



**WOOING TREE PROPERTY DEVELOPMENT  
LIMITED PARTNERSHIP  
SUBDIVISION CONSENT APPLICATION  
INFRASTRUCTURE REPORT**

**PROJECT:** Wooing Tree, Proposed Subdivision  
**PRINCIPAL:** Wooing Tree Property Development Limited Partnership  
**OUR REF:** C2655  
**DATE:** April 2021

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Rev:	Date:	Prepared By:	Reviewed By:	Comments:
0	11 September 2020	MG	PLD	Initial Draft
1	9 March 2021	MG	PLD	Final
2	15 April 2021	MG	PLD	Stormwater Update

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Job No: C2655  
Date: April 2021  
Report Prepared For: Wooing Tree Property  
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## 1. Scope

Paterson Pitts Limited Partnership (PPLP) has been engaged by the Wooing Tree Property Development Limited Partnership (the “Wooing Tree”) to provide an infrastructure report to support an application to subdivide land at SH6, SH8 and Shortcut Road, Cromwell comprised in Sec 3 S.O. 461514, Record of Title 684261.

This report covers the availability of the following infrastructure elements.

- (a) Wastewater
- (b) Stormwater
- (c) Water Supply – Potable, Firefighting and Irrigation
- (d) Network Utility Services (electricity and telecommunications)
- (e) Road Construction and Earthworks

It addresses erosion and sediment control measures and on-site management of construction activity including dust.

Investigations have been carried out, including test pits, soakage tests and computer modelling of the Cromwell water and wastewater reticulations.

## 2. Executive Summary

### 2.1 Stormwater

The site is underlain by a considerable depth of glacial out wash gravels, with depth to groundwater of 15 metres below ground level. Soakage tests have shown these gravels to be highly permeable. No issues are anticipated with the discharge of stormwater from roading, hard stand and roof run off direct to ground via suitably designed soak pits, as is the norm for all recent land development within the Cromwell area. Similarly, new house sites can discharge stormwater to ground soakage.

### 2.2 Wastewater

Computer modelling of the Cromwell wastewater reticulation by Mott MacDonald NZ Ltd shows that the site can be adequately serviced from the existing reticulation. The Lowburn sewer trunk rising main through the site will need to be relocated. This is shown on the infrastructure plans forming part of this application. This realignment of the trunk sewer rising main has been agreed, in principal, with the Council. The final route will depend on the final roading / lot layout.

### 2.3 Water Supply

Computer modelling of the Cromwell water reticulation by Mott MacDonald NZ Ltd shows that the site can be adequately serviced from the existing reticulation. A trunk water main through the site will need to be relocated. This is shown on the infrastructure plans forming part of this application. The new alignment has been agreed, in principal, with the Council.

There is a possibility that public space irrigation requirements could be met by an existing on-site groundwater source (i.e. bore), currently used to irrigate and frost fight the vineyard that occupies

much of the site. However that would be a future decision of the Council. This application is based on any required irrigation by the Council being through the public network supply. There is no “water take” consent sought as part of this application.

## 2.4 Network Utility Services

Chorus New Zealand Ltd have confirmed that a suitable telecommunications (fibre) supply can be made available to the proposed development of the site.

Power Net has advised that a suitable power supply can be made available to serve the proposed development of the site

All power and telecommunication services are located underground. There is no overhead cabling.

## 2.5 Road Construction & Earthworks

All roads will be constructed on sand and gravels, with some small pockets of silt requiring a subgrade improvement layer. Bearing capacity tests on likely road subgrades were well in excess of the minimum requirements. No issues are expected with designing and constructing road pavements in compliance with the procedures of “Austroads” and the subdivisional pavement design standards of the Central Otago District Council. Road typology designs and geometry are anticipated to be in accordance with “Austroads” and NZS 4404:2010. No significant bulk earthworks are required to develop the site and there is no possibility of any discharge of sediment from the site.

## 3. Stormwater

There is no reticulated stormwater system available that would ultimately have to discharge into Lake Dunstan to service this development and, even if there was, this form of stormwater management is no longer considered to be best practice.

The bore log for the existing irrigation bore on the site shows that the site is underlain by a considerable depth of glacial outwash sand and gravel with depth to groundwater of 14.6 metres below the ground surface. Test pitting by Paterson Pitts shows near surface topology to be 0.2m of topsoil over outwash sands and gravel, down to the depth of all test pits.

A location plan, test pit logs and the bore log are attached in **Appendix (A)**.

Soakage tests were carried out of 5 of the test pits. Infiltration rates of 686mm/hr to 3675mm/hr were recorded. This equates to soakage rates for a typical “Cauldwell” type soak pit of 3.7L/s to 20L/s.

The NIWA HIRDS program was used to calculate a 2% Annual Exceeding Probability (AEP) short duration rainfall event of 56 mm/hr using a 2 deg temperature risk factor to allow for climate change. This resulted in a run off of 0.0124L/s/m<sup>2</sup> to cater for.

Council’s engineering standards require a pair of road drainage sumps at a maximum spacing of 90m. This equates to a soakage rate requirement of 3.24L/s for each soak pit, draining a 6m wide road carriageway. Soakage tests, infiltration calculations and rainfall intensity calculations are attached in **Appendix (B)**

Direct discharge to ground for stormwater from roading, impermeable surfaces and roof run-off will therefore be possible. The standard solution acceptable to Council is a “Cauldwell type” soak pit, one per sump outlet. This method of stormwater disposal is universally used for land development over glacial outwash gravels in Cromwell, Alexandra and Clyde. See Fig 1.

The Central Otago District Council, in its addendum to NZS4404:2004; July 2008 which is the current Engineering standard adopted by the council for land development, adds to Clause 4.3.8.2 Soakpits:

*“A standard ‘Cauldwell’ type soakpit in accordance with Appendix 2 (which is the Caulwell Soakpit Detail – see Fig 1) of the Addendum shall be required for each separate sump.”*

And

*“Silt traps shall be installed in the stormwater system prior to discharge to any soakpit.”*

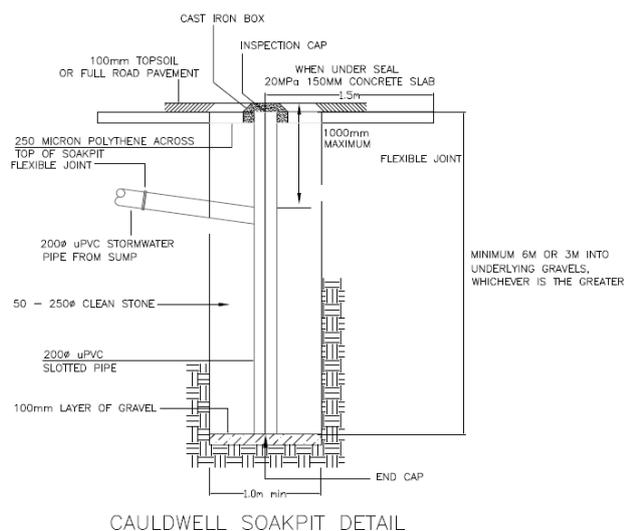
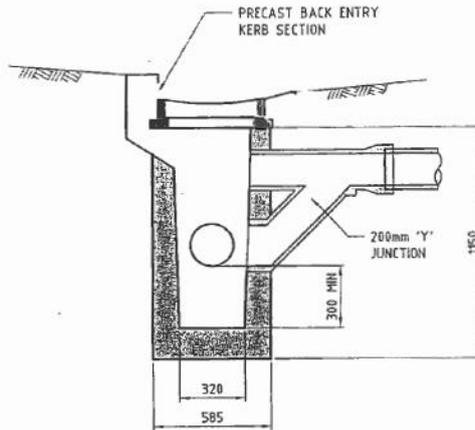


Fig 1

In order to comply with the Regional Water Plan rules, a silt and debris trap is required before discharge of stormwater to a soak pit. This will be provided by an “inverted syphon” type mud tank. See Fig 2.



TYPICAL SUMP DETAIL

Fig 2

The Otago Regional Council’s Regional Plan: Water for Otago, provides for the discharge of stormwater into land as being a permitted activity. The ORC has always accepted the use of Cauldwell type soakpits, in conjunction with a silt trap provided by an inverted syphon type mud tank ( Typical Sump Detail – see Fig 2), to satisfy these requirements.

**Regional Plan: Water:**

Rule 12.B.1.9

*“The discharge of stormwater from any road not connected to a reticulated stormwater system to water, or onto or into land, is a **permitted** activity, providing:*

- (a) The discharge does not cause flooding of any other person’s property, erosion, land instability, sedimentation or property damage; and*
- (b) Where the road is subject to works, provision is made for the interception of any contaminant to avoid, after reasonable mixing, the following effects in the receiving water:*
  - i) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials; or*
  - ii) Any conspicuous change in the colour or visual clarity; or*
  - iii) Any emission of objectionable odour; or*
  - iv) The rendering of fresh water unsuitable for consumption by farm animals; or*
  - v) Any significant adverse effects on aquatic life.”*

This stormwater management approach proposed for Wooing tree meets these requirements:

- Ground soakage testing demonstrates there will be no surface flooding.
- There are no overland flow paths that would create the risk of erosion
- The inverted siphon mud tank/Caudwell soak pit system will remove any contaminants, grease scum or floatable / suspended materials
- The discharge direct to groundwater means there is no impact on aquatic life or risk to humans or animals

Where road swales are used, these provide a measure of pre-treatment of stormwater before discharge into mud tanks. There is a depth of at least 9m of gravel and sand below each soak pit, which will further filter stormwater before it is eventually discharged to groundwater. The inverted siphon mud tank/Caudwell soak pit system effectively provides for 3 stage treatment of stormwater. The mud tank (which is periodically sucked out by Council) removes silt, trash and gross pollutants, while the Caudwell soak pit (also periodically sucked out by Council) provides secondary treatment by removing finer silt and debris, with the 9m of sand and gravel below the soak pit providing tertiary filtration

For roof run off, Council has a “rule of thumb” that 1m<sup>3</sup> of soak pit volume is required for every 50m<sup>2</sup> of roof area draining into a soak pit.

The site is relatively flat. This means there will be a lack of secondary flow paths. From a stormwater/road design aspect this means that most roads will need to be cut into the surrounding terrain by a least 150-300 mm in order to provide longitudinal road drainage and for dwellings to be able to comply with Building Code requirements (E1/AS1) for minimum floor levels above the road crown. See Fig 3

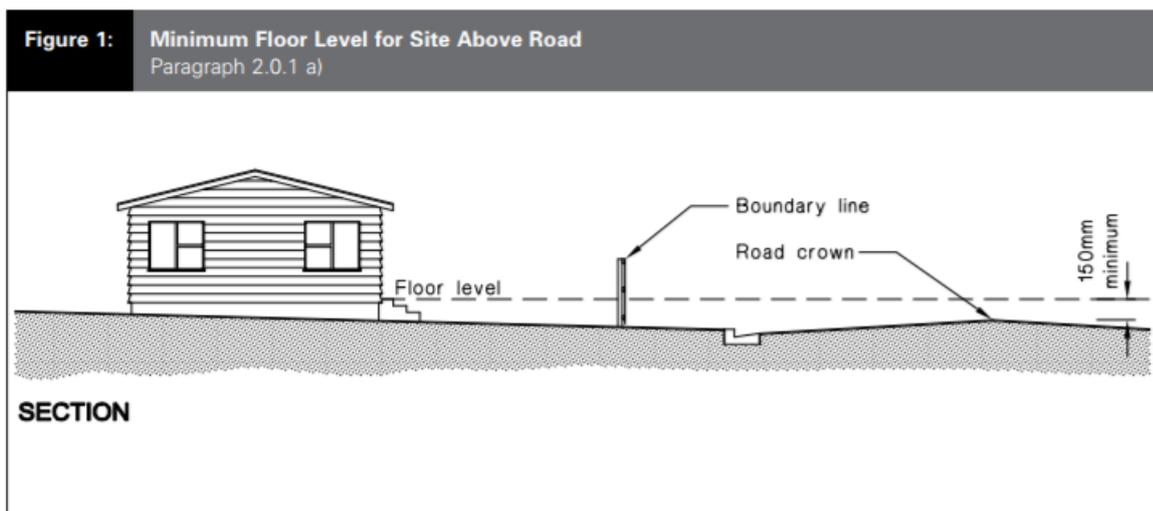


Figure 3

Essentially the roads act as temporary overflow ponding areas in the event of exceptional rain events and/or occasional blockage of mud tanks.

Stormwater management on individual house sites is addressed at building consent stage. Our analysis has demonstrated that all sites will be able to deal with stormwater from residential and commercial buildings by way of ground soakage. Carparks and access driveways within the hospitality centre will use the same Caldwell” and silt / debris trap stormwater treatment devices as proposed for roads.

In conclusion:

- (a) All stormwater can be managed on site through ground soakage.
- (b) Ground soakage is the best practice method of managing stormwater on this property.
- (c) Appropriate treatment devices are put in place for road stormwater catchpits.
- (d) Soakage will follow the standard CODC method and engineering standards.
- (e) No district consents are required.
- (f) Managed in the way proposed, the stormwater effects of this development will be less than minor.
- (g) This method of stormwater discharge does not trigger any regional consents under the Regional Plan: Water.

## **4. Wastewater**

A Wastewater Impact Assessment has been commissioned by Council from Mott MacDonald NZ Ltd, see **Appendix (C)**.

The assessment outlines various options for connection to the existing network. The option chosen is for the initial stages of the development (up to 130 lots) to connect by gravity to the existing Scott Terrace pump station and for the balance of the development to be serviced by pumping into the Lowburn sewer rising main intersecting to the site, which will need to be re-routed through the site. Central Otago District Council's 3-Waters Department has agreed with these options.

The specific location of the sewer pump station and route of the relocation of the Lowburn rising main will be determined at the subsequent detailed engineering design and approval stage under NZS 4404:2004 (Council's Subdivision and Land Development Code of Practice). The proposed design detail route and location is shown on the attached infrastructure plans.

The pump station will be designed in accordance with Section 5.3.10 of CODC's addendum to NZS4404:2204, dated July 2008. This requires 24 hours of average dry weather flow.

## **5. Water Supply**

### **5.1 Irrigation**

From the Otago Regional Council's "grow Otago" data base:

- (a) "Dry summer rainfall" is 61-80mm for Cromwell
- (b) "Median potential evapotranspiration" (Jan-Feb) is 211-215mm

Irrigation will therefore be essential to establish and maintain all public and private landscaping within the development. This is particularly so given the very low Plant Available Water (PAW) of the site, due to its light sandy/gravelly soils.

The Council's preferred option is that public space irrigation be supplied from a bore, rather than the town reticulation.

The Wooing Tree has an existing bore on the site which is used to irrigate and frost fight the vineyard. Given that there is to be a substantial reduction in the amount of land under vines, there is the possibility of using the "surplus" water for public space irrigation. However, at this stage there is no

intent to provide bulk water supply for irrigation. If this opportunity is pursued it would be subject to a separate consent application to the Otago Regional Council, fully independent of this application. Any irrigation system will connect to the public water supply network.

Peak irrigation requirements for lawn and garden irrigation within private allotments will typically be in the order of 0.1-0.3m<sup>3</sup>/day (Jan-Feb) with a metered supply. Experience in Central Otago (Cromwell/Clyde/Alexandra) is that this can only practicably be met out of the town reticulation. The demand factors considered in the below analysis factor in a suitable domestic irrigation allowance. Storage and recycling of roof run off is not a particularly viable option, because of the very low and irregular rainfall (401mm-450mm/year). An on-site storage reserve in the order of 20-30m<sup>3</sup> would be required to get through the Jan/Feb peak irrigation period. Given the size of the proposed lots, provision of this amount of storage within the lots is not practical.

## 5.2 Domestic and Firefighting

A Water Impact Assessment has been commissioned by Council from Mott MacDonald NZ Ltd, see **Appendix (C)**. Computer Modelling of the Cromwell reticulation shows that the site can be adequately serviced, without adversely impacting on the existing reticulation.

The development will connect to the existing 300m Council main within the site, which will require relocation, and to the existing 200mm Council main in Roberts Drive. The route of the relocation will be determined at the subsequent detailed engineering design and approval stage under NZS 4404:2004. The proposed alignment is shown on the attached infrastructure plans. A supply to SNZ PAS 4509:2008 FW2 Standard for the residential development is possible. A 200m through main will be required to furnish a FW3 supply to the proposed commercial area. Further detailed modelling when the exact configuration of the buildings (ie size of the fire cells) is known will be required to confirm that an FW3 standard can be supplied to the proposed commercial area.

A supply standard of greater than FW3 to the commercial area is unlikely to be possible, but this applies to all of the existing commercial and industrial precincts in Cromwell.

## 6. Network Utility Services

### 6.1 Telecommunications

Chorus New Zealand Ltd have confirmed that a suitable fibre reticulation can be supplied to the proposed development. See **Appendix (E)**.

Individual home owners will also have the alternative option of the cellular network and several wi-fi providers for their telecommunications and computer media service

### 6.2 Electricity

Power Net have confirmed that a suitable power supply can be made available to service development of the site. This will be an “embedded” network owned by Power Net, connected to an Aurora Energy Ltd point of supply. See **Appendix (F)**

### 6.3 Underground services

All services are “underground”. There is no above ground cabling of power or telecommunications.

## 7. Road Construction & Earthworks

No difficulty is expected in designing and constructing suitable road pavements within the site, in compliance with “Austroads” and the subdivision engineering pavement design standards of the Central Otago District Council. This report does not deal with the construction of the roundabout on State Highway 8A. This is subject to a separate design process in conjunction with NZTA.

All roads will be formed on sand and gravel with some very small pockets of silt anticipated. Laboratory Soaked California Bearing Ratio (CBR) tests were taken at the likely road subgrade at all test pits. See **Appendix (G)**. Soaked CBR’s varied from 10% - 55%, well above the normal minimum requirement of 7% for road pavement design in terms of the “Austroads” standard. One test pit showed a small pocket of silt with CBR of 0.5%. . Other small pockets of silt are expected to be encountered within the site. This can be dealt with by “bridging” with a subgrade improvement layer of compacted gravel.

Council’s current subdivisional roading engineering design standard is NZ 4404:2004 and its July 2008 amendments thereto. It is proposed that road typologies on any subsequent subdivision and development of the site will be in accordance with the updated version of this standard, being NZS 4404:2010. This updated version of the standard provides for a more innovative and flexible approach to road layout typologies, in accordance with the contemporary urban design concepts proposed for this development. To quote from the forward to NZS 4404:2010:

- Aims to encourage good urban design and remove road blocks to liveability and economic development in communities.
- Road design needs to allow ‘context’ or ‘place’ to be given significant emphasis, and to require roads to achieve safe (slower) operating speeds;
- Innovative subdivision has been discouraged to some extent under the 2004 version of NZS 4404.
- The review committee therefore challenged itself to produce a new Standard that:
  - Encourages sustainable and modern design;
  - Provides some certainty for designers and LAs; and
  - Prevents the outcomes that can arise when the sole focus is cost minimisation, and adherence to minimum standards.

and from the outcome statement

- This Standard provides local authorities, developers, and their professional advisors with standards for design and construction of land development and subdivision infrastructure. NZS 4404:2010 encourages sustainable development and modern design that emphasises liveability and environmental quality. It will also provide as much consistency as possible on

land development and subdivision infrastructure while still allowing flexibility for local variations to suit local circumstances.

It is noted that Council has granted consent (RC 190519) for a “Stage 1” subdivision of part of the site in compliance with the site’s current zoning. The consent provides for road typologies that are in accordance with NZS 4404:2010, not with Council’s July 2008 amendments to NZS 4404:2004. The approved typical sections are attached in **Appendix (D)** and these, or similar, will be used for these road servicing residential allotments in the balance of the development.

The site is basically flat, therefore no significant earthworks are anticipated for the development of the site, apart from the normal utility service trenching and roading. There may possibly be very minor areas of shallow fill which will be certified in accordance with NZS 4431:1989 “Earth fill for Residential Development”.

All earthworks for residential development are a permitted activity under the Operative Central Otago District Plan. The detailed design and management of earthworks is managed under the process of NZS 4404:2004. Proposed Plan Change 8 (Earthworks for Residential Development) to the Regional Plan: Water was notified by the Environmental Protection Agency on 6 July 2020 and takes immediate legal effect.

However proposed Rule 14.5.2.1 does not apply to this development because any discharge of sediment from the site cannot enter water. The reasons for this are:

- There will be no discharge of any sediment off the site as the site is flat and the materials are highly permeable gravel and sand.
- The nearest water body (Lake Dunstan) is 700m from the site and there is no overland flow path from the site to the lake.

The issue with earthworks on this site (and all other land development sites in Cromwell) is the control of dust discharge from the site, not sediment. This will be managed by the application of water by water cart and dragline pod spray irrigation.

## 8. Construction management

Normal ‘best practice’ construction management measures are put in place. This includes:

- (a) Erosion and sediment control measures. The site benefits from there being no stream or waterways traversing the site. Erosion and sediment control focuses largely on dust mitigation. This is achieved through:
  - undertaking the development in stages and therefore limiting the land area exposed to excavation work at any one time;
  - use of water spray jets and water carts for dust suppression;
  - use of dust suppression agents
  - construction of a trench adjacent to the northern properties to manage vibration;
  - management of truck movements for safety and amenity reasons. Trucks are required to enter the site from State Highway 8B via Shortcut Road. This reduces the impact on adjacent residential properties.

These measures have been tested and proven successful through the Stage 1 construction.

- (b) This consent proposes the development of a “Construction Management Plan” and a “Construction Traffic Management Plan”.

## **9. Conclusion**

Suitable provision can be made for roading, stormwater, wastewater, water supply and network utility services to the proposed development.

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## APPENDIX A

Location Plan of Test Pits / Test Pit Logs & Bore Log

## APPENDIX B

Soakage Tests, Infiltration Calculations & Rainfall Intensity Calculations

## APPENDIX C

Wastewater & Wastewater Impact Assessment

## APPENDIX D

Residential Roding Typologies

## APPENDIX E

Confirmation of Telecom Supply

## APPENDIX F

Confirmation of Power Supply

## APPENDIX G

### CBR TESTS