

Infrastructure Servicing Report

**eliot
sinclair**

Subject

Prepared for CVI Projects Limited
511185

Infrastructure Servicing Report

Subject

Prepared for CVI Projects Limited

511185

Quality Control Certificate

Eliot Sinclair & Partners Limited

eliotsinclair.co.nz

Action	Name	Signature	Date
Prepared by:	Simon Crundwell Civil Engineer BE(Hons) Civil MEngNZ simon.crundwell@eliotsinclair.co.nz		17 October 2023
Reviewed by:	Stephany Pandrea 3 Waters Engineer BE(Hons) Civil MEngNZ stephany.pandrea@eliotsinclair.co.nz		21 November 2023
Directed and approved for release by:	Justin Finlay Civil Engineer BEng(Hons) justin.finlay@eliotsinclair.co.nz		21 November 2023
Status:	A		
Release date:	21 November 2023		
Distributed to:	CVI Projects Limited Waimakariri District Council		

Version History

Status	Description	Author	Release Date
A	First issue of document	SC	21 November 2023

Contents

1. Introduction	1
2. Existing Site	1
2.1. Location and Surrounds	1
2.2. Surface Waters	2
2.3. Geology and Hydrogeology	2
2.4. Contamination	2
3. Potential for Development	3
4. Earthworks	3
5. Rooding	4
6. Water Supply	4
6.1. Existing Water Supply Network	4
6.2. Proposed Water Supply Connection	5
7. Wastewater	6
7.1. Existing Wastewater Network	6
7.2. Proposed Wastewater Network	7
8. Stormwater	8
8.1. Existing Waterways and Stormwater Discharge Points	8
8.2. Proposed Primary Stormwater System	9
8.3. Proposed Stormwater Management Area	9
8.4. Proposed Secondary Flow Path	10
9. Flood Hazard Investigation	11
10. Common Services (Power / Telecommunications)	11
11. Conclusion	12
12. Disclaimer	12
Appendix A. Proposed Development Concept Masterplan Layout	
Appendix B. Contamination Property Statement from the LLUR	
Appendix C. Earthworks Cut Fill Plan	
Appendix D. Typical Road Cross Sections	
Appendix E. WDC Correspondence	
Appendix F. Flood Impact Assessment	
Appendix G. Utility Provider Correspondence	

1. Introduction

Eliot Sinclair has been engaged by CVI Projects Limited to carry out an infrastructure services assessment to assist with the rezoning application of "the Site" at 518 Rangiora Woodend Road and 4 Golf Links Road, Rangiora from rural to residential use.

This report addresses the serving requirements for earthworks, roading, stormwater, wastewater, water supply and utility services.

Refer to **Appendix A** for the proposed development concept masterplan layout.

2. Existing Site

2.1. Location and Surrounds

The Site address is 518 Rangiora Woodend Road and 4 Golf Links Road as shown in Figure 1 below. The area of the Site is approximately 11.3 Ha and consists of the following allotments:

- Lot 2 DP 16884
- Part RS 1054



Figure 1: Site Location Plan

There are two existing residential dwellings with various associated structures on the Site, the remainder of the Site is pasture. The north part of the Site falls from the north-west to the north-east and the south part of the Site falls from the north-west to the south-east.

2.2. Surface Waters

The Cam River / Ruataniwha crosses the Rangiora Woodend Road to the west of the Site. Taranaki Stream is an existing Waimakariri District Council (WDC) owned natural ephemeral stormwater channel (WDC Asset Number SW001221) that runs through the Site. There is also an ephemeral overland flow path runs through the north-west quadrant of the Site and joins with the Taranaki Stream. Refer to Figure 2 below for existing waterways within the Site and nearby.



Figure 2: Existing Waterways

2.3. Geology and Hydrogeology

The GNS Geological Map of New Zealand indicates that the geology in this area comprises Holocene river deposits (modern river floodplain/low-level degradation terrace, un-weathered, variably sorted gravel/sand/silt/clay).

Groundwater depth across the Site varies between 2m to 8m bgl based on available ECan well information.

2.4. Contamination

The 4 Golf Links Road Site is listed on the Environment Canterbury Listed Land Use Register (LLUR) and the Hazardous Activities and Industries List (HAIL) activity indicated on this Site is the "Persistent pesticide bulk storage and use". **Appendix B** provides the property statement from the LLUR. Further

advice from a suitably qualified and experienced practitioner will be required to confirm if further reporting and subsequent remediation works will be required to comply with the National Environmental Standard for assessing and Managing Contaminants in Soil to Protect Human Health (NESCS).

3. Potential for Development

At this stage, the proposed subdivision layout has not been confirmed, however it is assumed that a proposed residential development will comprise of approximately 140 residential lots, associated roading and two stormwater management areas.

Figure 3 shows the proposed development concept layout.

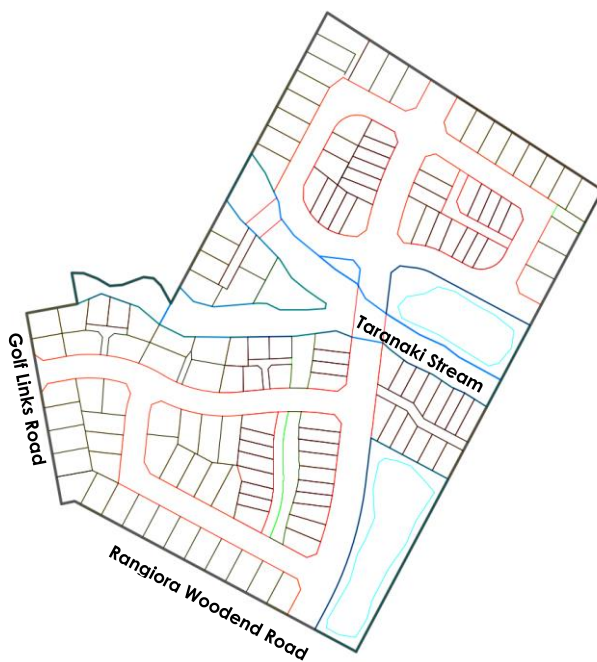


Figure 3 Proposed Indicative Development Layout

4. Earthworks

Earthworks will be required to construct road carriageways, form the stormwater basins, install services and fill the lots to achieve acceptable building Finished Floor Levels, as part of the comprehensive development for the site, while some of the earthworks will be within the building platform areas there will be earthworks outside this area for access, services and the stormwater basin.

Where ground levels need to be raised to enable allotments to comply with the minimum flood levels, this shall be achieved, by placing controlled, compacted fill in accordance with to NZS 4431:2022.

Lots will be filled so that the minimum lot level at the center of the lot will be at least 175mm above the combined 0.5% Annual Exceedance Probability (AEP) flood event so that a 400mm freeboard to the

dwelling Finished Flood Level (FFL) can be achieved (assuming that the top of foundation is 225mm above ground in accordance with Building Code E1/AS1 and E2).

The finished surface of each allotment will be filled (sloping down to the front boundary adjacent to the driveway at a grade of 1:300). The slope across the lots will ensure site drainage is towards the Roads and Right of Ways and associated stormwater conveyance infrastructure.

All bulk filling will be compacted in accordance with NZS 4431:2022 and all fill testing will be carried out by an independent laboratory.

A soils Californian Bearing Ratio (CBR) of 6% has been adopted for preliminary pavement design in the proposed Roads and Right of Ways. Further testing will be carried out during detailed design to confirm the design CBR and the exposed subgrade will be CBR tested during construction to define the required formation depth with more accuracy.

The earthworks cut and fill plan is included in **Appendix C**.

5. Rooding

The proposed plan change area will connect to Rangiora Woodend Road and Golf Links Road via new local roads and new intersections, as shown in the proposed development concept masterplan layout in **Appendix A**.

Proposed road carriageway widths will facilitate two-way traffic. Standard kerb and channel will contain the carriageway formations and convey stormwater runoff to sump inlets. Roads will be sealed predominantly with a 2 Coat Chipseal or with Asphaltic Concrete. All roads will incorporate footpaths and landscaped berms. Typical road and Right of Way cross sections are included in **Appendix D**.

6. Water Supply

6.1. Existing Water Supply Network

There is no WDC water supply infrastructure within the vicinity of the development Site within Golf Links Road or Rangiora Woodend Road.

The closest existing water supply connection point is a WDC owned 200 mm diameter water main located at the Kippenberger Avenue and Devlin Avenue, located approximately 350m away from the south-west corner of the Site boundary as shown in Figure 4.

Commented [SC1]: There is no WDC water infrastructure within close proximity to the site?

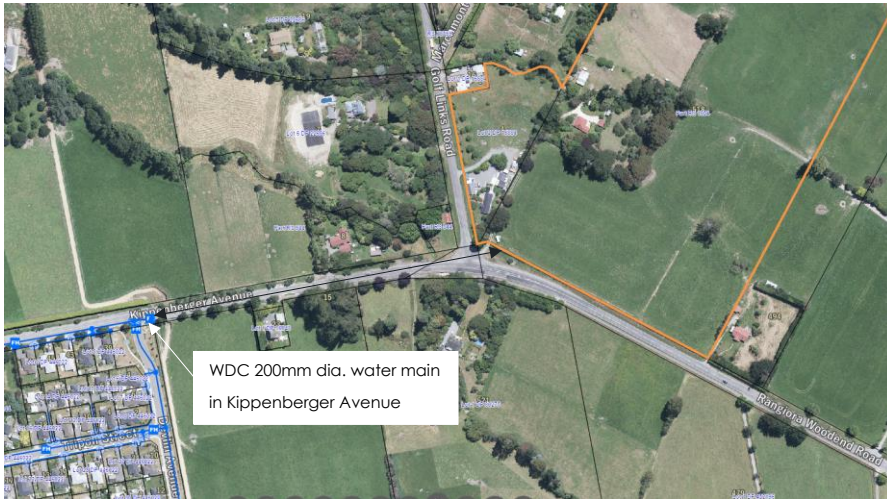


Figure 4: Water Supply Connection Points

6.2. Proposed Water Supply Connection

The Waimakariri District Council (WDC) Engineering Code of Practice (ECoP) indicates a peak potable water supply demand of 0.1 L/s/dwelling, therefore the peak demand to service the development is estimated to be 14 L/s based on an assumed 140 lot development.

It is anticipated for the residential subdivision an appropriate firefighting water category is FW2, requiring a supply demand of 25 L/s (in accordance with the SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice. The total demand for the Site could be conservatively calculated as 2/3 of peak potable demand + fire demand resulting in 33.4 L/s.

The water supply network within the development Site will need to be modelled at subdivision consent stage to demonstrate that it is sized to meet the minimum residual pressures under potable flows and fire-fighting flows.

To provide water supply for the development, a connection is proposed to the nearest existing WDC water supply network, which is the 200 mm diameter water main located at the Kippenberger Avenue and Devlin Avenue. A new water main would need to be extended approximately 350m along Kippenberger Avenue from the Site to this connection point.

WDC has confirmed that there is insufficient capacity within the existing WDC water supply network to service this Site. However, with some upgrades to the existing WDC water supply network (at the applicants cost), a water supply could be provided to the Site. WDC would need to carry out an investigation to confirm what upgrades are required to service the Site. This could be carried out at subdivision consent stage.

7. Wastewater

7.1. Existing Wastewater Network

There is no WDC wastewater infrastructure within the vicinity of the proposed development, within Golf Links Road or Rangiora Woodend Road, as shown in Figure 5 below.



Figure 5: WDC Wastewater Assets

The nearest connection point would be to the DN150 wastewater gravity main within Kippenberger Avenue. The Rangiora Wastewater Treatment Plant (WWTP) is located on Marsh Road.

WDC have advised that there is no capacity within their existing network, or any plans, to service developments east of Golf Links Road including this proposed development. Refer to **Appendix E** for correspondence.

Currently some Council owned infrastructure upgrades are taking place to the wastewater pressure main between Kippenberger Ave and the Rangiora WWTP, as part of the nearby Belgrove development. However, WDC have advised that the proposed Belgrove development wastewater system has not been sized with any spare capacity for residential development at this Site. The wastewater infrastructure that the Belgrove development will be installing has not yet been constructed, however, realistically the planned upgrades are likely to have already been undertaken before any proposed development proceeds.

Retrospective upsizing of the Belgrove development wastewater infrastructure upgrades between Kippenberger Avenue and the Rangiora WWTP could be considered.

There will be some time dependant capacity in the short to medium once all Belgrove development wastewater upgrades are undertaken, however further work would be required to determine how much short-term capacity is available, when additional upgrades would be needed and what additional financial contributions would be needed to pay for these future upgrades.

Commented [BM2]: Is there an option to upgrade at this stage and add capacity if nothing has been done yet. Cost benefit to all parties?

Commented [SP3R2]: Unless we design wastewater right now and tell them what the pipe size needs to be. They won't wait for us.

7.2. Proposed Wastewater Network

The proposed development with an estimate of 140 residential lots, would generate a wastewater design flowrate of 1.09 L/s or 94.5 m³/day for the average dry weather flow (ADWF), 2.73 L/s for the peak dry weather flow (PDWF) and 8.2 L/s for the peak wet weather flow (PWWF) when calculated in accordance with WDC ECoP Section 6.5.6 wastewater design criteria.

7.2.1. Connection to WDC Wastewater Network

WDC have advised that there are two potential options to dispose of wastewater flows arising from the proposed residential development:

- Option 1 – Further upsizing of the existing pressure main between Kippenberger Ave and the Rangiora WWTP to discharge wastewater from the Site to the Rangiora WWTP.
- Option 2 – Construct an additional new pressure main between Kippenberger Ave and the Rangiora WWTP in parallel with the existing pressure main.

For either of the above options the pressure main within Kippenberger Ave will need to be extended to the Site frontage.

7.2.2. Internal Wastewater Network

It is proposed that the development will discharge wastewater to the pressure main within Kippenberger Ave which will need to be extended to the Site frontage. At least one pump or lift station will be required on the Site to convey wastewater to this wastewater pressure main.

There are two options for providing wastewater within the development Site:

- Option 1 – This option would require a gravity sewer system within the Site to convey wastewater flows from individual dwellings to a new centralised wastewater pump station which would pump to the pressure main within Kippenberger Ave.
- Option 2 – A Low Pressure Sewer network is an alternative option for servicing the Site for wastewater. Individual low-pressure sewer pumping stations would be located on each of the future allotments and would be owned and operated by each property owner. These would pump into a common rising main vested in WDC which would be located in the new roads and will connect to the pressure main within Kippenberger Ave. With this system the LPS pumps can be controlled remotely to buffer peak flows by using the storage volume on each lot to defer pumping.

Discussions with WDC will be required at detailed design to confirm emergency storage requirements for either system as well as the upgrades required to service the development for wastewater.

8. Stormwater

8.1. Existing Waterways and Stormwater Discharge Points

An existing WDC owned natural stormwater channel called Taranaki Stream (WDC Asset Number SW001221) runs through the centre of the Site as shown in Figure 6 below. Also, an ephemeral overland flow path runs through the north-west quadrant of the Site and joins with the Taranaki Stream.



Figure 6: Existing Waterways

Due to the Site topography, it is considered appropriate that stormwater from the north part of the Site discharges to the existing Taranaki Stream and the southern part of the Site discharges to the existing roadside drain along Rangiora Woodend Road.

WDC has confirmed that development stormwater can discharge to the existing Taranaki Stream ephemeral drain crossing the Site and the roadside drain along Rangiora Woodend Road, refer to **Appendix E** for WDC correspondence.

Stormwater discharge to ground has not been investigated for this development at this stage. This could be investigated at detailed design stage to confirm if it is a feasible option as an alternative to discharging to the existing waterways.

8.2. Proposed Primary Stormwater System

It is proposed that stormwater runoff from the Site will be conveyed via a network of roadside channels, sumps and pipes or swales to two Stormwater Management Areas (SMA). SMA 1 is proposed to be located on the north side and SMA 2 located on the south side of Taranaki Stream in order to suit the Site topography as shown in Figure 7 below.

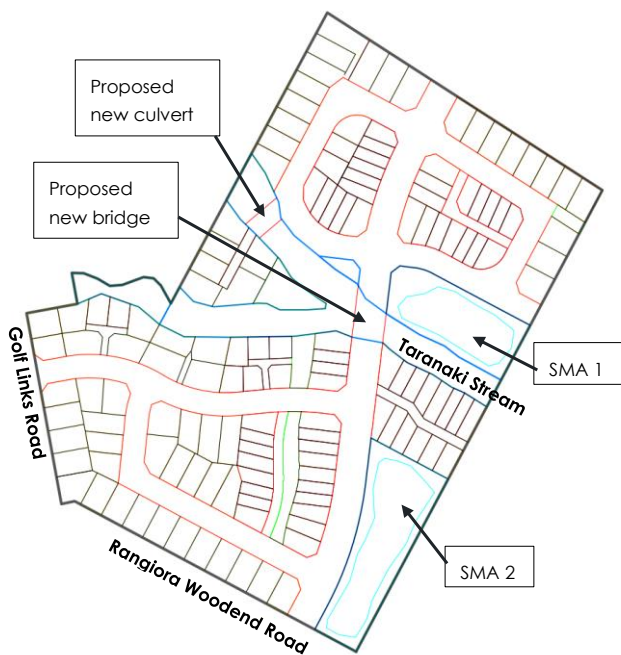


Figure 7 Proposed Indicative Development Layout

The primary stormwater conveyance system will be designed to accommodate the 20% AEP storm event in accordance with the Waimakariri Engineering Code of Practice.

Stormwater discharges from lots will be to the kerb via a PVC kerb entry adaptor. However, should it not be possible to discharge via a kerb entry adaptor, stormwater will be discharged to roadside pipe reticulation either via direct entry lateral or a bubble up sump within the roadside channel.

A new culvert for a road crossing is proposed within the tributary of Taranaki Stream and another culvert within Taranaki Stream.

8.3. Proposed Stormwater Management Area

WDC requires that stormwater treatment and attenuation is required for the development down to pre-development discharge flow rates for all events up to the 50 year ARI critical duration storm event, refer to correspondence in **Appendix E**.

We expect that WDC would also require stormwater pre-treatment. It is proposed that this is provided via forebays.

The following options are proposed for stormwater treatment:

- i) First flush basins
- ii) Wetlands

Wetlands are considered suitable in areas with high groundwater table and first flush basins require a 1m separation from the groundwater table. Since the groundwater levels are expected to be low, first flush dry basins are considered more suitable than wetlands for stormwater treatment on this Site. However, the groundwater level should be confirmed at detailed design stage to confirm the most appropriate stormwater treatment solution.

Therefore, it is proposed that each SMA will consist of a forebay, first flush basin and a detention basin. The first flush basins will be sized to treat the first 25mm rainfall depth. Overall, the SMAs will be sized to detain stormwater runoff from the Site for all events up to and including the 2% AEP storm event for the 24 hour duration. It is proposed that the first flush basins will discharge to the detention basins over a 4 day period, via a controlled outlet and swales are provided within the detention basins to provide an extra level of treatment of the first flush flows. Figure 8 shows the indicative proposed stormwater treatment and attenuation system.

The detention basins will also have a restricted outlet which will discharge attenuated flows to the Taranaki Stream and the Rangiora Woodend Road roadside drain. The practical depth of the SMAs is limited by the invert of these discharge points.

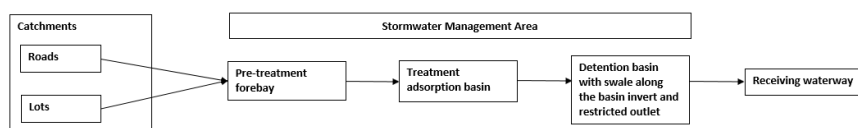


Figure 8: Stormwater Treatment and Attenuation System

The sizing calculations assume the basins will have a 3 m wide access track around the perimeter. The basin calculations have been based on HIRDS RCP 8.5 rainfall data and a runoff coefficient of 0.65.

Preliminary calculations indicate that the required volume for the SMAs is as shown in Table 1 below.

Table 1 – Preliminary SMA Volumes and Areas

Characteristic	North Basin	South Basin
Residential Catchment Area (ha)	4.67	6.39
Detention Required Volume 2% AEP 24 hour (m3)	1790	2380
First Flush Required Volume (m3)	760	1038
First Flush Basin Area (m2)	3014	1351
Detention Basin Area (m2)	2462	2211
Total Area including access tracks (m2)	6417	4748

8.4. Proposed Secondary Flow Path

Stormwater runoff flow rates beyond the pipe or sump capacities will discharge into the internal road network and will be conveyed within the road reserve into the SMAs which have sufficient capacity to ensure post development discharges will not be greater than the pre development for all rainfall events up to 2% AEP 24 hours. During extreme rainfall above the 2% SMA capacity, the North SMA will overflow into the Taranaki Stream and the south SMA will overflow into Rangiora Woodend Road roadside drain.

9. Flood Hazard Investigation

The WDC flood modelling results indicate areas within the Site that could be susceptible to flooding in a 200-year ARI flood resulting from heavy rainfall. Refer to Figure 9 below for the predicted SDC 200-year ARI flooding model results. These model results predict flood depths up to 1.0m within the Taranaki Stream crossing the Site.

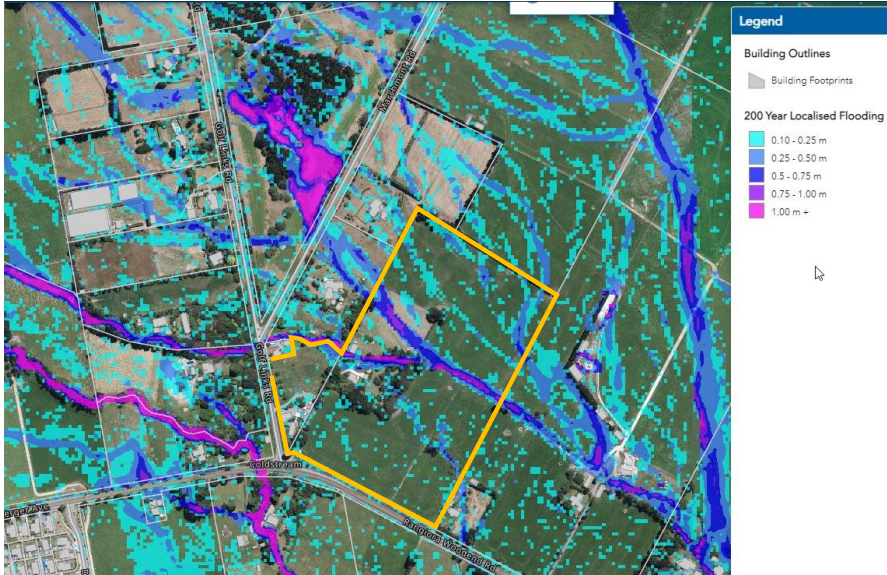


Figure 9 Waimakariri Hazard Flood Map 200 year Event

WDC have confirmed that a flood risk assessment will be required to determine the effects and impacts the proposed development will have on overland flow paths and the surrounding area.

Please refer to the Flood Impact Assessment attached in **Appendix F**.

10. Common Services (Power / Telecommunications)

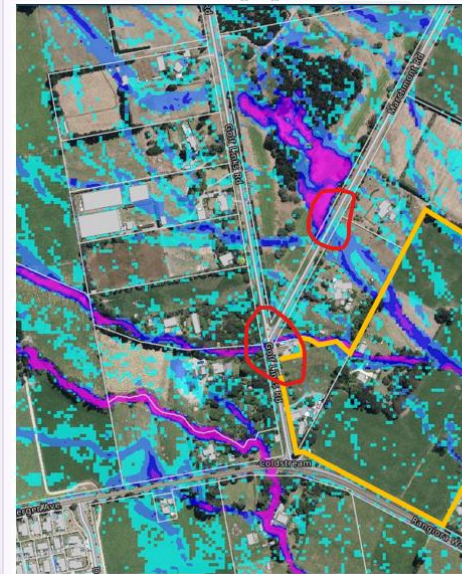
Chorus have provided a high-level comment that the proposed development can be supplied by their network.

Enable have provided a high-level comment that the proposed development can be supplied by their network.

Mainpower have provided a high-level comment that the proposed development can be supplied by their network.

Appendix G provides the correspondence with the relative utility providers.

Commented [BM4]: Do we know if there are existing culverts in the locations highlighted?



Commented [SP5R4]: We have included culverts

Commented [BM6]: If the course of the overland flow paths is to be altered.

Commented [SP7R6]: Yep just for the proposed culverts

11. Conclusion

WDC has confirmed that there is insufficient capacity within the existing WDC water supply network to service this Site. However, with some upgrades to the existing WDC water supply network (at the applicants cost), a water supply could be provided to the Site.

WDC have advised that there is no capacity within their existing wastewater network, to service this development. Upgrades of the WDC wastewater pressure main between Kippenberger Ave and the Rangiora WWTP would be required to service this development. The wastewater pressure main within Kippenberger Ave will need to be extended to the Site frontage. The wastewater network within the development Site can be either a gravity network with a centralised pump station or a Low Pressure sewer network.

WDC requires that stormwater treatment and attenuation is provided for the development. To suit the Site topography, it is proposed that two stormwater management areas are provided, one to service the north part of the Site and one to service the south part. To provide treatment and attenuation, each stormwater management area will comprise of a forebay, first flush basin and detention basin. The SMA should be designed to detain all events up to the 2% AEP 24 hours duration and discharge via restricted outlets to Taranaki Stream or the roadside drain along Rangiora Woodend Road. During extreme rainfall above the 2% SMA capacity, the North SMA will overflow into the Taranaki Stream and the south SMA will overflow into Rangiora Woodend Road roadside drain.

Utility providers have provided high-level comments that the proposed development can be serviced by their network.

The ability for the development to be serviced is subject to advice from the WDC on the upgrades required to service the development for water supply and wastewater.

Also, it is recommended that consultation with the WDC and ECan is carried out to determine if the options noted above are considered acceptable.

12. Disclaimer

This report has been prepared by Eliot Sinclair & Partners Limited ("Eliot Sinclair") only for the intended purpose as a preliminary servicing report. The report is based on:

- Canterbury Maps (2022)
- WDC Services Maps
- Correspondence with WDC and relevant authorities
- Waimakariri Flood Hazard Maps

Where data supplied by CVI Projects Limited or other external sources, including previous reports have been relied upon, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Eliot Sinclair for incomplete or inaccurate data supplied by other parties.

Whilst every care has been taken during our investigation and interpretation of available data to ensure that the conclusions drawn, and the opinions and recommendations expressed are correct at the time of reporting, Eliot Sinclair has not performed an assessment of all possible conditions or circumstances that may exist at the Site. Eliot Sinclair does not provide any warranty, either express or implied, that all conditions will conform exactly to the assessments contained in this report.

The exposure of conditions or materials that vary from those described in this report, may require a review of our recommendations. Eliot Sinclair should be contacted to confirm the validity of this report should any of these occur.

This report has been prepared for the benefit of CVI Projects Limited for the purposes as stated above. No liability is accepted by Eliot Sinclair or any of their employees with respect to the use of this report, in whole or in part, for any other purpose or by any other party.

Appendix A. Proposed Development Concept Masterplan Layout

Appendix B. Contamination Property Statement from the LLUR

Appendix C. Earthworks Cut Fill Plan

Appendix D. Typical Road Cross Sections

Appendix E. WDC Correspondence

Appendix F. Flood Impact Assessment

Appendix G. Utility Provider Correspondence