31 Ngongotaha Road Rotorua

Engineering Infrastructure Report Watchman Capital 3228 Prepared by James Dufty Date: 14/12/22



1.0 Introduction

My full name is James Stuart Dufty. I am a Director at McKenzie & Co Consultants Limited. I hold a Bachelor of Civil Engineering Technology (BETech) and a New Zealand Certificate of Engineering (NZCE).

I have 20 years experience as a Civil Engineer and I am the Lead Civil Engineer for the Ngongotaha Development and have been employed by Mckenzie and Co for 7 years.

Prior to joining McKenzie & Co, from 2013-2015, I worked in Auckland for Candor3 on various land development projects, and from 2007 – 2013, I worked abroad in United Arab Emirates for AECOM on large scale commercial and large-scale residential land developments. From 2003 – 2007 I worked in Auckland for Sinclair Knight Merz (now Jacobs) on commercial and residential projects and from 2002 to 2003 I worked for Fraser Thomas Ltd on various land development projects.

McKenzie & Co. Consultants have been engaged by Watchman Capital to provide a high-level engineering summary in support of the proposed development at 31 Ngongotaha Road. The proposed development consists of 196 residential units.

This summary addresses the key engineering infrastructure matters relevant to the proposed development. It covers earthworks, roads, stormwater, wastewater, and water supply. This report should be read in conjunction with the consent application and other supporting documents referred to in this report.

2.0 Site description

The development site is approximately 15.95ha located at 31 Ngongotaha Road. The property is bordered by Ngongotaha Road to the east, and Waiteti Stream to the north and west.

Majority of the site is grass with some tree/vegetation along the stream edges. The topography of the site is relatively flat and gradually slopes towards Waiteti Stream other than a sloped area located to the south east corner adjacent the railway lines.



FIGURE 1 - Site Location

3.0 Earthworks and sediment control

The proposed earthworks will involve approximately 45,300m³ cut and 102,000m³ fill. The additional fill material required will be obtained from civil surplus onsite and importation of clean fill as required. Any unsuitable materials found onsite will be transported off-site. The earthworks is required to create building platforms, road corridors, stormwater treatment devices and esplanade reserve areas

The final earthworks design will form a gradual even slope towards the existing streams. The raised topography in the south east corner is proposed to be cut down by approx. 4m to allow a suitable grade for roads and building platforms.

3.1 Erosion and Sediment Control

The proposed works will cover a range of sediment and erosion control measures implemented in accordance with Councils Guidelines. Proposed works include an area of disturbance of 8 Ha. To ensure the receiving downstream environment, is protected measures are as follows:

- Clean water diversion lines will be constructed to divert and collect upstream catchment runoffs away from the earthwork sites.
- Silt fences around stream banks
- Construct decanting earth bunds and sediment ponds and associated runoff/diversion bunds allow runoff to settle out particulate matter and decant clean water prior to discharging into the adjacent stream. PAC flocculating chemicals will be used to assist in settling of particles.
- To minimise open areas earthworks areas will be stabilised as works are completed where possible.
- All proposed measures will be based on the BOPRC guidelines

3.2 Geotechnical Assessment and Compliance

CMW Geosciences have provided a Geotechnical Memorandum in support of the fast-track application. A copy of CMWs reports is attached to the application.

The reports identify low strength materials that may require the need for preloading. All geotechnical related construction works shall be undertaken in accordance with the recommendations, and under the supervision of geotechnical engineers and any earthworks within the site will be undertaken in general accordance with NZS 4431 and the requirements of the Rotorua Lakes Council, Regional Technical Infrastructure Standards (RITS)

A geotechnical completion report will be prepared at the completion of all civil works pertaining to this application by a suitably qualified Geotechnical Engineer.

4.0 Roading

The site is bordered by Ngongotaha Road to the east. It is proposed to create a new intersection connecting to Ngongotaha Road. Internal roads will consist of a variety of 14m, 16m and 18m roads include park edge roads. A 3m shred path will be provided within the development to allow for offroad cycling and will also follow the stream edge. Numerous JOALS will be provided to remove vehicle crossings from the public streetscape. Private combined parking areas will also be provided to allow for 2 carparks per dwelling where possible.

An assessment of the roading can be round in Commutes Traffic Memo that is included as part of this application.

5.0 Stormwater

5.1 Existing Site

Waiteti Stream borders the site to the north and west and an offshoot of the stream meanders through the middle of the site. A majority of the existing catchment drains to the streams with a small catchment draining to Ngongotaha Road.

The Waiteti Stream which runs through the property has a catchment area of approximately 6,600ha (up to the SH36 bridge) as shown below



5.2 Works within the Existing Floodplain

The site has a known floodplain that extends across some of the site under a 1 in 100 year event. Parts of the development proposes to carryout earthworks within certain areas of the floodplain to create additional development area.

Flood Modelling to determine an indicative useable development footprint and flood levels has been provided by PDP. A peer review of the flood modelling will be provided as part of the application to confirm there is no adverse effects to the upstream and downstream neighbours when carrying out earthworks in the floodplain. A peer review of the flood modelling will be provided as part of the application.

To further compensate any displacement of flood waters additional earthworks will be carried out to lower the ground level within the revised floodplain extents to provide additional volume.

5.3 Stormwater Management Water Quality and Flow

A water sensitive design approach will be adopted throughout the site to improve water quality runoff from the development. It is proposed to provide several new wetland ponds to manage the runoff helping to maintain and enhance the quality of the watercourse downstream. A Stormwater Management Plan (SMP) will form part of the application which will outline the preferred approach.

5.4 10yr Primary Drainage

As part of the proposed development, stormwater reticulation in the form of standard road catchpits, and typical RCRRJ pipes will be installed to capture stormwater runoff from impervious surfaces constructed during development. The conveyance of the 10yr rainfall event will be via a piped network. The stormwater reticulation network will be sized to carry stormwater runoff flows for all storm events less than and equal to a 10% event.

To attenuate the flow the stormwater network will flow to appropriately sized wetlands. The outlet structure for the stormwater devices will include erosion protection to minimise the potential for scour in the downstream environment.

The opportunity to use onlot soakage is also being considered as part of the application to help recharge the groundwater. This will be detailed in the application.

5.5 100yr Secondary Drainage

Stormwater runoff flows above the 10% AEP and up to the 1% AEP events will be accommodated within and along the road carriageway. These overland flow paths will be dispersed at various low points within the road corridor to discharge into the existing stream. The overland flow outlet channels will be stabilised against soil erosion.

Sags and crests within the roads will be designed to divide catchments and to minimize velocities and flows in 100yr event. All overland flows will be maintained within the road reserve.

5.0 Wastewater

5.1 Existing Wastewater

There is an existing 150mm uPVC gravity line running along Ngongotaha Road.

5.2 Proposed Wastewater

It is proposed to construct a new gravity network within the development and connect to the existing manhole on Ngongotaha Road. Discussion have been had with council who have confirmed there is capacity within the line to accommodate circa 190-196 houses. Please note, Council has already allocated funds into their LTP for upgrading the local sewer network in the vicinity of the development to accommodate additional flows associated with development. This upgrade is not required as part of this application.

6.0 Water supply

6.1 Existing Water

There is an existing 300mm uPVC watermain running along the frontage of the proposed development site on Ngongotaha Road.

6.2 Proposed Domestic and Firefighting Supply

It is proposed to construct new watermains to service all the lots within the site for domestic and firefighting supply. Council have confirmed there is adequate capacity and pressure to service the entire development.

7.0 Engineering Risk Assessment Considerations

The engineering risks pertaining to the proposed development have been categorised into low, medium, and high.

High - Required detailed engineering investigation and input from other engineering specialists

Medium – Standard engineering solutions will apply – may require staging of works/upgrades of some infrastructure.

Low - General compliance with standards

A breakdown of each risk and how it relates to each engineering discipline can be found in table 1 below.

Engineering Discipline	Level of Complexity	Proposed Outcome/Solutions
Earthworks	Medium	Low strength materials have been identified – Further investigation and detailed geotechnical designs will be required. Pre-loading of weak materials will most likely be required. Geotechnical advice will be implemented into the design and construction.
Stormwater Management	Medium	Assessment of flows to determine Wetland Sizes. Wetlands may need to act as attenuation in the 100-year event. Typical design of SW network to discharge to streams via wetland.
Flooding	High	Flood Modelling has already been undertaken based on the development footprint that extends into the floodplain. This has previously been reviewed by council/BOPRC and there are ongoing discussions. The current model shows there is no effect on the upstream/downstream properties. The model is being peer reviewed and will form part of the detailed application.
Wastewater	Low	Council have confirmed the existing networks has capacity for 190-196 lots.
Water	Low	Council have confirmed there is sufficient capacity and suitable pressure on the existing network to service the development.

8.0 Conclusion

It is my view that all the civil engineering infrastructure considerations can be appropriately managed.

Stormwater flows and treatments can be addressed via a gravity networks, and stormwater management ponds/wetlands. Final earthworks extents and levels will be determined in conjunction with a flood model to ensure there are no effects on any upstream/downstream floodplains.

Wastewater and Water can be serviced by the existing networks running along Ngongotaha Road.

From a civil engineering perspective there is no reason this development should not proceed through the fast-track process.