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APPENDIX F

Civil Design Report, BECA (2020)

Ryman Healthcare Proposed Comprehensive Care
Civil Design Report
Kohimarama

Prepared for Ryman Healthcare Ltd
Prepared by Beca Limited

14 February 2020

Creative people together transforming our world

Revision History

Revision Nº	Prepared By	Description	Date
C	**Conor O'Boyle**	Issued for Resource Consent	14.02.20

Document Acceptance

Action	Name	Signed	Date
Prepared by	**Conor O'Boyle**		
Reviewed by	**Ron Melton**		
Approved by	**Blaise Cummins**		
on behalf of	Beca Limited		

Contents

Appendices

1 Introduction

Ryman Healthcare Ltd (Ryman) is seeking resource consent to construct and operate a comprehensive care retirement village (Proposed Village) on a 3.12 ha site at 223 Kohimarama Road and 7 John Rymer Place in Kohimarama, Auckland (Site).

This document details the proposed civil engineering works, assessment of effects and associated mitigation measures for the construction and operation of the Proposed Village. Preliminary design drawings for resource consent purposes have been prepared for earthworks, stormwater, water supply, wastewater and utilities. This report sets out the design basis behind those drawings and describes assessments that were carried out to:

- Demonstrate how stormwater quality and quantity is to be managed including consideration of potential flood risk effects both within and downstream of the Site;
- Demonstrate that the Site can be serviced, taking into consideration the capacity of the local network and requirements of local authorities and utility companies; and
- Demonstrate how erosion and sediment control requirements can be met for the expected earthworks design.

2 Site description

The proposed retirement village development is to be located at 223 Kohimarama Road and 7 John Rymer Place in Kohimarama, Auckland.

The development land comprises of two parcels; a principal block of 3.12 ha at 223 Kohimarama Rd (Lot 1 DP 332284) and a small parcel of 451 m^2 at 7 John Rymer Pl (Lot 51 DP 163242). Refer to **Figure 1** for site location. This area includes the land parcel detailed in **Table 1**:

Figure 1- Site Location

Table 1 - Land Parcels

Address	Legal Description	Area (m^2)	Title Reference
223 Kohimarama Road, Kohimarama, Auckland	Lot 1 Deposited Plan 332284	30,770 m^2	6706771
7 John Rymer Place, Kohimarama, Auckland	Lot 51 Deposited Plan 163242	451 m^2	5037290

In the Auckland Unitary Plan (AUP) the land parcels are located all within the mixed housing urban zone overlay. There is no Stormwater Management Area: Flow (SMAF) overlay for the site.

The proposed development has the following retirement village structure:

- A single multi-storey apartment building B01 with basement
- A podium covering the footprint of apartment building B02 to B06, with bowling green and shared basement carpark

These buildings will cater for:

- 93 assisted living suites
- 80 intensive care
- 123 apartments (1 bed to 3 bed)

2.1 Existing Site

The Site is located on an elongated wedge of land that is widest along Kohimarama Road and narrows to a width of 24m at the western end. It has a long northern boundary with Selwyn College, is boarded to the east by Kohimarama Road and houses accessed from Kohimarama Road, to the south by the existing residential development accessed from John Rymer Place and to the west by vacant land. Current access is from John Rymer Place through the undeveloped lot at 7 John Rymer Place.

The Site has a total area of approximately 31,221 m^2 (3.1221 ha). There are heavily vegetated areas in the east, middle and west of the Site while the rest of the Site is open covered grass. A low (less that 1m high) timber pole wall along a section of the northern boundary retains a paved area in the adjacent school. Retaining walls in adjacent properties support excavated slopes along parts of the southern boundary. The walls are 2m high and appear to be mainly timber pole-type. A Site topographic survey is enclosed as **Appendix A**.

A level playing field was previously formed in the eastern area of Lot 1. A gully extends northwards for approximately 40m from the northern corner of the field. The contours on Auckland Council GeoMaps indicate that the gradients of the western and eastern side slope of the gully are approximately 1v to 3h and 1v to 2.5h, respectively. The longitudinal grade of the gully is 1v to 3h. The gully is heavily vegetated with small trees and scrub.

The properties adjacent to the south-eastern boundary of Lot 1 have been developed with residential houses. The ground surface slopes downward towards the west at gradients between approximately 1v to 3.5h and 1v to 2.5h. There is a depression point near the south-eastern corner of Site, immediately north of 17 and 19 John Rymer Place. An existing stormwater inlet structure has been constructed in the invert of the depression.

The slope below the lower playing field is generally covered by grass. The gradient of the slope varies between approximately 1v to 6h and 1v to 2.5h.

The slope above and to the north- west of the lower playing field appears to be a cut batter. The slope is generally grass covered, except the area above the western corner of the field where there are several medium sized trees and scrub. The gradient of the slope is relatively uniform at approximately 1v to 4h, except above the western slope which is also locally steeper above the northern corner of the field.

Figures 2 and 3 below show the site topography and modelled overland flow paths from the Auckland Council GIS.

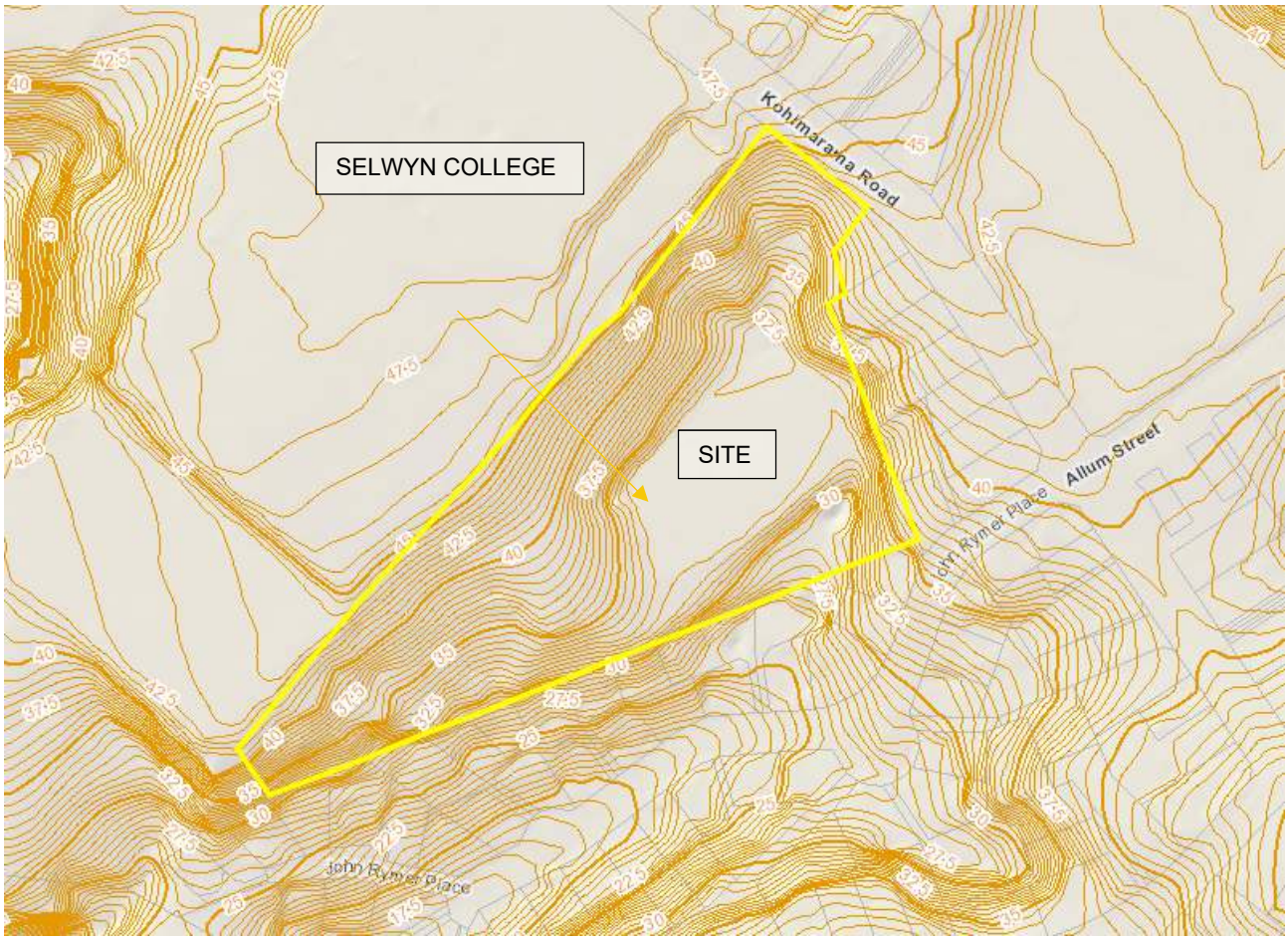


Figure 2- Site Landcover and Topography

Ryman has commissioned Freshwaters Solutions Environmental Consultants to assess the conditions of the existing gully and stream on the site. The existing open drain along the eastern boundary had been classed to be intermittent stream and is proposed to be reinstated to AUP standards.

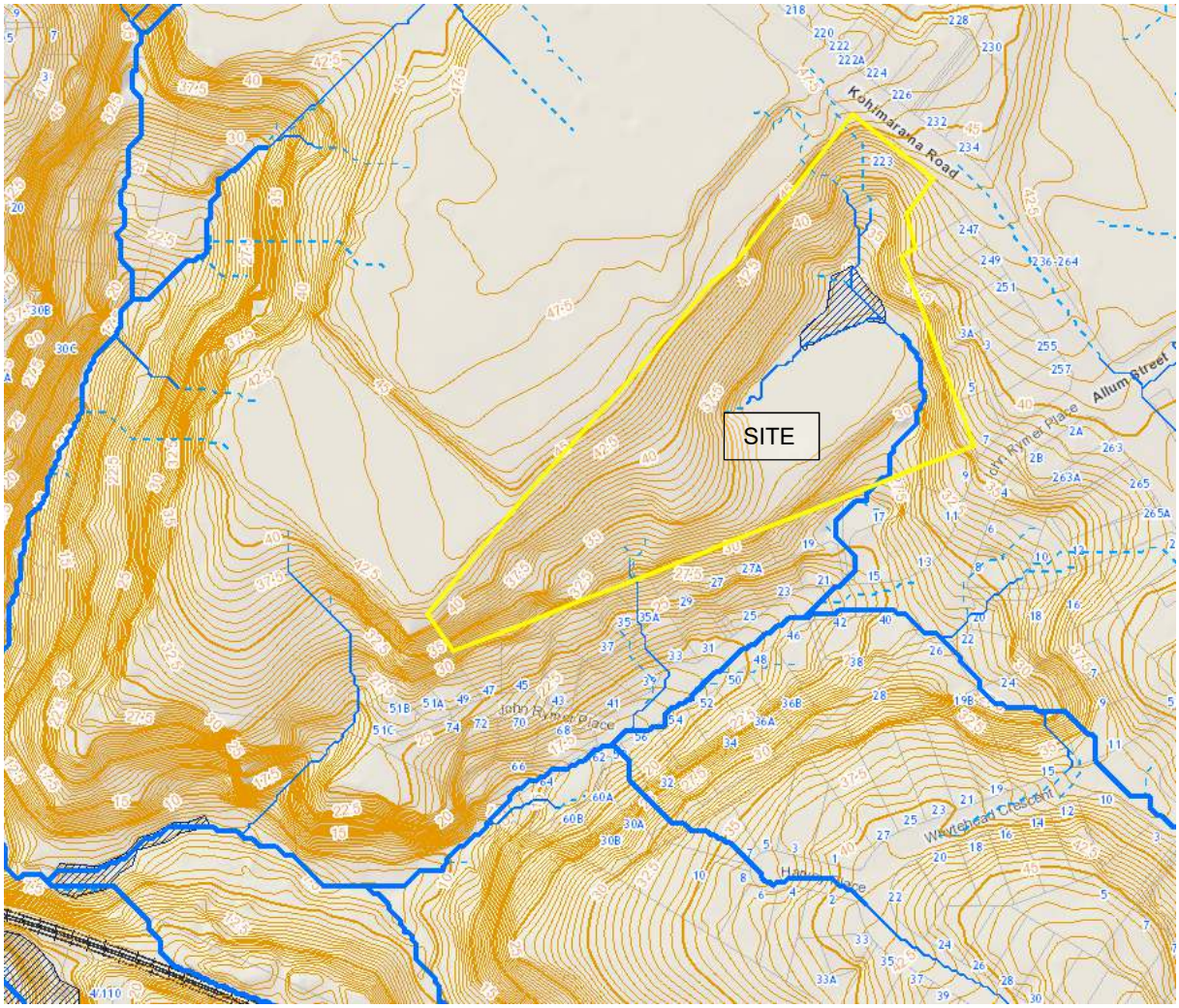


Figure 3 – Modelled overland flowpaths and streams (Auckland Council GIS viewer)

The existing Site services are detailed in **Beca Drawing 044-RCT_401_C0-004**.

3 Proposed Village

The Proposed Village comprises:

- A multi-storey Village Centre building, B01, with basement carpark
- Buildings B02 to B06 set on a podium, with bowling green on top and shared basement carpark below

The main entry/exit to the Site will be from John Rymer Place while the connection to Kohimarama Road will be a left turn in/out only.

The total proposed impervious area is estimated at 16,573m^2, 12,428m^2 of which is buildings. The overall impervious coverage is approximately 53% of the total site area, with maximum impervious area being less than the 60% provided for in the Residential – Mixed Housing Urban Zone.

The Landscape Masterplan showing the Site layout is shown in **Figure 4**.

Figure 4 – Landscape Masterplan (Design Square Landscape Architects)

4 Water Supply

4.1 General

Ryman are experienced operators of comprehensive care retirement villages and have collected their own information on occupancy rates, water demands and sewage discharges for this type of retirement village. This information, rather than the more generic Watercare guidelines, has been used in developing water demands and sewage discharge flows for the Proposed Village. Watercare and Auckland Council have accepted this approach in relation to other recent Ryman resource consent applications for comprehensive care retirement villages in the Auckland area.

The building data rates as provided by Ryman for the Proposed Village are summarised in **Table 2.**

Table 2 – Number of units

Unit type	Number of Units
Assisted Living Suites	75
Care Rooms	98
Apartments (1 bedroom)	12
Apartments (2-3 bedroom)	111
Total	**296**

Ryman advises that the average occupancy rate of its similar Villages is 1.3 residents per unit across the village, therefore it is estimated that the total number of residents will be 385.

4.2 Existing Water Network

Auckland Council Geomaps (GIS) information shows:

- A 100mm PE (polyethylene) line along the southern side of John Rymer Place
- A 50mm PE line along the northern side of John Rymer Place with 20mm stubs
- A 100mm CI (cast iron) line along the western side of Kohimarama Road
- A 225mm PVC (cast iron) and a 250mm diameter AC (asbestos cement) lines along the eastern side of Kohimarama Road

These existing lines are shown on **Beca Drawing 044-RCT_401_C0-004**.

4.3 Proposed water network

It is proposed to provide an internal water supply network as shown on **Beca Drawing 044-RCT_401_C0-031**. This network will connect to the existing 225mm PVC water line on Kohimarama Road. A secondary connection into the existing 100mm PE line on the southern side of John Rymer Place is proposed.

To provide the required fire water flows a DN 180 PE diameter internal network will be required, with connections to individual buildings sized according to the sprinkler demands within each building.

4.4 Water Demand

4.4.1 Residential Demand Requirements

Domestic water requirements are 200 litres / resident / day based on information Ryman has collected on water demand for its comprehensive care retirement villages. This covers all core functions such as kitchens, common rooms and staff usage. Based on 385 residents, it is estimated that the total daily water demand for the Village will be 77,000 litres.

The average site demand is estimated to be 0.89 litre/second. Watercare guidelines would require a peaking factor of 5 for a residential demand of this size. Comprehensive care retirement villages have a more even demand graph, with peak demand periods later in the morning and earlier in the evening, than that of typical residential demands. For on-site pipeline design a peaking factor of 3 will be applied rather than the Watercare value of 5. This is not critical for design of the connection to Watercare services as fire demands will dictate requirements for the connection. Therefore it is estimated that the peak water demand will be 2.67 l/s.

4.4.2 Fire Fighting Requirements

Firefighting water supply requirements have been determined in accordance with SNZ PAS 4509:2008[1]. Buildings in the Proposed Village will be sprinklered. Fire water requirements will therefore be for hydrant flows and sprinkler flows. With sprinklered buildings the network will need to meet water supply classification FW2. The reticulated water supply will need to provide 12.5 L/s from a hydrant within 135 metres of any building, and an additional 12.5 L/s from a second hydrant within 270m of any building.

The buildings will be mainly “Extra Light Hazard” classifications, with some sections being “Ordinary Hazard” classification in accordance with SNZ PAS 4509:2008. A flow of 25 L/s is expected to meet sprinkler flow requirements. This will be confirmed during the detailed design phase for fire services.

The total fire water requirement is therefore expected to be 50 L/s. Adding 60% of peak domestic demands to this would give a total demand of approximately 53 L/s. The minimum head required for this flow is 10m (100kPa). This is sufficient for the requirements detailed in SNZ PAS 4509:2008.

Hydrant testing has been undertaken for the Site and is attached in **Appendix B**. The hydrant test results show sufficient residual head at required flows on Kohimarama Road, with a second connection to the Site being provided from John Rymer Place as described above.

Boosting of sprinkler flows may be required within the buildings. Watercare had advised during early engagements that whilst there is sufficient capacity in the existing water reticulation, usage of booster pump to service the upper levels of the building is recommended. If required, this will be addressed at detailed design.

4.5 Conclusion

The total potable and fire demand for the building is estimated to be 53l/s. The hydrant tests undertaken in the surround watermain have suggested that there is sufficient capacity and pressure within the water network to accommodate the proposed demand, however the us of booster pump to service the upper levels of the building is recommended.

[1] Standards New Zealand Publicly Available Specification: New Zealand Fire Service Firefighting Water Supplies Code of Practice

5 Wastewater

5.1 General

The resident population basis is as set out for water supply in Ryman are experienced operators of comprehensive care retirement villages and have collected their own information on occupancy rates, water demands and sewage discharges for this type of retirement village. This information, rather than the more generic Watercare guidelines, has been used in developing water demands and sewage discharge flows for the Proposed Village. Watercare and Auckland Council have accepted this approach in relation to other recent Ryman resource consent applications for comprehensive care retirement villages in the Auckland area.

The building data rates as provided by Ryman for the Proposed Village are summarised in Table 2.

Auckland Council GIS information shows the following sewer line that could be accessed by the Proposed Village:

- A 150mm diameter public gravity sanitary sewer line (clay type) that runs along the back of existing residential lots on Kohimarama Road and continues westward along the frontage of John Rymer Place into an existing pump station (GIS reference: 961420) located on 64 John Rymer Place. The sewer is then pumped back into main sewer line along Kohimarama Road into an existing wastewater manhole (GIS reference: 529018) located at intersection of Kohimarama Road and Whytehead Crescent.
- A 150mm diameter public gravity sanitary sewer line (Asbestos Cement) that runs along Allum Street towards a pumping station on Baddeley Avenue (GIS reference : NS6726). The sewer is pumped intp the 2100mm diameter transmission sewer which crosses Southern Cross Road.
- A 150mm diameter public gravity sanitary sewer line (clay type) that runs along Kohimarama Road to the north of the site and flows down Southern Cross Road, which also leads to the pumping station on Baddeley Avenue (GIS reference : NS6726).

The existing sewer is shown on **Beca Drawing 044-RCT_401_C0-004**.

5.2 Sewer Loading

Domestic sewage flows are 160 litres / resident / day based on information Ryman has collected on flows for its comprehensive care retirement villages. This includes for all core functions such as kitchens, common rooms and staff usage.

Based on the estimated total number of residents of 385, the average daily wastewater discharge is estimated to be 61,600 litres. The dry weather flow (ADWF) is estimated to be 0.71 litre/second. Watercare guidelines require a peaking factor of 6.7 for residential flows. Comprehensive care retirement villages have a more even sewage discharge profile with peak demand periods later in the morning and earlier in the evening than for typical residential areas. For on-site pipeline design a peaking factor of 3 will be applied.

A low-pressure sewer (LPS) system for the Site will be implemented to accommodate these flows. An LPS has been proposed for this Site in order to minimise the depth of trenches required during construction and minimise pipe diameters. That together with the fact that a pump station would be required to lift sewage collected in a Site wide gravity system up to a relatively shallow public sewer adjacent the site makes on LPS system a better option.

5.3 Proposed Wastewater Network

The proposed internal sewer network is shown on **Beca Drawings 044-RCT_401_C0-031.**

Connecting into the existing 150mm diameter pipes along the southern boundary described in section 5.2 would be the most efficient option . However, Watercare advised during early consultation that this network is at capacity.

Watercare recommended that the sewer discharge from the Proposed Village be pumped into the adjacent local network at either Southern Cross Rd or 136 Allum St, with Watercare's preference being the latter option as there are fewer concerns in the downstream network. Watercare also raised the importance of the timing for the Proposed Village in order to assess future upgrade requirements in more detail. Watercare correspondence is attached as **Appendix C**.

For the reasons outlined above, and due to the terraced earthwork levels of the Site, a combination of a LPS system serving individual buildings and a gravity network will be required to connect to an on-site wastewater pumping station before being pumped into the existing 150mm AC wastewater network on Allum Street. Ryman has previously utilised such a system on other sites.

A sewage pump station is proposed to collect flow from Site into an existing wastewater manhole (GIS reference: 512934) and the 150mm AC pipes on Allum Street, as shown on Beca drawing **Beca Drawings 044-RCT_401_C0-031**. Details of the storage volumes associated with the pumping station are to be confirmed during the detailed design phase.

5.4 Conclusion

Previous correspondence with Watercare has indicated that there is a capacity constraint identified in the wastewater network. They have stated that it is preferable to discharge wastewater to 136 Allum Street as there are few capacity concerns in the downstream network. It is therefore proposed to pump wastewater flow from the site to the gravity sewer network on Allum Street.

6 Electricity, Gas and Communications

6.1 Existing Electrical Network

Vector plans show that there are existing 11kv supplies on Kohimarama Road in close proximity to the site and there is also an 11kv supply on John Rymer Place. The existing service information around the proposed site for development was obtained through a b4udig request.

There is an existing distribution substation located outside Selwyn College near the northern corner of Lot 1. This is serviced by a high voltage 11kv cables along Kohimarama Road and appears to supply the College as well as several properties along Kohimarama Road via supply pillars. There are existing sub transmission, high voltage and low voltage power cables along John Rymer Place, within the northern berm of the road. There is a low voltage cable connection that runs in to Lot 51.

Correspondence from Vector is contained within **Appendix C**.

6.2 Electrical Demand

Different measures are used to assess diversified demand for each building as shown in **Table 3**.

Table 3 – Electrical demand

Building	Basis of load assessment	Number of units	Estimated load (kW)
B01	70W/m^2	5,932 m^2	415
B02 to B07	3kW/apt	123	369
Site Services			400
Subtotal			1184 kw
Diversity for different use between buildings:			0.90
Total estimated demand			1,530 kw (approx. 1.5 MVA)

6.3 Proposed Electrical Network

Concept electrical connections to onsite substations are shown on **Beca Drawing 040-RCT_401_C0-041**. The Site will be connected to the existing (11kV) supplies nearby with 400V supplies proposed to individual buildings.

6.4 Existing Natural Gas Network

There is a 50mm PE gas cable MP4 (medium pressure 4, 210 – 410kPa) which runs along Kohimarama Road and John Rymer Place, with a 10mm PE gas branched connection within Lot 51. This will be used to provide gas to the main village centre (B01).

6.5 Natural Gas Demand

The natural gas supply is likely to supply the commercial kitchen, space heating, and domestic hot water plant for the main building (B01). The nominal allowance for these items is shown in **Table 4**. These loads will be confirmed during the detailed design phase.

Table 4 - Natural gas design criteria

Item	Use	Estimated Load (mj/hr)
1	Kitchen	650
2	Space Heating	1,300
3	Domestic Hot Water	1,000
	Total:	2,950

6.6 Proposed Natural Gas Network

A concept natural gas connection is shown on **Beca Drawing 044-RCT_401_C0-041.**

Advice from Vector confirms that there is existing capacity from Scott Road to supply the retirement village. This correspondence is contained within **Appendix C**.

6.7 Existing and Proposed Communications Network

There is an existing Vector communications cable which runs along Kohimarama Road. The cable runs within the berm that is opposite to Lot 1. There are no Vector communications cables available along John Rymer Place.

A Chorus communications cable runs along Kohimarama Rd and John Rymer Pl. The cable runs within the berms on both sides of John Rymer Pl, and within the berm of Kohimarama Rd closest to Lot 1.

6.8 Conclusion

Previous correspondence with utility providers indicates that the existing gas, comms and electrical services in the surrounding streets have sufficient capacity to accommodate the proposed development.

7 Stormwater Management

7.1 General

Stormwater runoff from this Site will be to an existing stormwater network, with discharges from this network authorised by Council's Regional Network Discharge Consent (RNDC). A Stormwater Management Plan (SMP) detailing the Best Practicable Option (BPO) is required to demonstrate compliance with the conditions of the RNDC, and this requires review and adoption by Healthy Waters to formally authorise the diversion and discharge of stormwater from the site to the network. A draft SMP has been prepared as a separate, standalone document. This infrastructure report section is intended to provide a summary of the existing situation and proposed stormwater works to confirm that stormwater can be appropriately managed without adverse effects on private property or on the wider public network. The SMP provides more detail and demonstrates compliance with the requirements of the RNDC.

7.2 Proposed Village Stormwater Design

The layout of the Proposed Village on this Site is shown in Figure 8. This layout consists of a main Building B01 and five apartment buildings B02-B06 served by a road running from John Rymer Place at the southeast, through the centre of the Site (between Building B01 and the apartment buildings) to the northern boundary with Selwyn College and then connects to Kohimarama Road, as illustrated in **Figure 5.**

Figure 5 – Landscape Masterplan (Design Squared Landscape Architects)

The existing hollows and intermittent stream sections are to be reclaimed, and the stream channel relocated. This new channel will be longer than the existing section of open channel, as it will replace part of the existing piped network on-site. To limit the longitudinal grade on the stream four waterfalls will be constructed in the stream. These will provide drops ranging between 2.3 and 3.1m matching the floor level changes in the building. The area available for the stream is constricted by the buildings and the steep slopes adjacent. Typical cross-sections and long sections have been developed for hydraulic analysis and site grading design.

The ecology assessment of the existing site notes that Banded Kokopu have also been observed within the existing stream on-site. The details of the waterfalls are to be further developed to ensure that they do not create a barrier to the Banded Kokopu.

A stormwater reticulation network will be constructed to capture and convey the runoff from all hard areas. The post site development peak flows (both into the piped stormwater network and overland) will be limited to the pre development (with attenuation in the two hollows) levels. It is proposed that this will be achieved by providing 1350m^3 of storage in a tank below Building B01 to attenuate peak flows in storm events from the 1% AEP rainfall event to the 1% AEP rainfall event, to mitigate the effects of the development downstream during these events.

The runoff from roads and buildings will typically be kept separate, with treatment for the runoff from roads provided by proprietary filter units. Roofs will be constructed of inert materials to avoid need for treatment,

7.3 Design Criteria

The primary and secondary stormwater networks have been conceptually designed in accordance with the Auckland Unitary Plan, the Building Act and the conditions of the RNDC. The key documents used to achieve this are:

- Auckland Councils Code of Practice for Land Development and Subdivision Chapter 4 – Stormwater (SW CoP)
- TP108 – Guidelines for Stormwater Runoff Modelling in the Auckland Region
- GD01 – Stormwater Management Devices in the Auckland Region
- Section E1 of the NZ Building Codes

These systems remain subject to future detailed design processes, leading to building consent and engineering plan approval assessments prior to construction.

7.4 Conclusion

Stormwater can be managed on site to avoid adverse impacts on downstream networks, properties and ecological values. The proposed system will connect to the existing available public stormwater network on the southern boundary of the Site. The overall management regime has been designed in accordance with best practice, and to achieve consistency with the relevant requirements of Auckland Council's Regionwide Network Discharge Consent.

It is proposed to provide an attenuation storage tank to limit the peak pipe and overland flow for the 10% AEP and 1% AEP storm events to that of the existing pre-development Site, in order to mitigate the flood risk to the downstream properties. Water quality outcomes will be achieved via proprietary filter devices for runoff from all trafficable areas. Overland flow paths will be managed in accordance with best practice on site, and mimic the pre-development conditions at the site boundaries.

8 Earthworks and Grading

8.1 Earthworks Volumes and Grading

The drivers for the grading design include:

- Providing for vehicle access from the Site entrances to all the buildings including into undercover carparks. Roads are typically 5.5 metres wide kerb to kerb with 3% cross-fall.
- Providing accessible pedestrian pathways that are suitable for the intended residents. Typical pathways are 1.2 metres wide with maximum grades of 5% and no steps.
- Creating useable and accessible public spaces for residents that are generally at flat grades and can accommodate pedestrian circulation, courtyards and flower beds.
- Landscaped and open areas to be kept to slopes of 1 in 4 as a maximum to allow for maintenance.
- The estimated earthworks quantities for the Site are shown in Table 5 and are based on the following assumptions:
- All new buildings will have basements and have assumed to be undercut by 1 metre in construction.
- Construction batters to excavations of 1 in 2.
- Settlement is anticipated due to the underlying ground containing compressible layers

Table 5 – Earthworks quantities

Item	Quantity	Unit
Earthworked area	25,377	m^2
Total cut	52,874	m^3
Total fill	5,750	m^3
Excess of cut over fill	47,124	m^3

Construction methods will seek to re-use as much of the cut material as practical. It is expected much of the fill required to backfill against structures or form roads will need to be imported hardfill to suit the construction sequencing and programme. There will be some opportunities to reuse excavated material in the landscaped areas and open spaces.

8.2 Erosion and Sediment Control

Throughout construction, erosion and sediment control measures will be undertaken to meet at least the standard for Auckland as outlined in “GD05 – Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland region”. Given the size of the Site and the likely duration of works it is recommended that a flexible approach be taken whereby detailed erosion and sediment control plans and construction management plans be prepared and followed for each stage of the works as it progresses. These plans are expected to include on-going monitoring requirements which include weekly inspections by the consent holder of erosion and sediment control structures and inspections within a day of every significant rain event.

Concept erosion and sediment control plans are detailed in **Beca Drawing 044-RCT_401_C0-061** and is described below.

8.2.1 Erosion and sediment control

The construction of the Proposed Village including associated roads comprises 25,377 m^2 of area requiring earthworks.

Construction entrances will be stabilised and wheel washes provided if necessary. Throughout the works, erosion management practices will be applied including limiting the amount of open area exposed at any time, re-vegetating and rehabilitating disturbed ground as soon as practicable for completion of works, progressive stabilisation of slopes and dust suppression through watering if required in dry weather. These practices will be applied throughout all stages of the works.

Clean runoff will be diverted around earthworks areas using diversion channels and bunds sized to accommodate the 5% AEP event. They have been generally designed to follow contours where possible to minimise velocities and hence erosion and will be top soiled and seeded. There will be some sections of the diversion channel on the Site where check dams may be used to minimise erosion.

Construction zone water (dirty water) surface runoff will fall to a dirty water diversion swale which will direct flow to a GD05 3% sediment retention pond (SRP). The SRP will be located in the vicinity of the natural low point of the Site. The SRP will discharge to the existing stormwater swale. It is likely that flocculation will be applied to improve sediment removal efficiency due to the consistency of the existing soil material.

Excavation of all building basements will require a dirty water pump that will be directed to the dirty water diversion swale.

8.3 Earthworks Effects Assessment

Application of appropriate erosion and sediment control measures as described above will minimise the potential effects of sediment runoff to at least GD05 standard.

A conceptual assessment of the effectiveness of the proposed sediment control measures was undertaken using the Universal Soil Loss Equation (USLE) method and is presented in **Appendix G**. Refer to **Table 6** for an overview of the annual sediment generated and captured by the sediment retention devices.

Table 6 – Sediment generation and removal

	Quantity	Unit
Total Earthworks Area	2.5377	hectares
Sediment Generated	22	tonnes / year
Sediment to Sediment Control Pond	4.4	tonnes / year
Sediment Captured by Control Devices	4.0	tonnes / year
Sediment Discharge	0.4	tonnes / year

For the purpose of this calculation only, it was assumed that there would be a total earthworks period of 24 months and that excavation activities will be carried out intermittently during that time. The total disturbed site area is 2.54 ha and was used in the calculation to size the sediment retention pond. Sediment retention ponds are assumed to have 75% removal efficiency, and this has been taken into consideration through the calculations. Efficiency of the basin can be improved, if unnecessary, through the use of chemical flocculants to assist in the settlement of fines within the retention device. The bare soil was considered to be compact and smooth, giving a 'Vegetation Cover Factor' and 'Roughness Factor' of 1 and 1.3 respectively.

The sizing of the sediment basin was calculated in accordance with 'Guidance for Erosion & Sediment Control (GD05)'. The required basin volume is calculated to be 760 m^3, provided pond volume is 792 m^3.

9 Conclusion

Demand for water supply, wastewater, gas and electricity has been assessed and a preliminary layout of a network servicing the Site has been prepared. The Site will be serviced from the existing network in the surrounding streets.

A stormwater network has been designed to manage the additional runoff from the Proposed Village. It is proposed to provide an attenuation storage tank to limit the peak pipe and overland flow for the 10% AEP and 1% AEP storm events to that of the existing pre-development site, in order to mitigate the flood risk to the downstream properties.

This site is generally steep and requires approximately 52,874m^3 of cut, which is mostly generated by basement excavations, and 5,750m^3 of fill to create the buildings, underground carparks, road and pedestrian circulation and accessible open spaces of the village. Earthworks will be managed using standard good practice for Auckland erosion and sediment control measures.

In summary, the village can be serviced from the surrounding networks and, as designed, will have negligible potential adverse stormwater and earthworks effects.

A

Appendix A – Site topographic survey

Drawing Plotted: 23 Nov 2018 1:33 p.m.

NOTES.

1. THIS SURVEY WAS UNDERTAKEN USING GNSS AND TERRESTRIAL SURVEY METHODOLOGIES. SURVEY CONTROL FOR THE SITE WAS ESTABLISHED USING GNSS OBSERVATIONS AND DIRECT CONNECTION TO THE LIN: GEODETIC MARK C9YC.
2. THIS SURVEY IS IN TERMS OF MT EDEN 2000 COORDINATES AND AUCKLAND 2016 VERTICAL DATUM.
3. ORIGIN OF SURVEY: C9YC (AP II DP 138837)
   801549.79 mN, 406742.48 mE, 40.21 mRL
4. CONTOURS ARE AT 0.2m INTERVALS. CONTOURS SHOWN ON THIS PLAN HAVE BEEN ELECTRONICALLY COMPUTED FROM SPOT HEIGHT DETERMINATIONS AND MAY NOT REPRESENT THE TRUE GROUND LEVELS, ANY CRITICAL HEIGHTS SHOULD BE CHECKED ON SITE PRIOR TO DESIGN AND CONSTRUCTION COMMENCING.
5. THIS PLAN HAS BEEN CARRIED OUT TO TOPOGRAPHICAL STANDARDS. ALL LEVELS SHOWN ARE CORRECT AT TIME OF SURVEY. CRITICAL DIMENSIONS AND LEVELS SHOULD BE VERIFIED.
7. THE POSITION OF BOUNDARIES SHOWN WERE OBTAINED FROM A QUICKMAP DIGITAL DOWNLOAD AND HAVE NOT BEEN CONFIRMED BY SURVEY.
8. THESE NOTES ARE AN INTEGRAL PART OF THIS PLAN.

LEGEND

- SURVEY MARK
- ELECTRICAL POWER POLE
- FEATURE BOREHOLE
- FEATURE GATE
- STORMWATER CESSPIT SINGLE
- TOPO SPOT HEIGHT
- UNKNOWN MANHOLE
- UNKNOWN VALVE
- UNKNOWN VENT
- BUILDING ROOF
- BUILDING FOOTPRINT
- BUILDING FOUNDATION
- BUILDING MISC LINE
- CADASTRAL BOUNDARY
- FEATURE CONCRETE
- FEATURE FENCE
- FEATURE WALL BOTTOM
- FEATURE WALL TOP
- FEATURE MISC LINE
- ROAD TOP OF KERB
- ROAD GUTTER FLOW
- ROAD EDGE OF SEAL
- STORMWATER LID LINE
- STORMWATER CHANNEL
- TOPO BREAKLINE
- TOPO TOP OF BANK
- TOPO BOTTOM OF BANK
- UNKNOWN LID LINE
- VEG BUSH

801900 mN
406700 mE
406500 mE
801700 mN
N
SELWYN COLLEGE
PIN 501
801699.20 mN
406712.72 mE
42.46 RL
MH5
44.11 LL
TOP OF CULVERT
36.78 RL
400Ø
PIN 502
801809.38 mN
406633.53 mE
44.02 RL
PIN 503
801737.72 mN
406669.97 mE
34.32 RL
LOT 1
DP 332284
245
KOHIMARAMA ROAD
247A
KOHIMARAMA ROAD
249A
KOHIMARAMA ROAD
KOHIMARAMA ROAD
3A JOHN
RYMER PLACE
7 JOHN
RYMER PLACE
7 JOHN
RYMER PLACE
LOT 51
DP 163424
MH4
37.20 LL
MH3
37.26 LL
MH1
36.55 LL
MH2
36.68 LL
JOHN RYMER PLACE
49 JOHN
RYMER PLACE
47 JOHN
RYMER PLACE
45 JOHN
RYMER PLACE
35 JOHN
RYMER PLACE
35A JOHN
RYMER PLACE
29 JOHN
RYMER PLACE
27 JOHN
RYMER PLACE
27A JOHN
RYMER PLACE
19 JOHN
RYMER PLACE
17 JOHN
RYMER PLACE
9 JOHN
RYMER PLACE

ORIGINAL DRAWING IN COLOUR

FOR INFORMATION
NOT FOR CONSTRUCTION

www.beca.com

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION ONLY				

Drawing Originator: Beca

Original Scale (A1) 1:500 / Reduced Scale (A3) 1:1000	Surveyed	MS,PJ,PB MH	11/18
	Drawn	GLS	11/18
	Verifier	MP	11/18
	Dwg Check	SH	11/18

Approved For Issue* Date

* Refer to Revision 1 for Original Signature

Client: RYMAN HEALTHCARE

Project: KOHIMARAMA ROAD

Title: TOPOGRAPHICAL SURVEY OF 223 KOHIMARAMA ROAD KOHIMARAMA

Discipline: SURVEY

Drawing No.: 3124460-221-GS-0001

Rev.: A

Document No. 3124460-221-GS-001_2D DRAFT.DWG

DO NOT SCALE

Source Application

IF IN DOUBT ASK.

B

Appendix B – Hydrant testing results

NOVA FLOWTEC SERVICES LTD
HYDRANT TESTING SPECIALISTS

E: info@novaflowtec.co.nz
T: 09 444 8375
PO Box 241, Albany Village, Auckland 0755
www.novaflowtec.co.nz

10th September 2019

Beca
PO Box 6345
Auckland 1141

RE: Firefighting Water Supply at 223 Kohimarama Road

Attention: Weng Lye

Dear Weng,
Nova Flowtec Services were engaged to conduct a FW2 hydrant flow test for the proposed sprinkler protected development at the above address.
The testing was conducted on Monday 9th September at 9.30pm.
The object of the testing was to prove that there is sufficient water for firefighting purposes (1500Lpm, FW2) and the simultaneous activation of the proposed sprinkler system.

Fire Fighting Water Supply Requirements:
In order to meet the FW2 minimum requirements of PAS 4509: 2008, 750Lpm is required within 135m and an additional 750Lpm is required within 270m of the development.
This being a total of 1500Lpm at a minimum residual pressure of 100kPa.

Fire-fighting Water Supply Results:
During testing the minimum requirement was not able to be met due to insufficient hydrants being available within 135m of all parts of the proposed development. However, the nearest two hydrants on John Rymer Place were tested and 1500Lpm at 545kPa was recorded, exceeding the minimum requirement. Additional hydrants will need to be fitted inside the site so as the FW2 can be achieved.
Please find the results table and the hydrant map on the following page.
Note: these hydrants were not opened to full capacity during testing.

Sprinkler Flow Testing:
During testing a single hydrant flow and pressure curve was carried out on the two mains opposite the site to assist with planning for the sprinkler system connection. This testing and the fire-fighting water supply testing was carried out simultaneously. Please find the mains flow and pressure curves on page three and four.

Should you have any questions please do not hesitate to contact me.

Kind Regards

Melanie Keane

FW2 Water Classification Test

	Hydrant One	Hydrant Two	Total Flow (Lpm)	Hydrant Six Pressure (kPa)
			0	570
Flow (Lpm)	750	750	1500	545
Date & Time:	9th September 2019 at 9.30pm			
Site Address:	223 Kohimarama Road			
Full Flow Result:	1500Lpm at 545kPa			

Hydrant Map

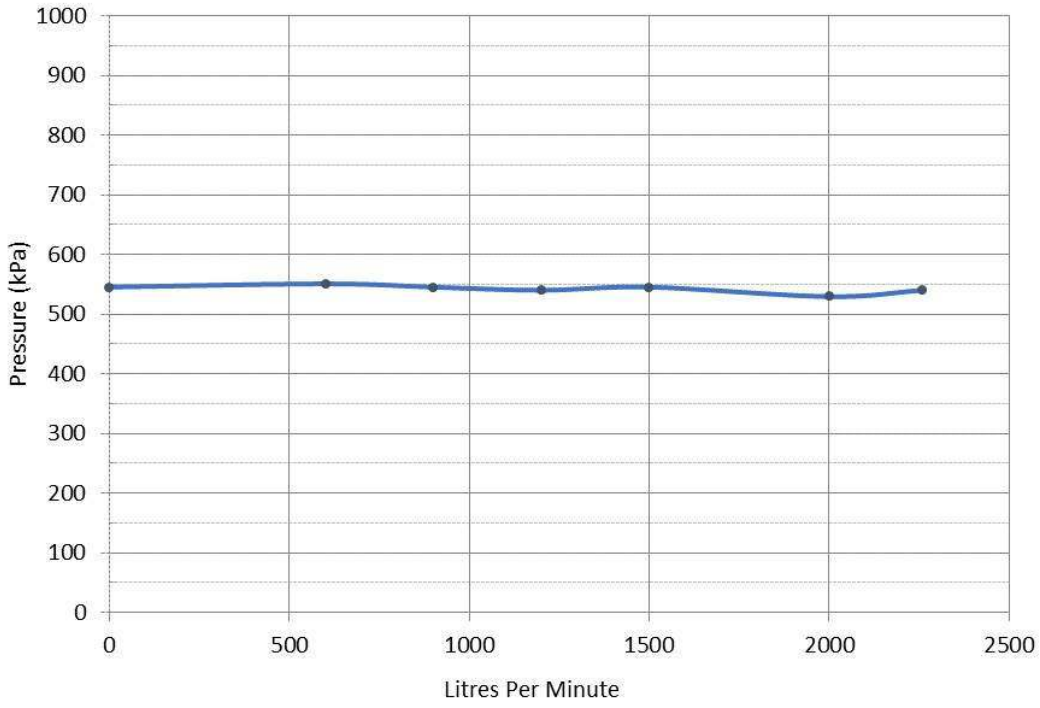
Mains Flow and Pressure Curve (250mm Main)

Hydrant locations: Kohimarama Road
Date: 9th September 2019
Time: 9.30pm
Flow: Hydrant 5
Residual pressure: Hydrant 6
Maximum flow result: 2260Lpm at 540kPa
Test Supervisor: Edward Middleton

Data:

Flow (Lpm)	Pressure (kPa)
0	545
600	550
900	545
1200	540
1500	545
2000	530
2260	540

Graph:



Notes: Hydrant 5 was flowed to full capacity whilst a combined flow of 1500Lpm was being flowed from Hydrants 1 & 2 simultaneously.

Hydrant Map: See page 2

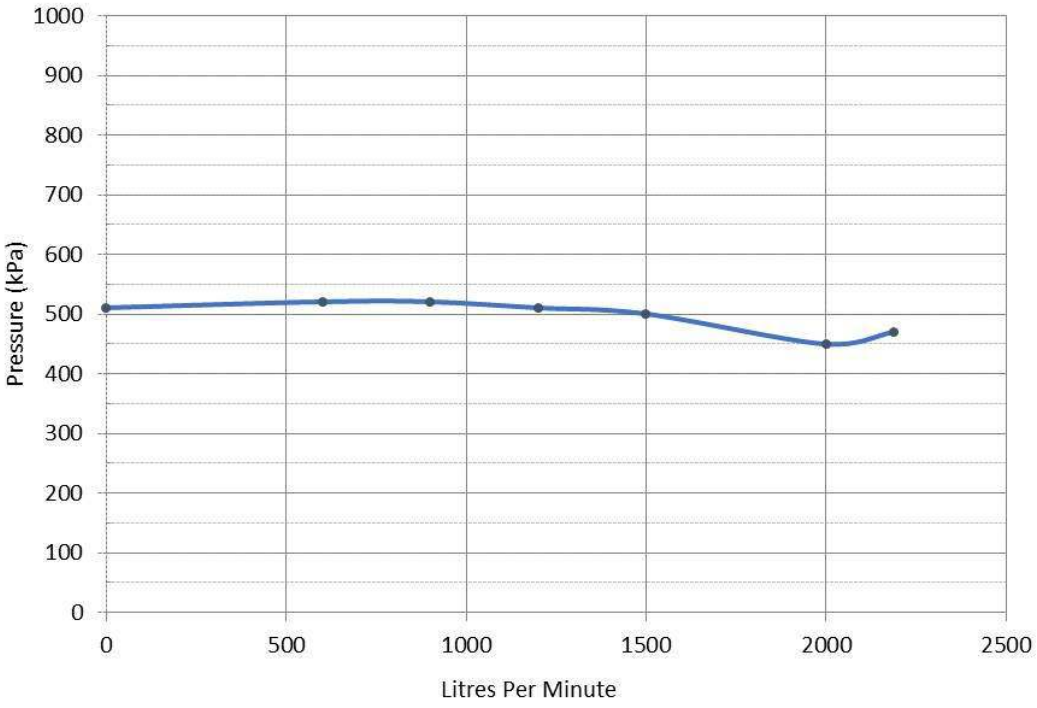
Mains Flow and Pressure Curve (225mm Main)

Hydrant locations: Kohimarama Road
Date: 9th September 2019
Time: 9.45pm
Flow: Hydrant 3
Residual pressure: Hydrant 4
Maximum flow result: 2190Lpm at 470kPa
Test Supervisor: Edward Middleton

Data:

Flow (Lpm)	Pressure (kPa)
0	510
600	520
900	520
1200	510
1500	500
2000	450
2190	470

Graph:



Notes: Hydrant 3 was flowed to full capacity whilst a combined flow of 1500Lpm was being flowed from Hydrants 1 & 2 simultaneously.

Hydrant Map: See page 2

Report end

C

Appendix C – Utility provider correspondence

Shilaj Shah

From: Jane Liu <Jane.Liu@vector.co.nz>
Sent: Wednesday, 16 January 2019 2:00 p.m.
To: Shilaj Shah
Cc: Edward Robinson
Subject: RE: 223 Kohimarama Rd Power and Gas connection and capacity conformation

Hi Shilaj,

To your enquiry regarding the availability of electricity and gas supply for the development at 223 Kohimarama Rd, at the time of this enquiry, we can confirm the followings:

Electricity supply

1) There is available capacity in the existing 11kV (HV) network in Kohimarama Rd. Installation of new 11kV cables, switchgear and transformers will be required to provide supply to the development.

2) The existing 11kV cable in John Rymer Pl is not suitable for new HV connection. If a point of supply is required to be established at Lot 51 from John Rymer Pl, installation of new 11kV cables, switchgear and transformer(s) will be required extending from the existing 11kV network in Kohimarama Rd.

3) Installation of new LV cables and equipment within the new development site will be required to provide points of supply for the residential units.

Gas supply

4) There is available capacity in the existing MP4 system in Kohimarama Rd and John Rymer Pl to supply the development. Installation of new gas pipes and equipment will be required to provide supply to the development.

5) Installation of gas distribution network within the new development site will be required to provide points of supply for the residential units.

Regards
Jane

From: Crispin Maclean
Sent: Tuesday, 11 December 2018 9:24 AM
To: Jane Liu <Jane.Liu@vector.co.nz>; Edward Robinson <Edward.Robinson@vector.co.nz>
Subject: FW: 223 Kohimarama Rd Power and Gas connection and capacity conformation

Hi Jane, in your area.
thanks

From: Shilaj Shah [mailto:Shilaj.Shah@beca.com]
Sent: Monday, 10 December 2018 4:46 PM
To: Crispin Maclean <Crispin.Maclean@vector.co.nz>
Subject: 223 Kohimarama Rd Power and Gas connection and capacity conformation

Hi Crispin,

We are undertaking due diligence on a another property at 223 Kohimarama Road and 7 John Rymer Pl in Kohimarama, Auckland for the building of a retirement village. The development land comprises of two parcels; a principal block of 3.08ha at 223 Kohimarama Rd (Lot 1 DP 332284) and a small parcel of 451m2 at 7 John Rymer Pl (lot 51 DP 163242). We are seeking information regarding supply and connection for

both the power and gas supply to the proposed development. The site location is depicted in the figure below.

The expected site layout is shown below.

The existing service information around the proposed site for development was obtained through a b4udig request.

There is an existing distribution substation located outside Selwyn College near the northern corner of Lot 1. This is serviced by a high voltage cables along Kohimarama Rd, and appears to supply the college as well as a number of properties along Kohimarama Rd via supply pillars. There are existing sub transmission, high voltage and low voltage power cables along John Rymer Pl, within the northern berm of the road. There is a low voltage cable connection that runs in to lot 51.

There is a 50mm PE gas cable which runs along Kohimarama Rd and John Rymer Pl. A 10mm PE gas connection is provided to Lot 51. No gas connection is provided to Lot 1.

Based on the information provided by the client the expected power demands are tabulated below

Building	Basis of load assessment	Number of units	Estimated load (kW)
B01	70W/m^2	35,100 m^2 approx.	2,500
B02 to B07	3kW/apt	143	430

Building	Basis of load assessment	Number of units	Estimated load (kW)
Site Services		Allow	400
Subtotal			3330 kw
Diversity for different use between buildings:			0.90
Total estimated demand			3,000 kw (approx. 3MVA)

The natural gas supply is likely to supply the commercial kitchen, space heating, and domestic hot water. The nominal allowance for these items is tabulated below.

Item	Use	Estimated Load (mj/hr)
1	Kitchen	650
2	Space Heating	1,300
3	Domestic Hot Water	1,000
	Total:	2,950

It is expected that the power and gas utilities from the developed site will connect to the existing utilities on Kohimarama Rd and the connections provided to Lot 51. The connection will be made from lot 51, and from the northern corner of Lot 1.

Please note that the client has asked to keep their intention regarding this property confidential.

Regards

Shilaj Shah
Civil Engineering
Beca
Phone: +64 9 300 9000 Fax: +64 9 300 9300
www.beca.com
www.LinkedIn.com/company/Beca

We accept no responsibility for viruses or defects in this email
or any attachments.

Shilaj Shah

From: TDosSantosGirio (Tarso) 1 <Tarso.DosSantosGirio@water.co.nz>
Sent: Monday, 17 December 2018 10:56 a.m.
To: Shilaj Shah
Cc: IGotelli (Ilze)
Subject: Capacity Review – 223 Kohimarama Road Kohimarama – (Ref. 86364)
Attachments: 86364 - 223 Kohimarama Road Kohimarama - Application Fee Schedule.pdf; 86364 - 223 Kohimarama Road Kohimarama - Pre-assessment Letter.pdf

Hi Shilaj,

Thank you for contacting Watercare Services Limited.

Please note that we are not allowed to release any document before confirming the full payment, however, due to the urgency request, we have decided to make this one-off dispensation.
You shall receive an invoice for this assessment within 48 hours and we will be waiting for the prompt payment.

See attached your initial assessment for water and wastewater capacity.

We have completed an assessment for the proposed **3-5 storeys , 8 Apartment buildings (360 residents)** at **223 Kohimarama Road Kohimarama & 7 John Rymer Place Kohimarama**. There is a capacity constraint identified in the current wastewater network as at today's date. Options available to service this site include a private pump station, discharging to the local network at either Sothern Cross Road or 136 Allum Street. Discharging to 136 Allum Street is preferable as there are fewer concerns in the downstream network.

The timing of development is critical and we will need to assess future upgrade requirements in more detail when you apply for resource consent. You will need to include the following information in the infrastructure report when you lodge your resource consent application:

- A completed water and wastewater planning assessment form (available on the Watercare website)
- A plan showing the proposed location and size of the water and wastewater connections
- Design flows in accordance with the Watercare Code of Practice for Development
- Contributing catchment analysis showing calculations
- Hydrant flow test results

If applicable the following requirements may also need to be included in the infrastructure report:

- Confirmation of development scale and any changes
- Acknowledgement of additional development in the contributing catchment which may affect water and wastewater network capacity
- Acknowledgement of any catchment network changes as a result of upgrades or any additional information that was not taken into consideration as part of this assessment

Please note, as part of the water reticulation design, the infrastructure report should consider boost pumping to upper levels of buildings of more than two storeys. Once consented, it is the responsibility of

the building owner to conduct a periodic review of sprinkler design flow and pressure against available pressure and flow from the Watercare network.

Yours faithfully,

Tarso Girio | Connections Engineer – Developer Services

Watercare Services Limited
DDI: 09 539 7389
Customer service line: +64 9 442 2222
Postal address: Private Bag 92 521, Wellesley Street, Auckland 1141, New Zealand
Physical address: 73 Remuera Road, Remuera, Auckland 1050, New Zealand
Website: www.watercare.co.nz

"Did you know you can now apply for your Works Over and Domestic connections online?"
Please visit https://www.watercare.co.nz/ and select building and developing to find out more.

Please be advised that Watercare Services Limited has updated their Standard Construction Drawings and are available on our website. Watercare have recently revised the Code of Practice for Land development and Subdivision. Click here for the latest Code of Practice.

Please note that new rates will apply for accepted applications received from 1 July 2018. For more information on rates please click on the following link: Watercare - Fees and charges. Please note the new Infrastructure Growth Charge will be $11,680 excluding GST for the Metropolitan area.


Special Notice:


Christmas holidays are coming and we would like to inform you of the scheduled shutdowns of our New Connections and Compliance application assessment:

1. **Auckland transport (Road corridor) moratorium, see below dates:**
    a. **Auckland Transport will not be allowing works on Level 2 roads between 10th December 2018 – 26th December 2018; &**
    b. **Road Corridor Access Department are closed between 21st December 2018 to the 7th January 2019.**
2. **Watercare water networks (planned works) moratorium – 15th December 2018 – 9th January 2019**
3. **Developer Service Department will remain open with limited staff, except on statutory holidays 25th & 26th of December and the 1st & 2nd of January.**

From: Shilaj Shah [mailto:Shilaj.Shah@beca.com]
Sent: Monday, 17 December 2018 9:36 a.m.
To: TDosSantosGirio (Tarso) 1
Subject: 223 Kohimarama Rd #86364

Hi Tarso, I've been advised that you have been assigned to assess capacity checks on the existing watercare infrastructure for a development in Kohimarama that Beca is involved with. We urgently need to send a response back to our client regarding capacities. Can you please give me a call back to discuss.

Thanks

Shilaj Shah
Civil Engineering
Beca
Phone: +64 9 300 9000 Fax: +64 9 300 9300
www.beca.com
www.LinkedIn.com/company/Beca

D

Appendix D – USLE calculations

Beca Ltd

Project Description 223 Kohimarama

JOB NO: 3124460

USLE Calculations

Input

See Basis of USLE Calculation sheet for approach.
A=R K LS C P

2 year ARI, 24 hour rainfall (p-mm) 73

Input data for each site until Area left blank

Input	Activity 1					**Total**
Area of disturbance (m^2)	25377					
Duration of earthworks (months)	24					
Soil Erodability Factor (K)	0.4					
Average slope (s-%)	0.5					
Average drainage length (L-m)	150					
Vegetation cover factor (C)	1					
Roughness factor (P)	1.3					
Sediment Delivery Ratio	0.2					
Sediment Control Effcy (%)	90					
Output						
Rainfall Erosion index (R - J/ha)	64					
Slope length Factor (LS)	0.13					
Sediment Yield (A in t/ha/yr)	4.3					
Sediment Generation (t)	22					**22**
Sediment to Sediment Control (t)	4.4					**4**
Sediment from Sediment Control (t)	0.4					**0**

Notes:

Clay soils assumed with 30% clay, 60% silt, 10% sand (K=0.55)
Assumed earthworks season is 6 months.

Volume of the sediment basin calculated according to Auckland Council:
GD05 Guidance For Erosion and Sediment Control

Design – Size of the Pond

Calculate the volume of the Sediment Retention Pond using the depth measured from the base of the Sediment Retention Pond to the top of the outlet riser. The following design criteria apply.

- On earthwork sites with slopes less than 10% and less than 200m in length, construct a Sediment Retention Pond with a minimum volume of 2% of the contributing catchment ($200m^3$ for each ha of contributing catchment).

Minimum volume of basin: 300 x (Area of Disturbance)/100(
761.31 m^3

Beca Ltd

JOB NO: 3124460

Project Description 223 Kohimarama

Basis of USLE Calculations

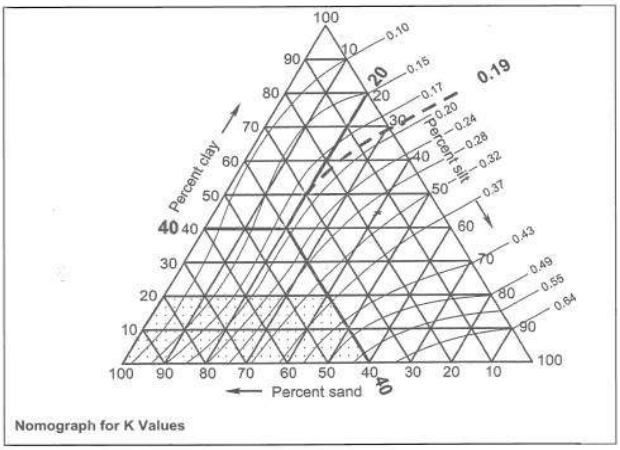
Basis of calculations
A=R K LS C P

R=0.0141 $(0.628p)^{2.2}$
p= 2year, 24 hour rainfall (mm)

- **Soil Erodibility Factor (K)**

K represents the ability of the surface to resist the erosive energy of rainfall. To calculate the K value the percentage of clay, silt and sand must be known for the site soils.

1. The K value can be ascertained for soil from the following nomograph. The nomograph assumes 2% organic matter.



Nomograph for K Values

2. Adjustments are made to the K value depending on the quantity of organic matter.

	Correction Factor when percent organic matter is				
K Value	0%	1%	2%	3%	4% (topsoil)
Greater than 0.40	+0.14	+0.07	0	-0.07	-0.14
0.20 – 0.40	+0.10	+0.05	0	-0.05	-0.10
Less than 0.20	+0.06	+0.03	0	-0.03	-0.06

3. To covert the K value to metric multiply the K value by 1.32.

LS=$(65.41s^2/(s^2+10000)+4.56s/(s^2+10000)^{0.5}+0.065)(L/22.1)^m$
s=slope (%): L=length(m): m=0.2 if s<1%,0.5 if s>5%

Treatment	C Factor	P Factor
Bare Soil		
• Compacted and smooth	1.0	1.3
• Track walked on contour	1.0	1.2
• Rough irregular surface	1.0	0.9
• Disked to 250mm depth	1.0	0.8
Native Vegetation (undisturbed)	0.01	1.0
Pasture (undisturbed)	0.02	1.0
Temporary grass	0.10	1.0
Mulch on topsoil (3 months)	0.05	1.0
Mulch on subsoil (3 months)	0.15	1.0

Sediment Delivery Ratio:
General: 0.5
Steep Sites: 0.7
Flat/trenches: 0.2

Sediment Control Efficiency:
Silt Fences: 50%
Decanting Earth Bunds: 50%
Sediment Retention Ponds: 75%
Flocculated Ponds: 90%