					

Investigation Information

Depth	3m	**Logged By**	SF/TD	**Start Date**	01/11/22
Termination	Collapse	**Checked By**	SF	**End Date**	02/11/22
Machine Used		**Test Pit Dimensions**		**Logged Date**	01/11/22

Investigation Type

- ☐ Hand Auger (50mm)
- ☑ Test Pit
- ☐ Scala Penetrometer

Water Legend

- Standing Water Level
- Out flow
- In flow

Log ref: R8468-1 TP&SPT104

Application as Notified 403

INVESTIGATION LOG

TP&SPT105

Report Ref R8468-1

Client	Coordinates (NZTM2000)	Elevation	Location Method (±2m)
Willowridge Developments Ltd			MAP

Location Stage B3, Three Parks Development, Wanaka

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
TOPSOIL	TOPSOIL, with some silt and sand and gravel; brown. Loose; dry to moist.	
ALLUVIUM	Sandy GRAVEL, with some cobbles; light yellowish brown. Loose to medium dense; dry; gravel, fine to medium, subround to subangular; sand, medium to coarse; cobbles, subround to subangular, up to 90mm; bedding sloping gently to the East, angle of approx 10 degrees.	
RIVER DEPOSITS	Gravelly SAND; dark grey. Loose; dry to moist; sand, fine to coarse; gravel, medium to coarse, subround to subangular; bedding sloping to East at approx 10 degrees.	1
RIVER DEPOSITS	Gravelly SAND, with some cobbles, with trace boulders. Very loose to loose; dry; sand, fine to coarse; gravel, fine to coarse, subround to subangular; cobbles, subround to subangular, up to 150mm; boulders, subround to rounded, up to 300mm; Profile following trend of sloping to the East at approx 10 degrees ED due to collapse of pit walls.	2
	End of Investigation: 1.9m Collapse	3

Samples | Legend | Vane Shear Strength (Vane No: Vane Size: 0mm; 50 100 150 200) | Values (kPa) | Scala Penetrometer (Blows / 100mm; 2 4 6 8 10 12 14 16 18) | Groundwater

Scala Penetrometer values: 4, 10, 12, 16, 18, 17, 21 >>, 10

Investigation Information

Depth	1.9m	**Logged By**	SF/TD	**Start Date**	01/11/22
Termination	ology Establis	**Checked By**	SF	**End Date**	02/11/22
Machine Used		**Test Pit Dimensions**		**Logged Date**	01/11/22

Investigation Type

- ☐ Hand Auger (50mm)
- ☑ Test Pit
- ☐ Scala Penetrometer

Water Legend

- Standing Water Level
- Out flow
- In flow

Log ref: R8468-1 TP&SPT105

Application as Notified 404

INVESTIGATION LOG

TP&SPT106

Report Ref R8468-1

Client	Coordinates (NZTM2000)	Elevation	Location Method (±2m)
Willowridge Developments Ltd			MAP

Location Stage B3, Three Parks Development, Wanaka

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Samples	Depth (m)	Legend	Vane Shear Strength (Vane No: Vane Size: 0mm)	Values (kPa)	Scala Penetrometer (Blows / 100mm)	Groundwater
TOPSOIL	TOPSOIL, with some sand and gravel, with trace cobbles; brown. Loose; dry to moist.			TS T TS	50 100 150 200		6	
ALLUVIUM	Silty gravelly SAND, with some cobbles; yellowish brown. Very loose to loose; dry; sand, fine to coarse; gravel, fine to medium, subround to subangular; cobbles, subround to subangular, up to 100mm.						12 14 14 11 14	
RIVER DEPOSITS	Gravelly SAND, with minor boulders; grey and layers of light brown. Very loose to loose; dry; gravel, subangular to rounded; boulders, subround to rounded, up to 700mm; Pit termination at 1.8m. pit wall collapse from 0.6m bgl.		1 2 3				8 18 21 >> 28 >> 13	
	End of Investigation: 1.8m Collapse							

Investigation Information

Depth	1.8m	**Logged By**	SF/TD	**Start Date**	01/11/22
Termination	Collapse	**Checked By**	SF	**End Date**	02/11/22
Machine Used		**Test Pit Dimensions**		**Logged Date**	01/11/22

Investigation Type

- ☐ Hand Auger (50mm)
- ☑ Test Pit
- ☐ Scala Penetrometer

Water Legend

- Standing Water Level
- Out flow
- In flow

Log ref: R8468-1 TP&SPT106

Application as Notified 405

INVESTIGATION LOG

TP&SPT107

GCL Ground Consulting Ltd

Report Ref R8468-1

Client	Coordinates (NZTM2000)	Elevation	Location Method (±2m)
Willowridge Developments Ltd			MAP

Location Stage B3, Three Parks Development, Wanaka

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
UNCONTROLLED FILL	UNCONTROLLED FILL: GRAVEL; brown / grey. Gravel, medium to coarse, (40 - 60mm Drainage Media)	
RIVER DEPOSITS	SAND & GRAVEL, with minor cobbles, with trace boulders; light brownish grey tending grey; bedded. Medium dense; dry; sand, medium to coarse, gravel, fine to coarse, subround to subangular; cobbles, subround to subangular, up to 150mm; boulders, subround to subangular, up to 250mm; stratograde bedding, pit walls collapse over time.	
RIVER DEPOSITS	SAND & GRAVEL; light grey. Loose to medium dense; dry; sand, medium to coarse, gravel, fine to coarse, subround to subangular; stratograde structures and cross bedding, more gravelly towards the south, some pit wall collapse, lack of binding fines (running gravels).	1, 2, 3
	End of Investigation: 2.5m Geology Established	

Samples | Legend | Vane Shear Strength (Vane No: Vane Size: 0mm; 50 100 150 200) | Values (kPa) | Scala Penetrometer (Blows / 100mm; 2 4 6 8 10 12 14 16 18) | Groundwater

Scala Penetrometer (Blows / 100mm)
10
20
20
14
10
19
12
10
9
9
13
18
24 >>
29 >>

Investigation Information

Depth	2.5m	**Logged By**	SF/TD	**Start Date**	01/11/22
Termination	Collapse	**Checked By**	SF	**End Date**	02/11/22
Machine Used		**Test Pit Dimensions**		**Logged Date**	01/11/22

Investigation Type

- ☐ Hand Auger (50mm)
- ☑ Test Pit
- ☐ Scala Penetrometer

Water Legend

- Standing Water Level
- Out flow
- In flow

Log ref: R8468-1 TP&SPT107

Application as Notified 406

INVESTIGATION LOG

TP&SPT108

Report Ref R8468-1

Client	Coordinates (NZTM2000)	Elevation	Location Method (±2m)
Willowridge Developments Ltd			MAP

Location Stage B3, Three Parks Development, Wanaka

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Samples	Depth (m)	Legend
UNCONTROLLED FILL	UNCONTROLLED FILL: Gavel (Pit Run)			
ALLUVIUM	Silty SAND; brown. Loose to medium dense; dry to moist; sand, fine to coarse.			
RIVER DEPOSITS	SAND & GRAVEL; light grey. Loose to medium dense; dry; poorly graded; sand, medium to coarse, gravel, fine to medium, subround to subangular; Running gravels, minor pit wall collapse.		1	
RIVER DEPOSITS	SAND & GRAVEL, with minor cobbles, with trace boulders; light grey. Medium dense; dry; sand, medium to coarse, gravel, fine to coarse, subround to subangular; cobbles, subround to subangular, up to 150mm; boulders, subround to subangular, up to 300mm; reverse stratograding between in upper 500mm.		2	
RIVER DEPOSITS	Sandy GRAVEL, with minor cobbles; light grey. Medium dense; gravel, fine to medium, subround to subangular; sand, medium to coarse; cobbles, subround to subangular.			
	End of Investigation: 3m Geology Established		3	

Vane Shear Strength
Vane No:
Vane Size: 0mm
50 100 150 200

Values (kPa)

Scala Penetrometer (Blows / 100mm)
2 4 6 8 10 12 14 16 18

5 9 6 8 9 8 7 8 10 13 14 18 22 >> 28 >>

Groundwater

Investigation Information

Depth	3m	**Logged By**	SF/TD	**Start Date**	01/11/22
Termination	ology Establis	**Checked By**	SF	**End Date**	02/11/22
Machine Used		**Test Pit Dimensions**		**Logged Date**	01/11/22

Investigation Type

- ☐ Hand Auger (50mm)
- ☑ Test Pit
- ☐ Scala Penetrometer

Water Legend

- Standing Water Level
- Out flow
- In flow

Log ref: R8468-1 TP&SPT108

Application as Notified 407

INVESTIGATION LOG

TP&SPT109

Report Ref R8468-1

Client	Coordinates (NZTM2000)	Elevation	Location Method (±2m)
Willowridge Developments Ltd			MAP

Location Stage B3, Three Parks Development, Wanaka

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Samples	Depth (m)	Legend
ALLUVIUM	Silty sandy GRAVEL; brown. Loose to medium dense; dry to moist; sand, fine to coarse.			
RIVER DEPOSITS	Sandy GRAVEL, with minor cobbles, with trace boulders; light grey. Medium dense; dry; poorly graded; gravel, fine to medium, subround to subangular; sand, fine to coarse; cobbles, subround to subangular, up to 100mm; boulders, subround to subangular, up to 400mm; two cobble/boulder concentrations mid profile, gently dipping towards the north.		1 2	
	Sandy GRAVEL; light grey. Medium dense to dense; dry; gravel, fine to coarse, subround to subangular; sand, medium to coarse.		3	
	End of Investigation: 3m Geology Established			

Vane Shear Strength
Vane No:
Vane Size: 0mm
50 100 150 200

Values (kPa)

Scala Penetrometer (Blows / 100mm)
2 4 6 8 10 12 14 16 18

7
12
9
5
4
1
9
13
6
6
13
15
20
21 >>
24 >>

Groundwater

Investigation Information

Depth	3m	**Logged By**	SF/TD	**Start Date**	01/11/22
Termination	ology Establis	**Checked By**	SF	**End Date**	02/11/22
Machine Used		**Test Pit Dimensions**		**Logged Date**	01/11/22

Investigation Type

- ☐ Hand Auger (50mm)
- ☑ Test Pit
- ☐ Scala Penetrometer

Water Legend

- Standing Water Level
- Out flow
- In flow

Log ref: R8468-1 TP&SPT109

Application as Notified 408

INVESTIGATION LOG

TP&SPT111

Report Ref R8468-1

Client	Coordinates (NZTM2000)	Elevation	Location Method (±2m)
Willowridge Developments Ltd			MAP

Location Stage B3, Three Parks Development, Wanaka

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Samples	Depth (m)	Legend	Vane Shear Strength (Vane No: Vane Size: 0mm; 50 100 150 200)	Values (kPa)	Scala Penetrometer (Blows / 100mm; 2 4 6 8 10 12 14 16 18)	Groundwater
TOPSOIL	TOPSOIL, with some silt and sand, with minor gravel, with trace cobbles; brown. Covering/Rehabilitation TS.			TS			11	
ALLUVIUM	SAND, with some silt and gravel; light brown. Medium dense; dry to moist; sand, fine to coarse; gravel, fine to medium, subround to subangular; lower portion of the Alluvium horizon .						33 >>	
RIVER DEPOSITS	GRAVEL, with some sand, with minor cobbles and boulders; light grey; bedded. Medium dense; dry; gravel, fine to medium, subround to subangular; sand, medium to coarse; cobbles, subround to subangular, up to 100mm, boulders, subround to subangular, up to 300mm; cross bedding and stratograding throughout, structures dipping 30 degrees towards the south; absence of binding fines - minor pit wall collapse.		1					
	End of Investigation: 1.8m Geology Established		2					
			3					

Investigation Information

Depth	1.8m	**Logged By**	SF/TD	**Start Date**	01/11/22
Termination	ology Establis	**Checked By**	SF	**End Date**	02/11/22
Machine Used		**Test Pit Dimensions**		**Logged Date**	01/11/22

Investigation Type

- ☐ Hand Auger (50mm)
- ☑ Test Pit
- ☐ Scala Penetrometer

Water Legend

- Standing Water Level
- Out flow
- In flow

Log ref: R8468-1 TP&SPT111

Application as Notified 409

INVESTIGATION LOG

TP&SPT112

Report Ref R8468-1

Client	Coordinates (NZTM2000)	Elevation	Location Method (±2m)
Willowridge Developments Ltd			MAP

Location Stage B3, Three Parks Development, Wanaka

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Samples	Depth (m)	Legend	Vane Shear Strength (Vane No: / Vane Size: 0mm)	Values (kPa)	Scala Penetrometer (Blows / 100mm)	Groundwater
TOPSOIL	TOPSOIL, with some silt and sand, with minor gravel, with trace cobbles; brown. Covering/Rehabilitation TS.			TS T	50 100 150 200		2 4 6 8 10 12 14 16 18	
RIVER DEPOSITS	Sandy GRAVEL; light grey. Medium dense to dense; dry to moist; gravel, fine to medium, subround to subangular; sand, medium to coarse.						10	
	Sandy GRAVEL, with trace cobbles; light grey; bedded. Medium dense to dense; dry; gravel, medium to coarse, subround to subangular; sand, medium to coarse; cobbles, subround to subangular, up to 100mm; cross bedding and stratograding throughout, structures dipping 30 degrees towards the south; absence of binding fines - minor pit wall collapse.		1				12	
	GRAVEL, with some sand, with minor cobbles and boulders; light grey; bedded. Medium dense to dense; dry to moist; gravel, fine to coarse, subround to subangular; sand, medium to coarse; cobbles, subround to subangular, up to 100mm, boulders, subround to subangular, up to 300mm; discontinuous stratograde structures dipping 15 - 20 towards the SE at 2.0m bgl. lack of binding fines - minor pit wall collapse.		2				15	
	End of Investigation: 2.5m Geology Established		3					

Investigation Information

Depth	2.5m	**Logged By**	SF/TD	**Start Date**	01/11/22
Termination	ology Establis	**Checked By**	SF	**End Date**	02/11/22
Machine Used		**Test Pit Dimensions**		**Logged Date**	01/11/22

Investigation Type

- ☐ Hand Auger (50mm)
- ☑ Test Pit
- ☐ Scala Penetrometer

Water Legend

- Standing Water Level
- Out flow
- In flow

Log ref: R8468-1 TP&SPT112